



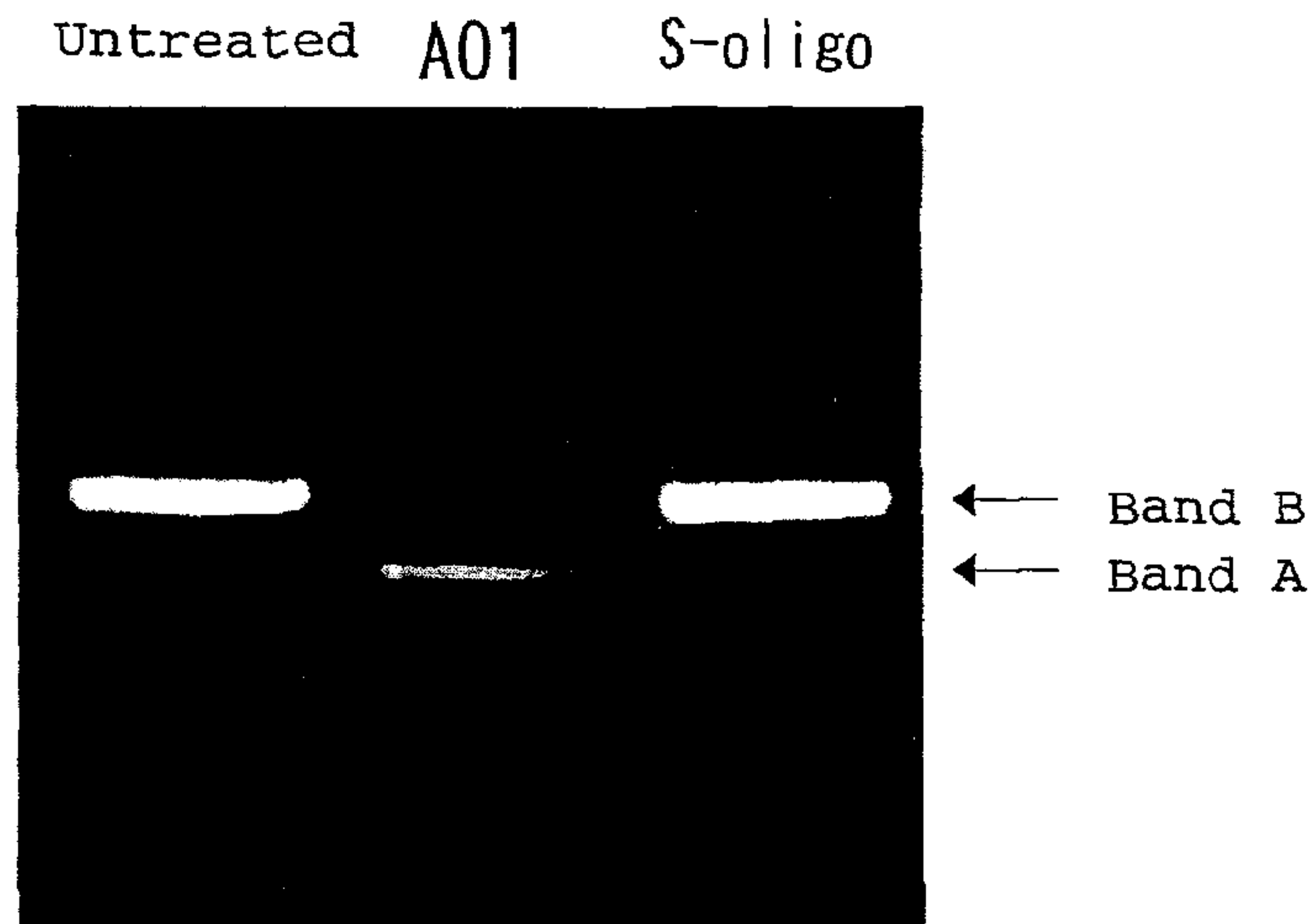
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C07H 21/04 (2006.01), *C12N 15/11* (2006.01)

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...

(54) Titre : PRODUITS PHARMACEUTIQUES A BASE D'ACIDE NUCLEIQUE ENA CAPABLES DE MODIFIER
L'EPISSAGE DE PRECURSEURS D'ARNm
(54) Title: ENA NUCLEIC ACID PHARMACEUTICALS CAPABLE OF MODIFYING SPLICING OF mRNA PRECURSORS



(57) **Abrégé/Abstract:**

Oligonucleotides having a nucleotide sequence complementary to nucleotide numbers such as 2571-2607, 2578-2592, 2571-2592, 2573-2592, 2578-2596, 2578-2601 or 2575-2592 of the dystrophin cDNA (Gene Bank accession No. NM_004006.1) and therapeutic agents for muscular dystrophy comprising such oligonucleotides.

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(74) Agent: SMART & BIGGAR

ABSTRACT

Oligonucleotides having a nucleotide sequence complementary to nucleotide numbers such as 2571-2607, 2578-2592, 2571-2592, 2573-2592, 2578-2596, 2578-2601 or
5 2575-2592 of the dystrophin cDNA (Gene Bank accession No. NM_004006.1) and therapeutic agents for muscular dystrophy comprising such oligonucleotides.

DEMANDES OU BREVETS VOLUMINEUX

**LA PRÉSENTE PARTIE DE CETTE DEMANDE OU CE BREVETS
COMPREND PLUS D'UN TOME.**

CECI EST LE TOME __1__ DE __2__

NOTE: Pour les tomes additionels, veuillez contacter le Bureau Canadien des Brevets.

JUMBO APPLICATIONS / PATENTS

**THIS SECTION OF THE APPLICATION / PATENT CONTAINS MORE
THAN ONE VOLUME.**

THIS IS VOLUME __1__ OF __2__

NOTE: For additional volumes please contact the Canadian Patent Office.

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DESCRIPTION

ENA NUCLEIC ACID PHARMACEUTICALS
CAPABLE OF MODIFYING SPLICING OF mRNA PRECURSORS

This application is a division of Canadian Application Serial No. 2,796,924
5 (parent application), which is a division of Canadian Patent Serial No. 2,507,125, filed
November 21, 2003 (grand-parent patent).

It should be understood that the expression “the present invention” or the like
used in this specification encompasses not only the subject matter of this divisional
application, but that of the parent application and grand-parent patent also.

10 TECHNICAL FIELD

The present invention relates to ENA nucleic acid pharmaceuticals capable of
modifying splicing of mRNA precursors. More specifically, the present invention relates to
antisense oligonucleotide compounds to splicing enhancer sequences within exon 19, 41, 45,
46, 44, 50, 55, 51 or 53 of the dystrophin gene, as well as therapeutic agents for muscular
15 dystrophy comprising the compounds.

BACKGROUND ART

Muscular dystrophy, which is a genetic muscular disease, is roughly classified
into Duchenne muscular dystrophy (DMD) and Becker muscular dystrophy (BMD). DMD is
the most frequently occurring genetic muscular disease and occurs at a ratio of 1 per 3,500
20 male births. DMD patients show symptoms of weakening of muscles in their childhood;
thereafter, muscular atrophy progresses consistently and results in death at the age of around
20. Currently, there is no effective therapeutic for DMD. Development of therapeutics is
strongly demanded by DMD patients throughout the world. BMD in many cases occurs in
adulthood and most of the patients are capable of normal survival though slight weakening of
25 muscles is observed. Mutations of deletions in the dystrophin gene have been identified in 2/3
of DMD and BMD cases. The progress of clinical symptoms in DMD or BMD patients is
predictable depending on whether such deletions disrupt the translational reading frame of

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mRNA or maintain that reading frame (Monaco A.P. et al., Genomics 1988: 2:90-95).

Although molecular biological understanding of DMD has been thus deepened, no effective method for treating DMD has been established yet.

- When DMD patients have a frame shift mutation, dystrophin protein
- 5 disappears completely from patients' skeletal muscles. On the other hand, dystrophin protein is produced from in-frame mRNA in BMD patient-derived muscle tissues, though the protein is incomplete. As a method for treating DMD, there is known a method in which an out-frame mutation (the reading frame of amino acids is shifted) is converted to an in-frame

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mutation (the reading frame is maintained) by modifying dystrophin mRNA (Matsuo M., Brain Dev 1996; 18:167-172). Recently, it has been reported that the mdx mouse synthesized a deletion-containing dystrophin as a result of induction of exon skipping with an oligonucleotide complementary to the splicing consensus sequence of the dystrophin gene (Wilton S.D. et al., Neuromusc Disord 1999: 9:330-338; Mann C.J. et al., Proc Natl Acad Sci USA 2001: 98:42-47). In these studies, exon skipping is induced using as a target the splicing consensus sequence located on the border between two exons.

It is asserted that splicing is regulated by splicing enhancer sequences (SESs). In fact, it has been demonstrated that by disrupting the SES within exon 19 of the dystrophin gene with an antisense oligonucleotide complementary thereto, complete skipping of exon 19 occurs in normal lymphoblastoid cells (Takeshima Y. et al., J Clin Invest 1995: 95:515-520; Pramono Z.A. et al., Biochem Biophys Res Commun 1996: 226:445-449).

It has been also reported that by introducing an oligonucleotide complementary to the SES within exon 19 of the dystrophin gene to thereby induce exon skipping, a deletion-containing dystrophin was successfully produced in muscular cells derived from DMD patients carrying exon 20 deletion (Takeshima Y. et al., Brain & Development 2001: 23:788-790; Japanese Unexamined Patent Publication No. H11-140930; Japanese Unexamined Patent Publication No. 2002-10790). This indicates that repairing of the reading frame shift by inducing exon 19 skipping with an antisense oligonucleotide complementary to the SES within exon 19 of the dystrophin gene results in production of a dystrophin protein whose function is partially restored; and thus it is possible to change DMD to BMD. If it is possible to convert DMD, a severe myoatrophy, to slight BMD, prolonging patients' lives can be expected.

At present, oligonucleotide analogues having stable and excellent antisense activity are being developed (Japanese Unexamined Patent Publication No. 2000-297097).

It is an object of the present invention to provide therapeutics with broader applicable range and higher efficacy, by improving antisense oligonucleotides to the SES within exon 19, 41, 45, 46, 44, 50, 55, 51 or 53 of the dystrophin gene.

30 DISCLOSURE OF THE INVENTION

As a result of extensive and intensive researches toward the achievement of the above-described object, the present inventors have succeeded in designing and synthesizing

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those nucleotide sequences and antisense oligonucleotide compounds which have higher exon skipping effect on exon 19, 41, 45, 46, 44, 50, 55, 51 or 53 of the dystrophin gene. Thus, the present invention has been achieved.

The present invention may be summarized as follows.

5 [1] An oligonucleotide having the nucleotide sequence as shown in any one of SEQ ID NOS: 2-6, 10-22, 30-78, 87 or 88 in the SEQUENCE LISTING, or a pharmacologically acceptable salt thereof.

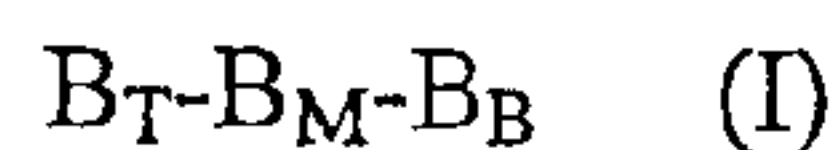
[2] The oligonucleotide of [1] above or a pharmacologically acceptable salt thereof, wherein at least one of the sugars and/or the phosphates constituting the oligonucleotide is
10 modified.

[3] The oligonucleotide of [2] above or a pharmacologically acceptable salt thereof, wherein the sugar constituting the oligonucleotide is D-ribofuranose and the modification of the sugar is modification of the hydroxyl group at position 2' of D-ribofuranose.

[4] The oligonucleotide of [3] above or a pharmacologically acceptable salt thereof, wherein the modification of the sugar is 2'-O-alkylation and/or 2'-O,4'-C-alkylenation of
15 the D-ribofuranose.

[5] The oligonucleotide of [2] above or a pharmacologically acceptable salt thereof, wherein the modification of the phosphate is thioation of the phosphate group.

[6] A compound represented by the following general formula (I) or a pharmacologically
20 acceptable salt thereof:



where B_T is a group represented by any one of the following (1a) to (1k):

(1a)HO-,

(1b)HO-Bt-,

25 (1c)HO-Bc-Bt-,

(1d)HO-Bg-Bc-Bt-,

(1e)HO-Ba-Bg-Bc-Bt-,

(1f)HO-Bg-Ba-Bg-Bc-Bt-,

(1g)HO-Bt-Bg-Ba-Bg-Bc-Bt-,

30 (1h)HO-Bc-Bt-Bg-Ba-Bg-Bc-Bt-,

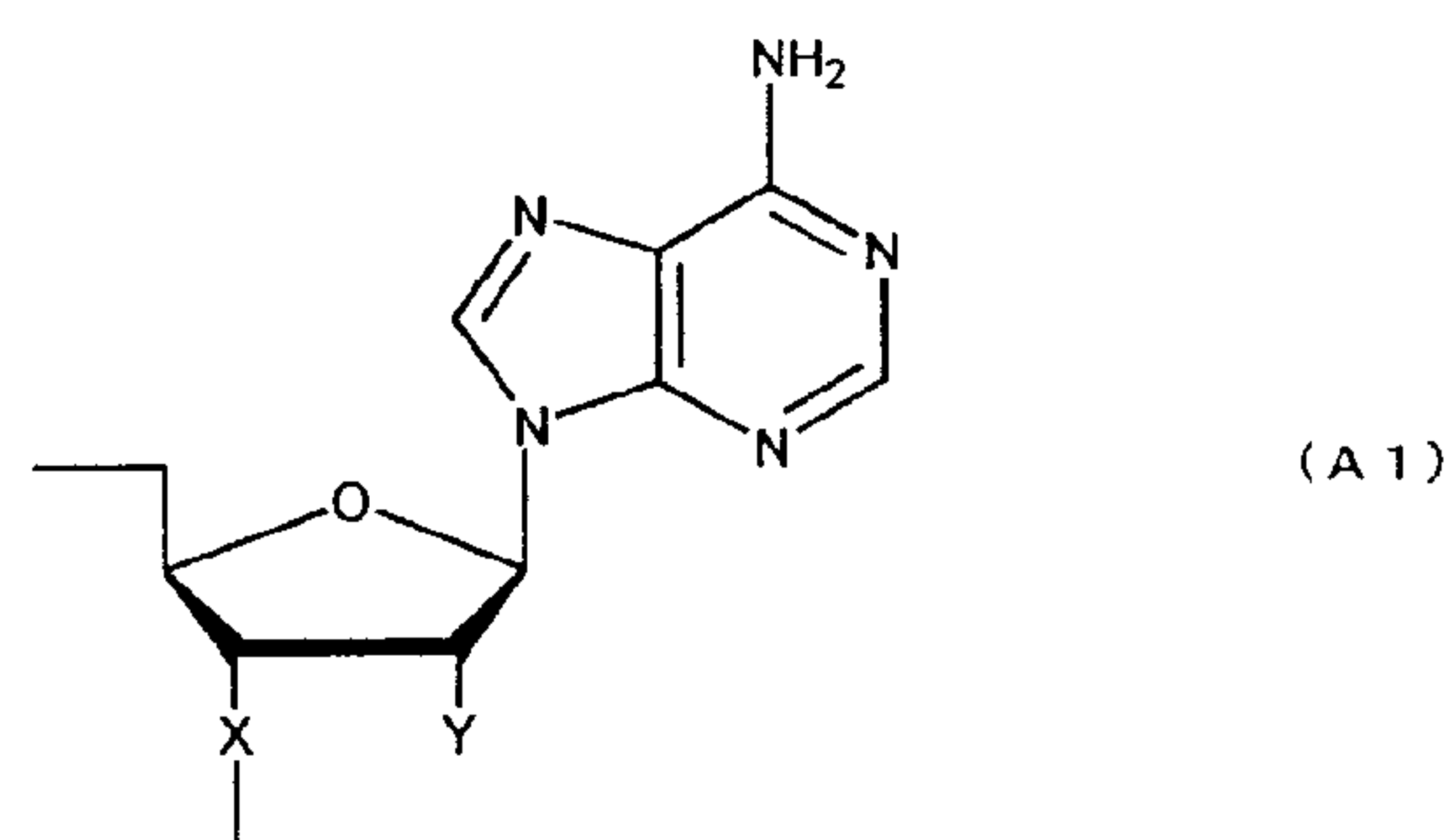
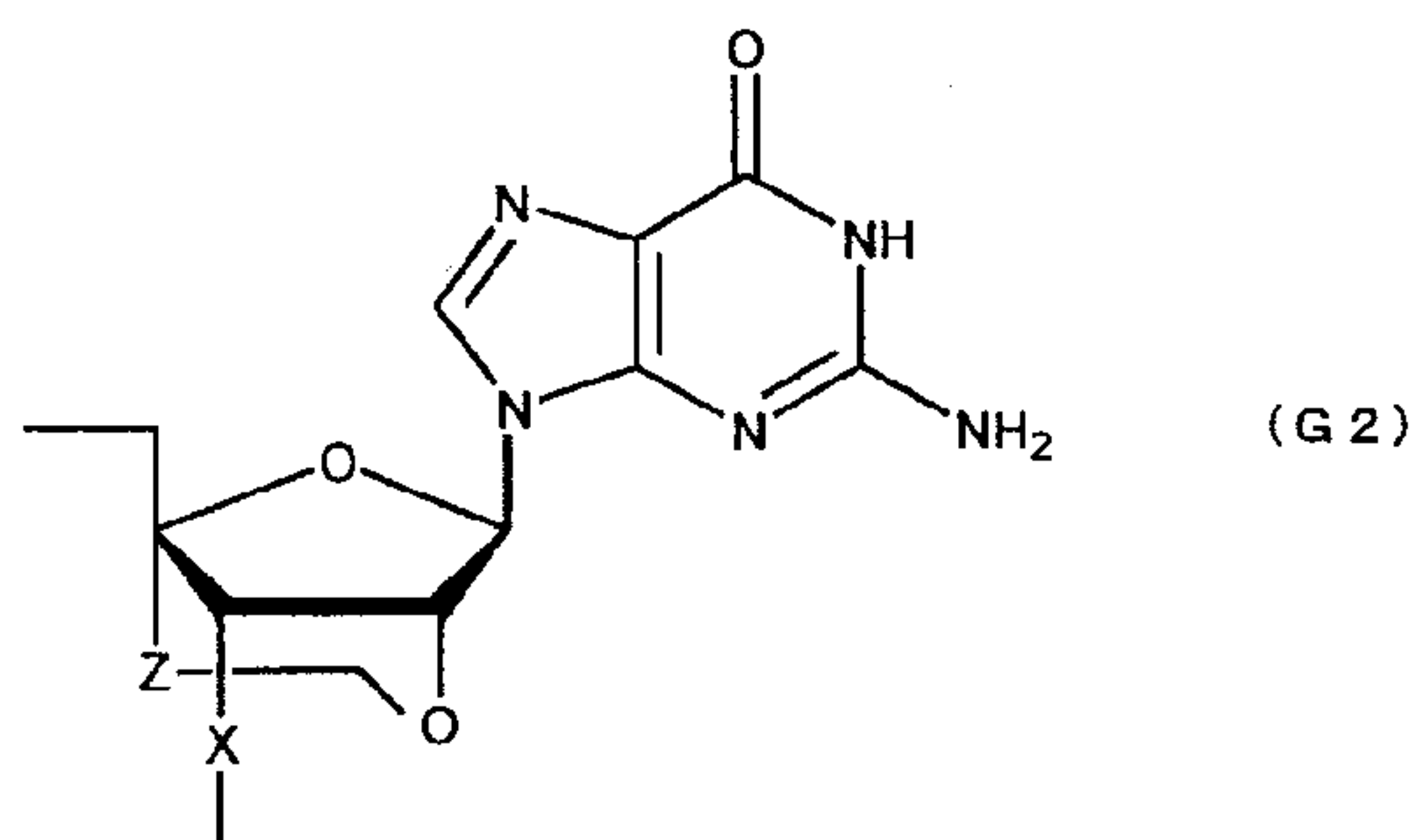
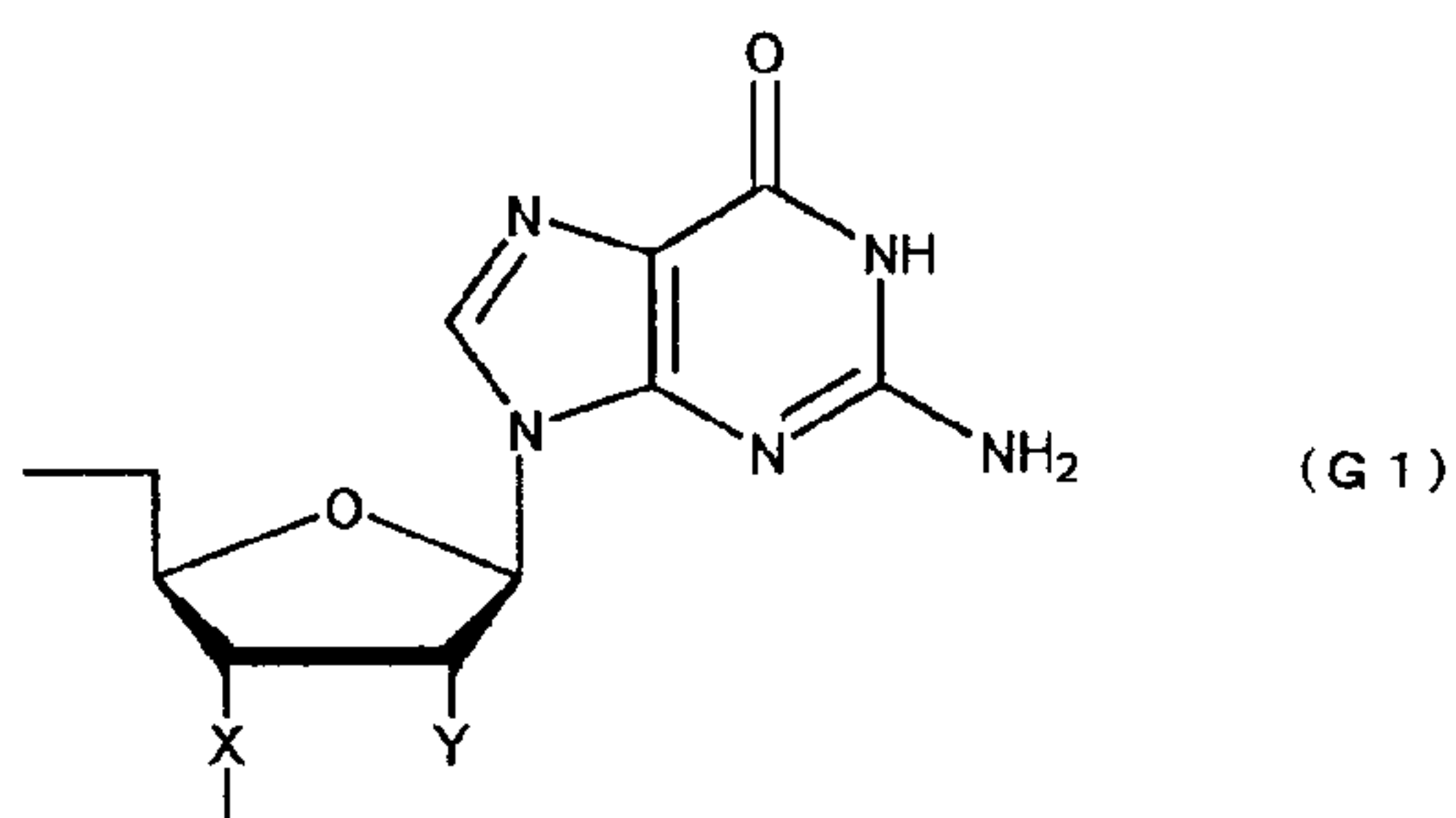
(1j)HO-Bc-Bc-Bt-Bg-Ba-Bg-Bc-Bt-, or

(1k)HO-Bg-Bc-Bc-Bt-Bg-Ba-Bg-Bc-Bt-;

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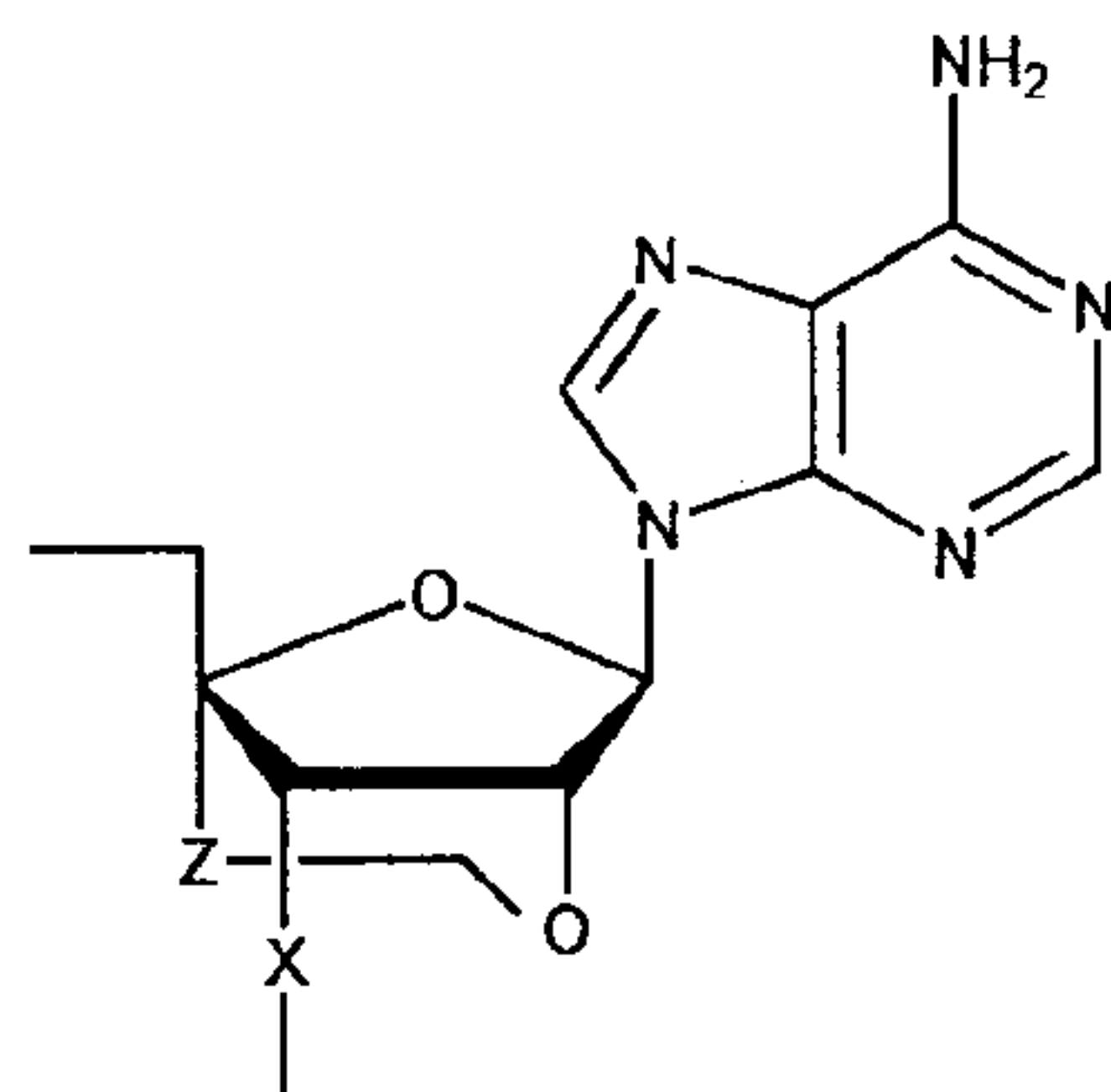
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

5

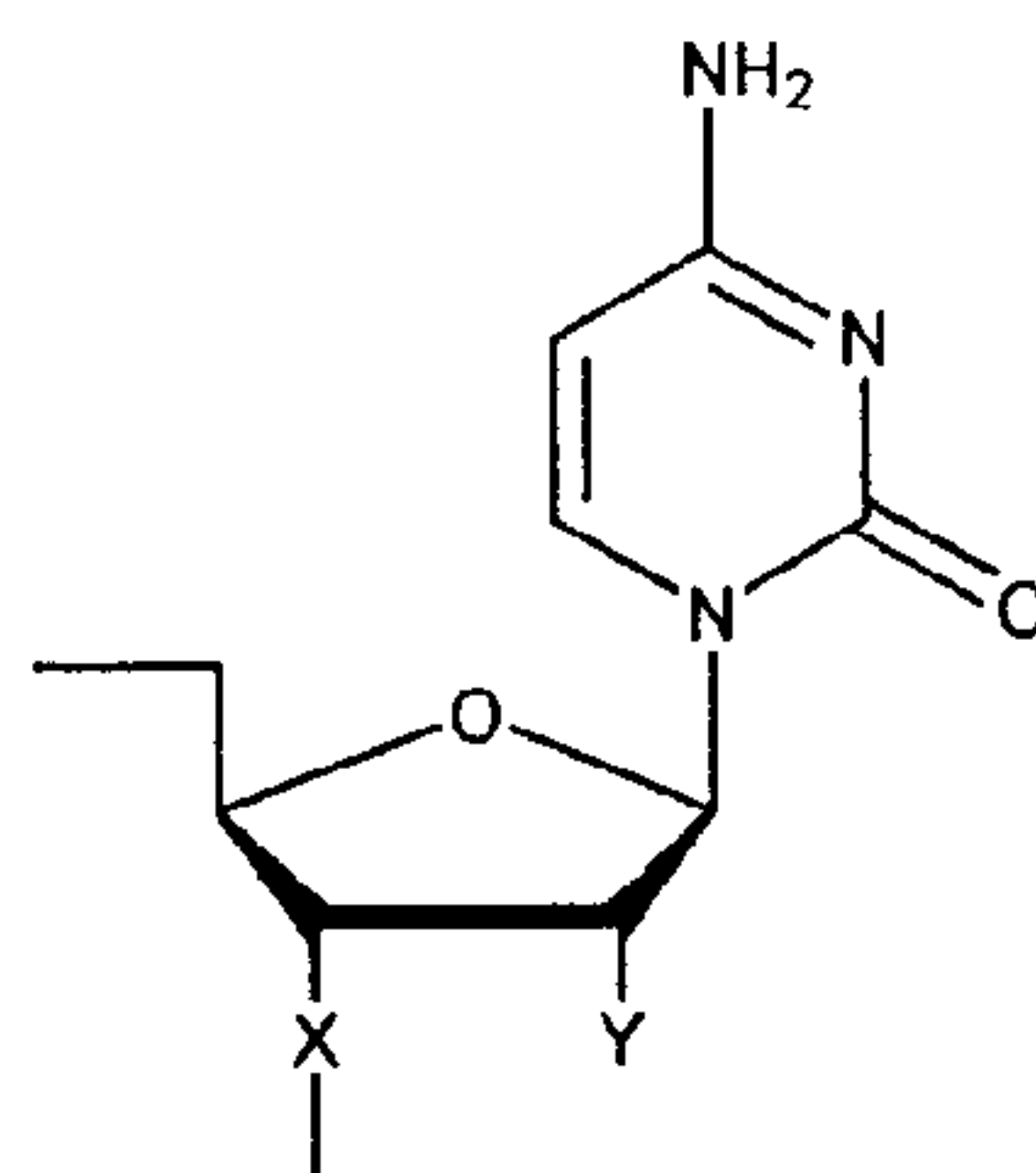


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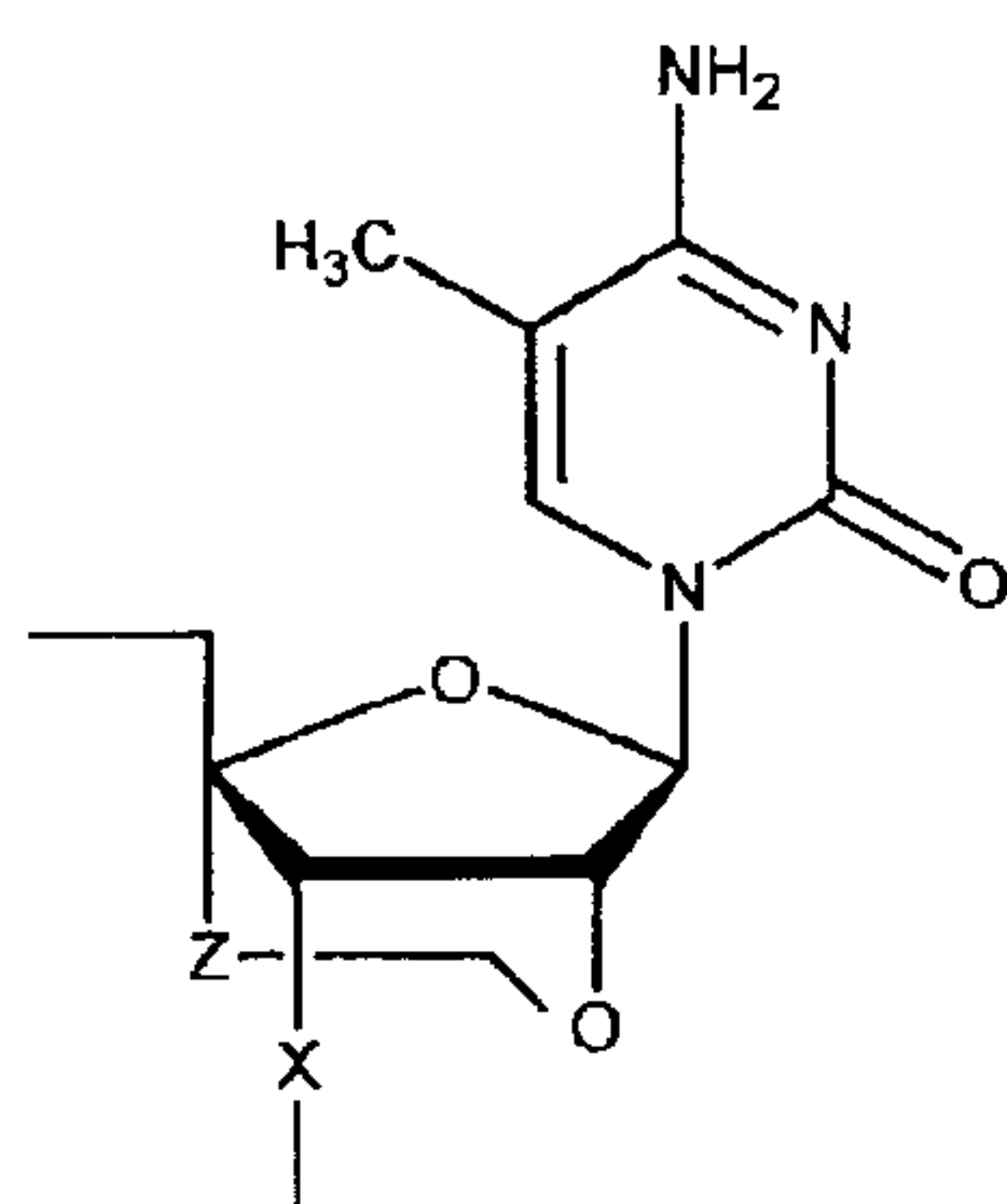
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(A 2)

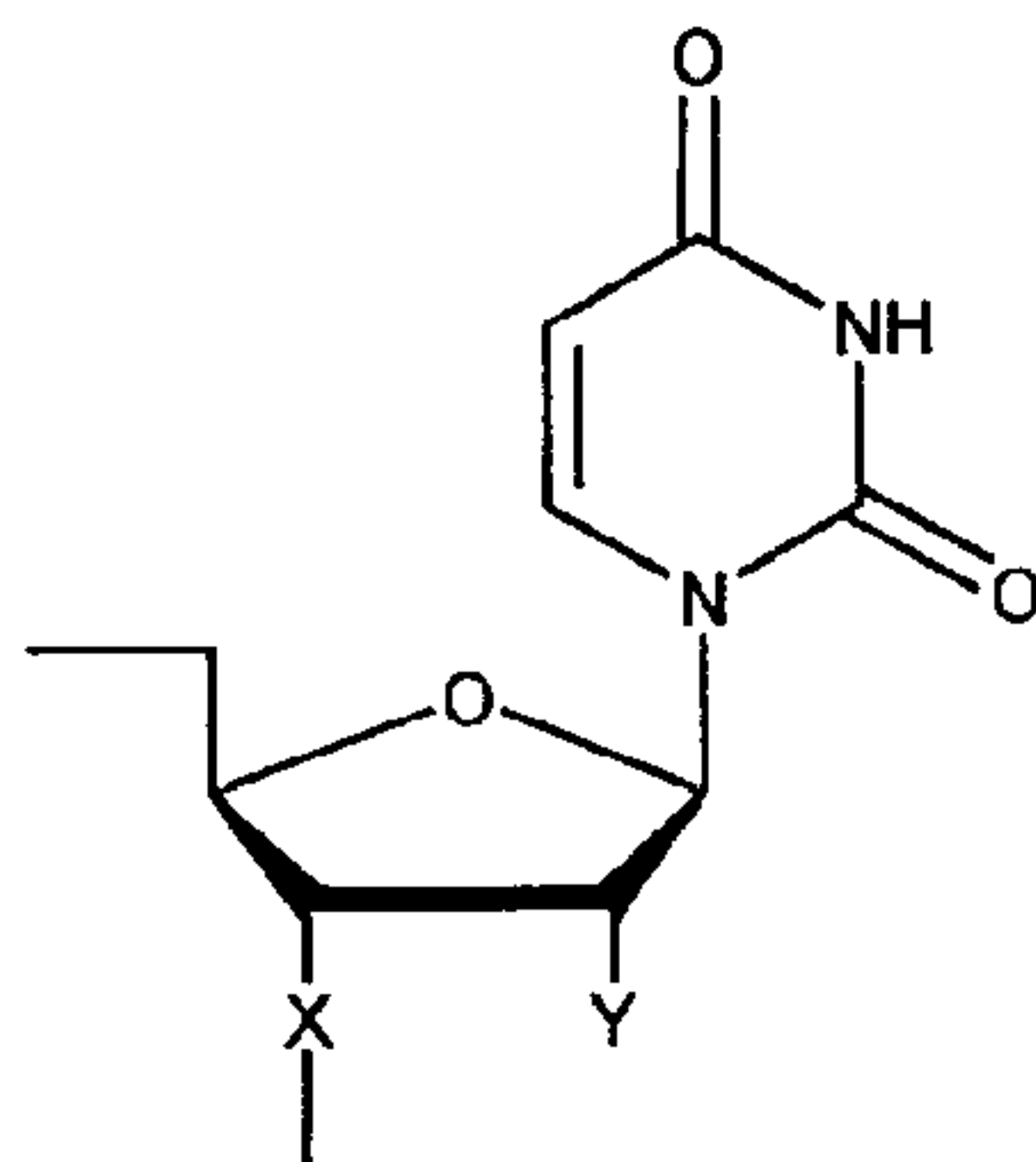


(C 1)

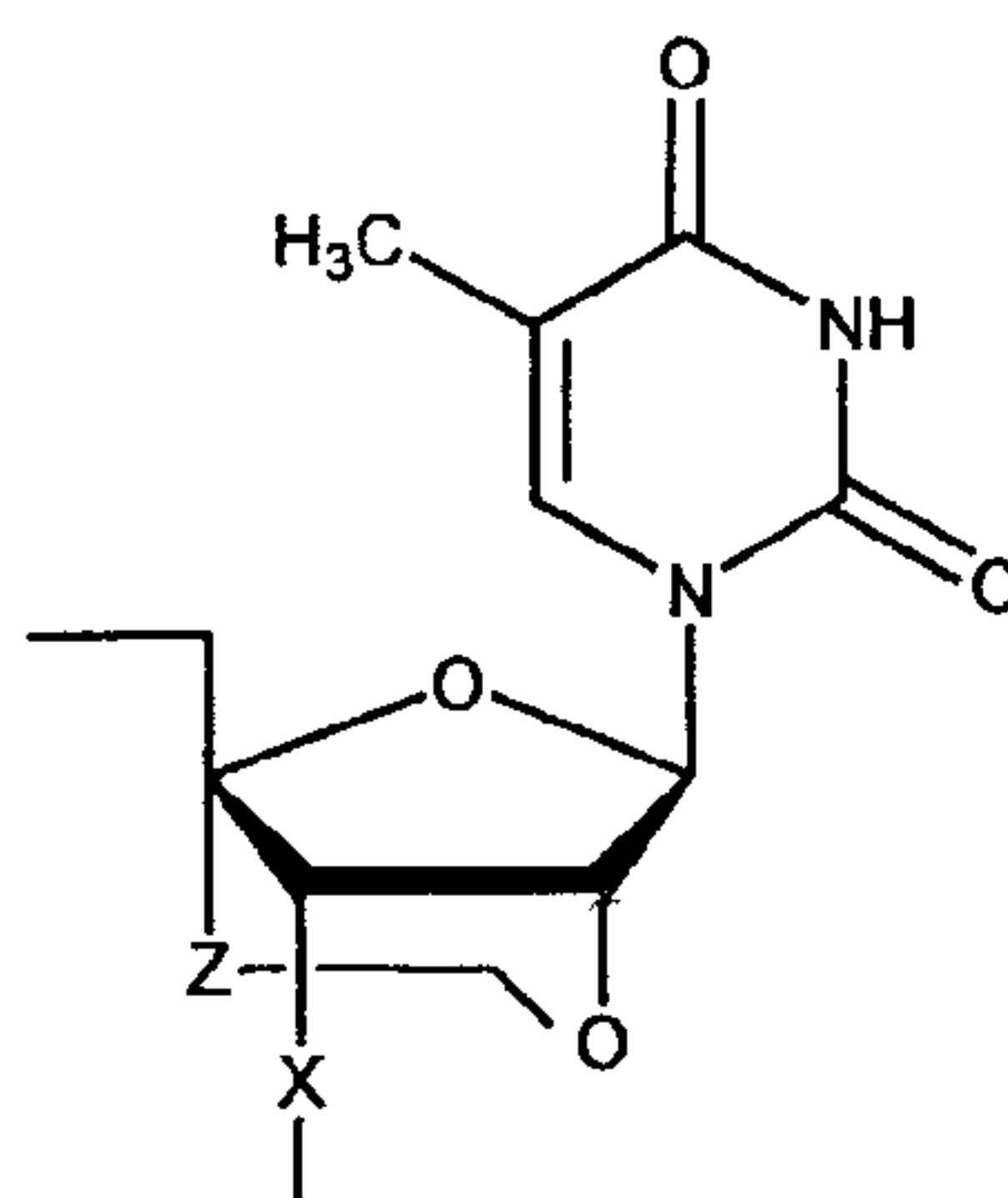


(C 2)

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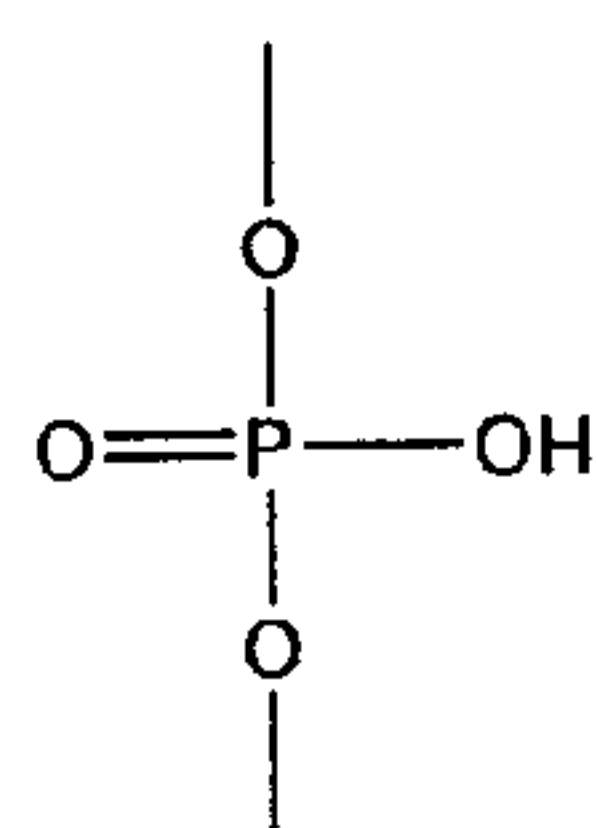


(U 1)

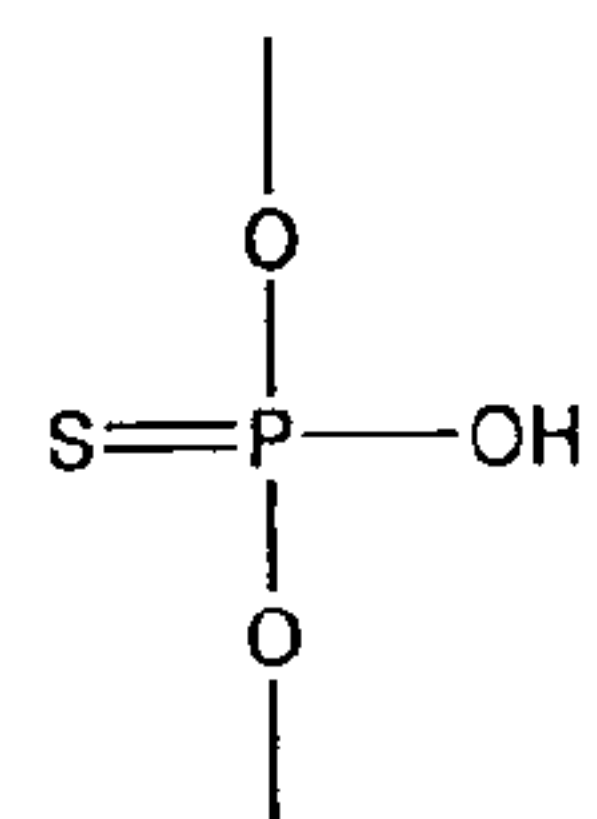


(T 2)

- 5 where X is individually and independently a group represented by the following formula (X1) or (X2):



(X 1)



(X 2)

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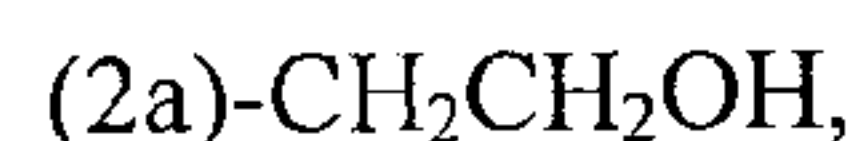
Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

5 B_M is a group represented by the following formula (2):



where B_g , B_a , B_t and B_c are as defined above;

B_B is a group represented by any one of the following (2a) to (2h):



10 (2b)- $B_t-CH_2CH_2OH$,



15 (2g)- $B_t-B_g-B_c-B_a-B_g-B_t-CH_2CH_2OH$, or



where B_g , B_a , B_t and B_c are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (I) has 2'-O,4'-C-alkylene group.

20 [7] The compound according to claim 6 which is selected from the group consisting of the following compounds (i) to (vi), or a pharmacologically acceptable salt thereof:

(i) a compound where B_T is a group represented by (1k) and B_B is a group represented by (2h),

(ii) a compound where B_T is a group represented by (1a) and B_B is a group represented by

25 (2a),

(iii) a compound where B_T is a group represented by (1a) and B_B is a group represented by (2h),

(iv) a compound where B_T is a group represented by (1e) and B_B is a group represented by (2a),

30 (v) a compound where B_T is a group represented by (1k) and B_B is a group represented by (2a),

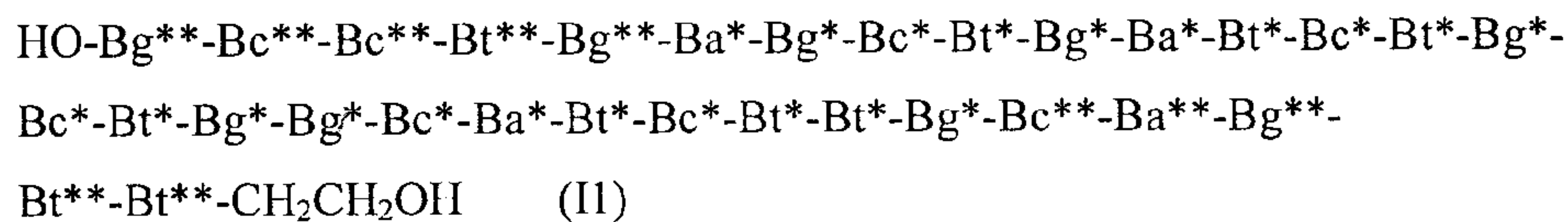
(vi) a compound where B_T is a group represented by (1a) and B_B is a group represented by

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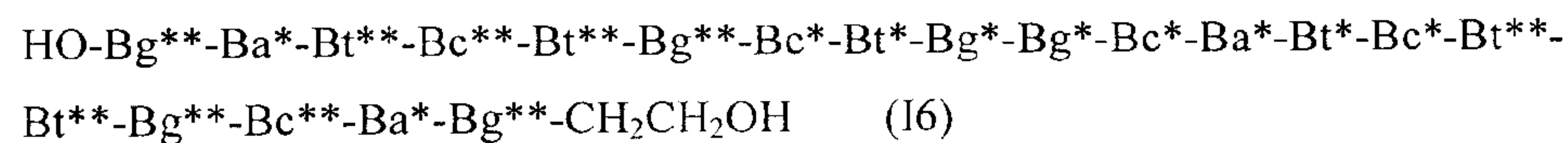
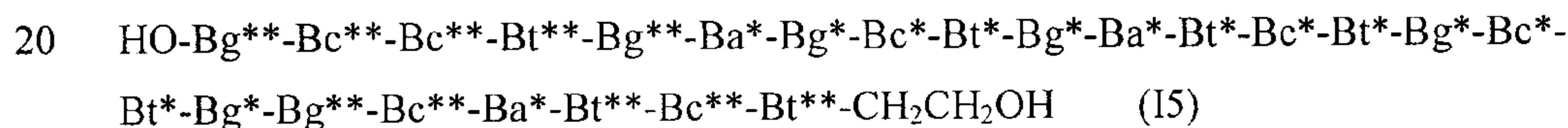
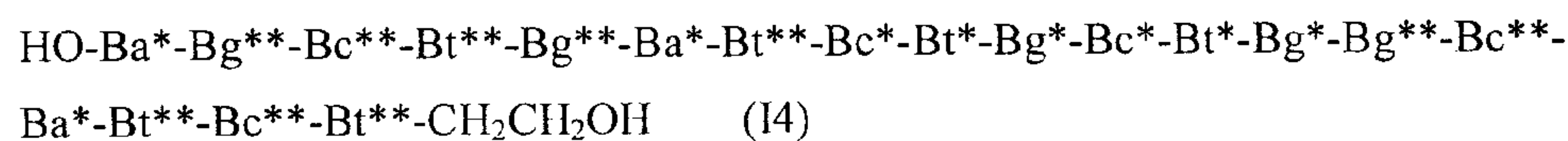
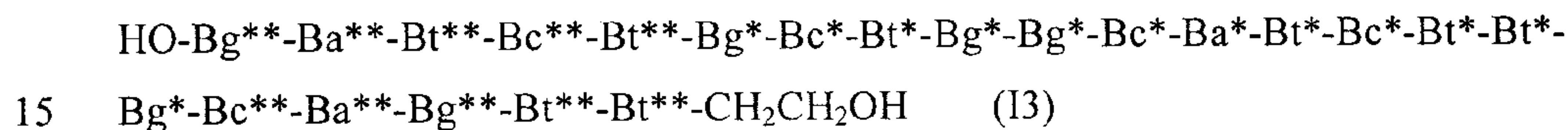
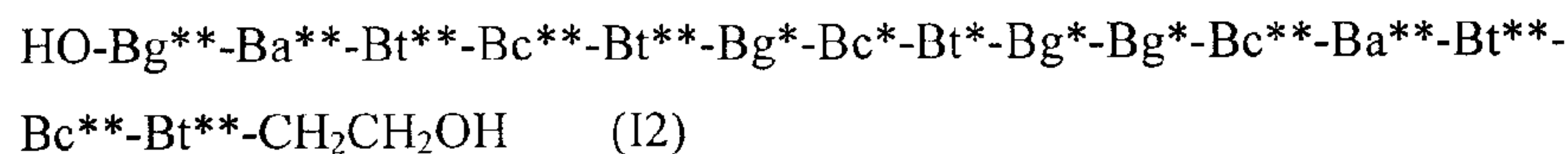
(2f), and

(vii) a compound where B_T is a group represented by (1a) and B_B is a group represented by (2d).

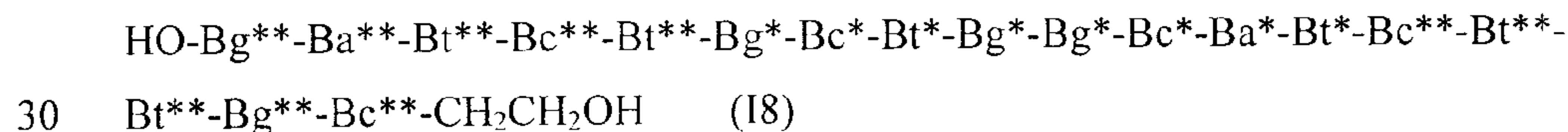
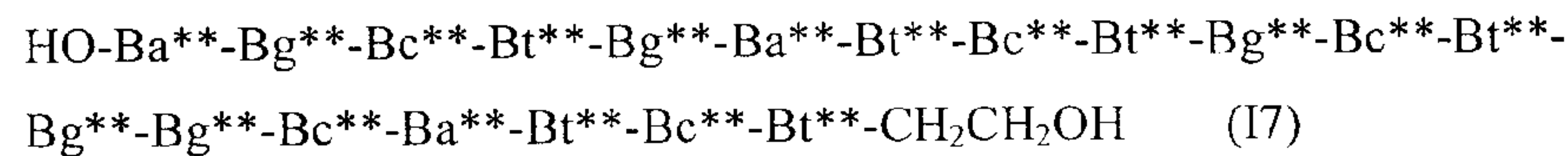
[8] The compound of [6] above which is selected from the group consisting of the
5 following compounds (I1) to (I7), or a pharmacologically acceptable salt thereof:



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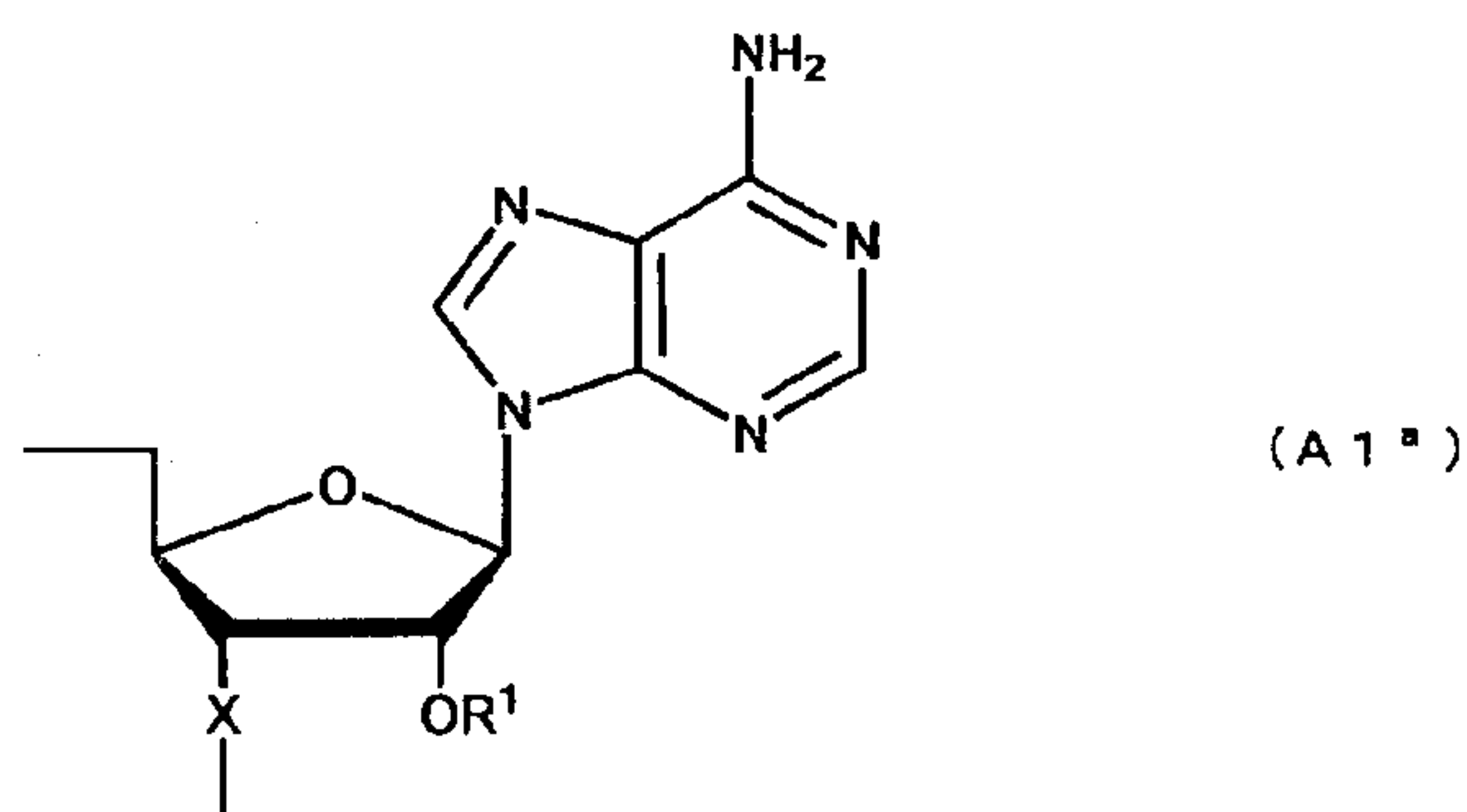
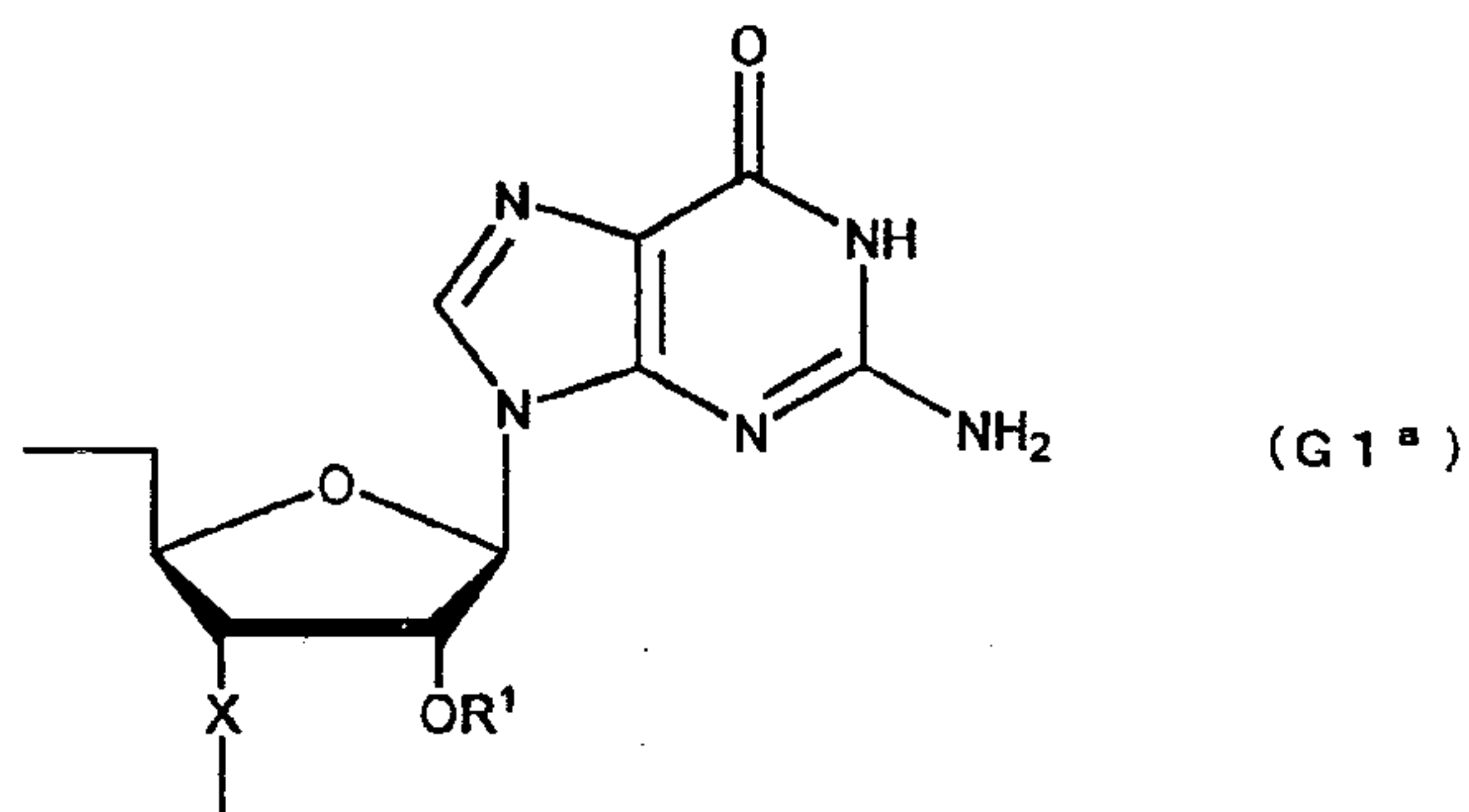
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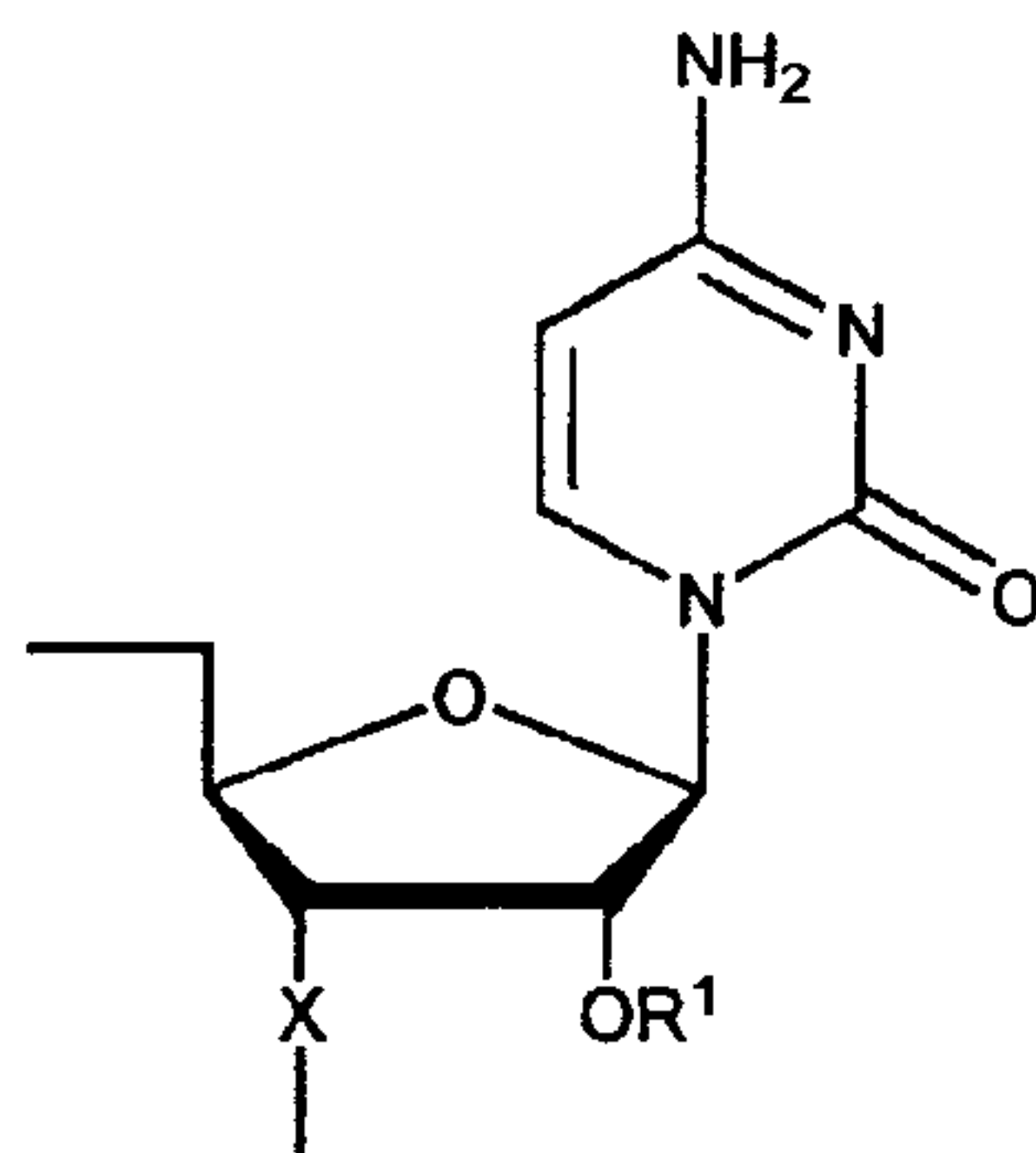
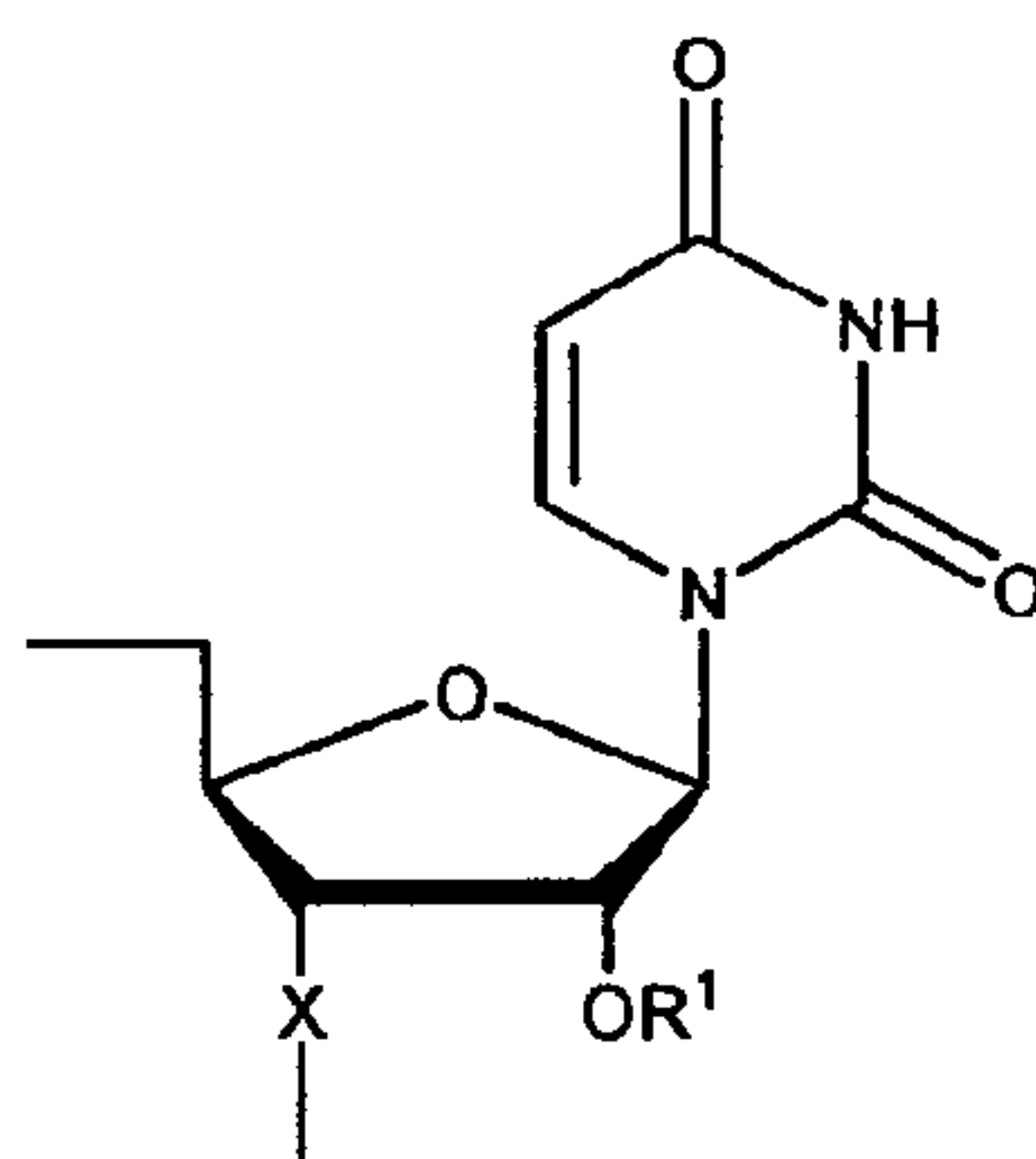


where Bg* is a group represented by the following formula (G1^a), Ba* is a group represented by the following formula (A1^a); Bc* is a group represented by the following
 5 formula (C1^a); Bt* is a group represented by the following formula (U1^a); Bg** is a group represented by formula (G2); Ba** is a group represented by formula (A2); Bc** is a group represented by formula (C2); and Bt** is a group represented by formula (T2):



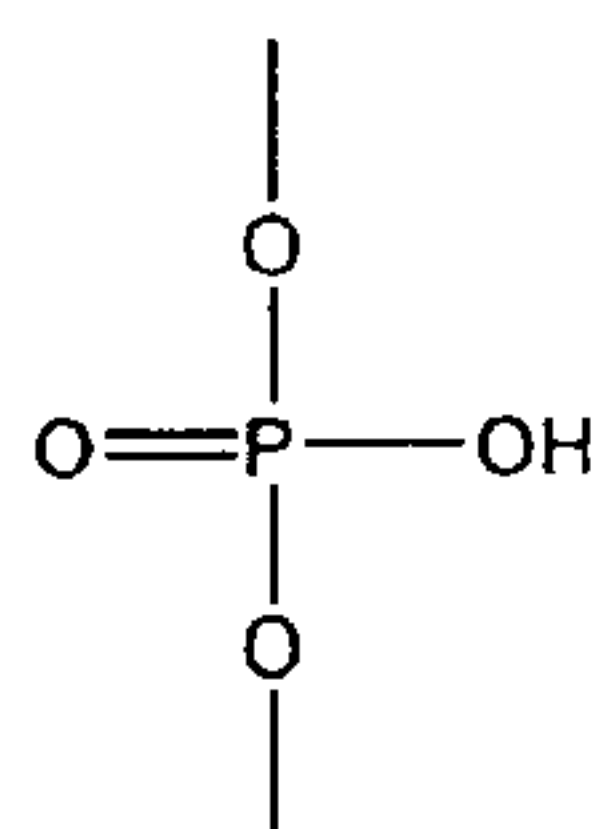
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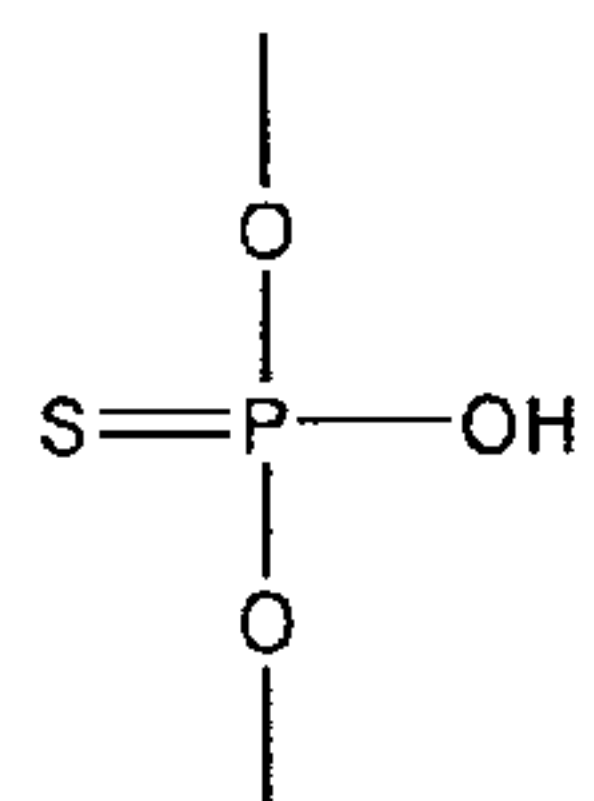
(C 1^a)(U 1^a)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



(X 2)

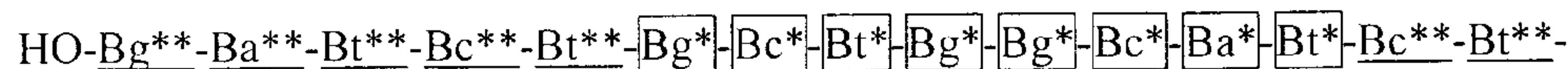
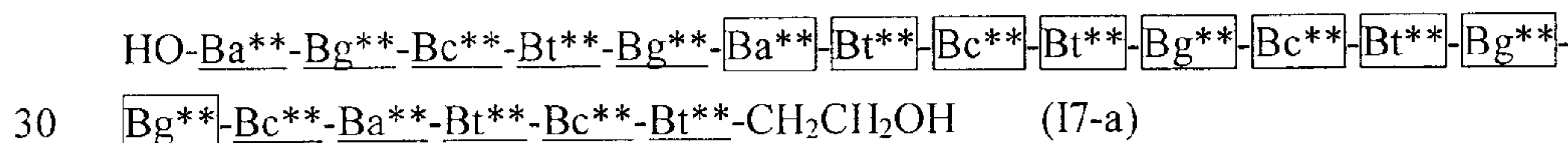
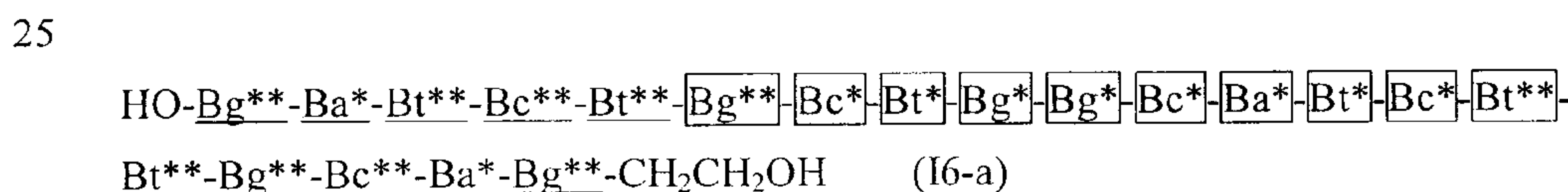
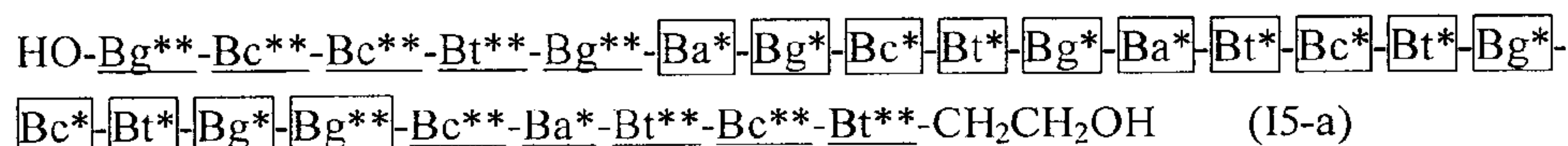
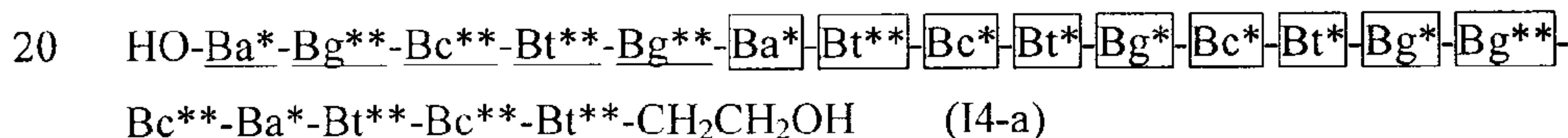
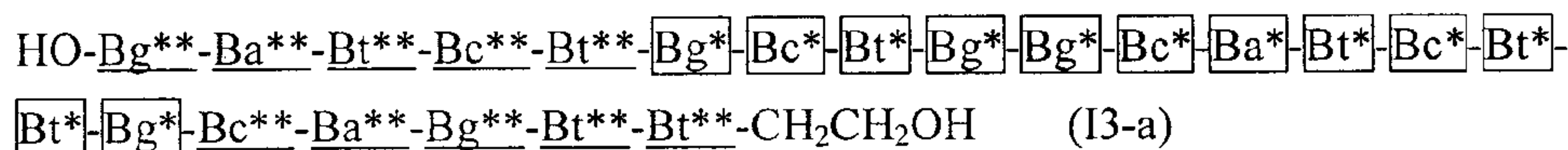
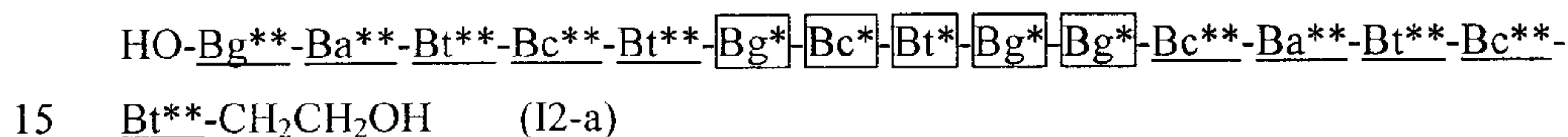
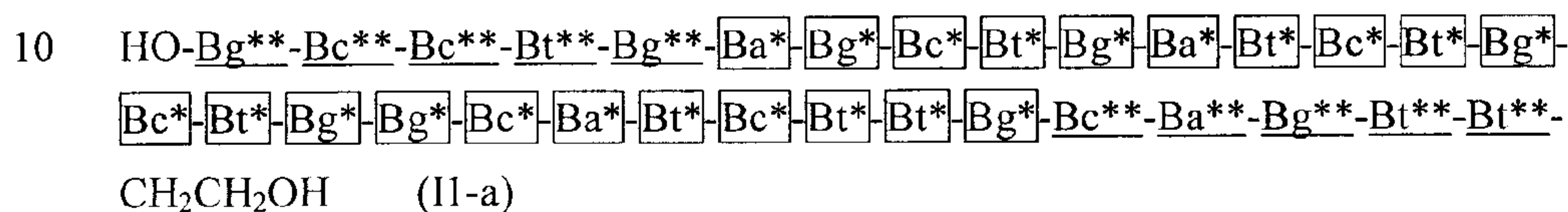
and R¹ is individually and independently an alkyl group with 1-6 carbon atoms.)

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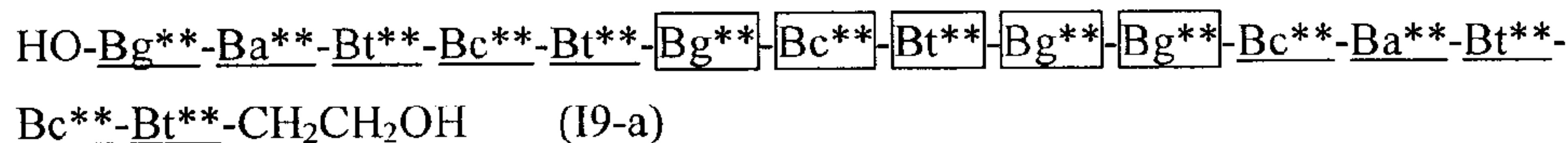
[9] The compound of [8] above where X in formulas (G1^a), (A1^a), (C1^a) and (U1^a) is a group represented by formula (X2) and X in formulas (G2), (A2), (C2) and (T2) is a group represented by formula (X1), or a pharmacologically acceptable salt thereof.

[10] The compound of [8] above where X in all the formulas (G1^a), (A1^a), (C1^a), (U1^a), (G2), (A2), (C2) and (T2) is a group represented by formula (X2), or a pharmacologically acceptable salt thereof.

[11] The compound of [8] above which is represented by any one of the following formulas (I1-a), (I2-a), (I3-a), (I4-a), (I5-a), (I6-a), (I7-a), (I8-a) and (I9-a), or a pharmacologically acceptable salt thereof:



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where Bg* is a group represented by formula (G1^a); Ba* is a group represented by formula (A1^a); Bc* is a group represented by formula (C1^a); Bt* is a group represented by formula (U1^a); Bg** is a group represented by formula (G2); Ba** is a group represented by formula (A2); Bc** is a group represented by formula (C2); Bt** is a group represented by formula (T2); and in individual formulas, at least one of Bg*, Ba*, Bc*, Bt*, Bg**, Ba**, Bc** and Bt** has a group represented by formula (X2) as X and all of $\boxed{\text{Bg}^*}$, $\boxed{\text{Ba}^*}$, $\boxed{\text{Bc}^*}$, $\boxed{\text{Bt}^*}$, $\boxed{\text{Bg}^{**}}$, $\boxed{\text{Ba}^{**}}$, $\boxed{\text{Bc}^{**}}$ and $\boxed{\text{Bt}^{**}}$ have a group represented by (X1) as X.

[12] The compound of any one of [6] to [11] above where Y in formulas (G1), (A1), (C1) and (U1) is a methoxy group and Z in formulas (G2), (A2), (C2) and (T2) is an ethylene group, or a pharmacologically acceptable salt thereof.

[13] A compound represented by the following general formula (I') or a pharmacologically acceptable salt thereof:



where B_{T'1} is a group represented by any one of the following (1a') to (1o'):

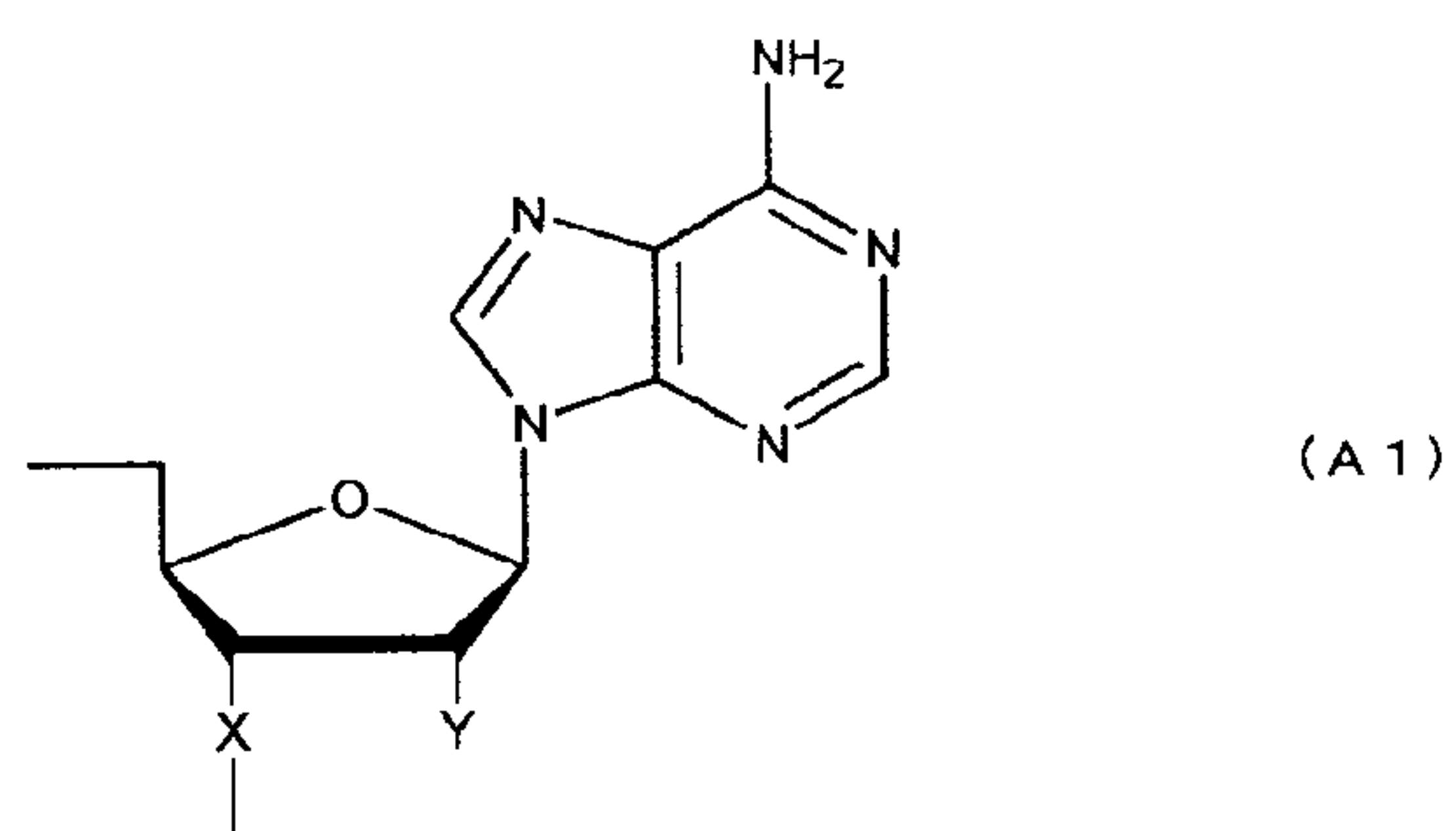
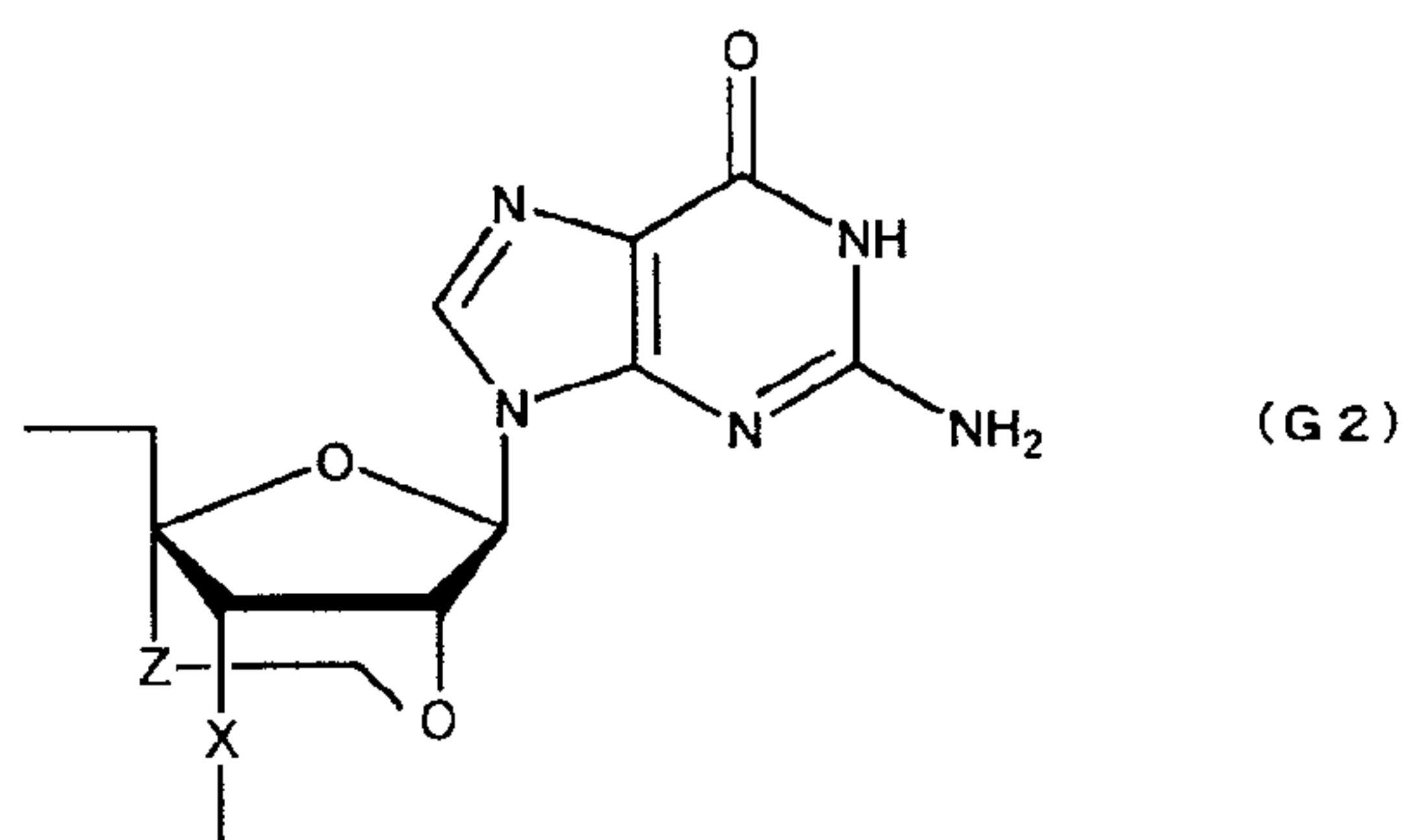
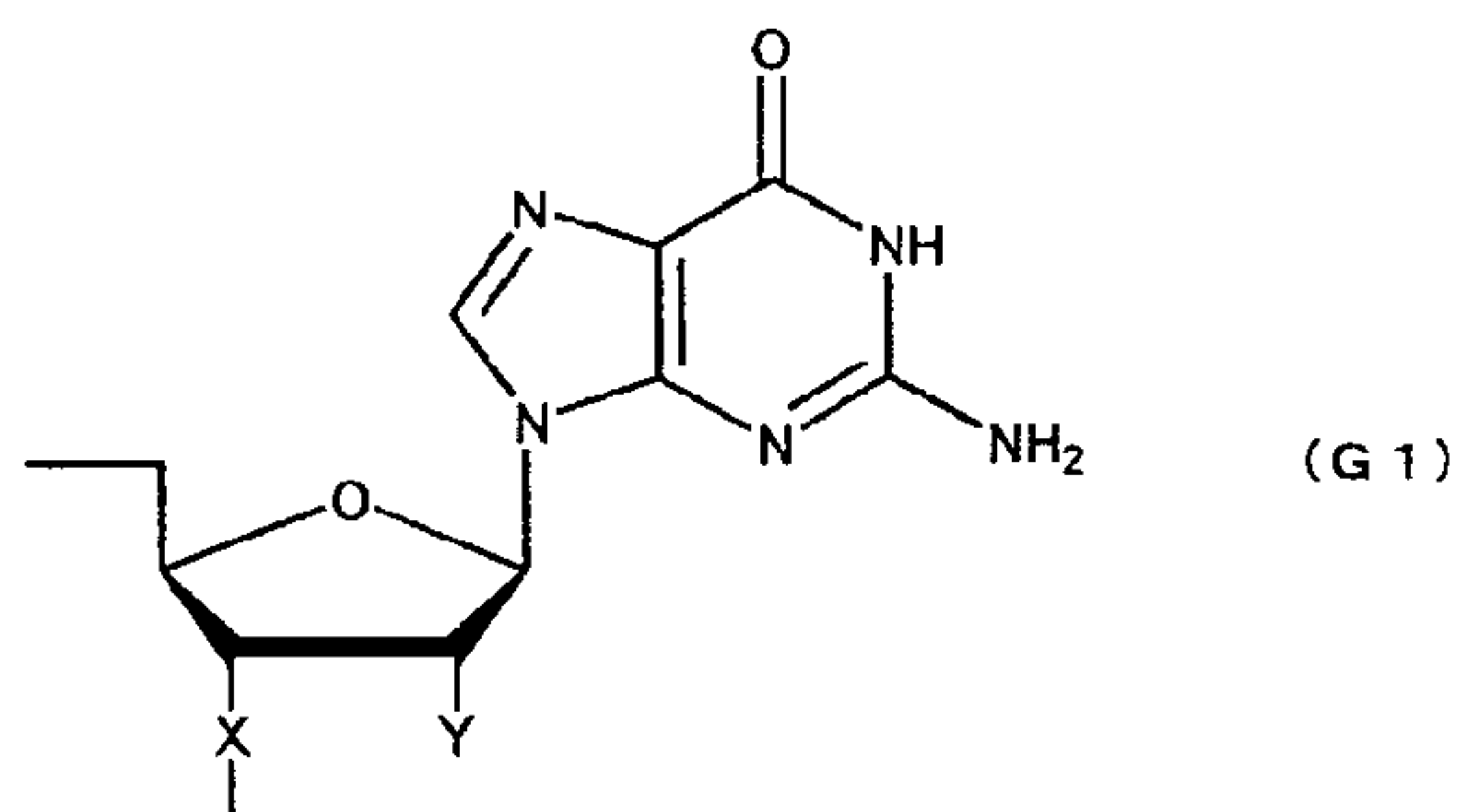
- 20 (1a')HO-,
 (1b')HO-Bg-,
 (1c')HO-Bc-Bg-,
 (1d')HO-Bt-Bc-Bg-,
 (1e')HO-Bt-Bt-Bc-Bg-,
 25 (1f')HO-Bc-Bt-Bt-Bc-Bg-,
 (1g')HO-Bt-Bc-Bt-Bt-Bc-Bg-,
 (1h')HO-Bg-Bt-Bc-Bt-Bt-Bc-Bg-,
 (1j')HO-Ba-Bg-Bt-Bc-Bt-Bt-Bc-Bg-,
 (1k')HO-Bg-Ba-Bg-Bt-Bc-Bt-Bt-Bc-Bg-,
 30 (1l')HO-Bt-Bg-Ba-Bg-Bt-Bc-Bt-Bt-Bc-Bg-,
 (1m')HO-Bt-Bt-Bg-Ba-Bg-Bt-Bc-Bt-Bt-Bc-Bg-,
 (1n')HO-Bg-Bt-Bt-Bg-Ba-Bg-Bt-Bc-Bt-Bt-Bc-Bg-, or

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(1o')HO-Ba-Bg-Bt-Bt-Bg-Ba-Bg-Bt-Bc-Bt-Bt-Bc-Bg-

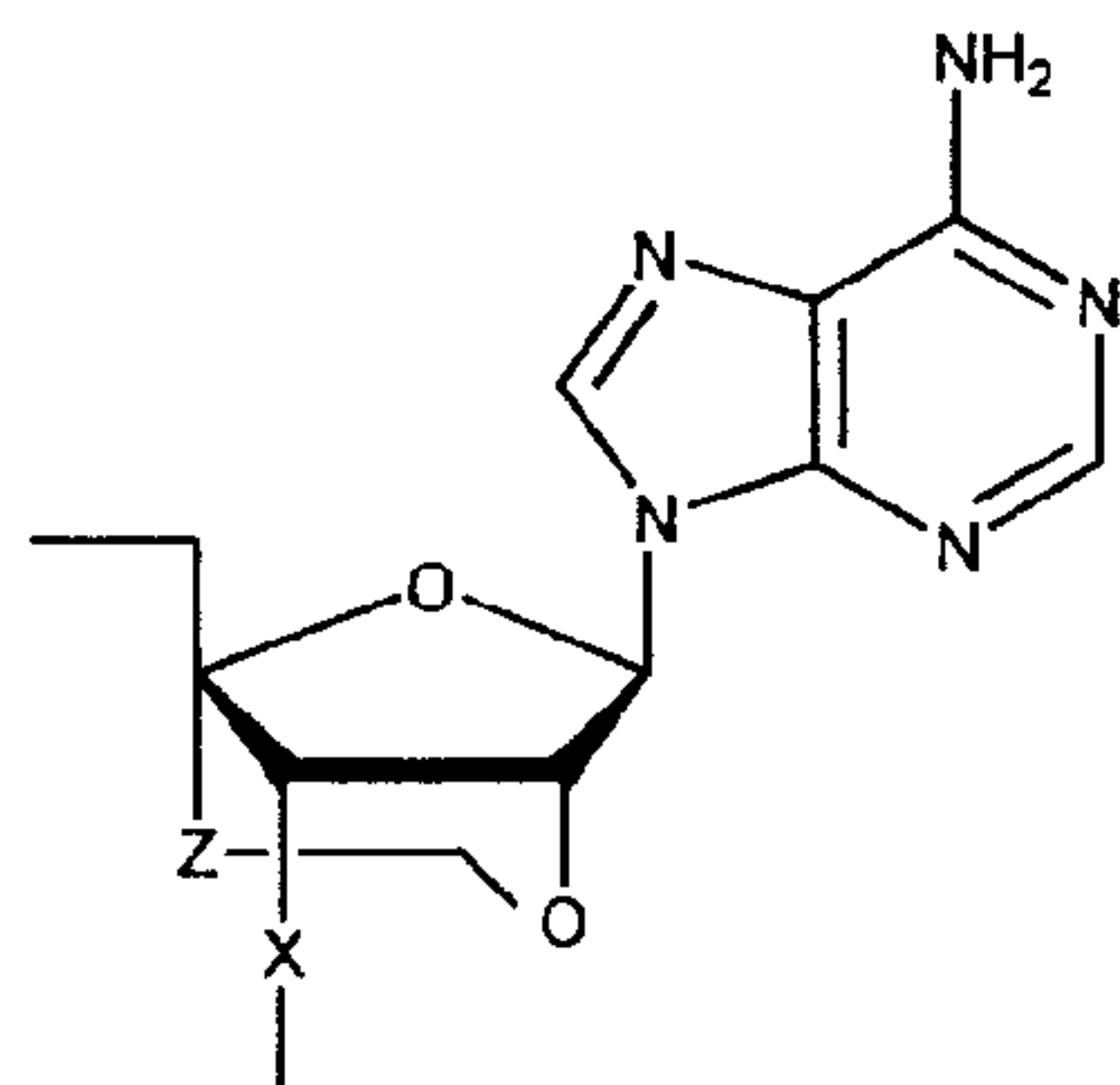
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula

5 (U1) or (T2):

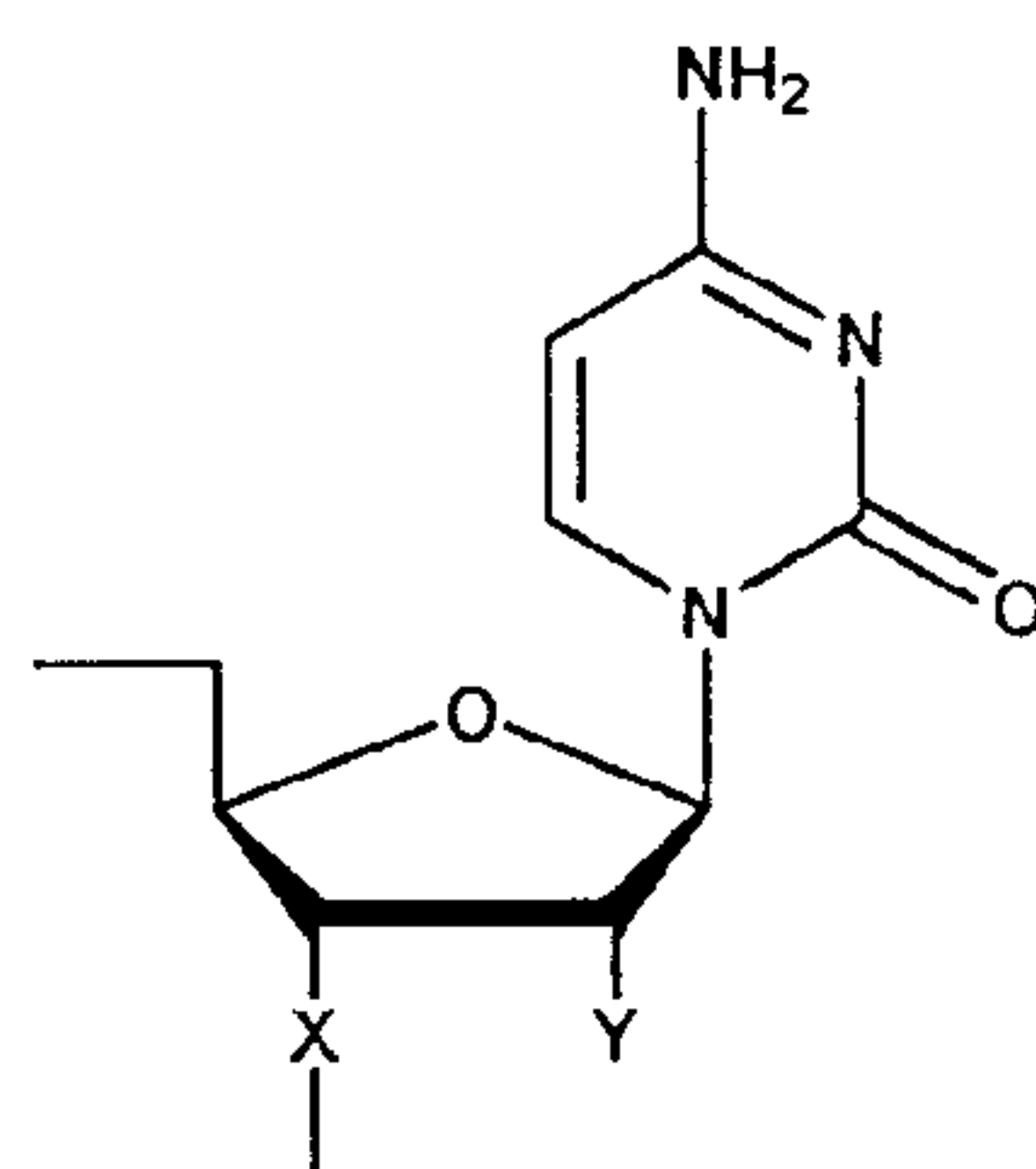


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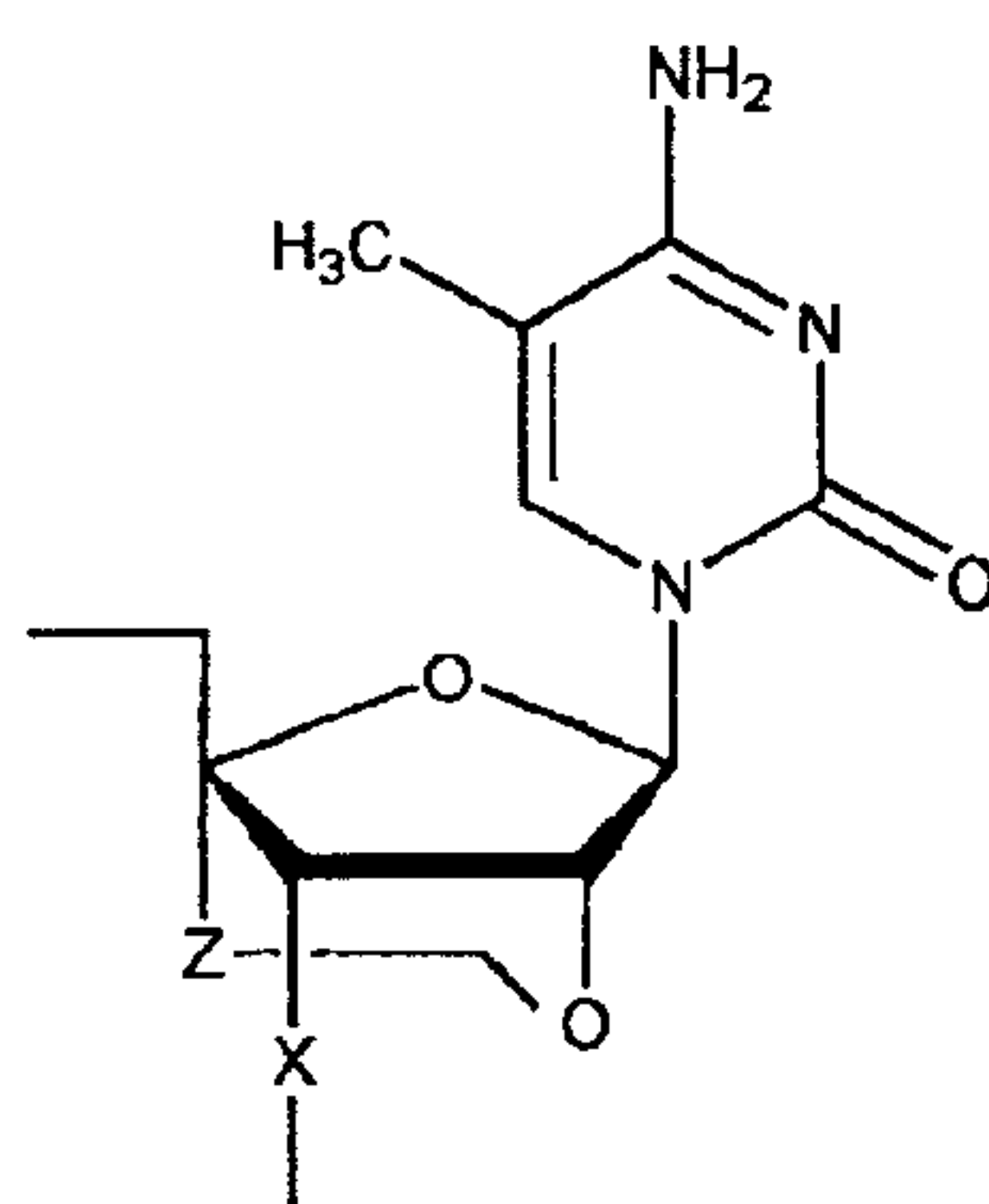
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(A 2)

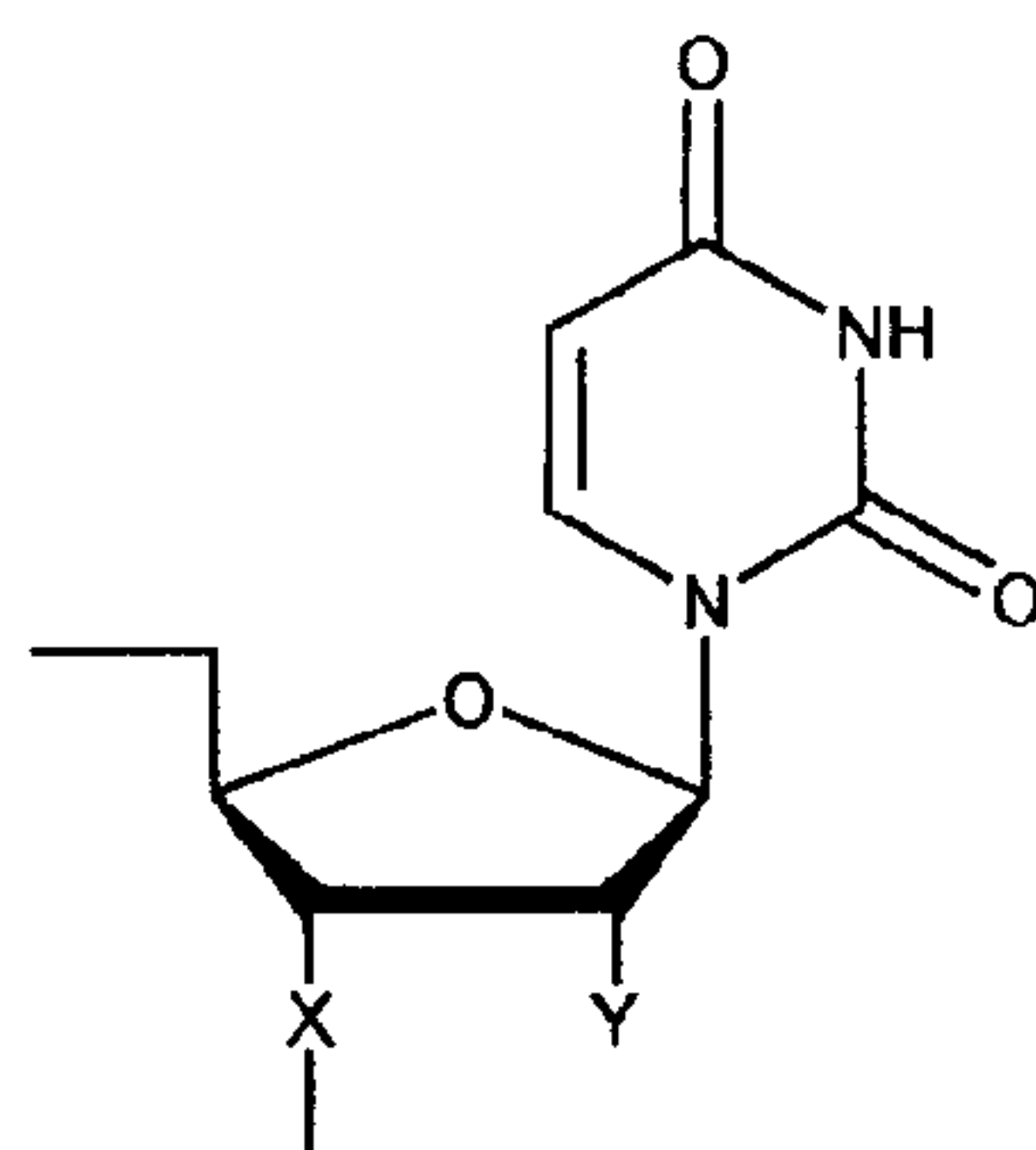


(C 1)

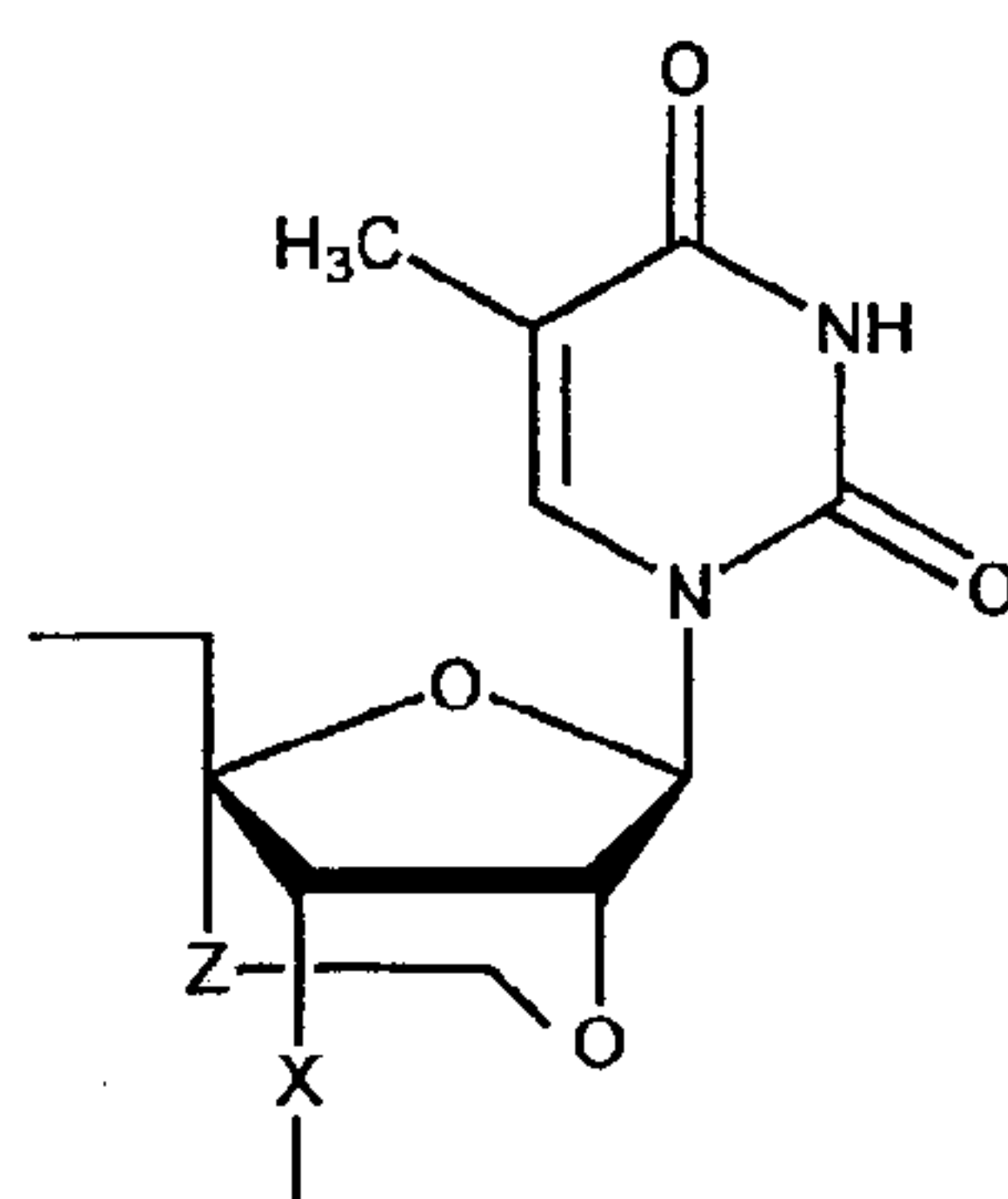


(C 2)

79861-7D



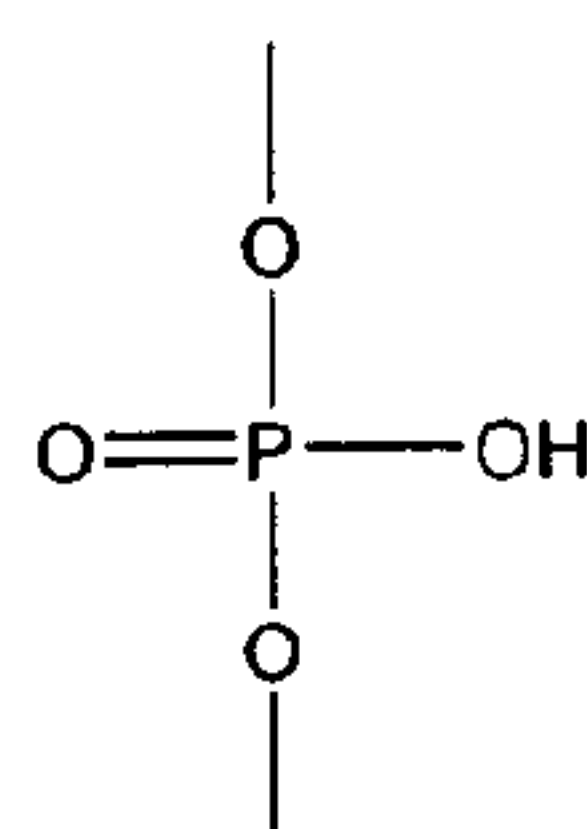
(U 1)



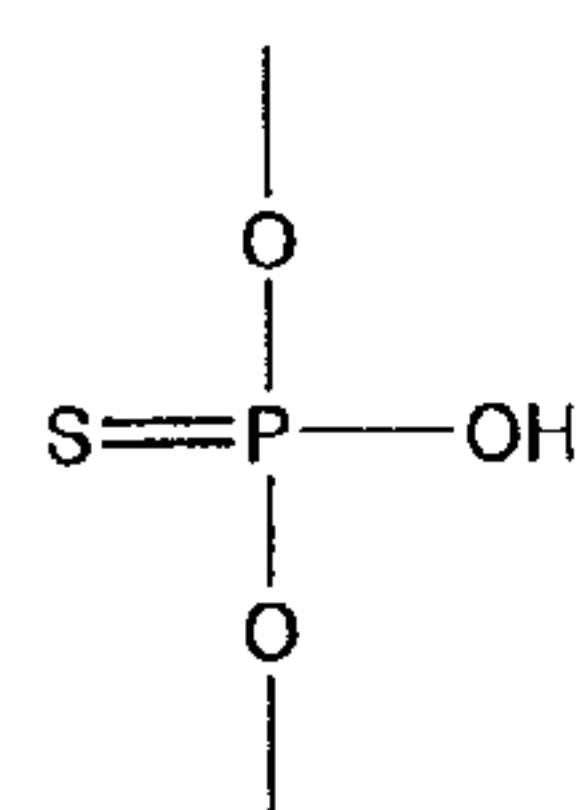
(T 2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



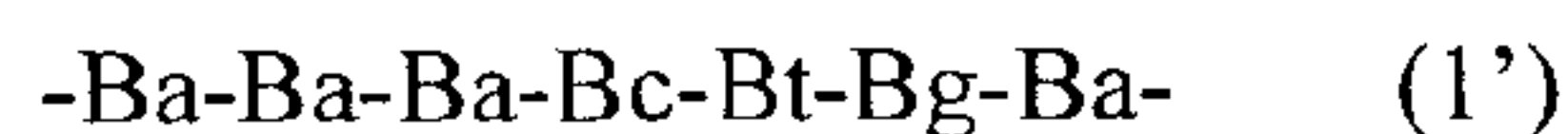
(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 10 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene

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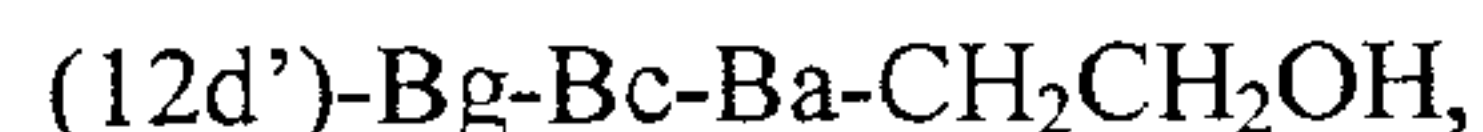
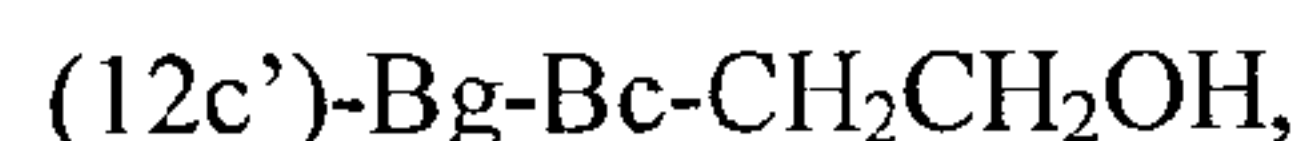
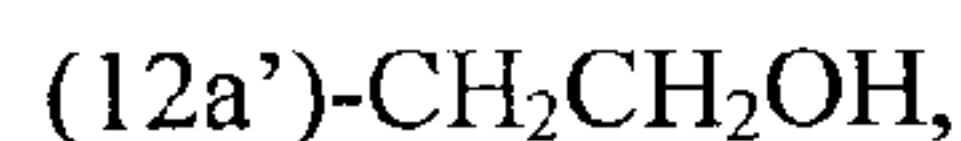
group with 1-5 carbon atoms;

B_{M'1} is a group represented by the following formula (1'):

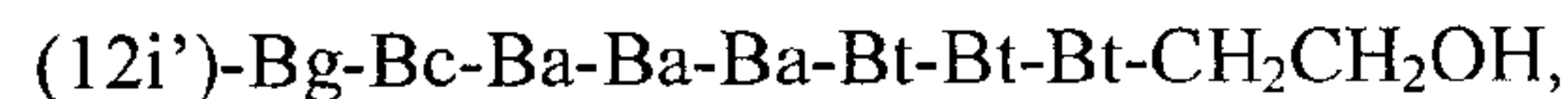
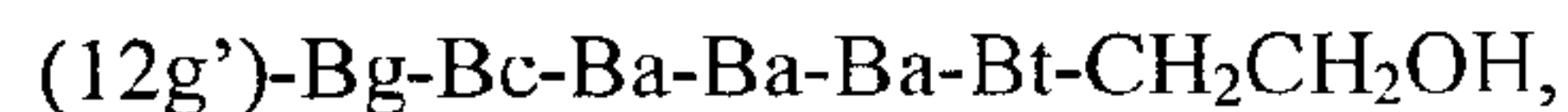


where Bg, Ba, Bt and Bc are as defined above;

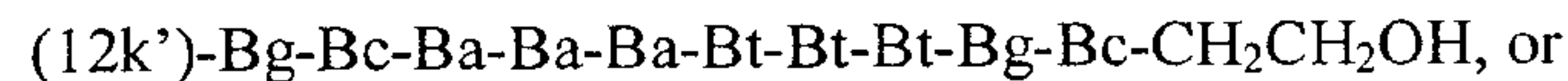
5 B_{B'1} is a group represented by any one of the following (12a') to (12l'):



10 (12e')-Bg-Bc-Ba-Ba-CH₂CH₂OH,



15 (12j')-Bg-Bc-Ba-Ba-Ba-Bt-Bt-Bt-Bg-CH₂CH₂OH,



where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by

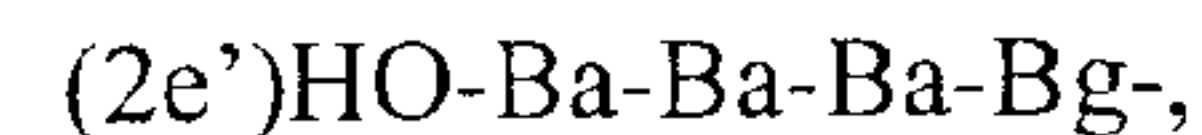
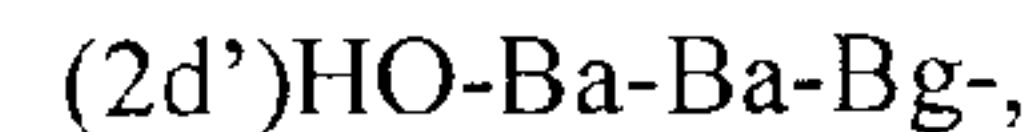
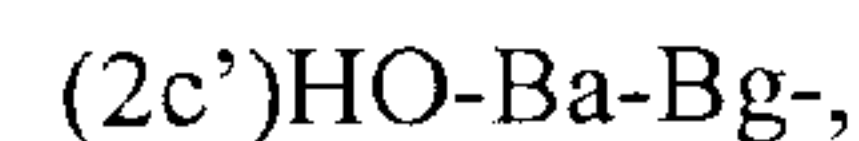
20 formula (I') has 2'-O,4'-C-alkylene group.

[14] A compound represented by the following general formula (II') or a pharmacologically acceptable salt thereof:

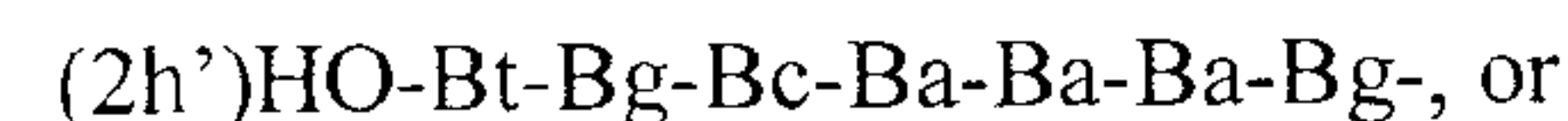
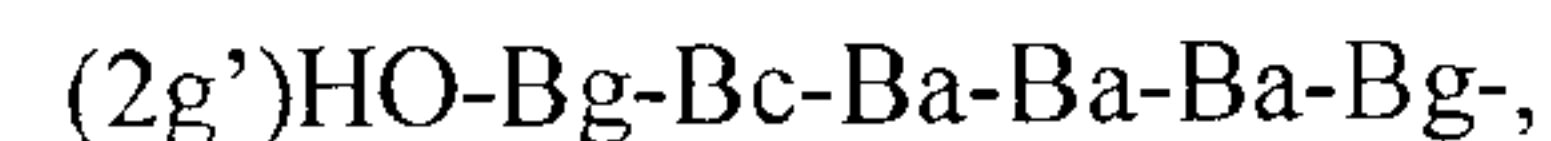


where B_{T'2} is a group represented by any one of the following (2a') to (2j'):

25 (2a')HO-,



30 (2f')HO-Bc-Ba-Ba-Ba-Bg-,

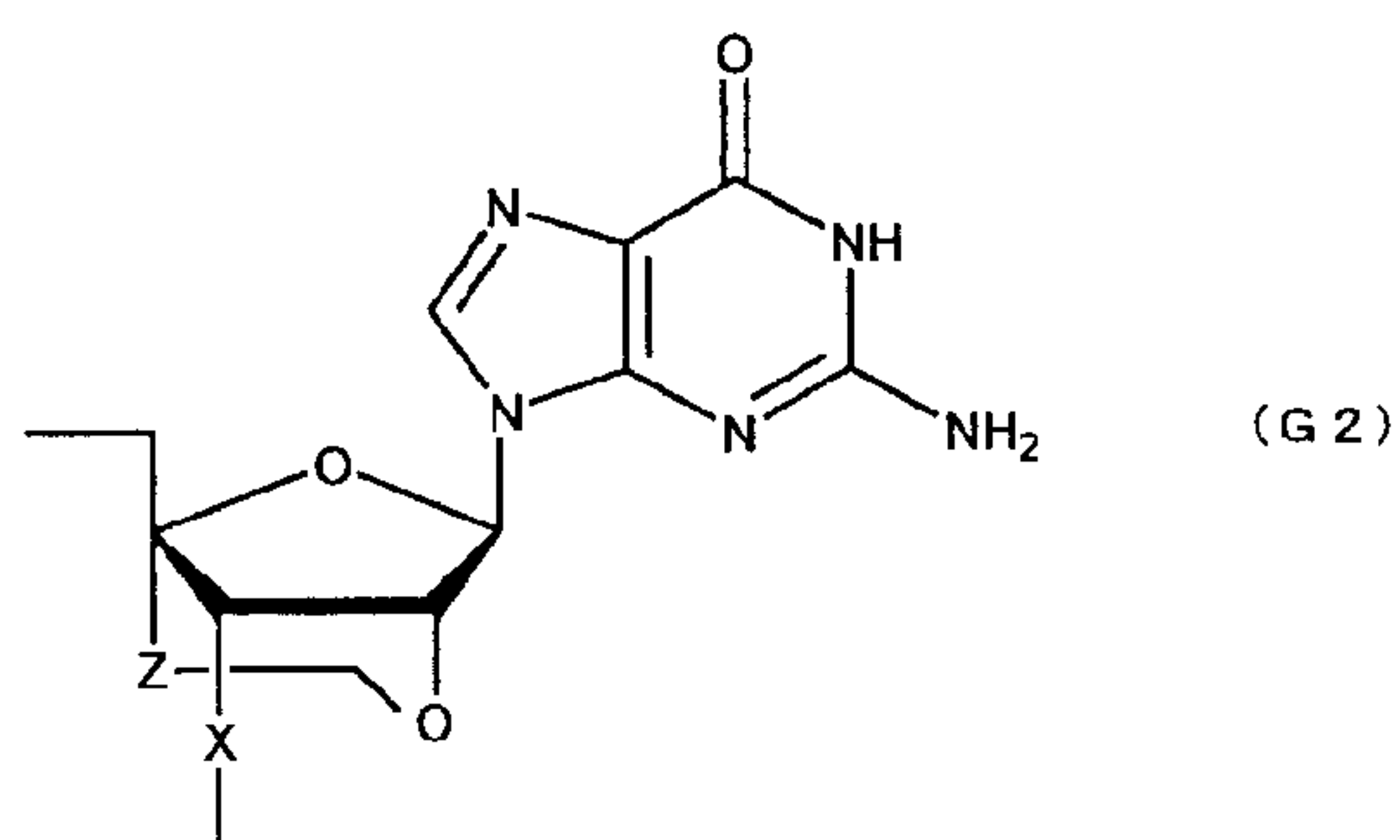
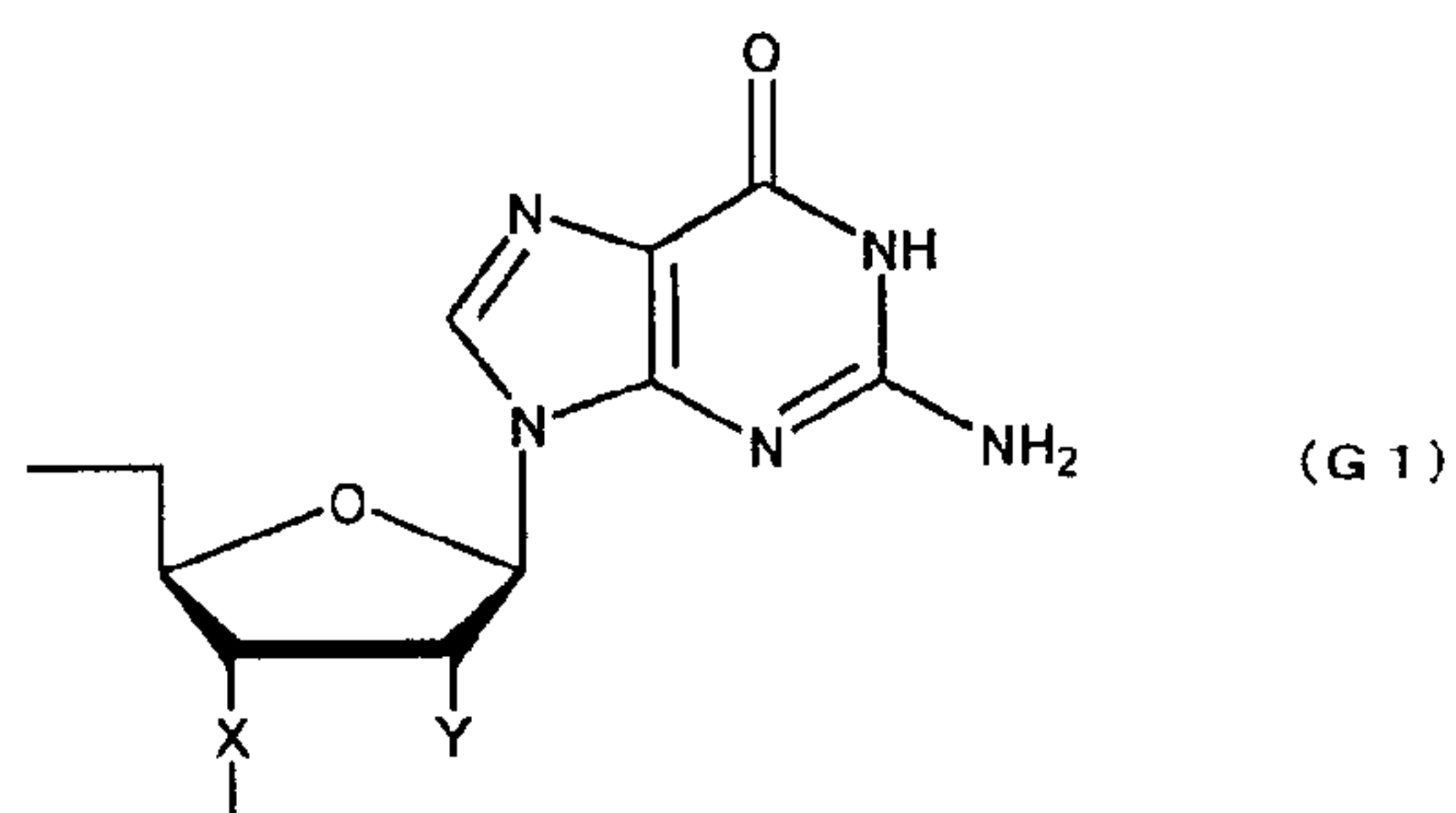


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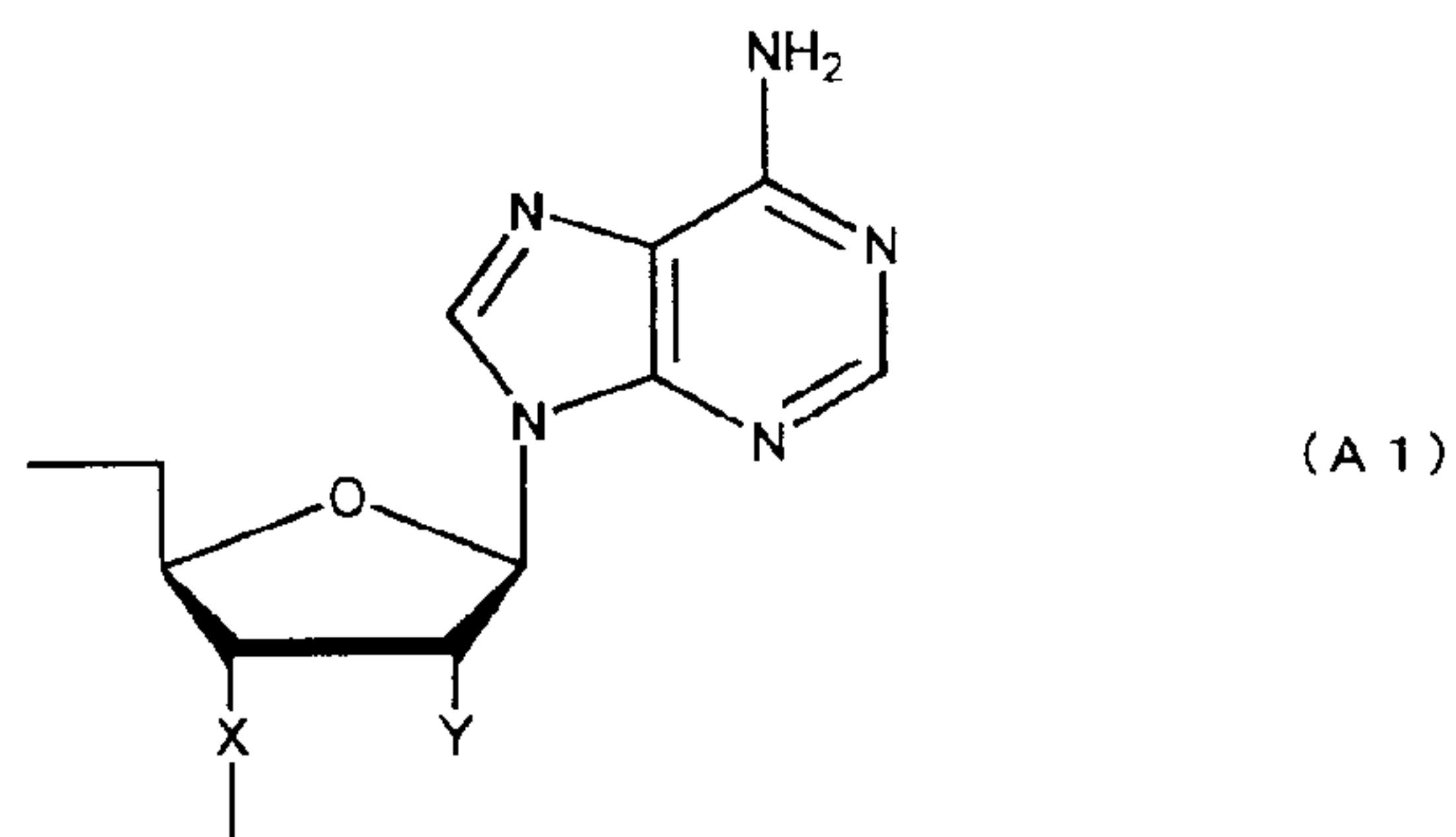
(2j')HO-Bg-Bt-Bg-Bc-Ba-Ba-Ba-Bg-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula

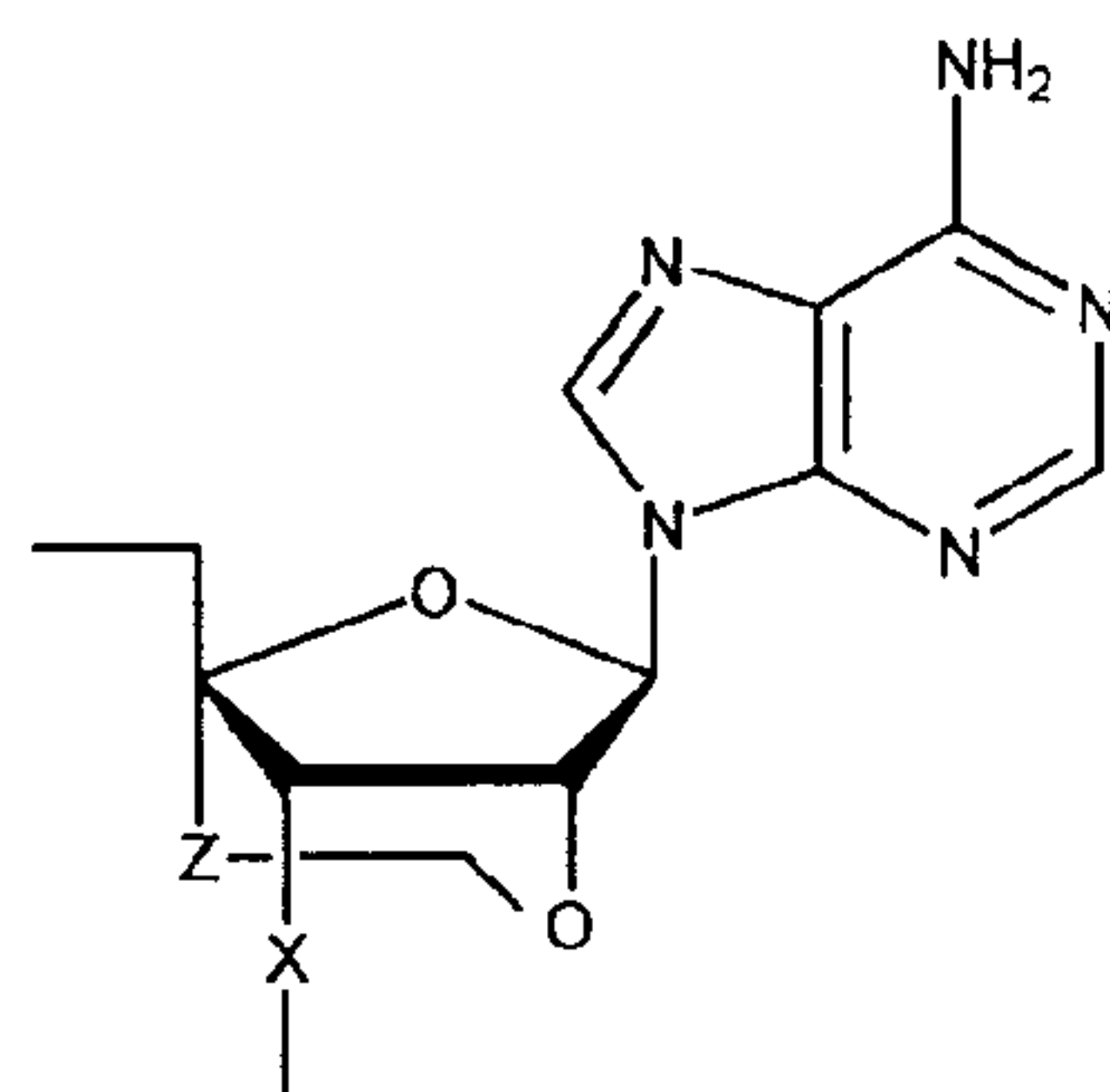
5 (U1) or (T2):



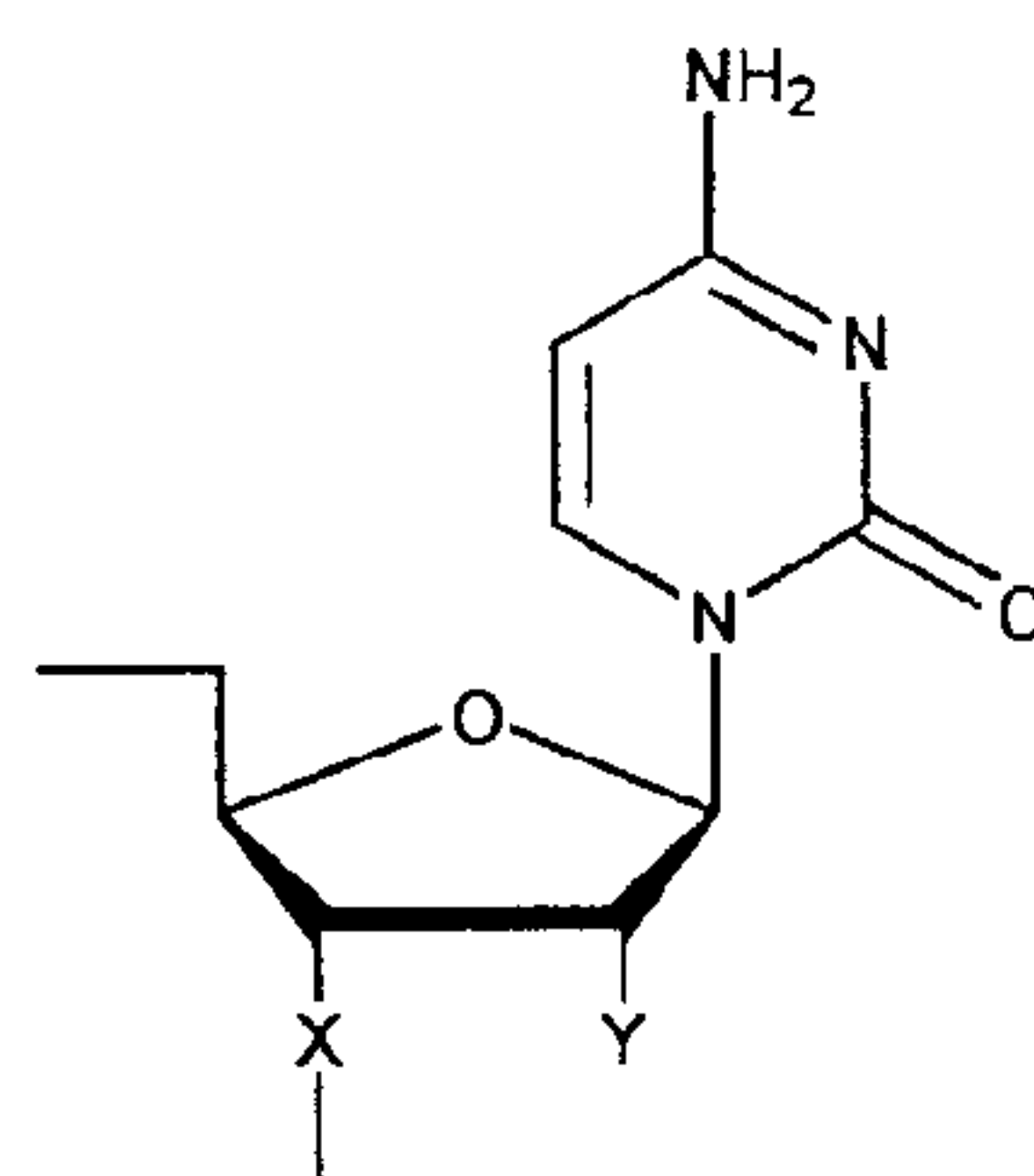
10



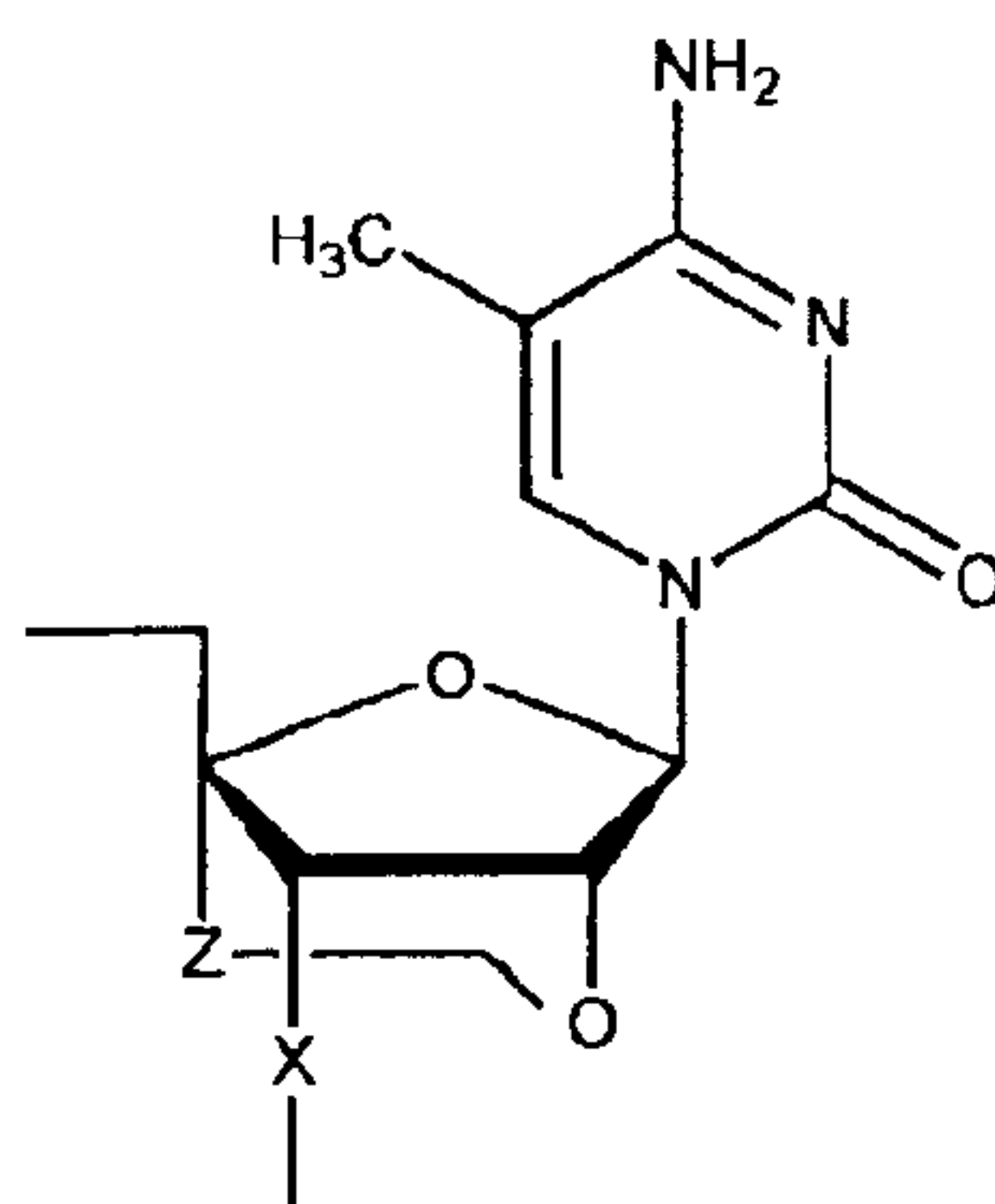
79861-7D



(A 2)

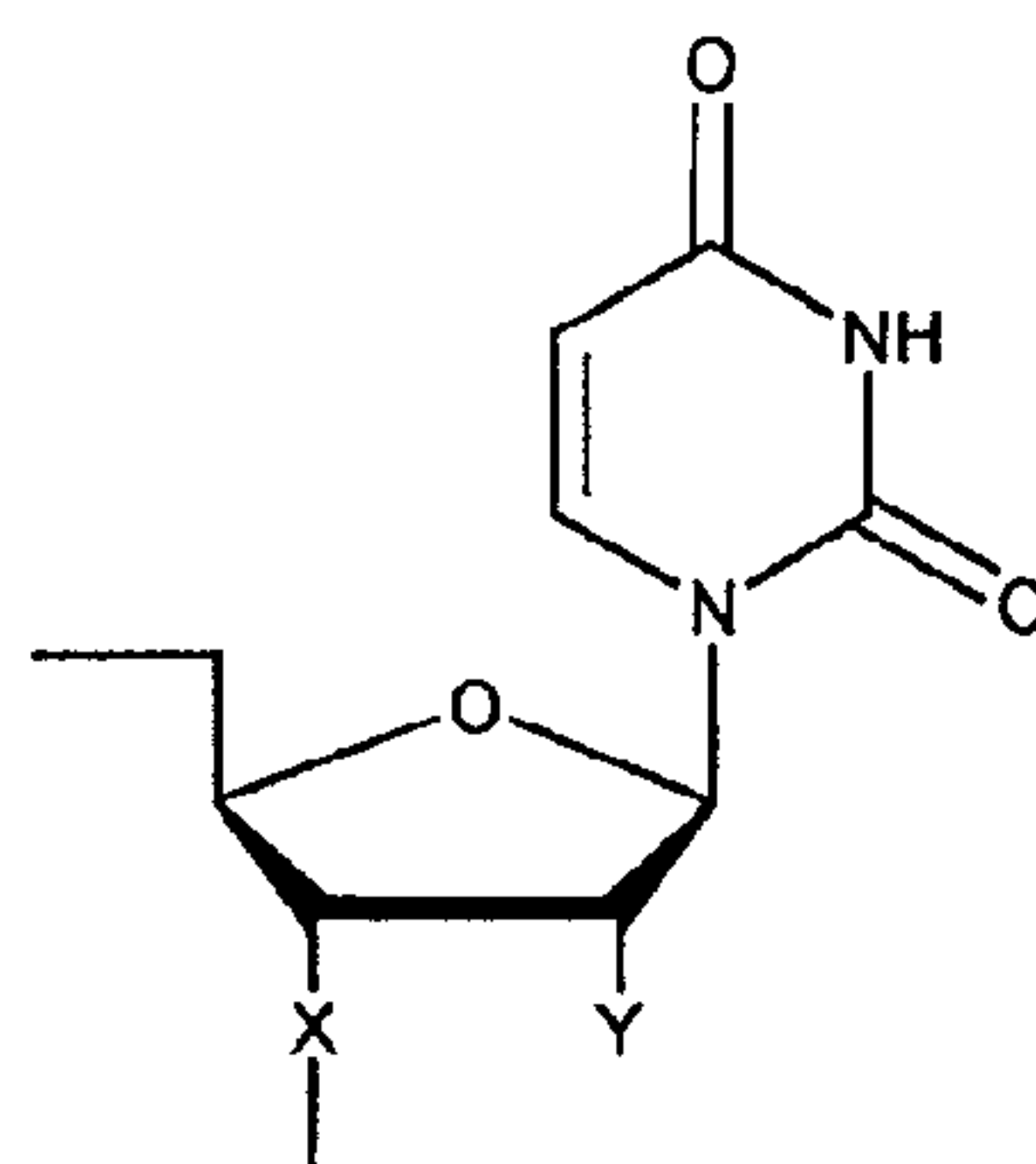


(C 1)

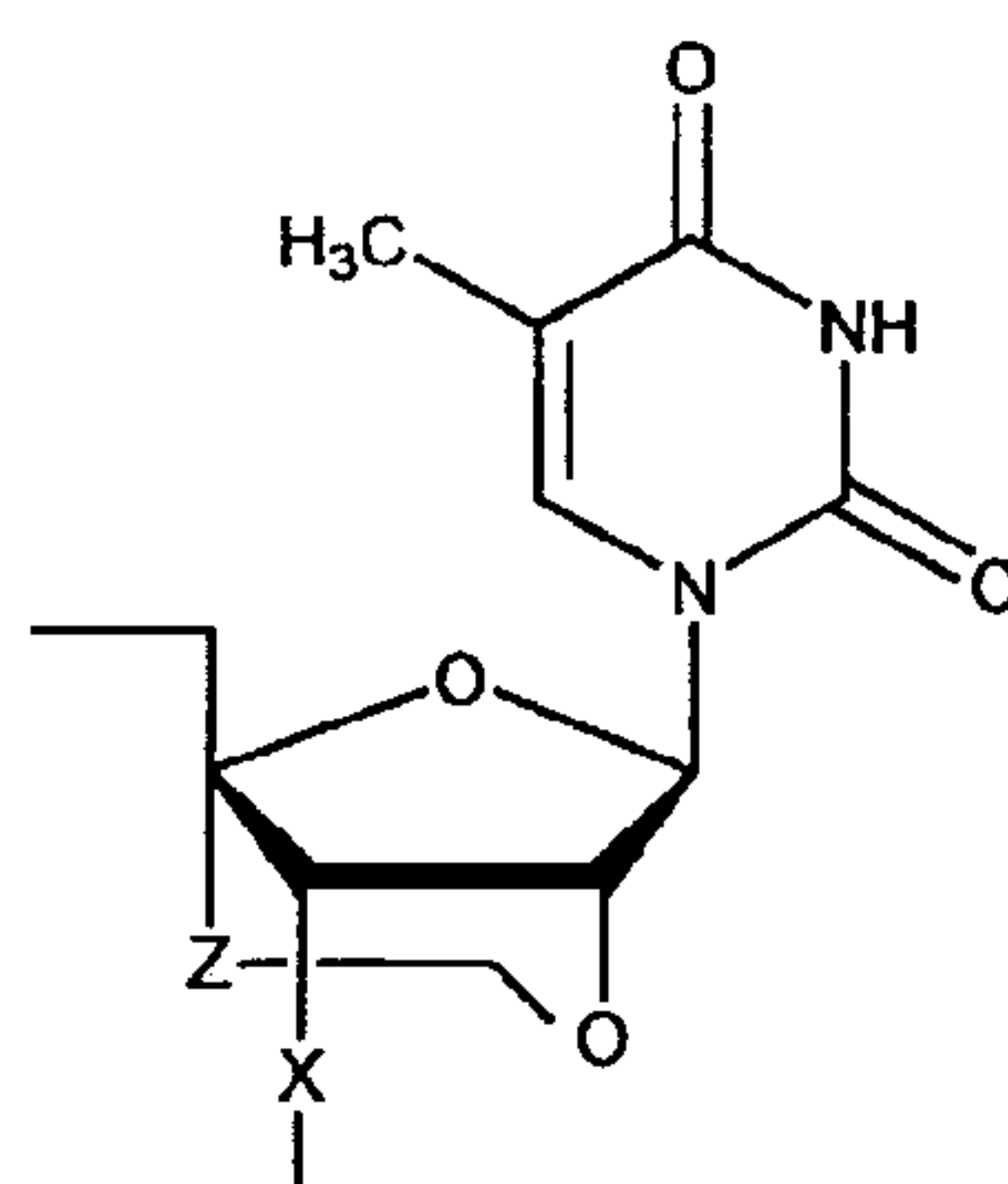


(C 2)

79861-7D



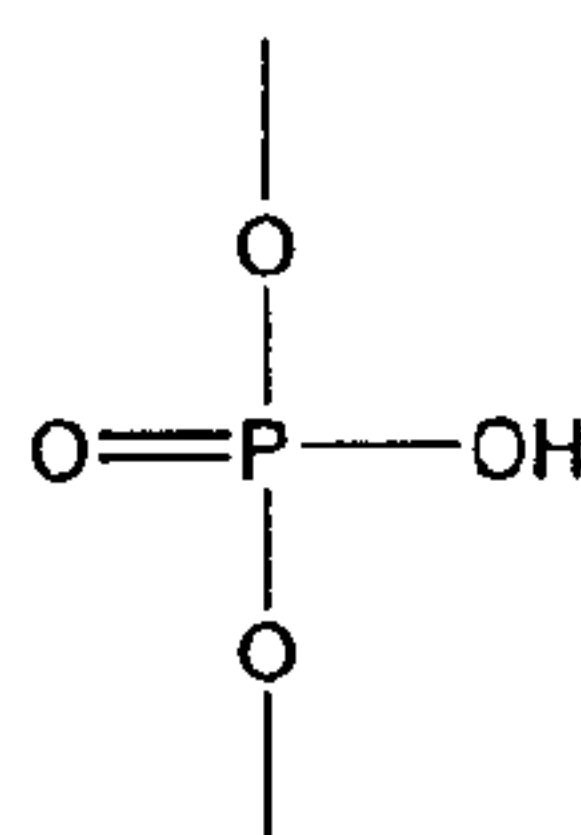
(U 1)



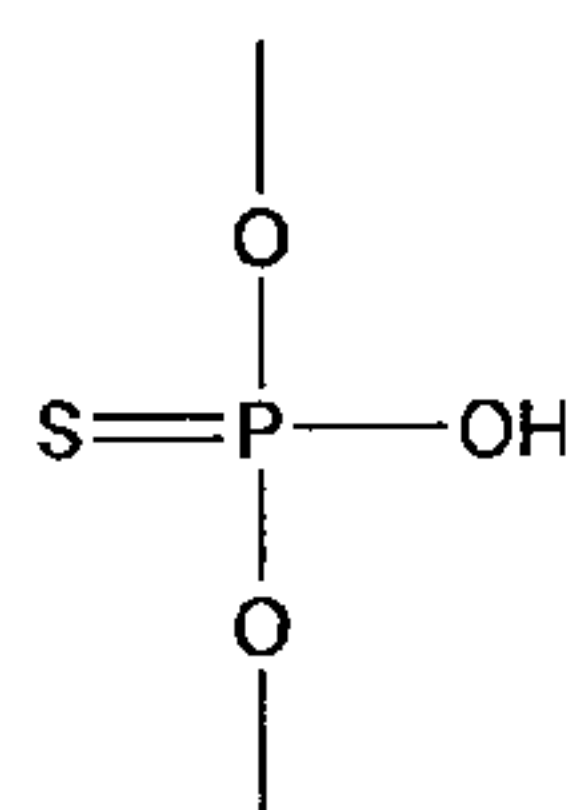
(T 2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 10 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene

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group with 1-5 carbon atoms;

B_{M'2} is a group represented by the following formula (2'):



where Bg, Ba, Bt and Bc are as defined above;

5 B_{B'2} is a group represented by any one of the following (22a') to (22i'):

(22a')-CH₂CH₂OH,

(22b')-Ba-CH₂CH₂OH,

(22c')-Ba-Ba-CH₂CH₂OH,

(22d')-Ba-Ba-Ba-CH₂CH₂OH,

10 (22e')-Ba-Ba-Ba-Ba-CH₂CH₂OH,

(22f')-Ba-Ba-Ba-Ba-Bc-CH₂CH₂OH,

(22g')-Ba-Ba-Ba-Ba-Bc-Bt-CH₂CH₂OH,

(22h')-Ba-Ba-Ba-Ba-Bc-Bt-Bg-CH₂CH₂OH, or

(22i')-Ba-Ba-Ba-Ba-Bc-Bt-Bg-Ba-CH₂CH₂OH

15 where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (II') has 2'-O,4'-C-alkylene group.

[15] A compound represented by the following general formula (III') or a pharmacologically acceptable salt thereof:

20
$$\text{B}_{T'3}\text{-B}_{M'3}\text{-B}_{B'3} \quad (III')$$

where B_{T'3} is a group represented by any one of the following (3a') to (3c'):

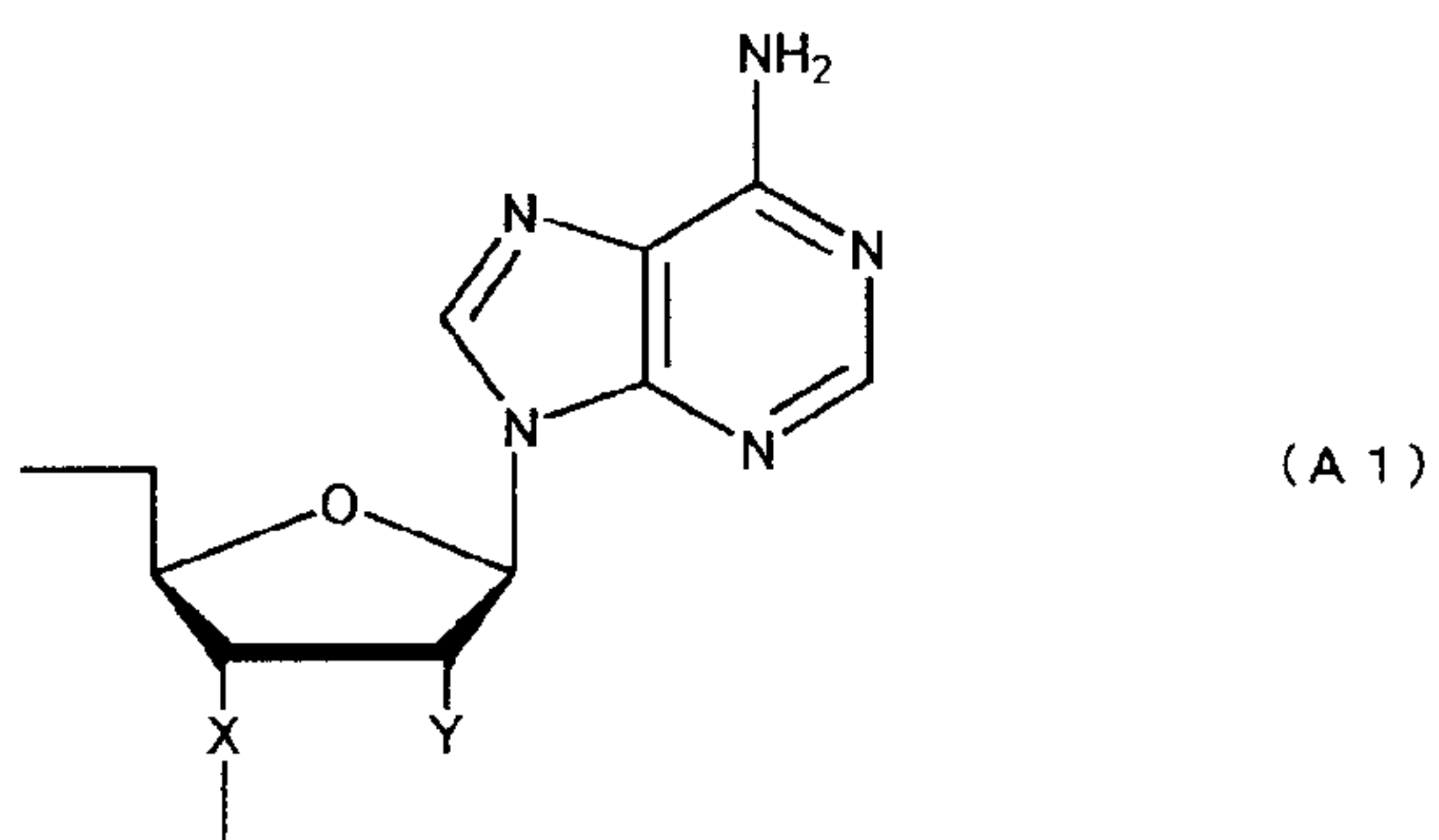
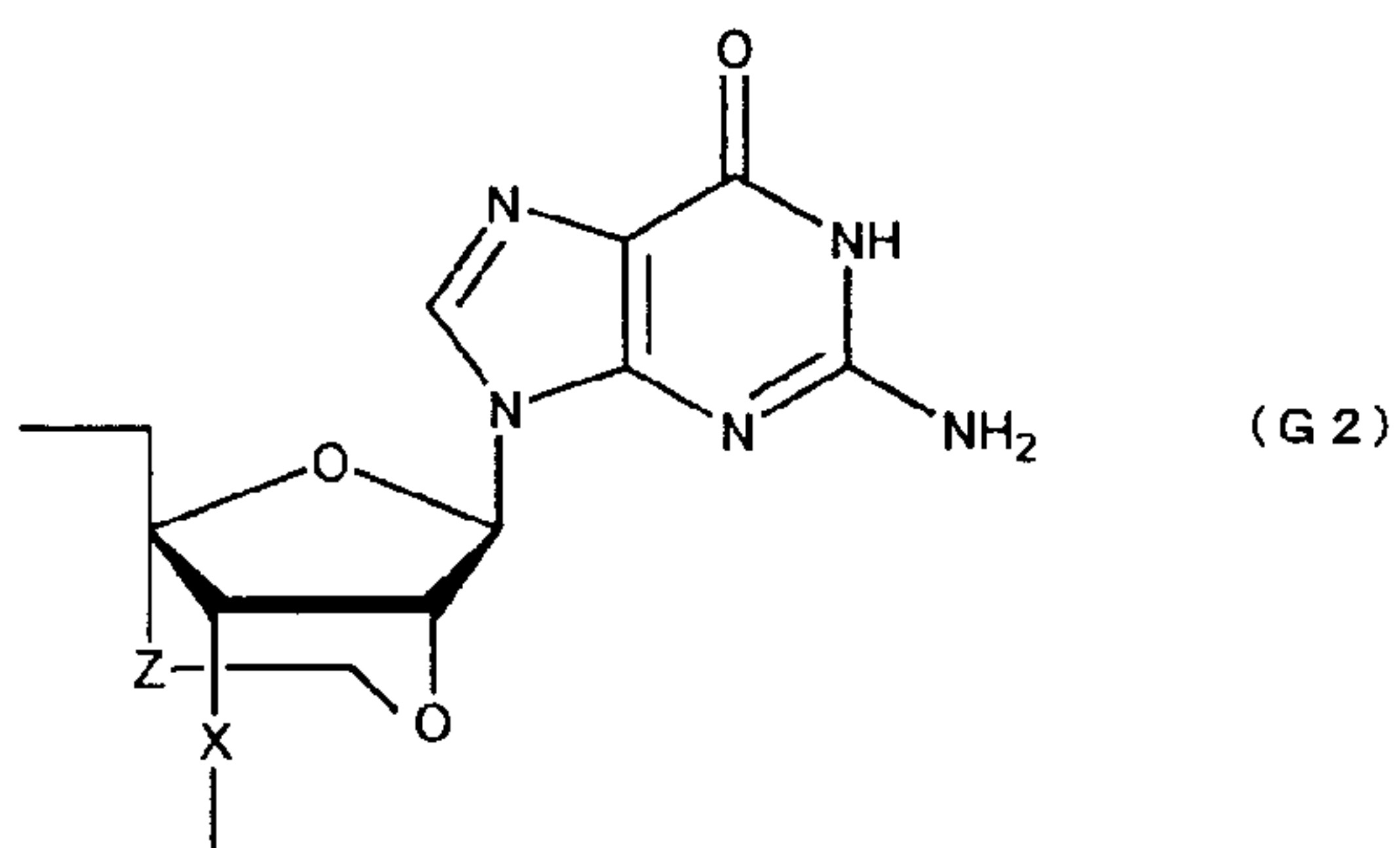
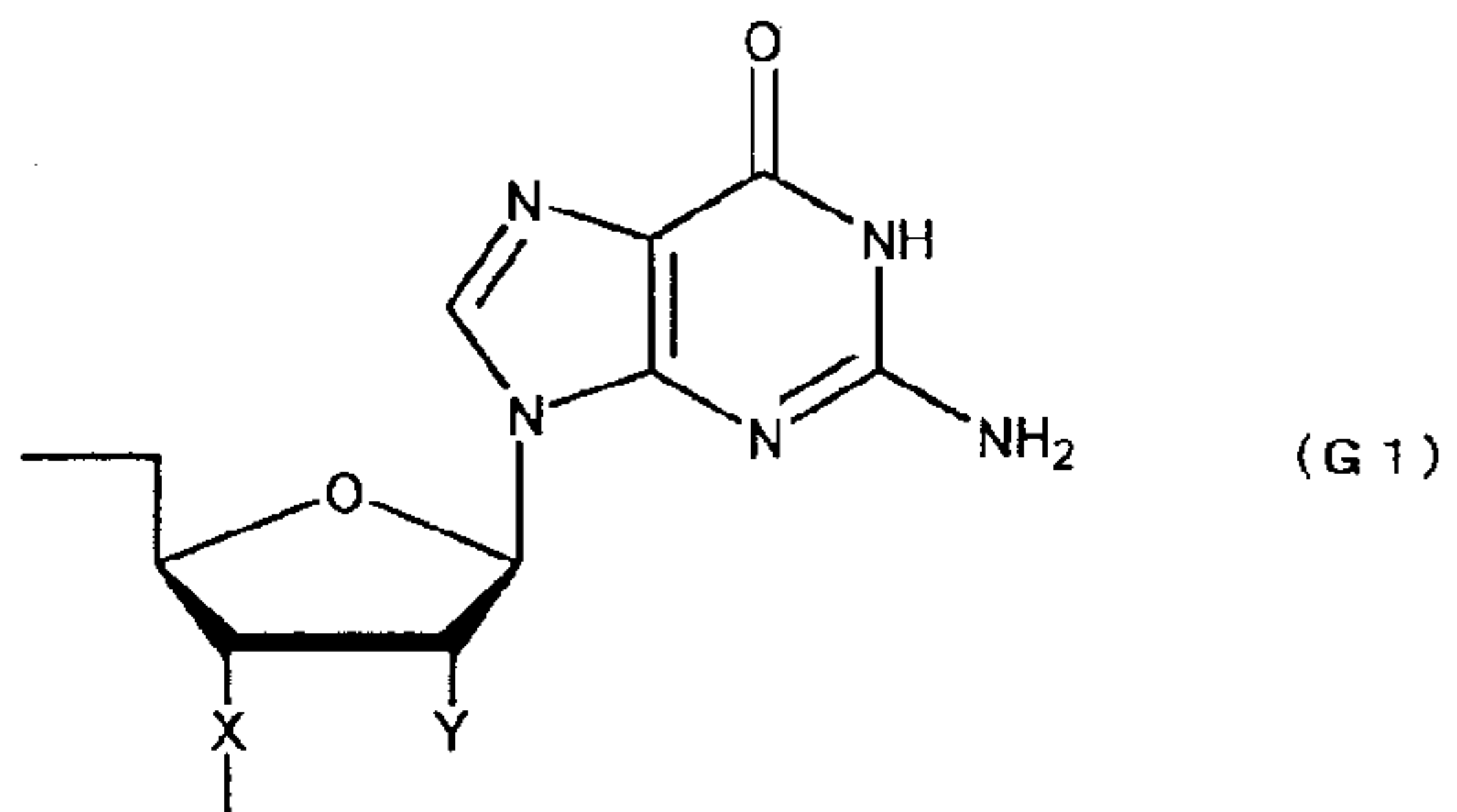
(3a')HO-,

(3b')HO-Bc-, or

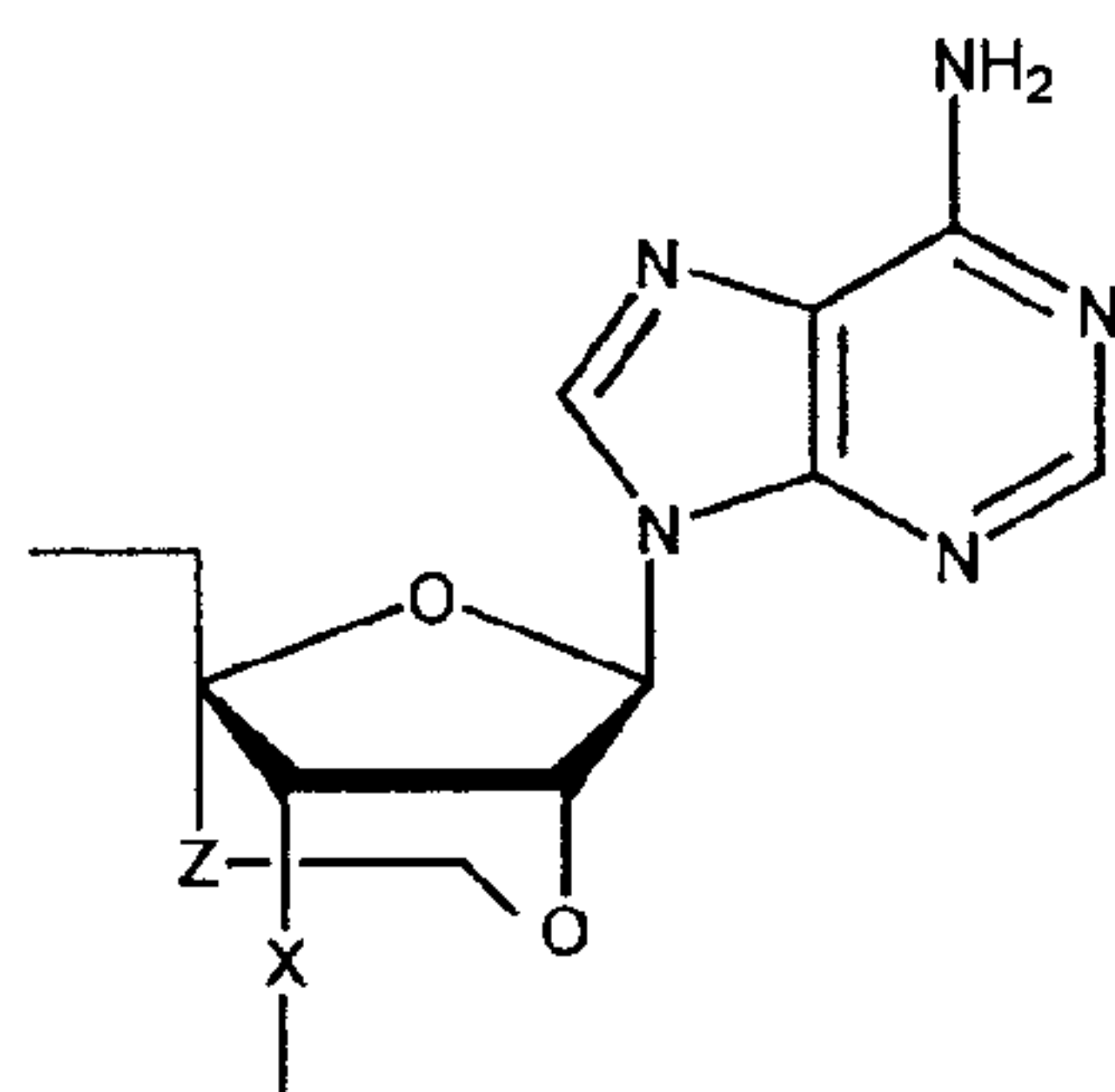
(3c')HO-Bg-Bc-

25 where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

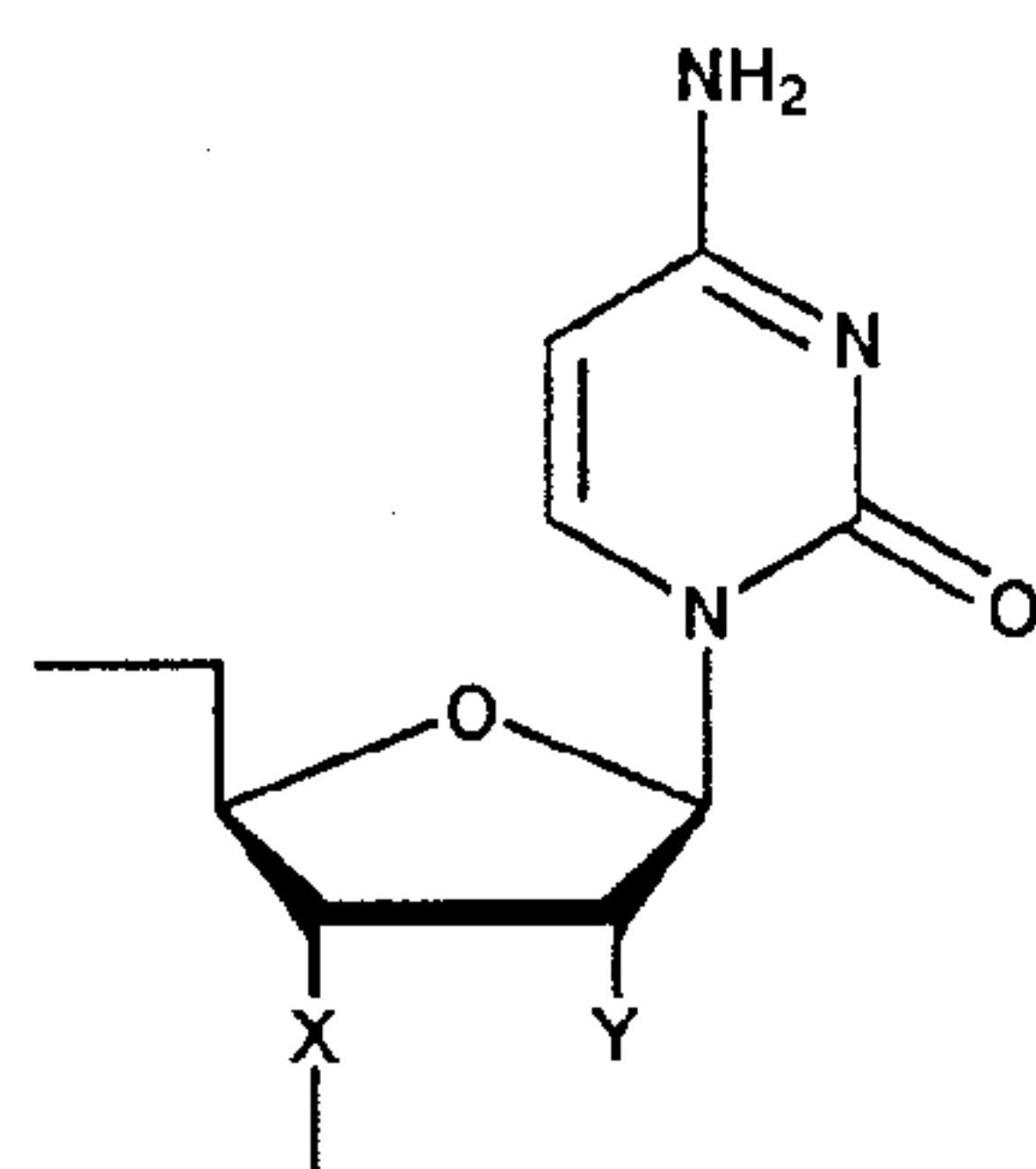
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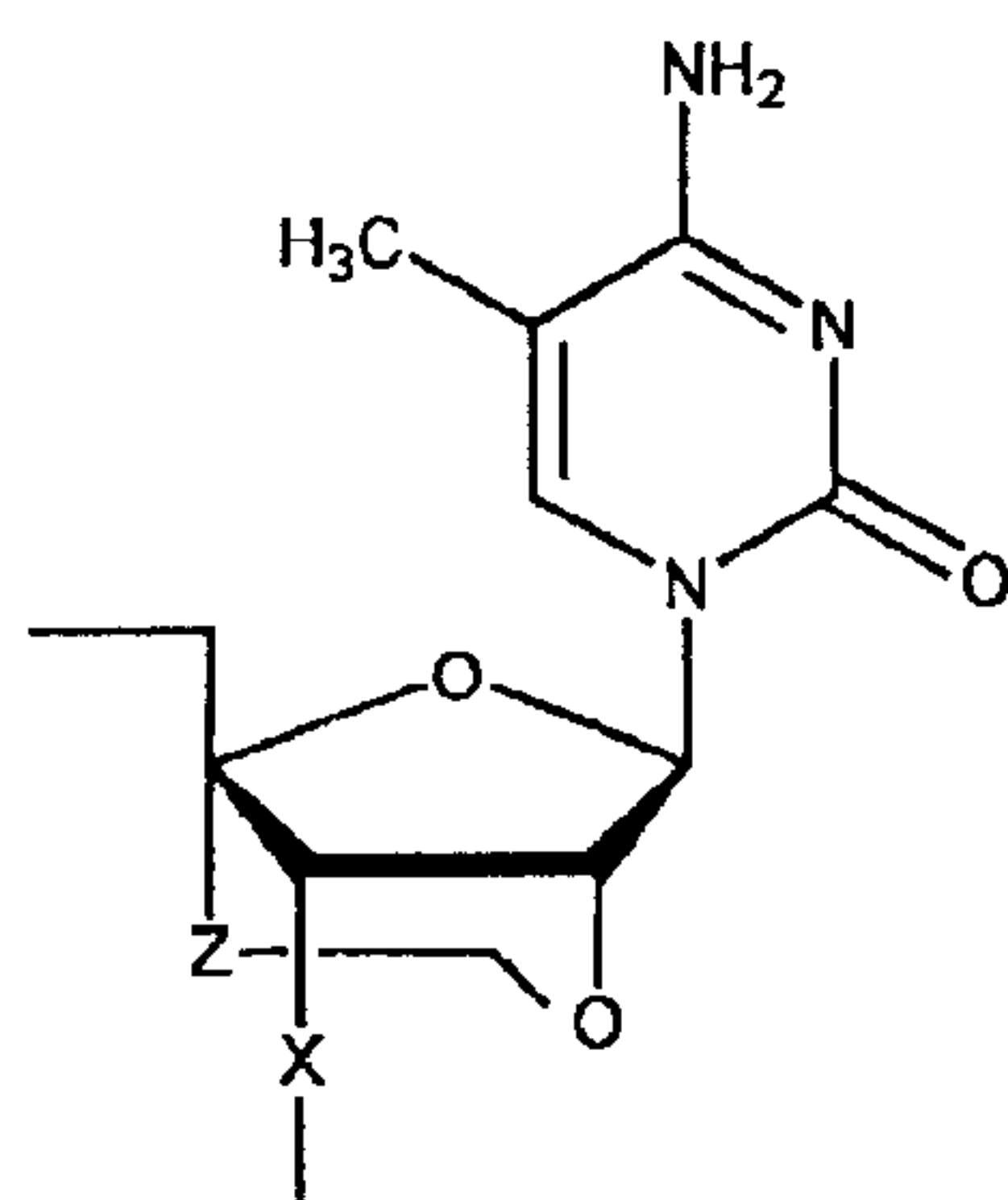
79861-7D



(A 2)

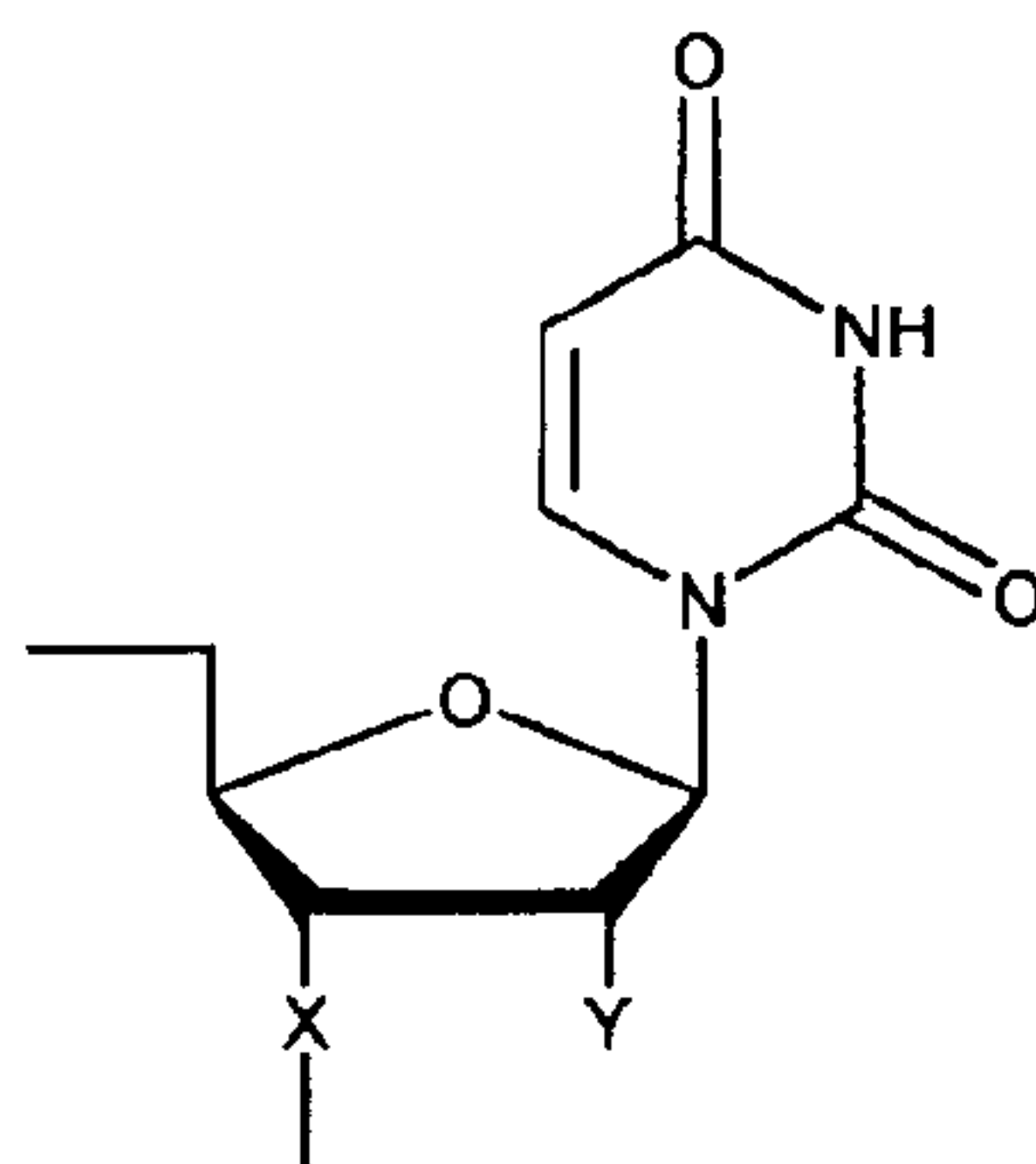


(C 1)

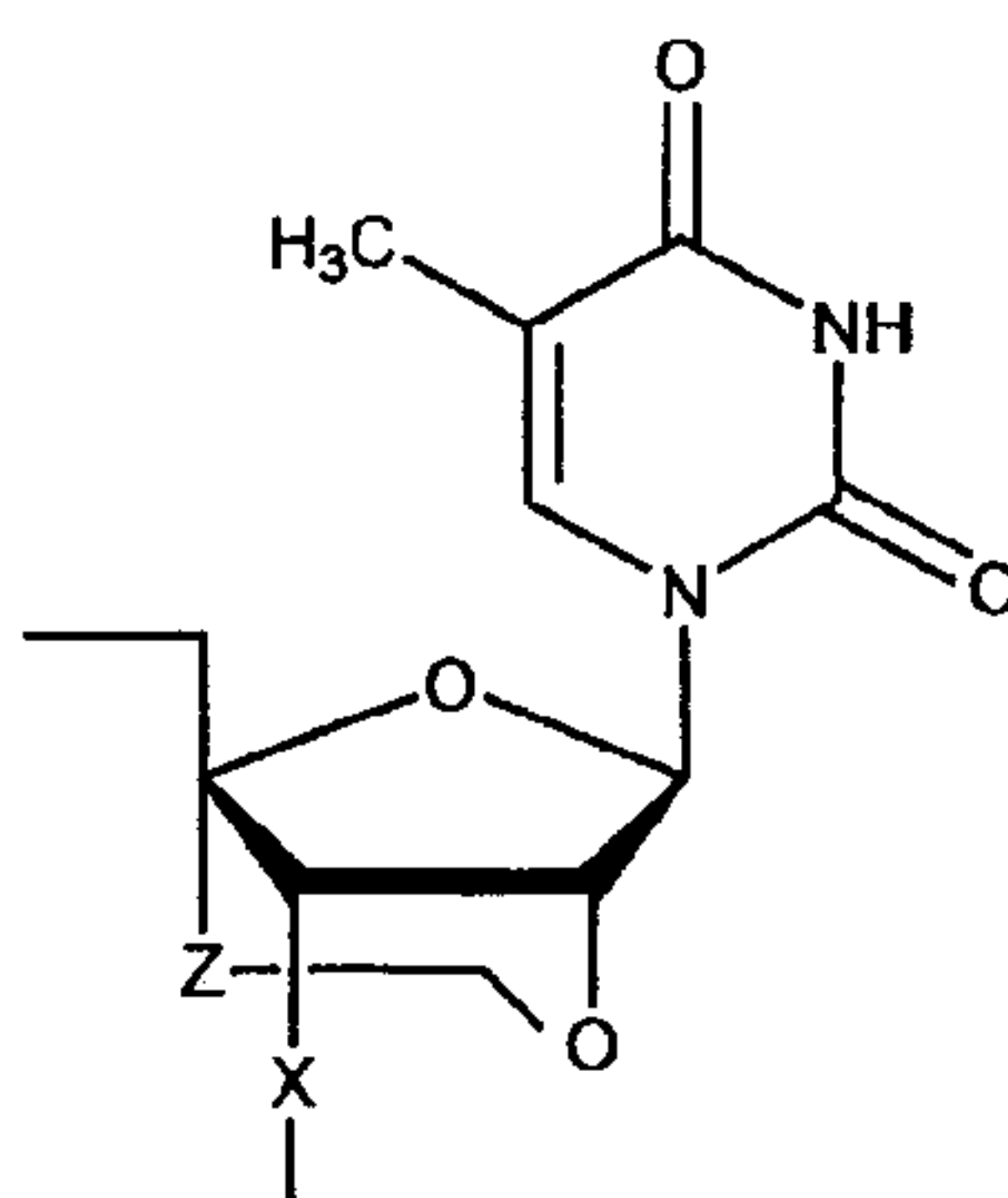


(C 2)

79861-7D



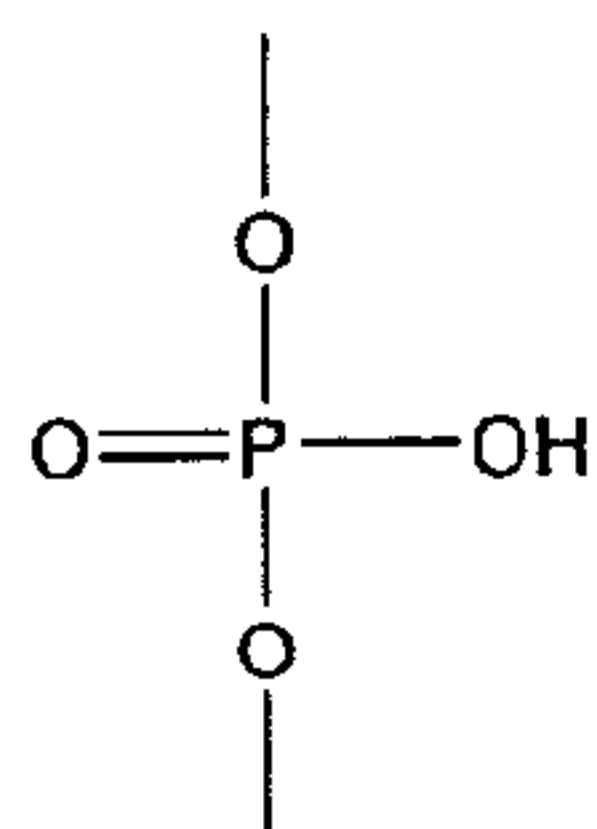
(U 1)



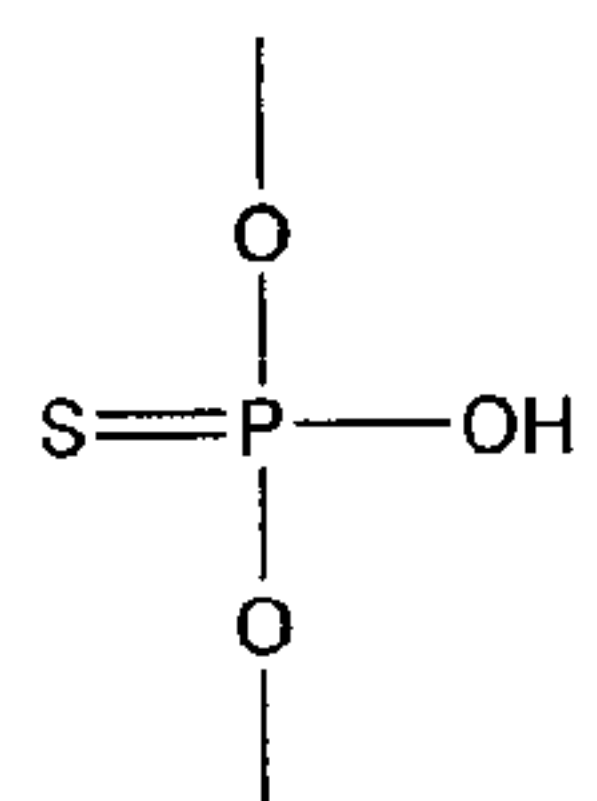
(T 2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



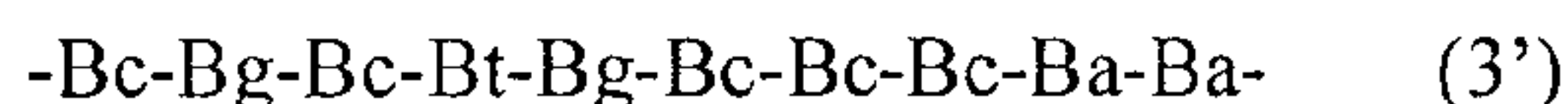
(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 10 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene

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group with 1-5 carbon atoms;

B_{M'3} is a group represented by the following formula (3'):

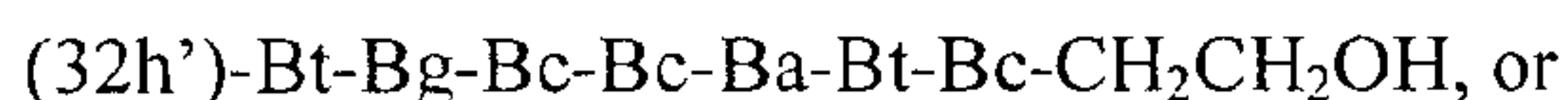
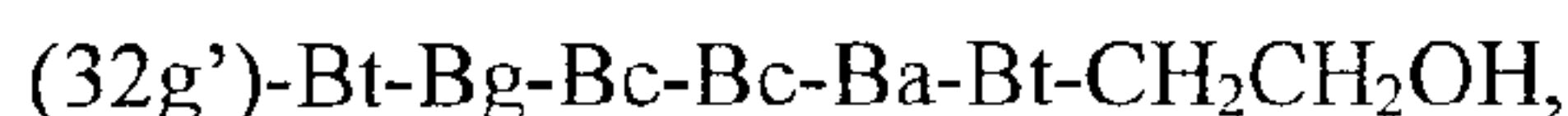


where Bg, Ba, Bt and Bc are as described above;)

5 B_{B'3} is a group represented by any one of the following (32a') to (32i'):



10 (32e')-Bt-Bg-Bc-Bc-CH₂CH₂OH,



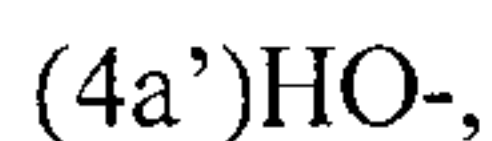
15 where Bg, Ba, Bt and Bc are as described above;

provided that at least one of the nucleosides constituting the compound represented by formula (III') has 2'-O,4'-C-alkylene group.

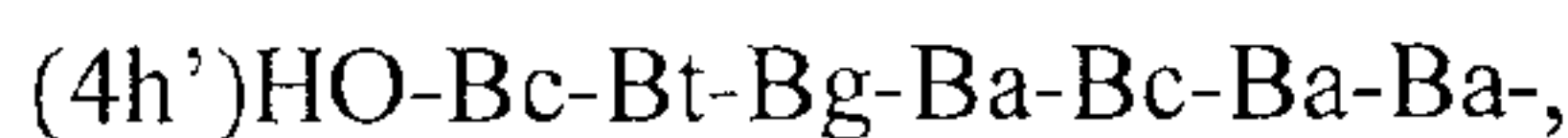
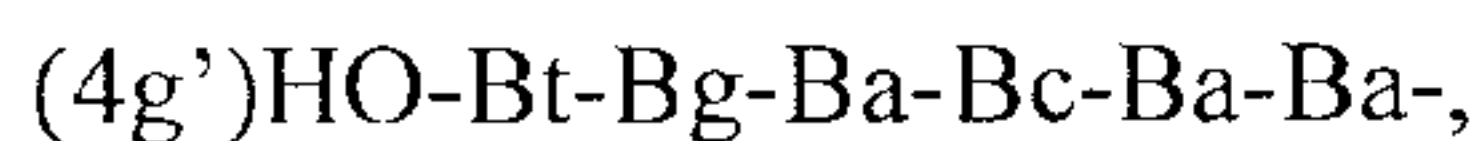
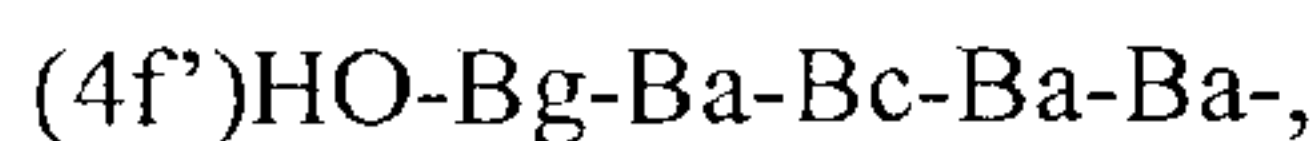
[16] A compound represented by the following general formula (IV') or a pharmacologically acceptable salt thereof:



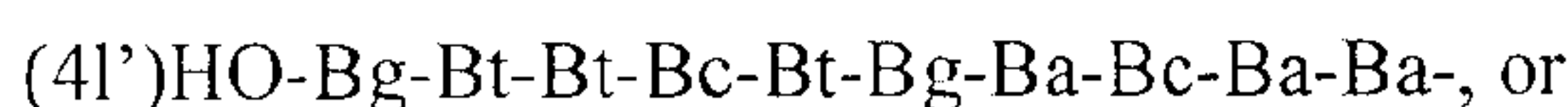
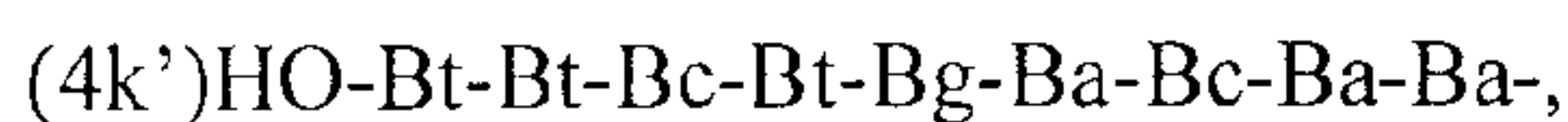
where B_{T'4} is a group represented by any one of the following (4a') to (4m'):



25 (4d')HO-Bc-Ba-Ba-,



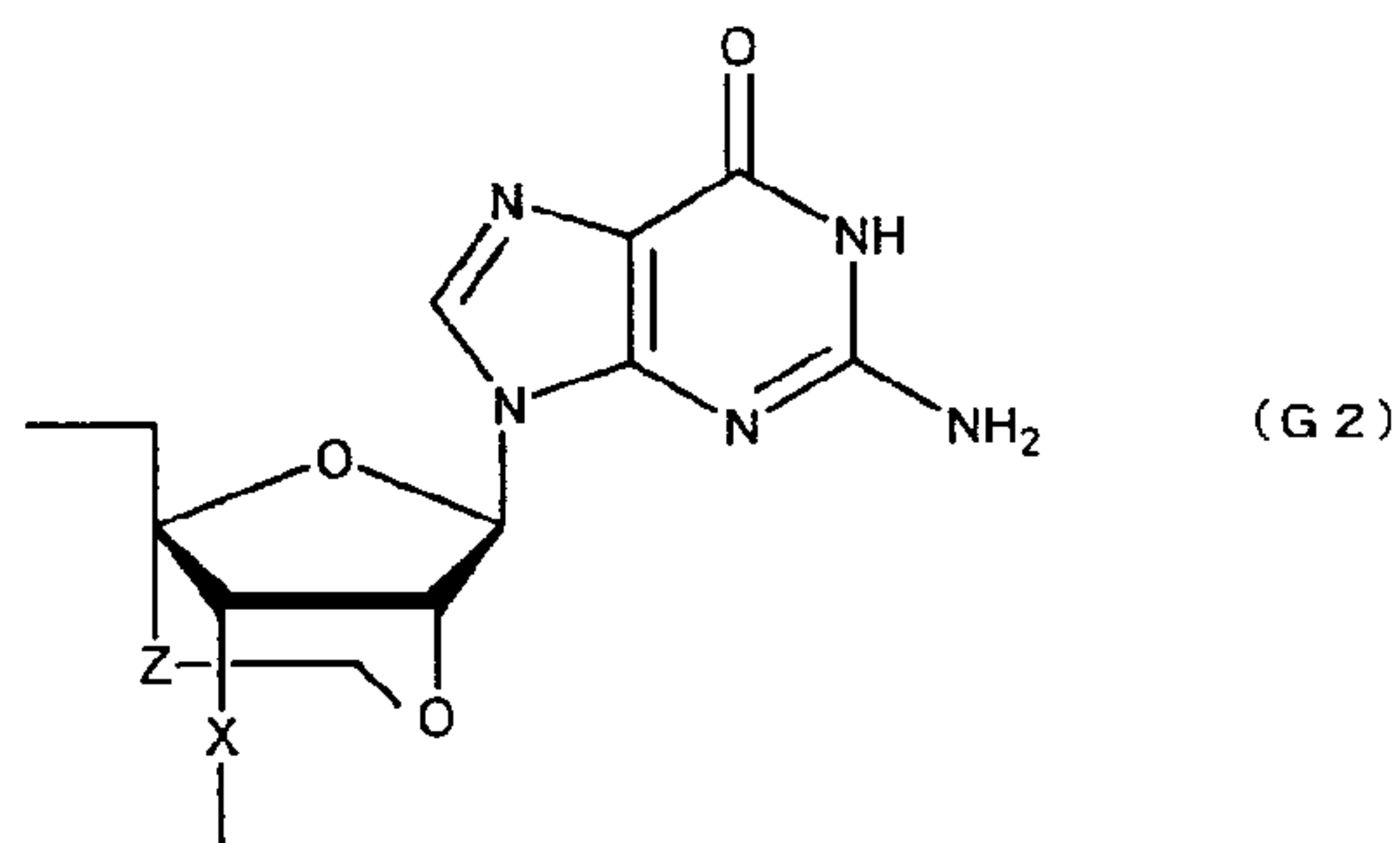
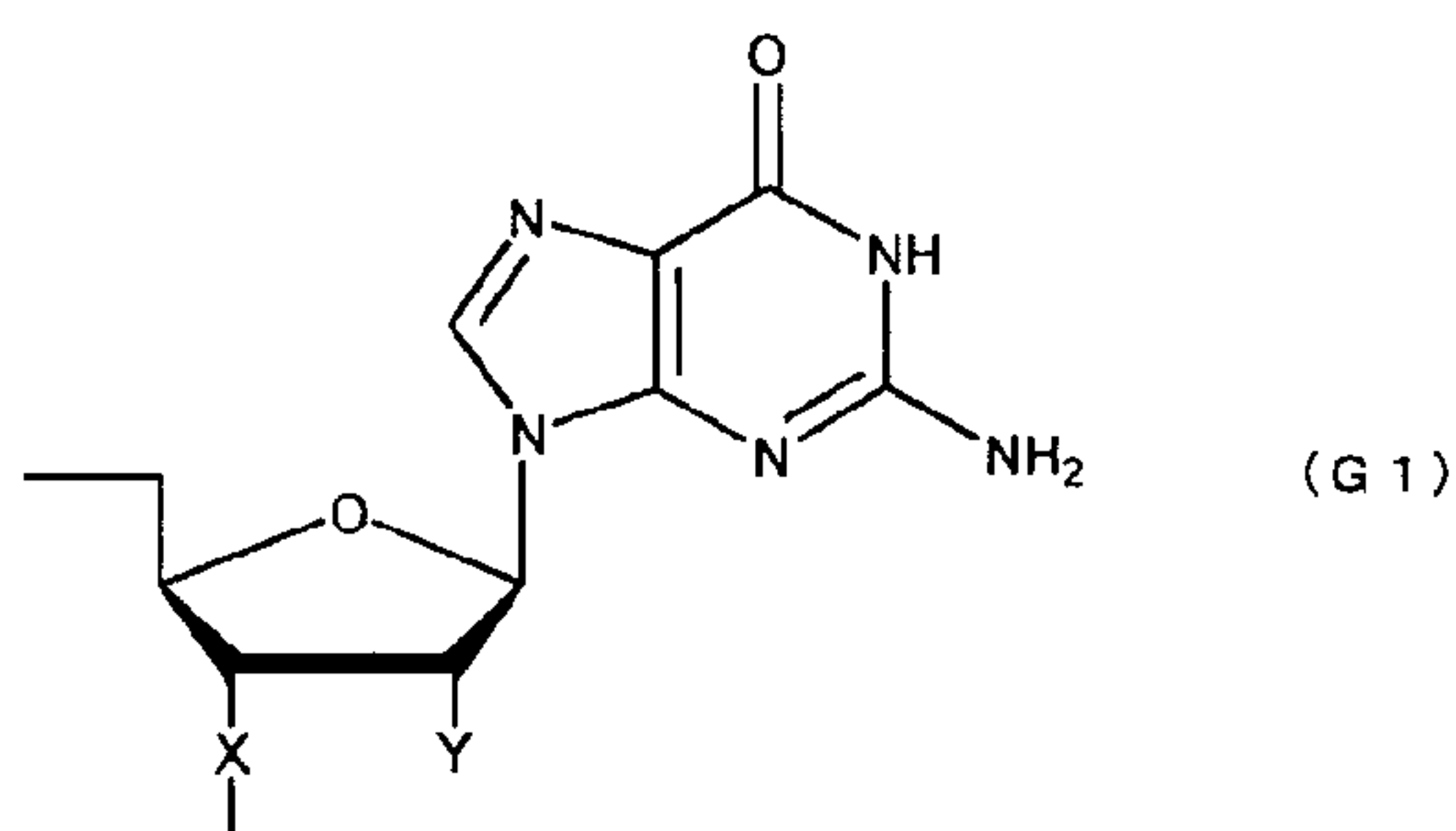
30 (4j')HO-Bt-Bc-Bt-Bg-Ba-Bc-Ba-Ba-,



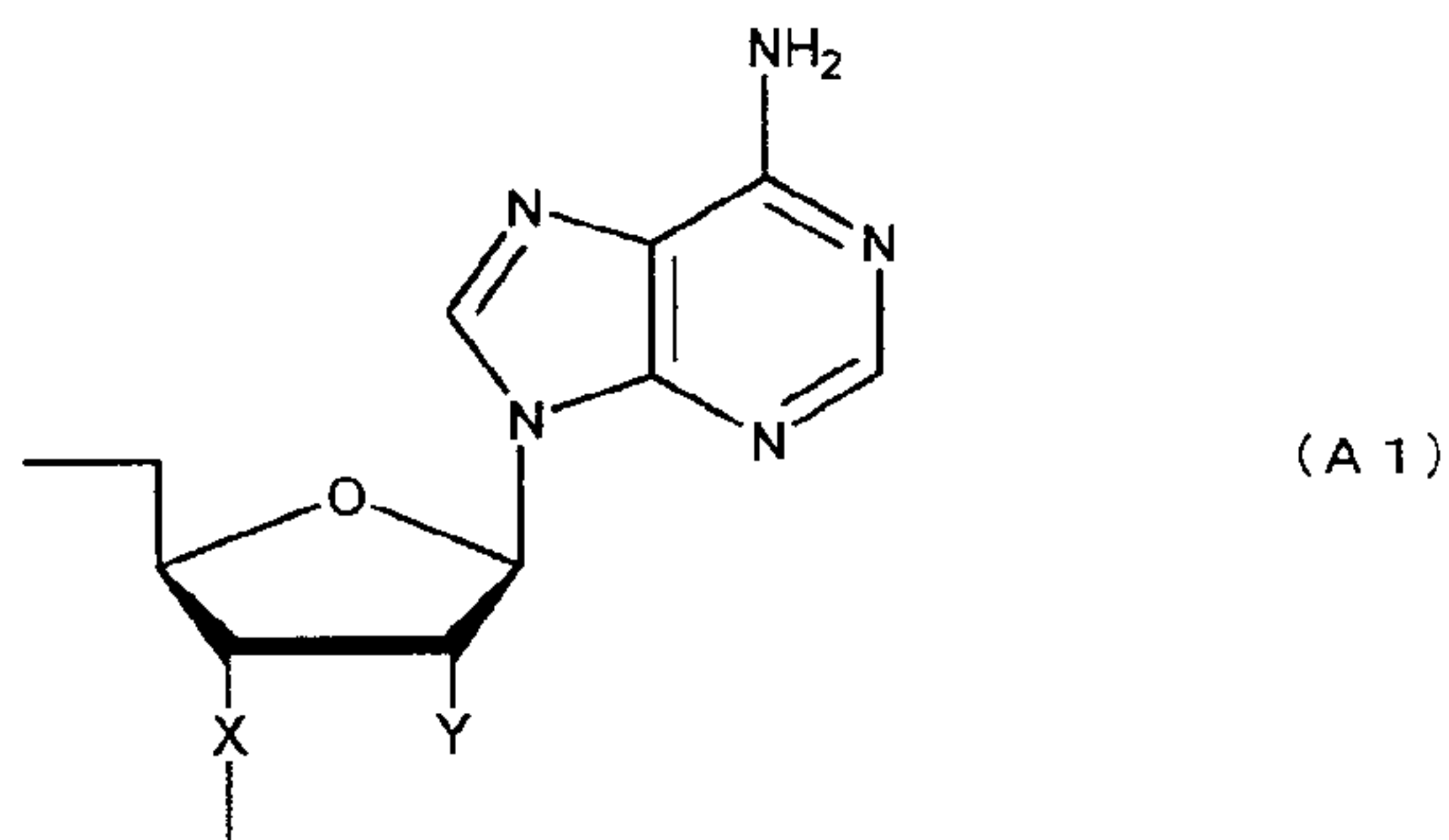
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(4m')HO-Bt-Bg-Bt-Bt-Bc-Bt-Bg-Ba-Bc-Ba-Ba-

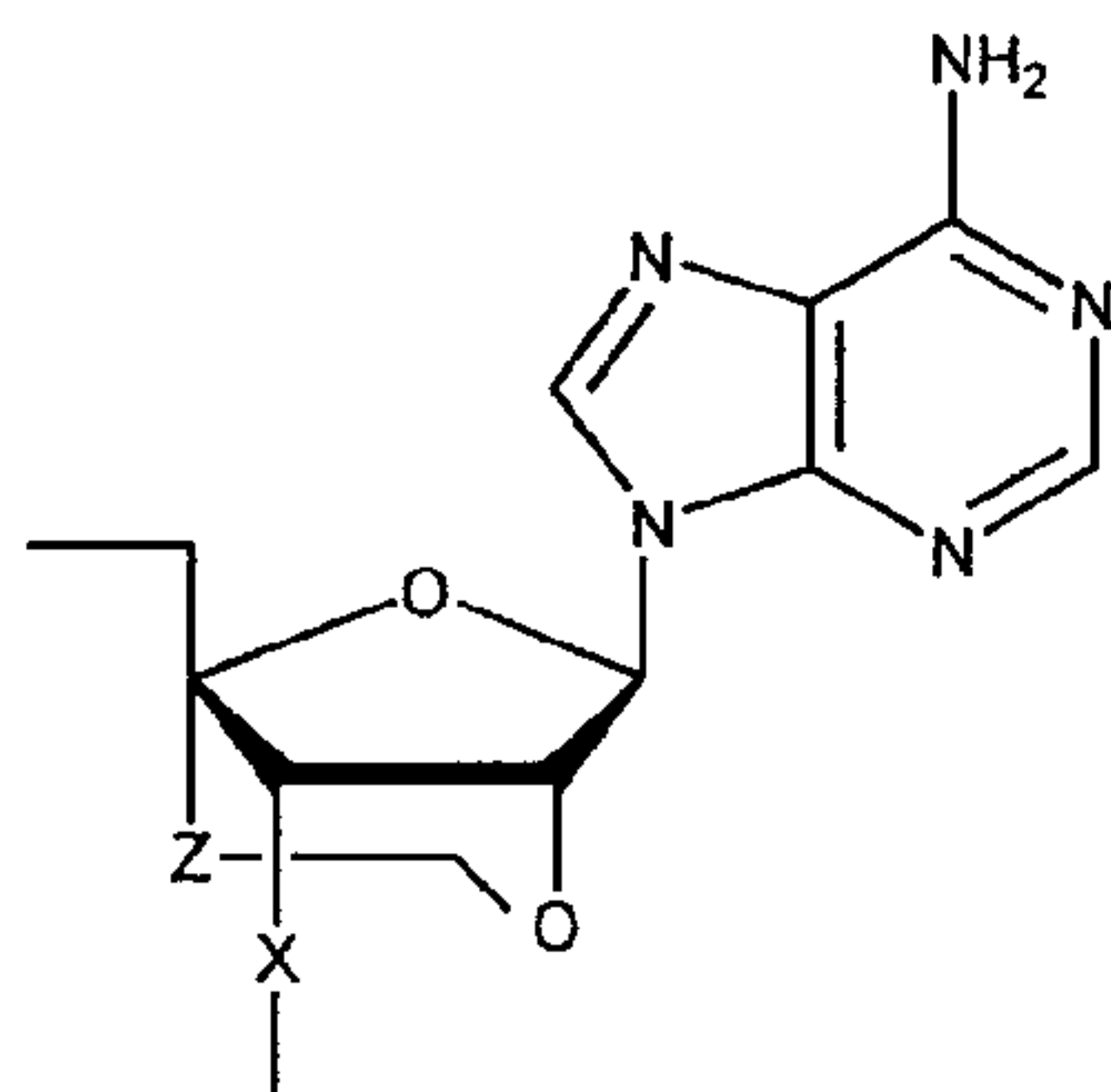
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):



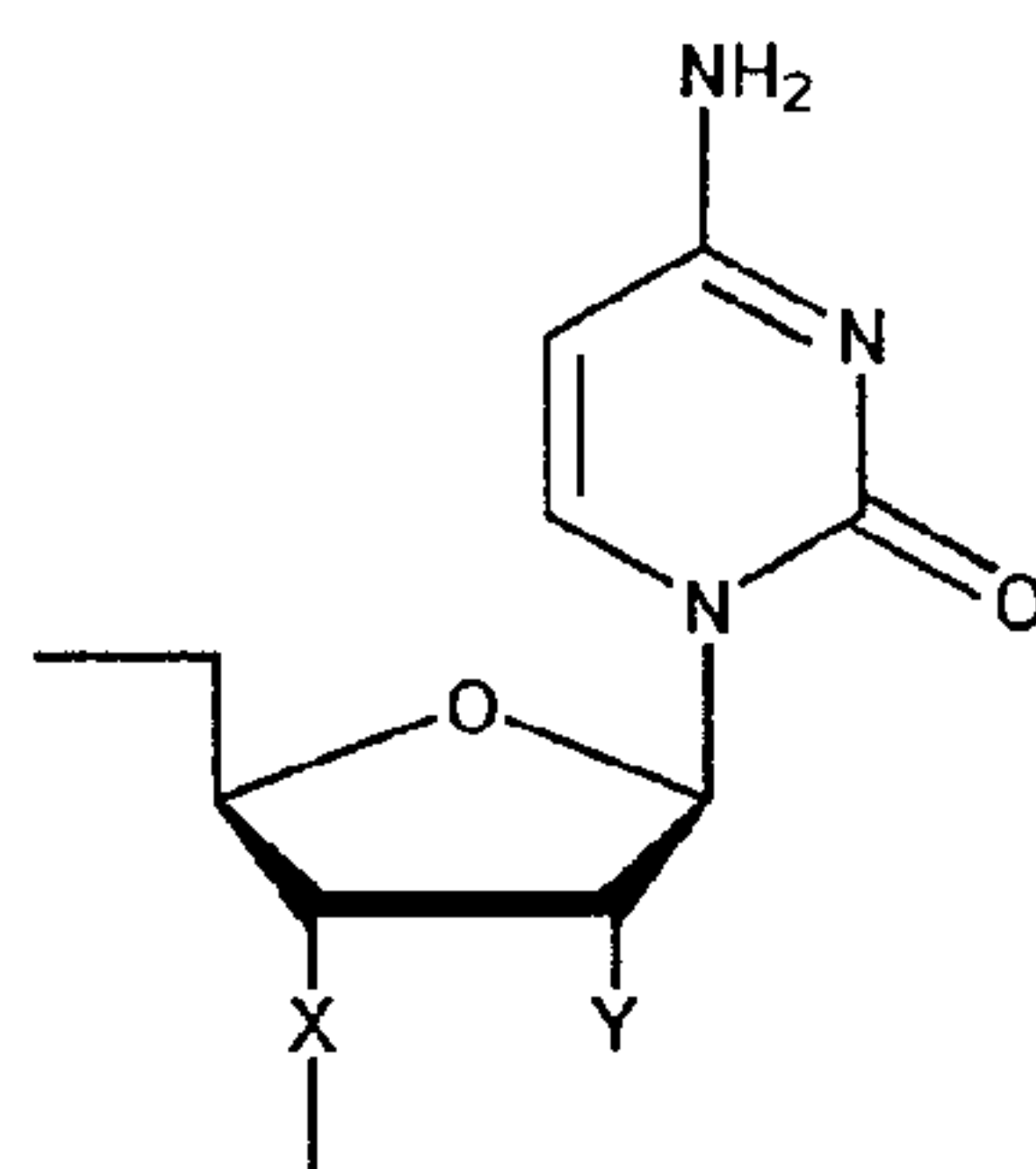
10



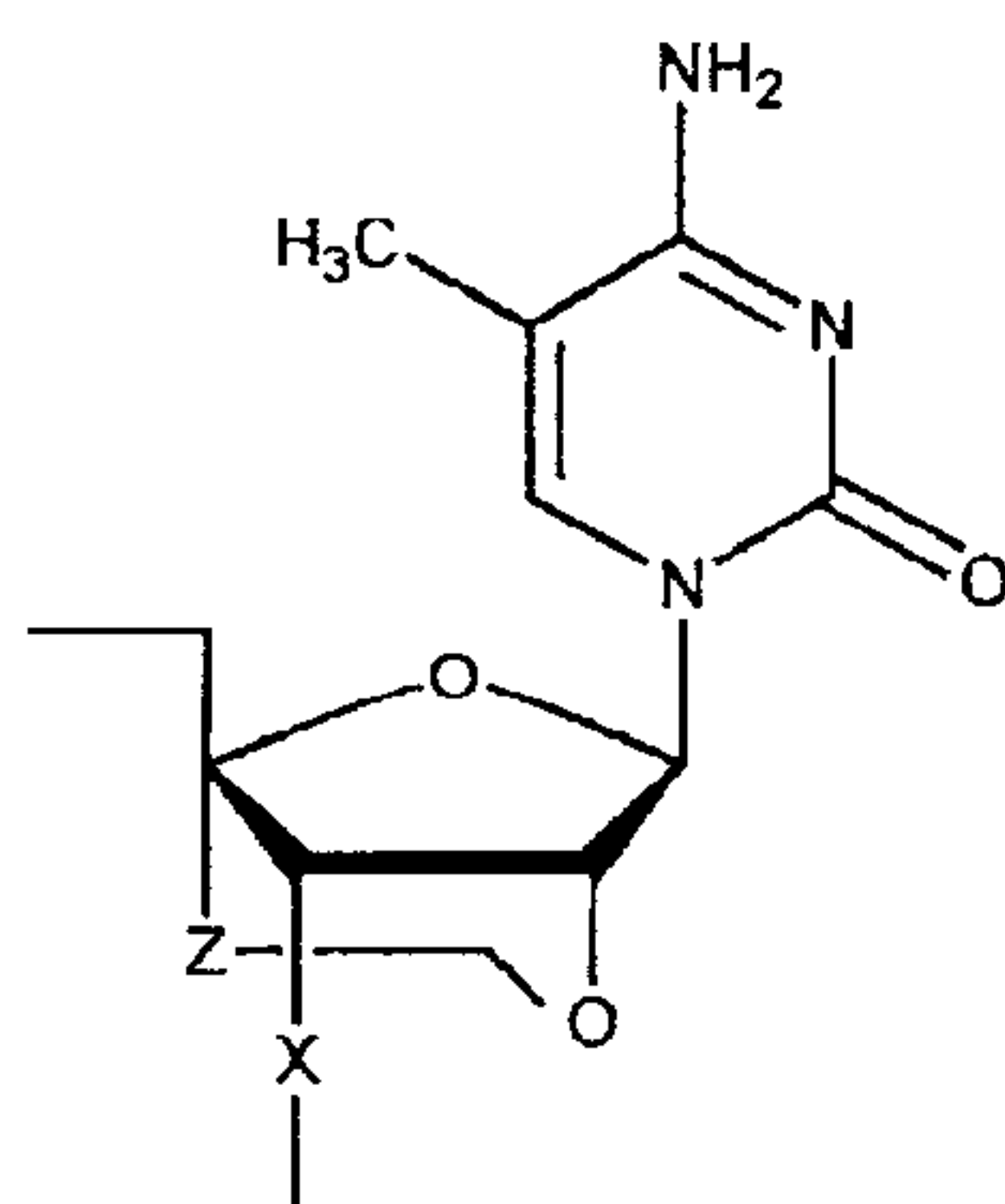
79861-7D



(A 2)



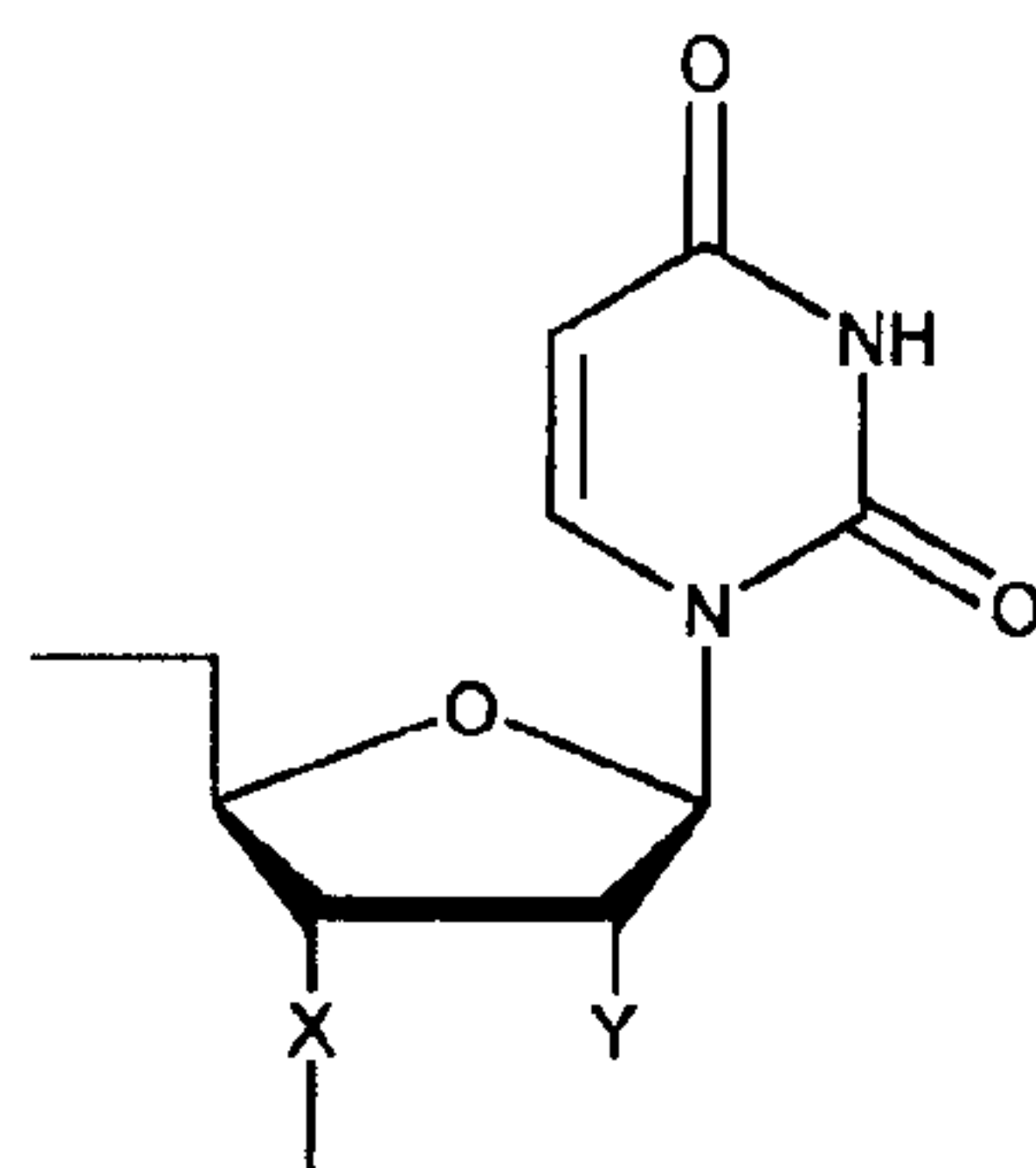
(C 1)



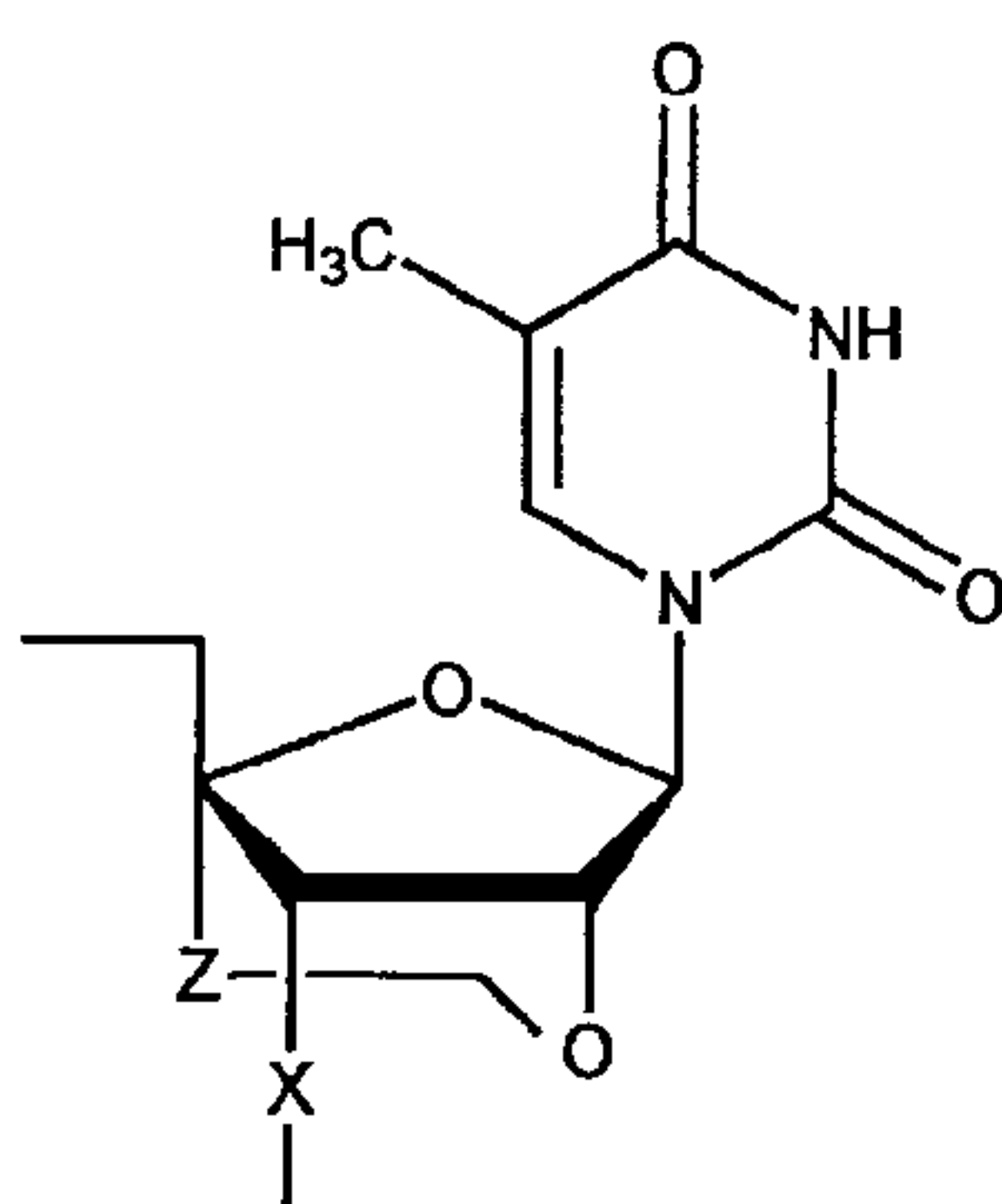
(C 2)

5

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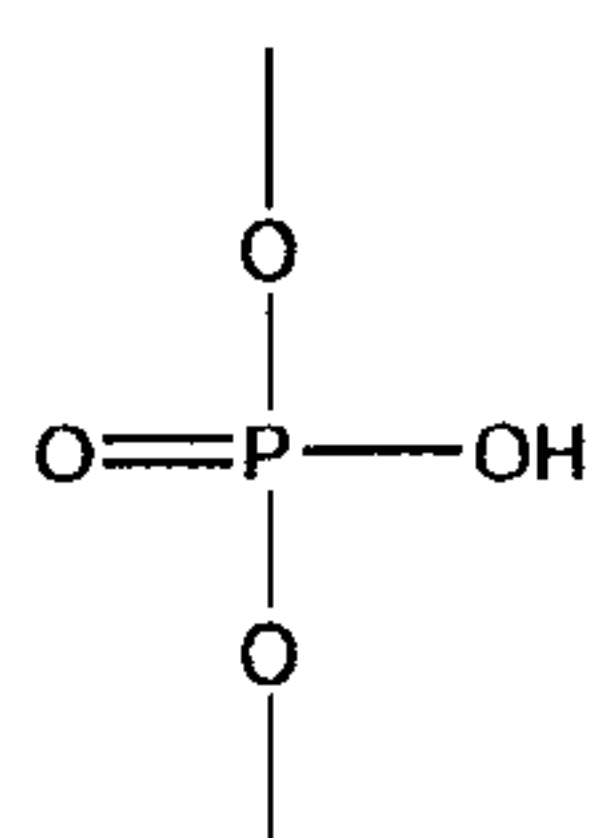
(U1)



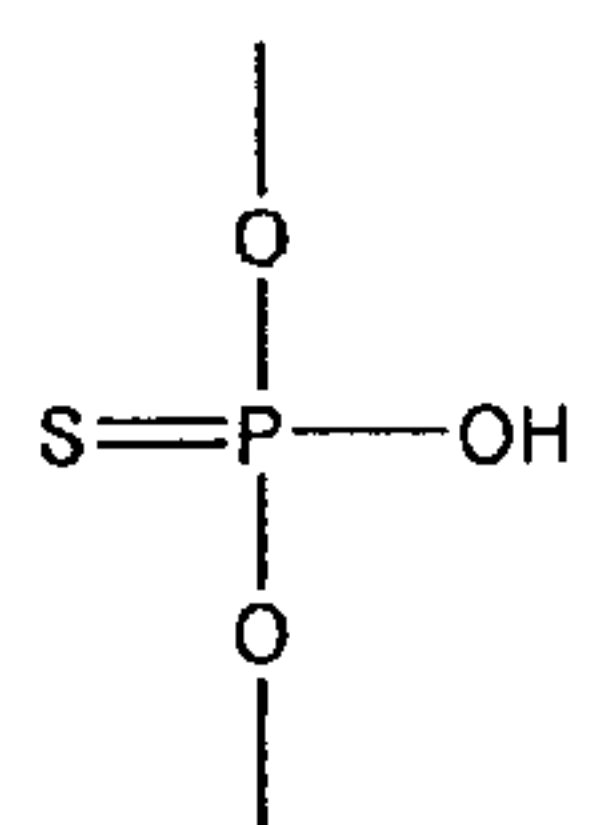
(T2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X1)



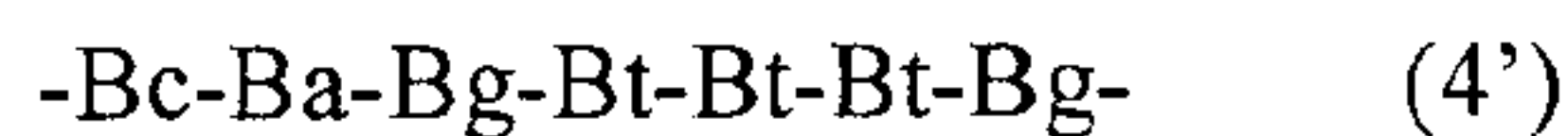
(X2)

10 Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group

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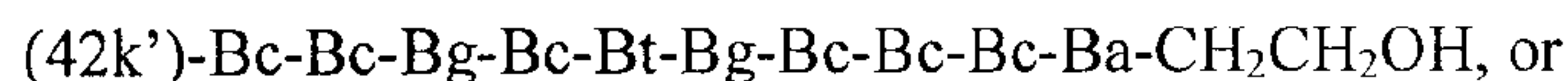
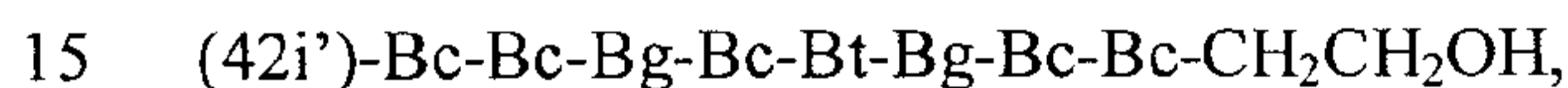
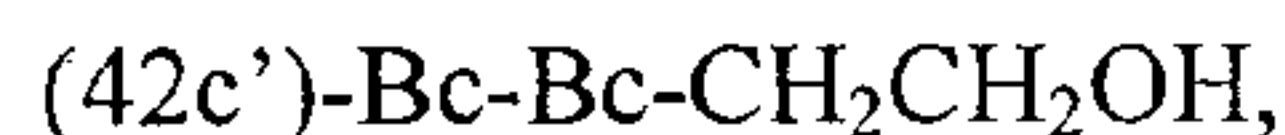
with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M'4} is a group represented by the following formula (4'):



5 where Bg, Ba, Bt and Bc are as described above;

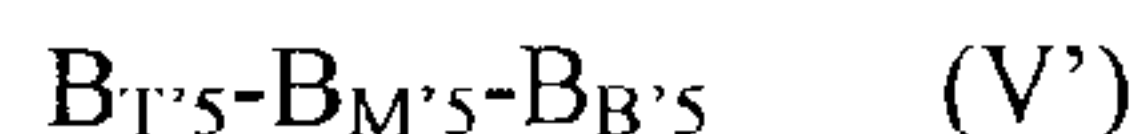
B_{B'4} is a group represented by any one of the following (42a') to (42l'):



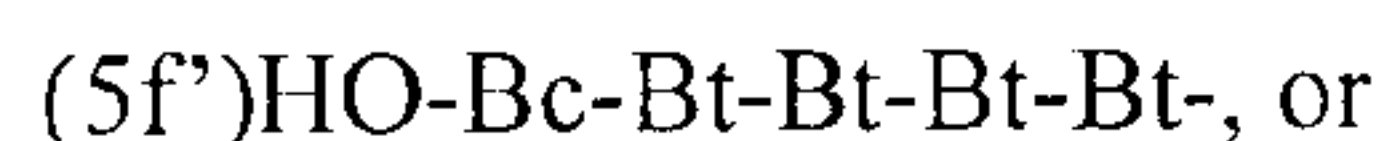
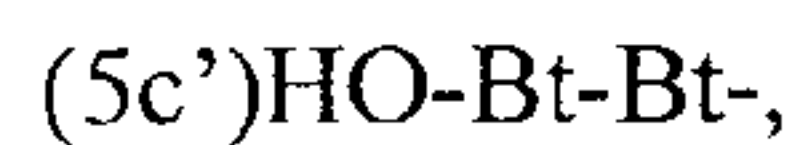
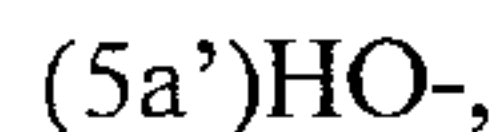
where Bg, Ba, Bt and Bc are as described above;

20 provided that at least one of the nucleosides constituting the compound represented by formula (IV') has 2'-O,4'-C-alkylene group.

[17] A compound represented by the following general formula (V') or a pharmacologically acceptable salt thereof:



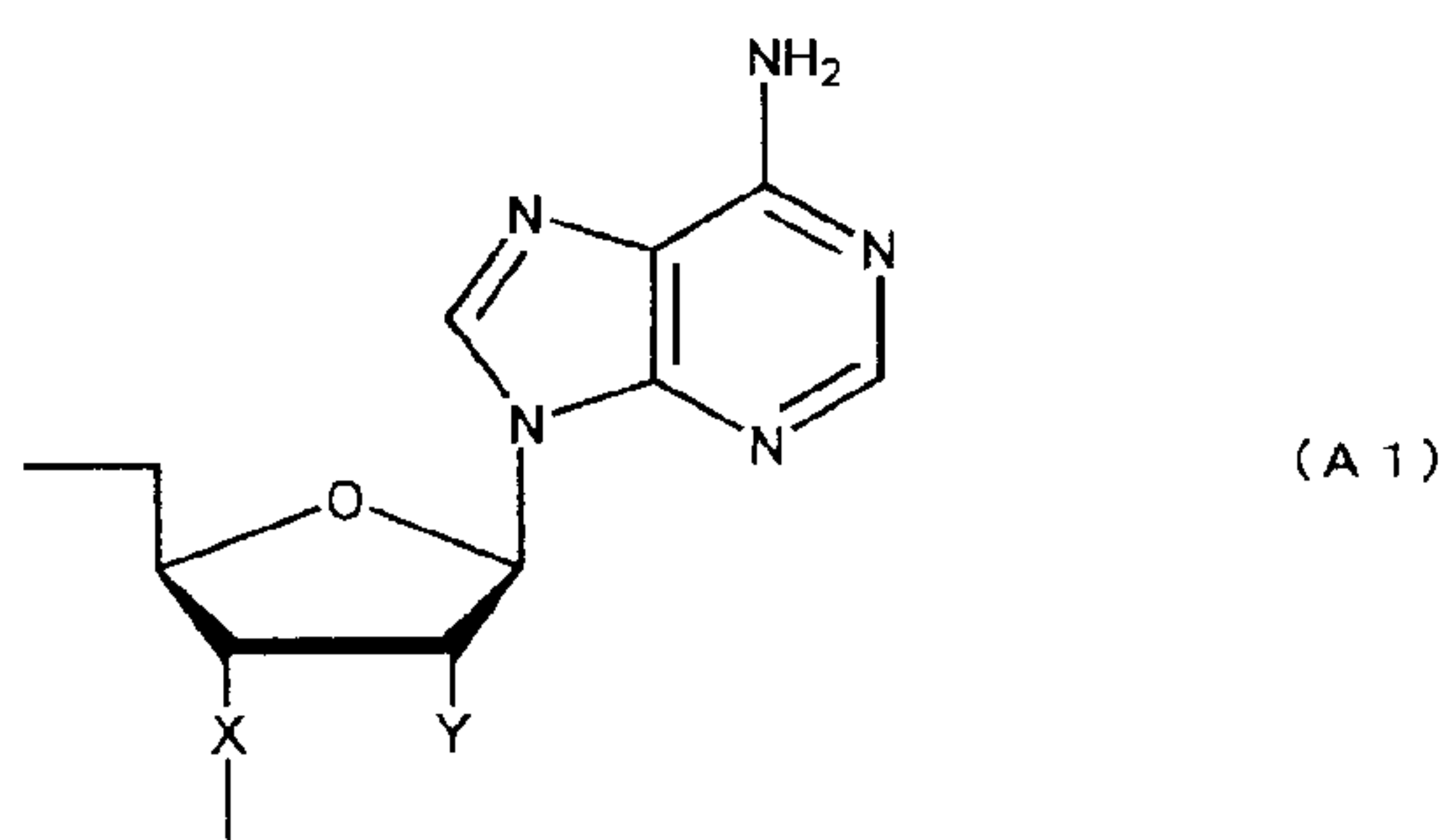
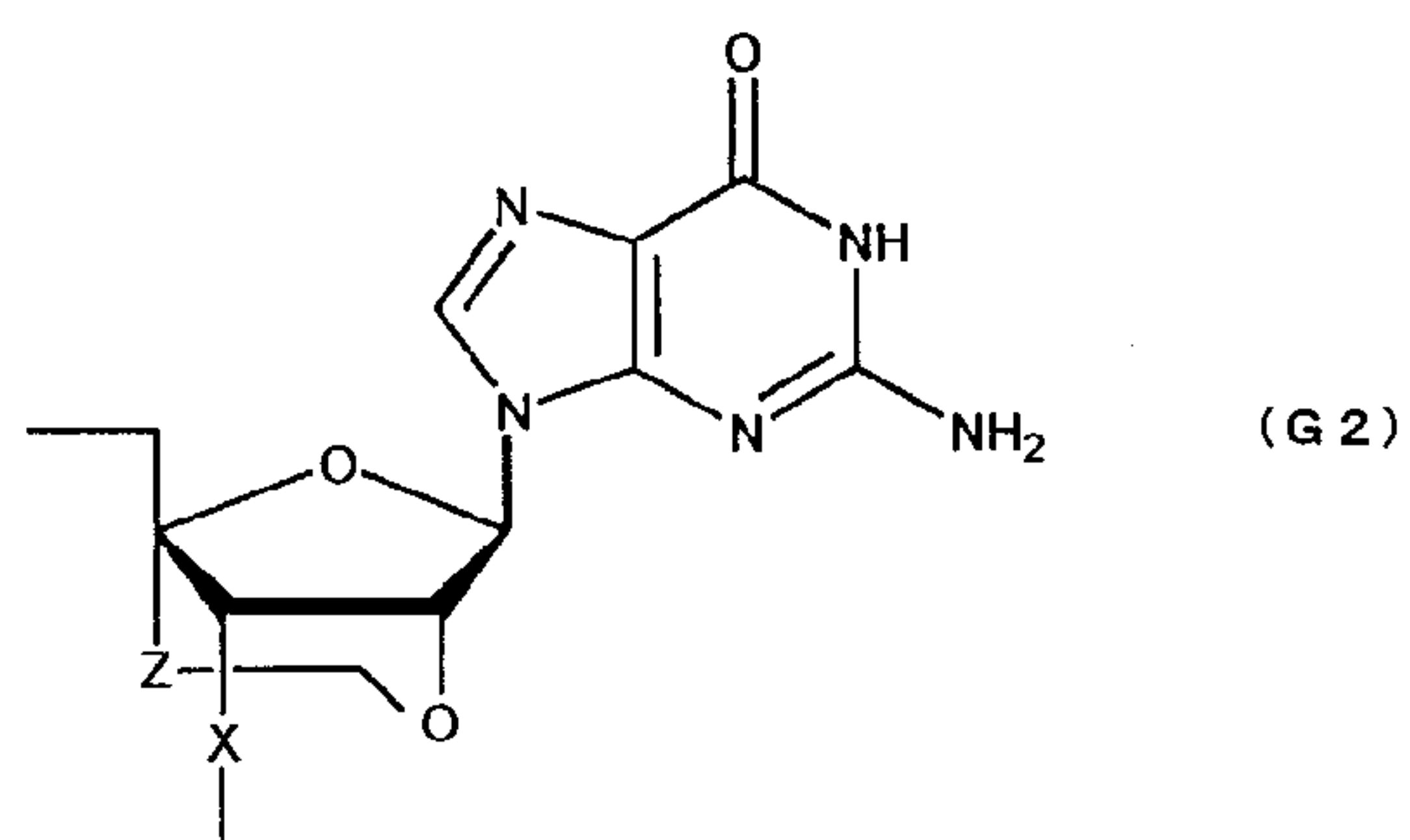
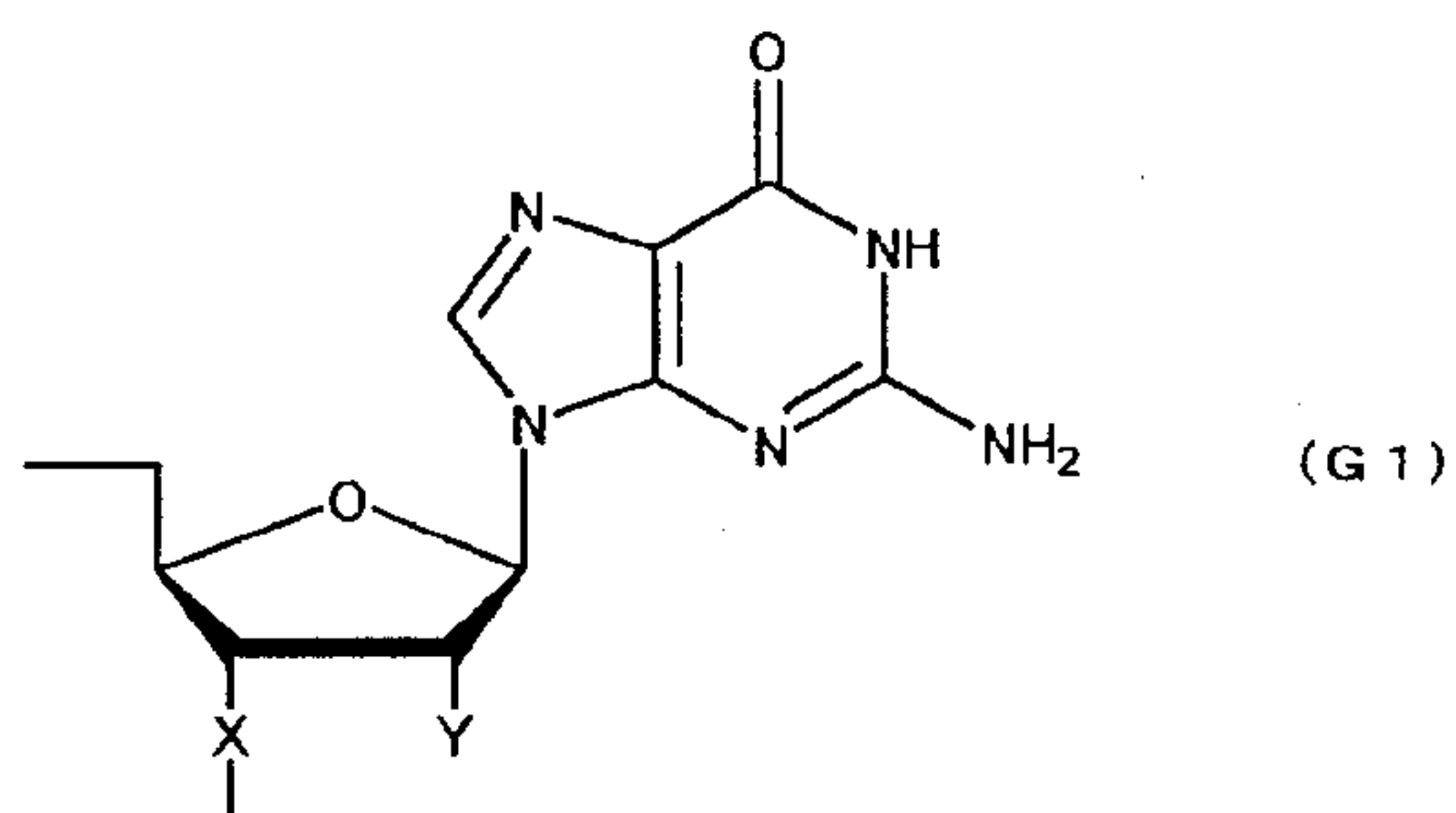
25 where B_{T'5} is a group represented by any one of the following (5a') to (5g'):



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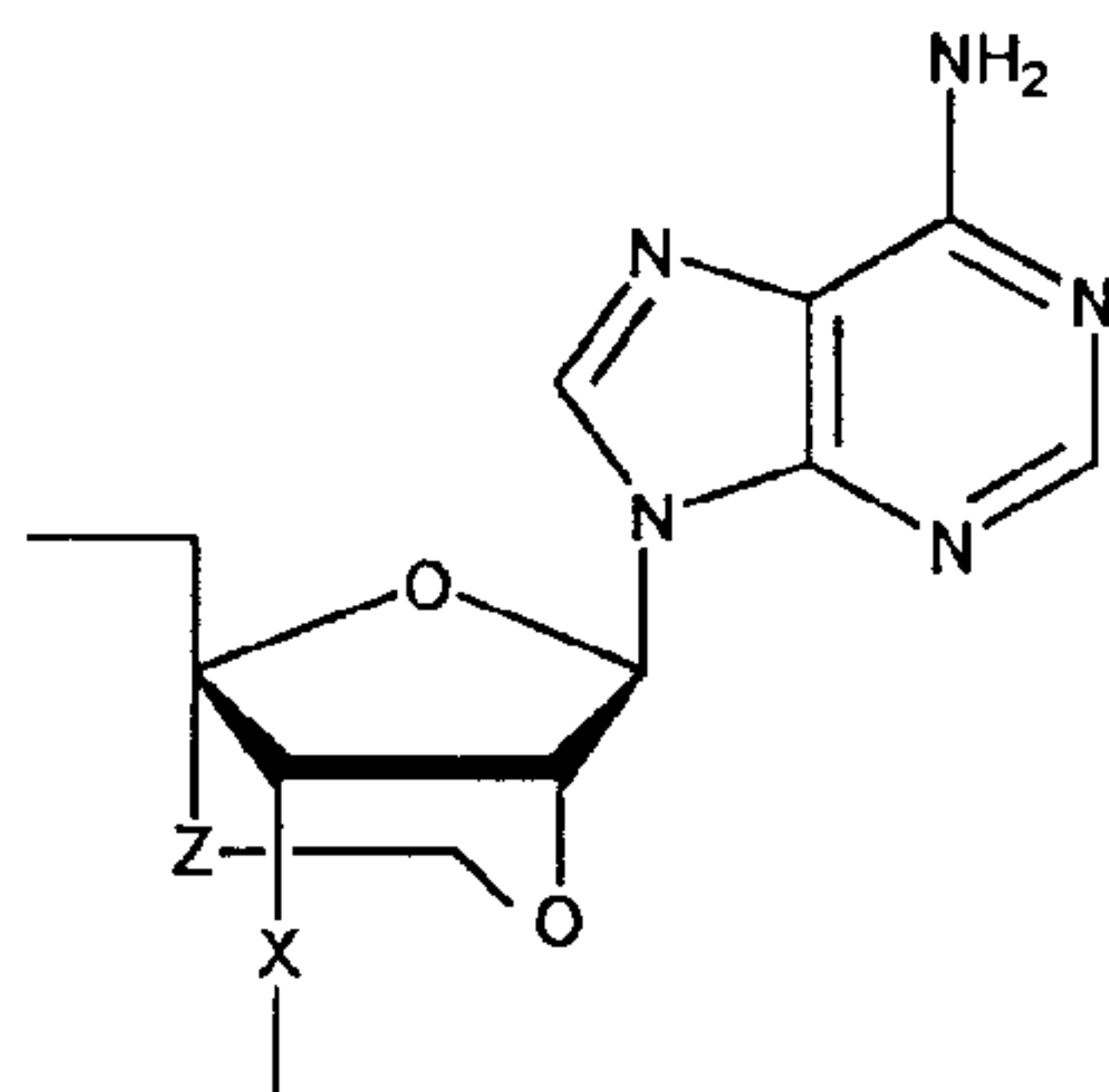
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

5

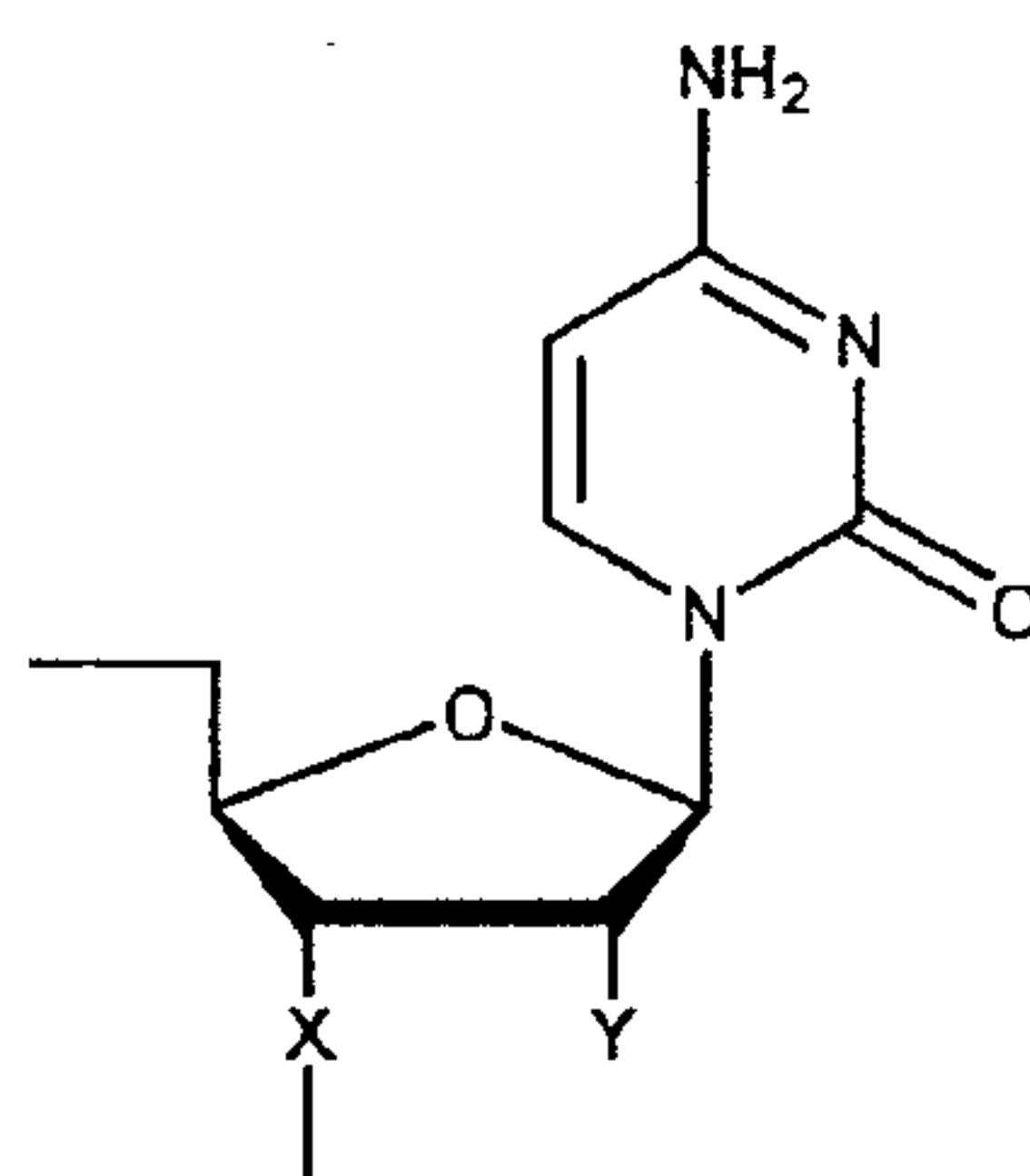


10

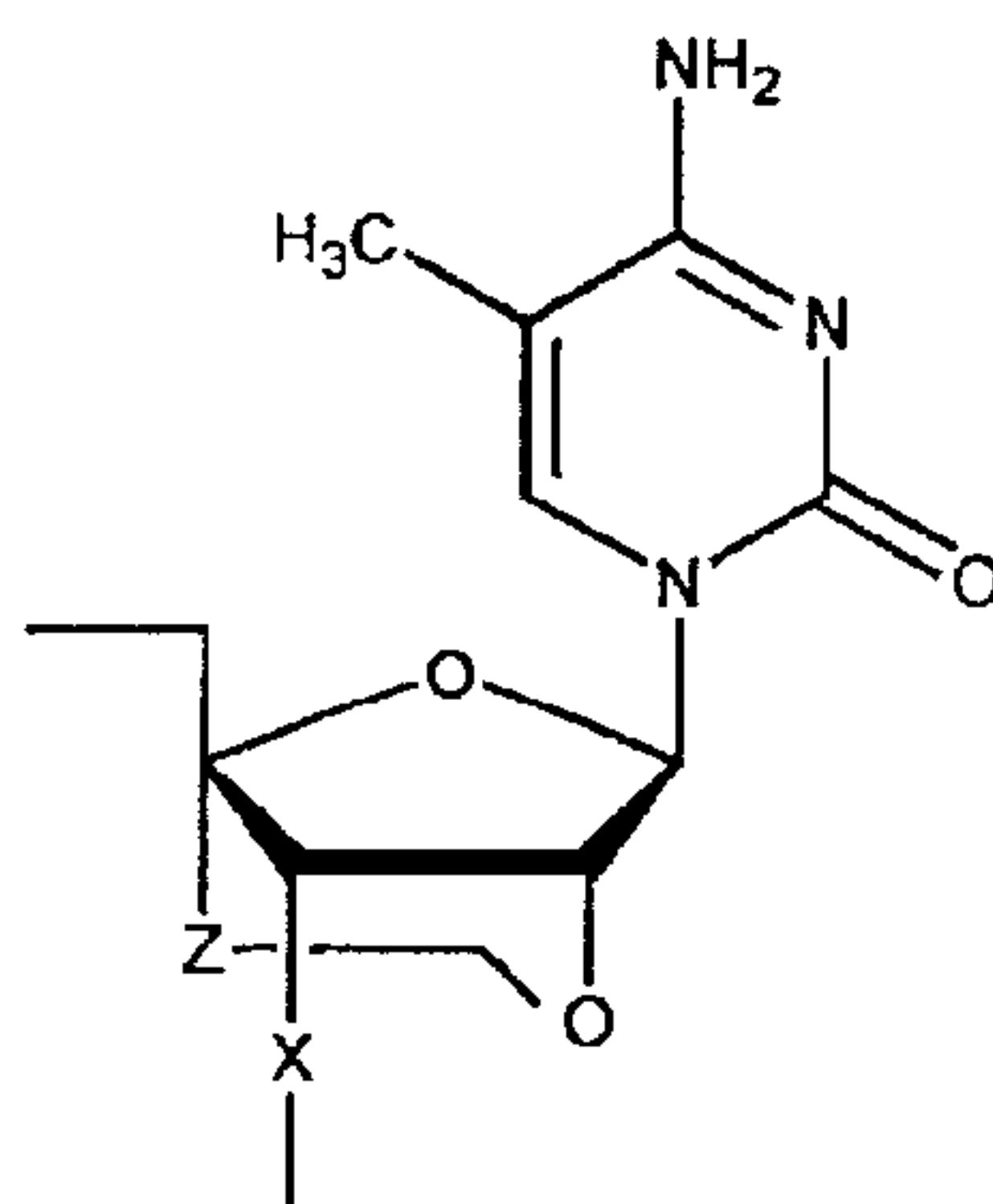
79861-7D



(A 2)

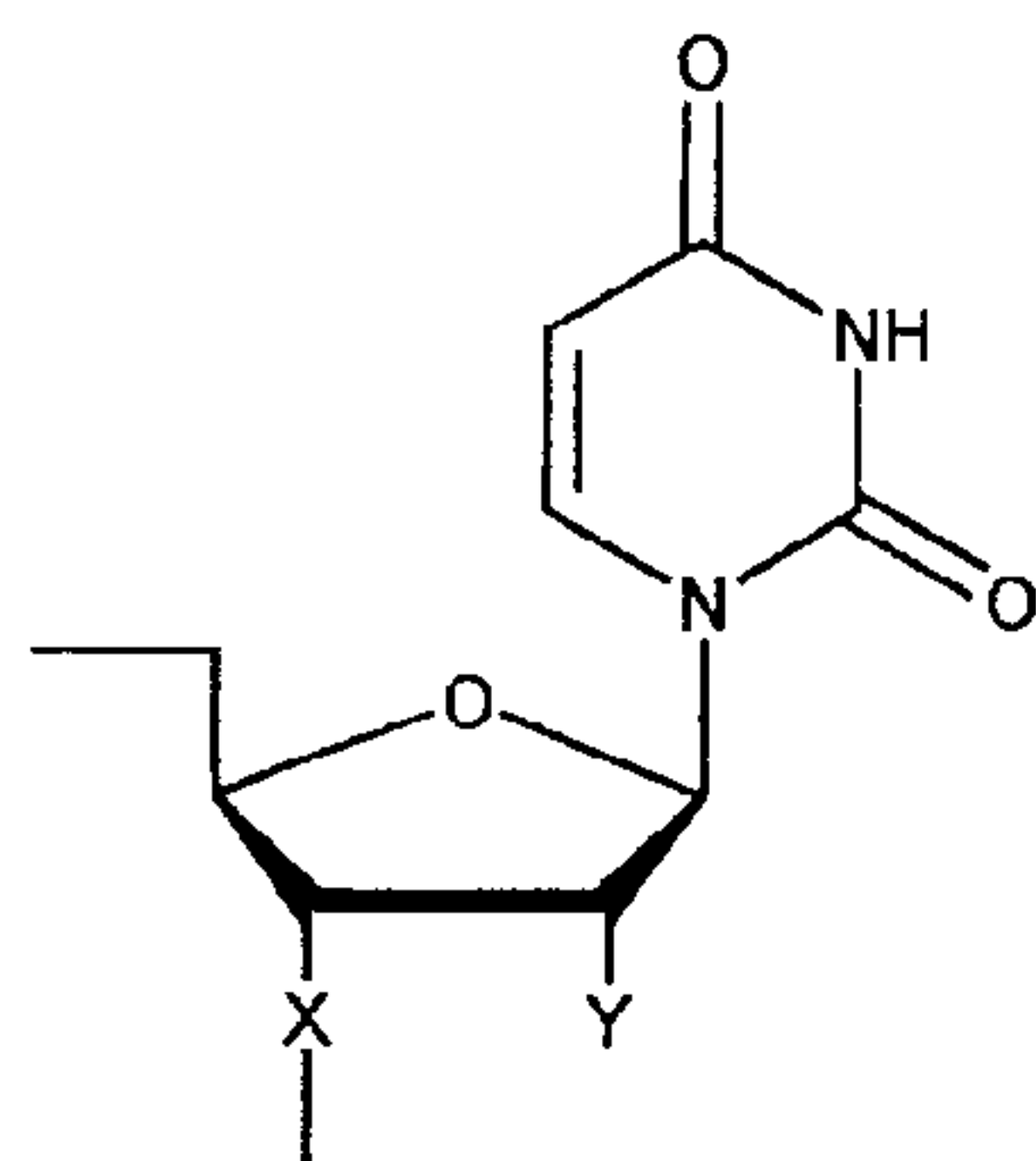


(C 1)

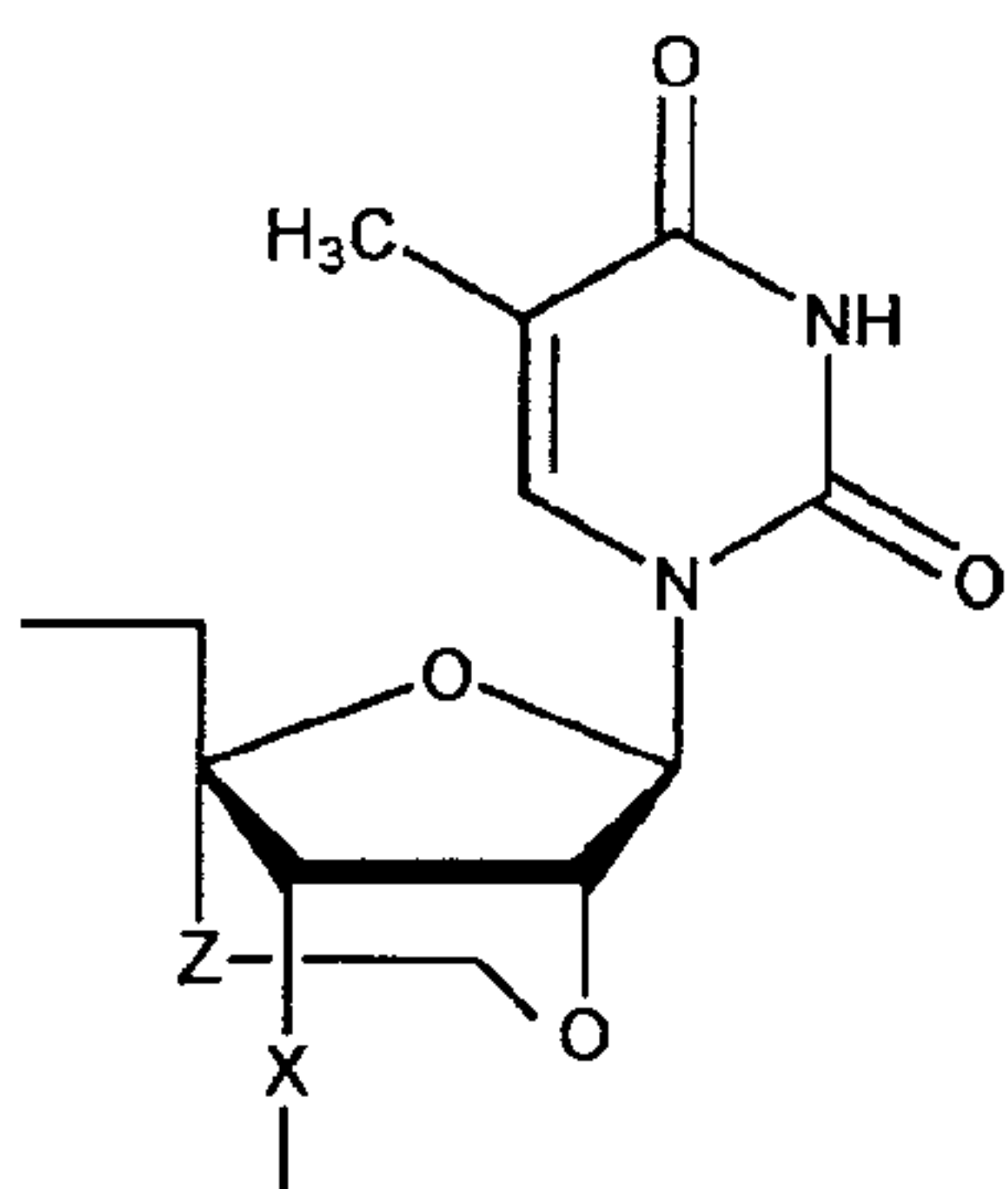


(C 2)

79861-7D



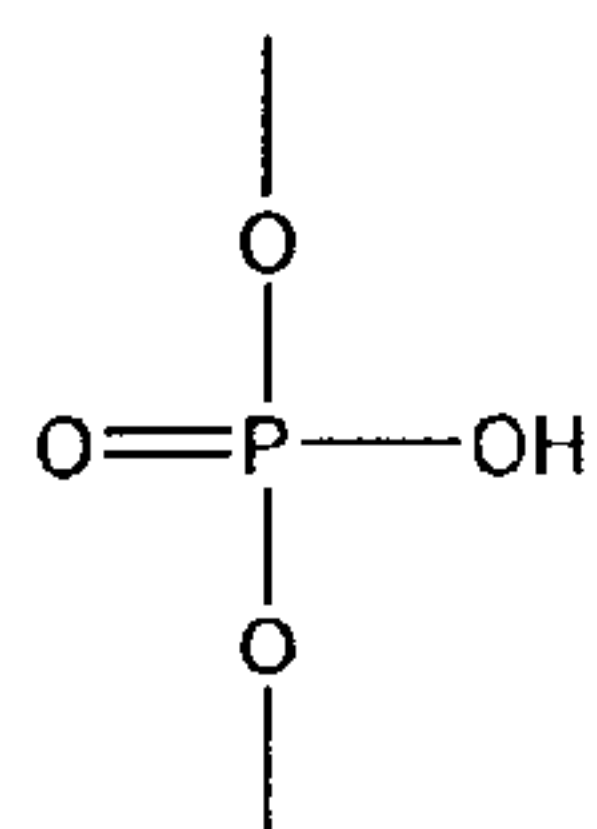
(U 1)



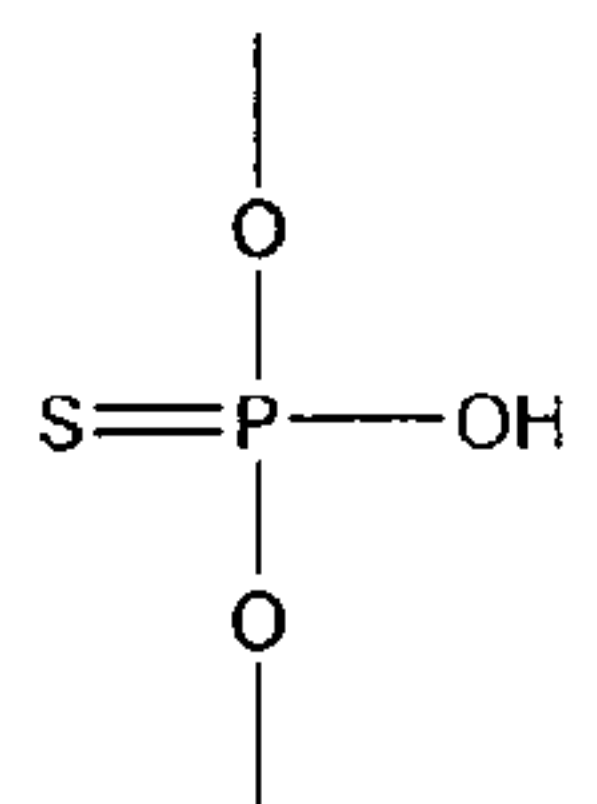
(T 2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



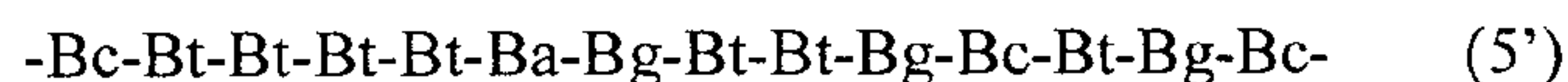
(X 2)

10 Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group

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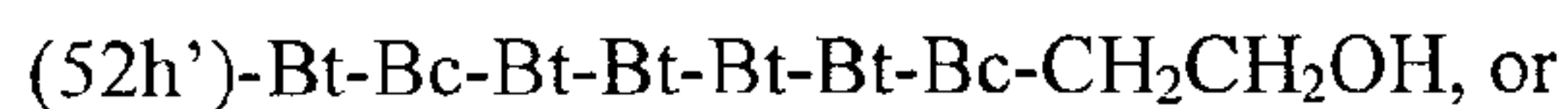
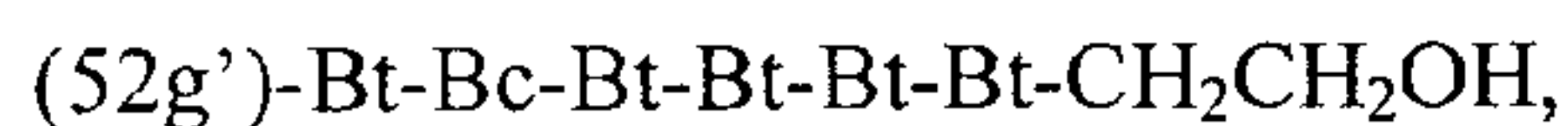
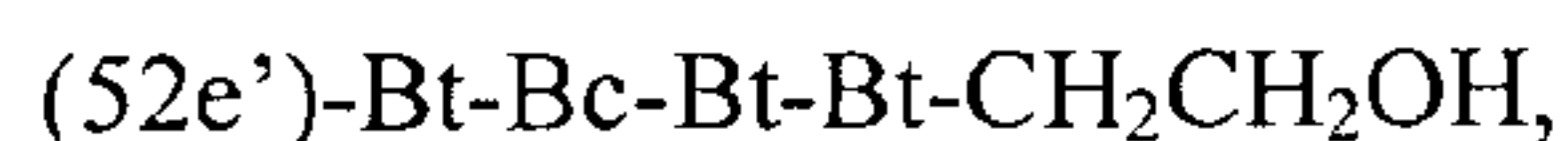
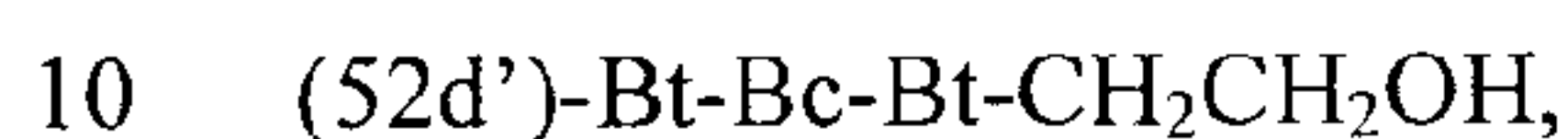
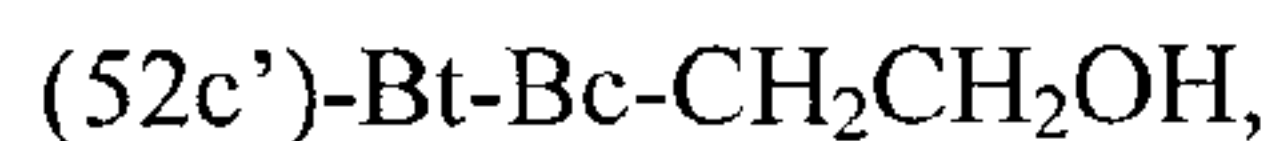
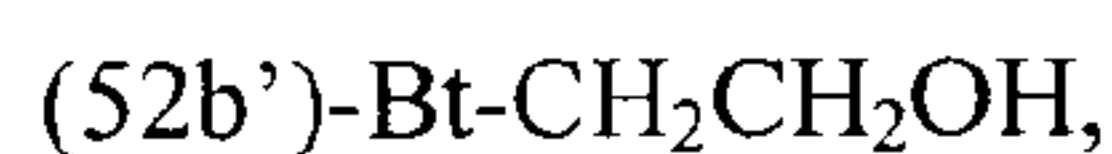
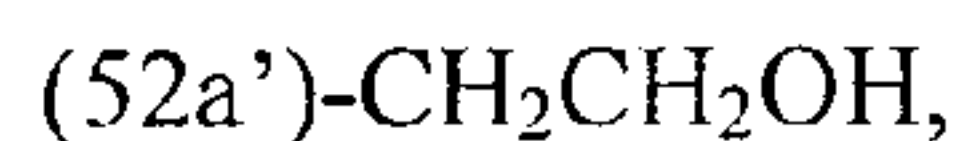
with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M'5} is a group represented by the following formula (5'):



5 where Bg, Ba, Bt and Bc are as described above;

B_{B'5} is a group represented by any one of the following (52a') to (52i'):



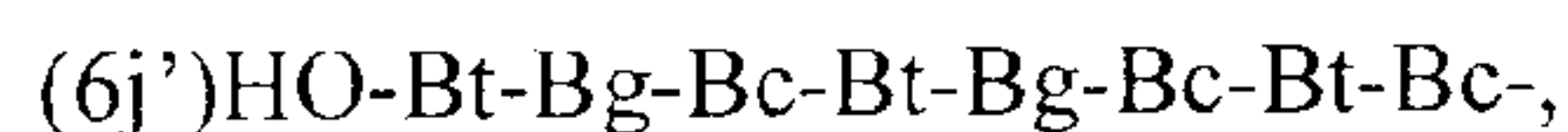
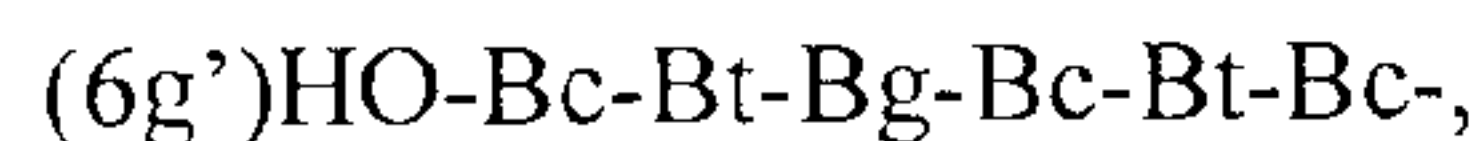
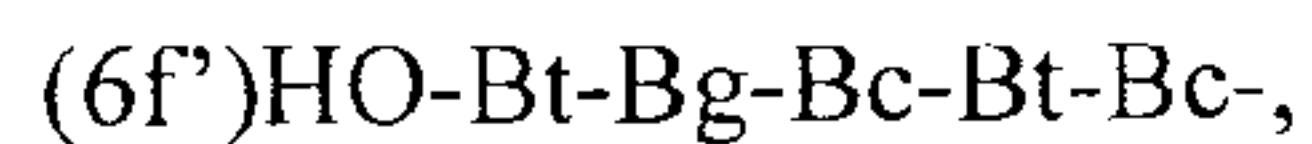
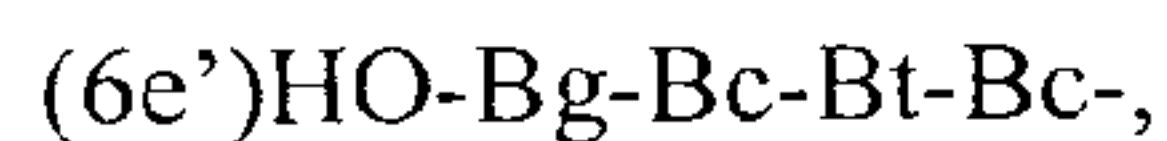
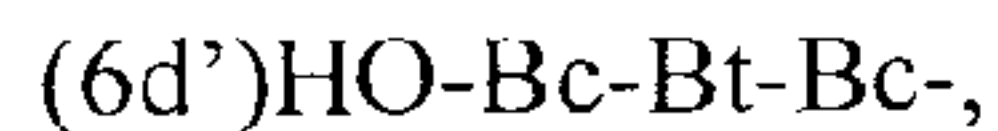
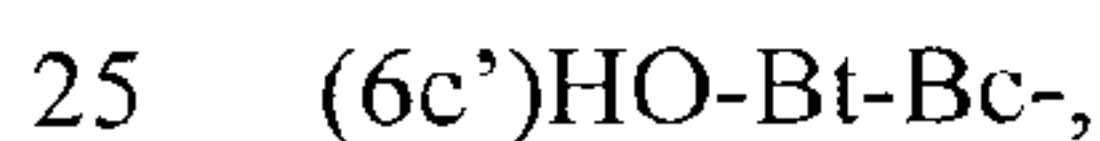
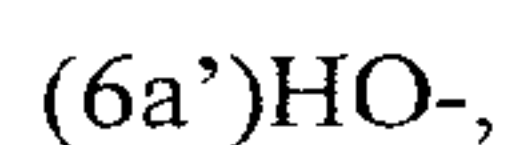
where Bg, Ba, Bt and Bc are as described above;

provided that at least one of the nucleosides constituting the compound represented by formula (V') has 2'-O,4'-C-alkylene group.

[18] A compound represented by the following general formula (VI') or a
20 pharmacologically acceptable salt thereof:



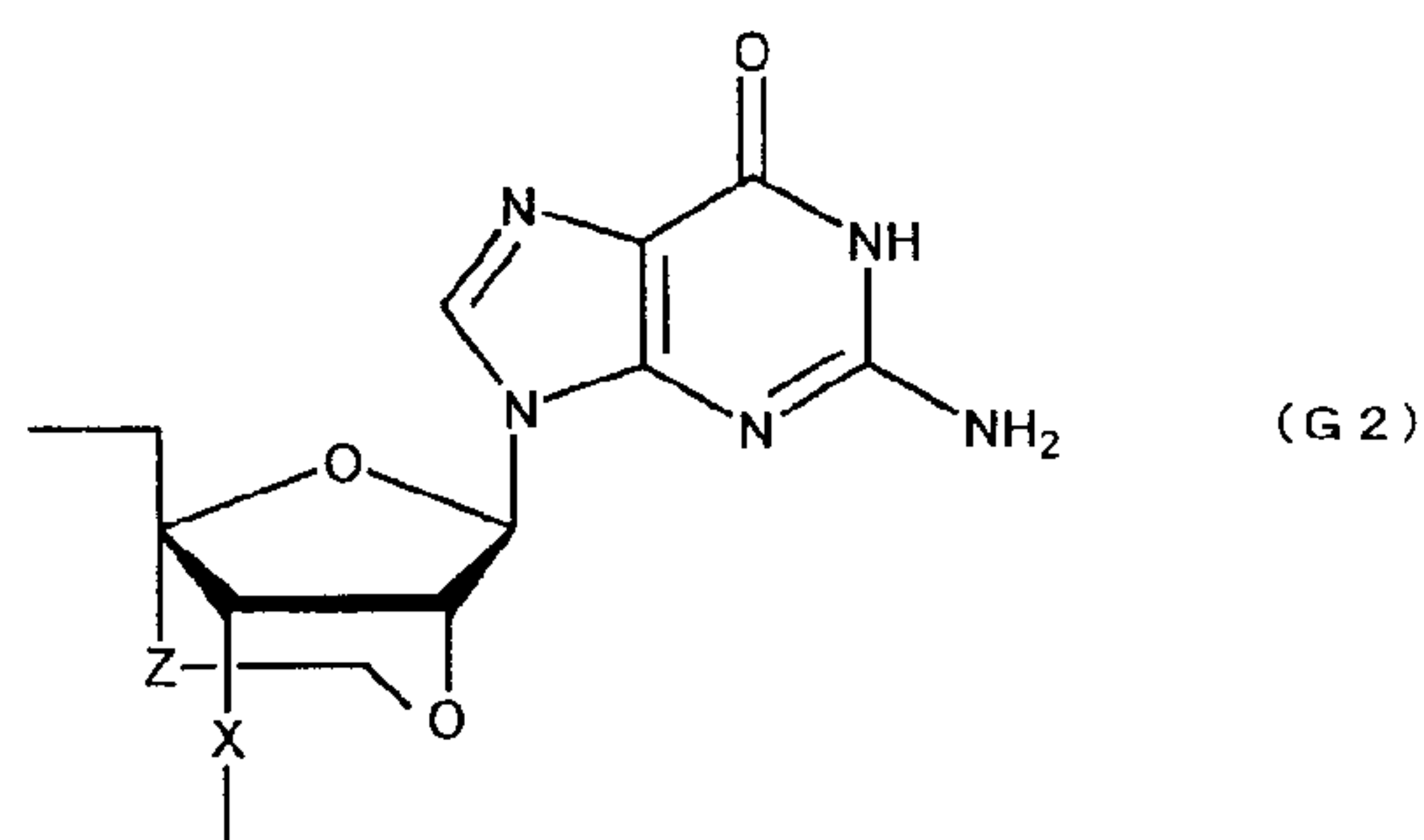
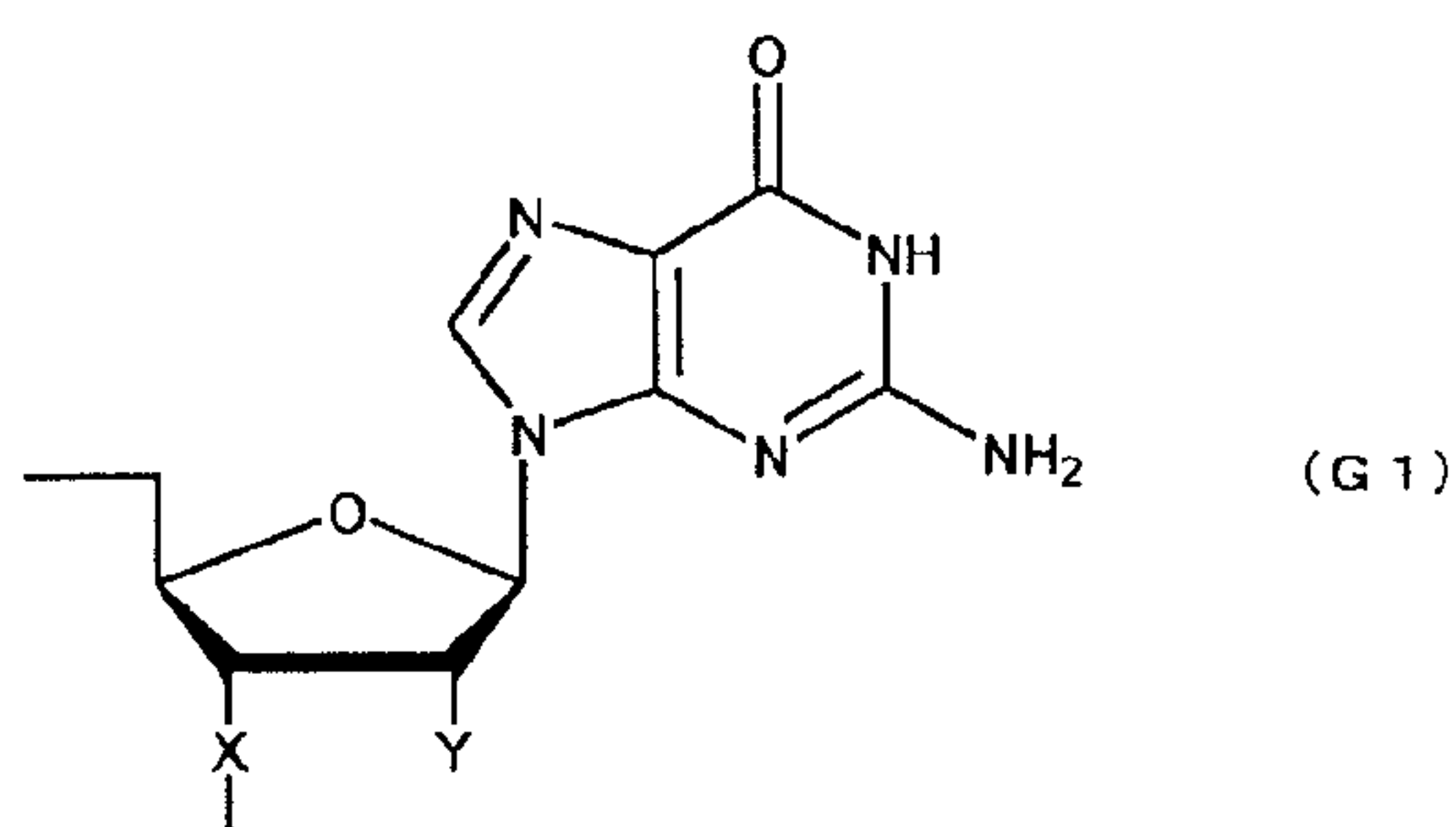
where B_{T'6} is a group represented by any one of the following (6a') to (6r'):



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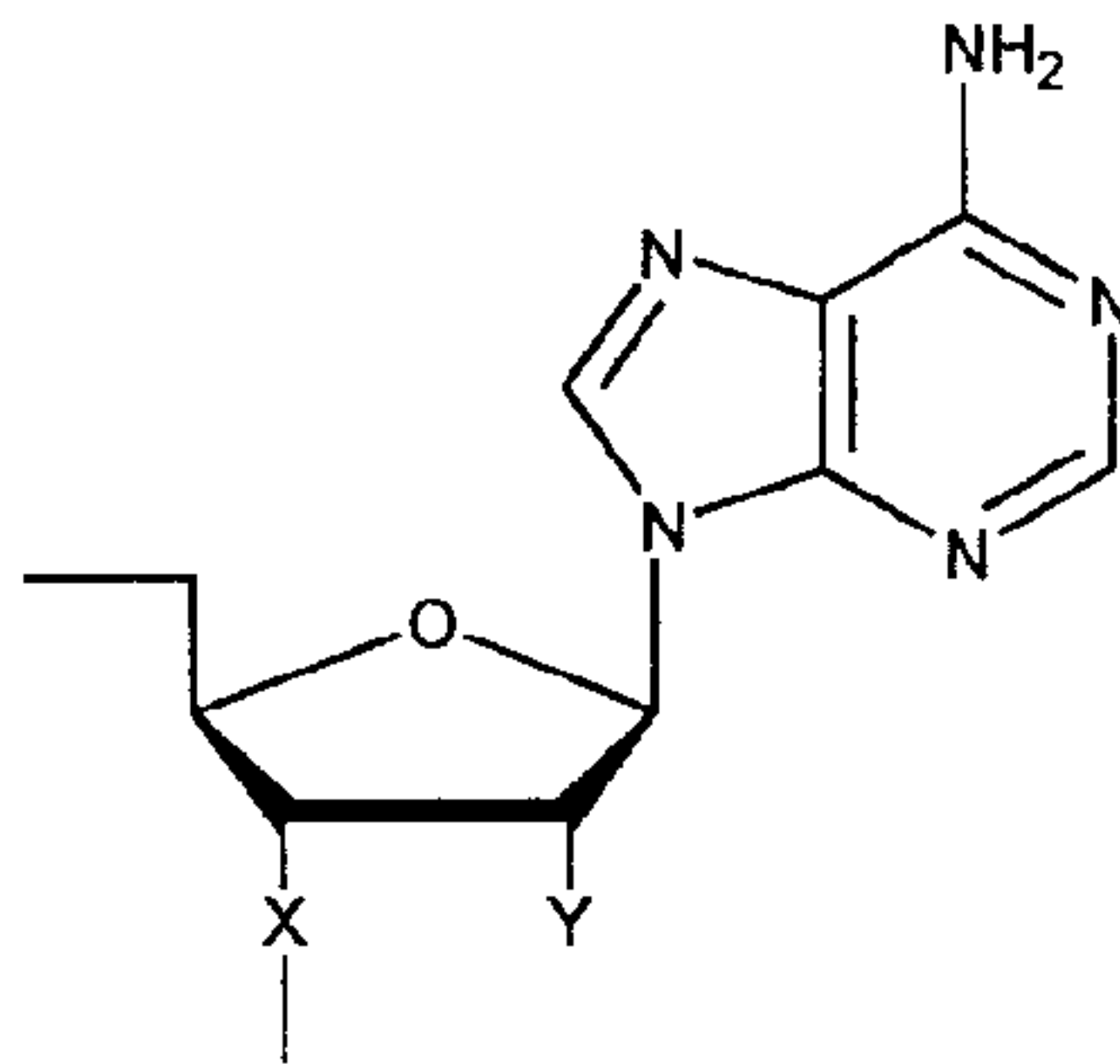
- (6l')HO-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-,
 (6m')HO-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-,
 (6n')HO-Bt-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-,
 (6o')HO-Bt-Bt-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-,
 5 (6p')HO-Bt-Bt-Bt-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-,
 (6q')HO-Bt-Bt-Bt-Bt-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-, or
 (6r')HO-Bc-Bt-Bt-Bt-Bt-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

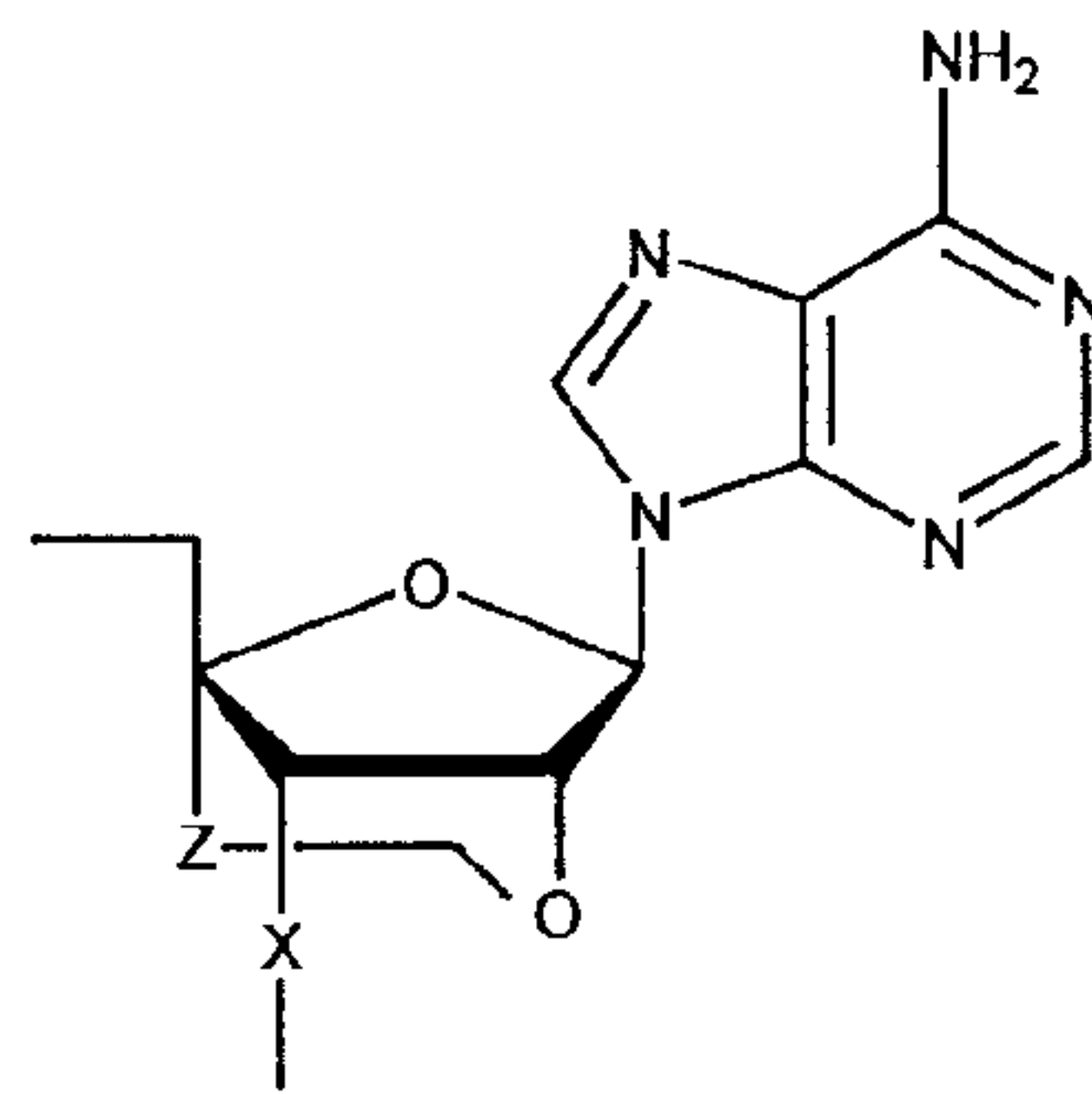


15

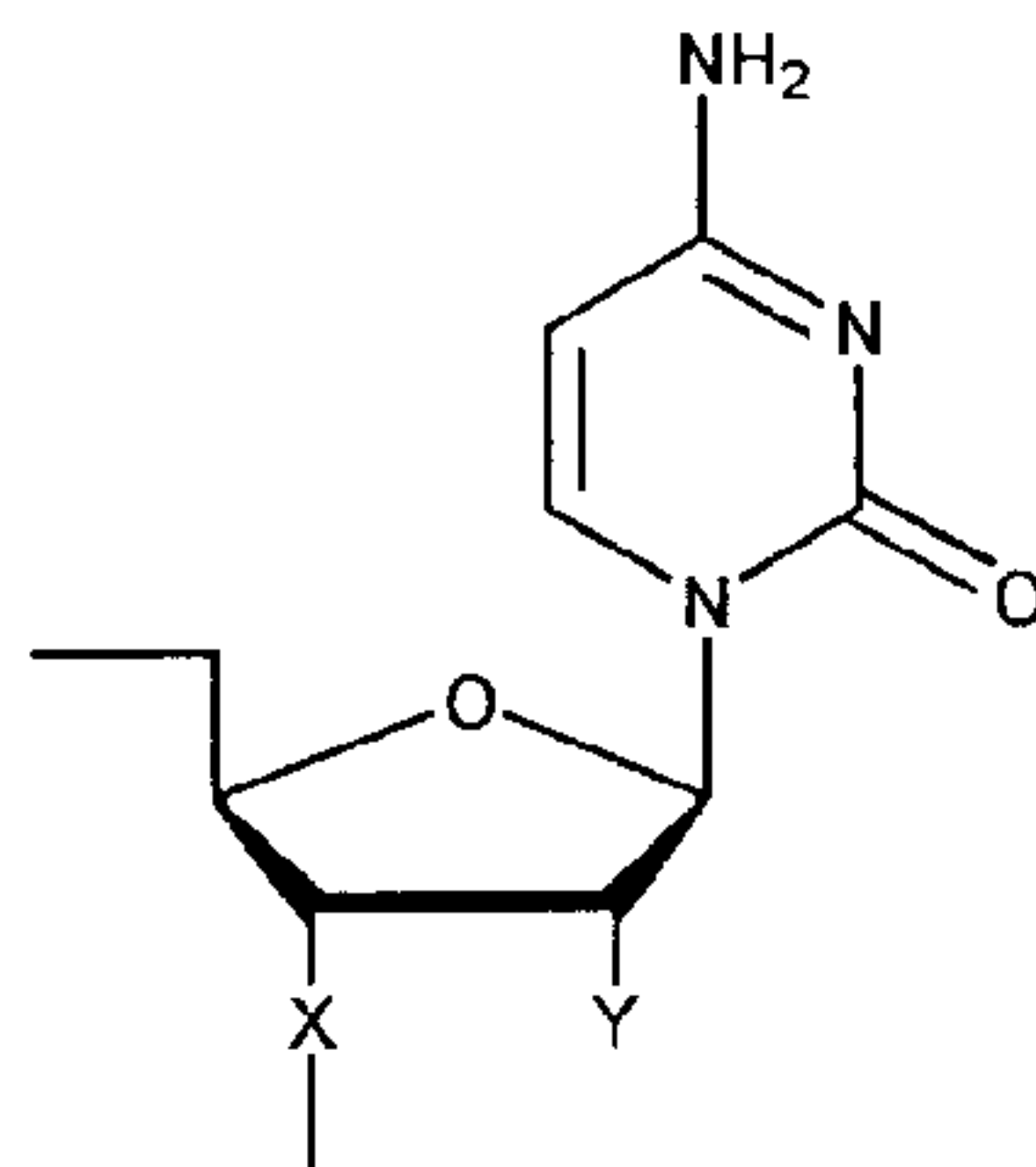
79861-7D



(A 1)

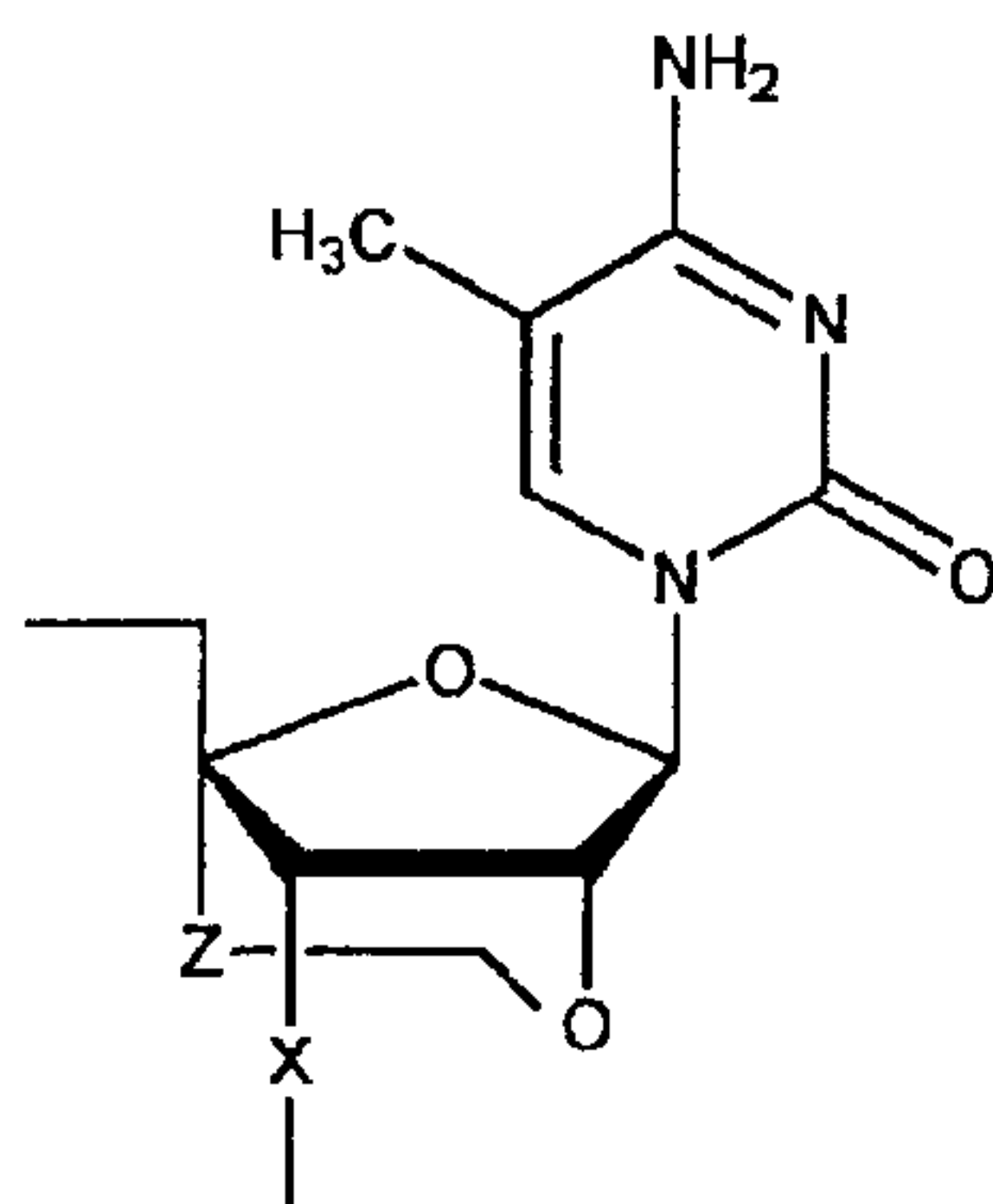


(A 2)

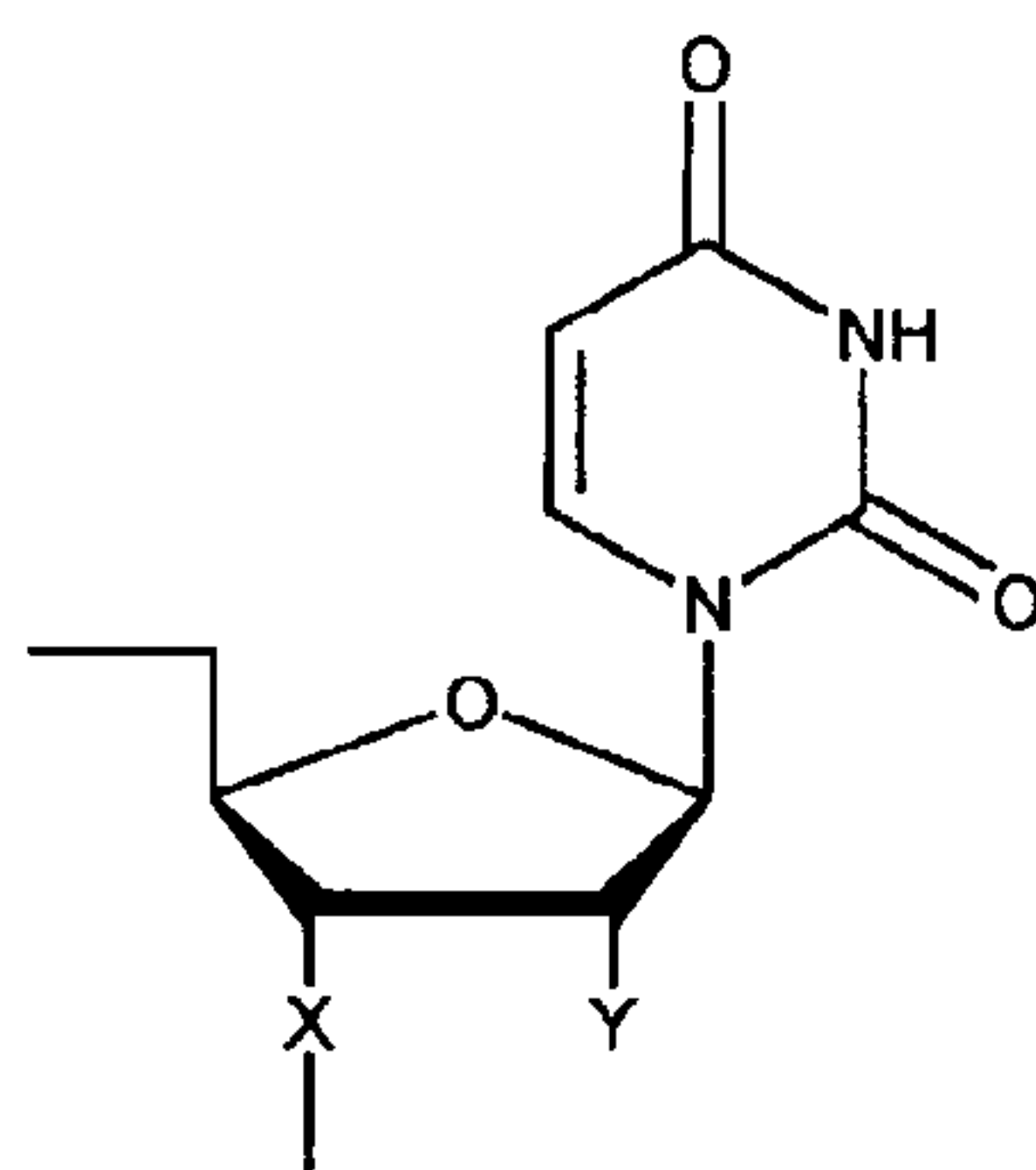


(C 1)

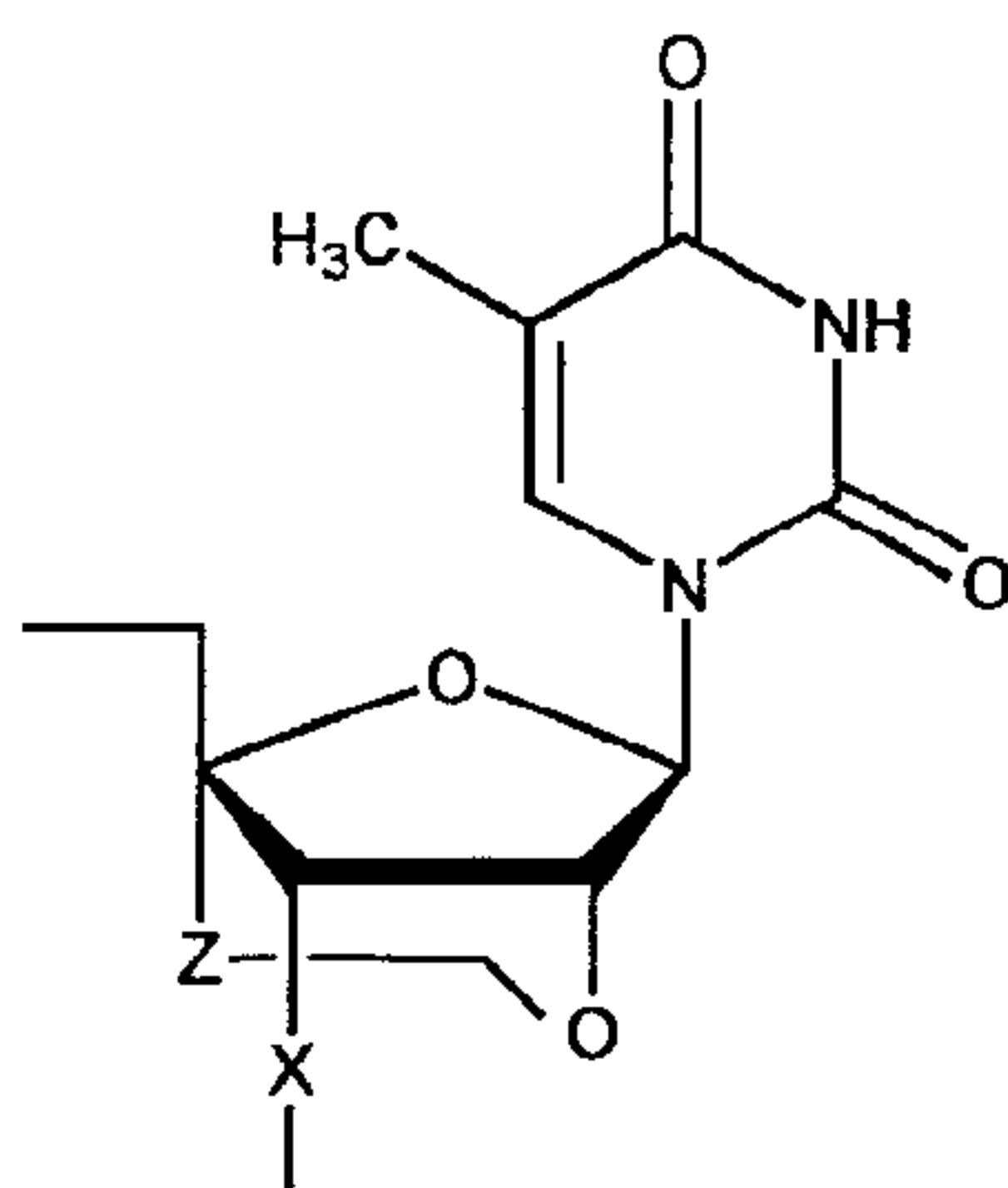
79861-7D



(C 2)



(U 1)

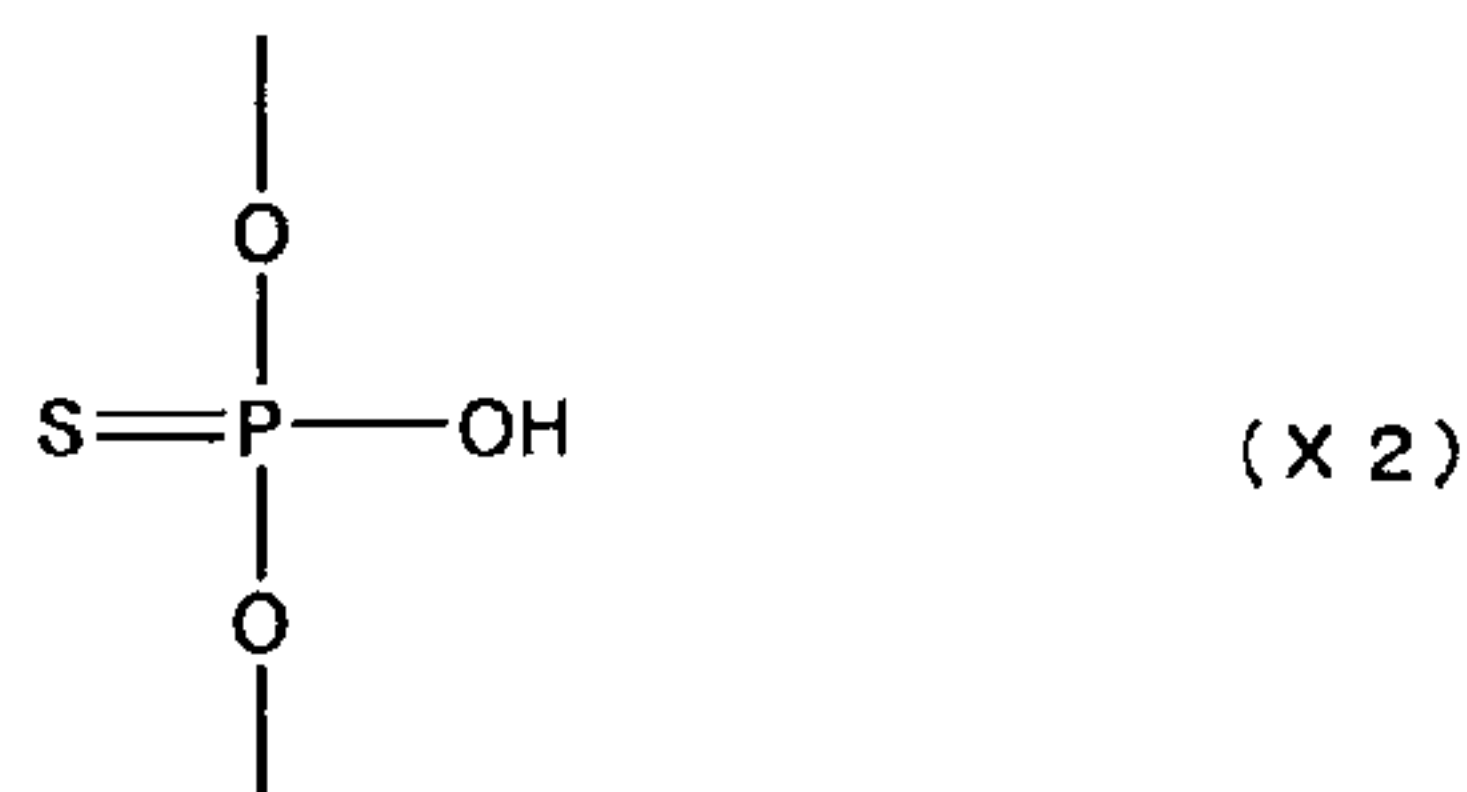
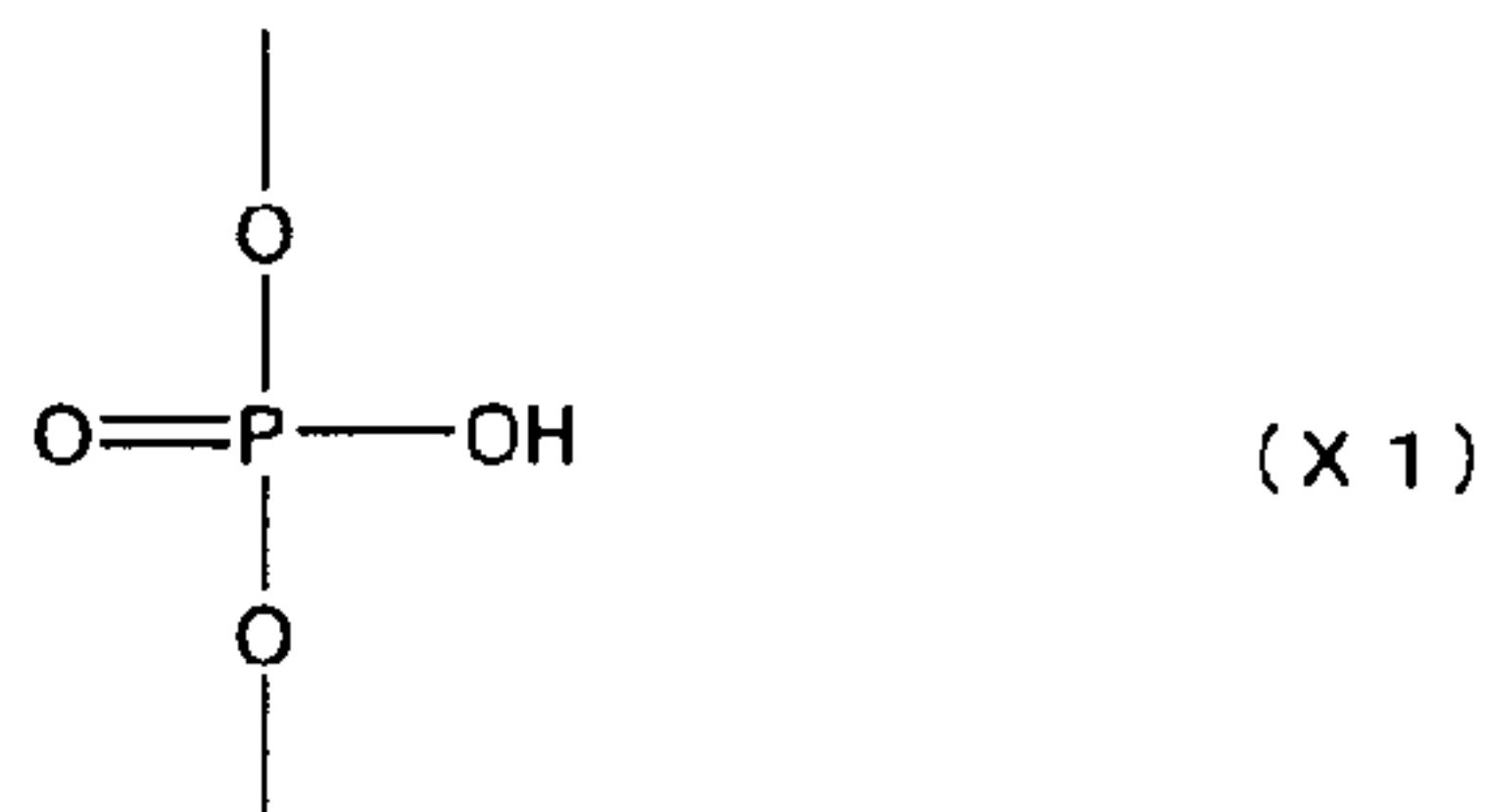


(T 2)

5

where X is individually and independently a group represented by the following formula (X1) or (X2):

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Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 5 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M'6} is a group represented by the following formula (6'):



where Bg, Ba, Bt and Bc are as described above;

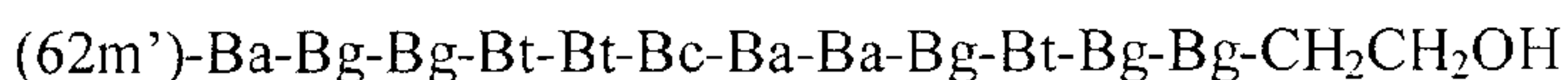
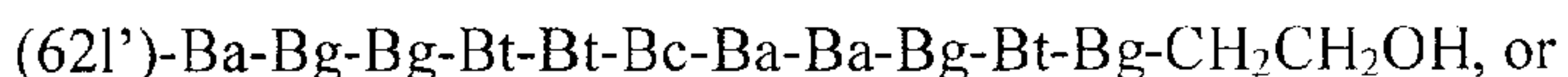
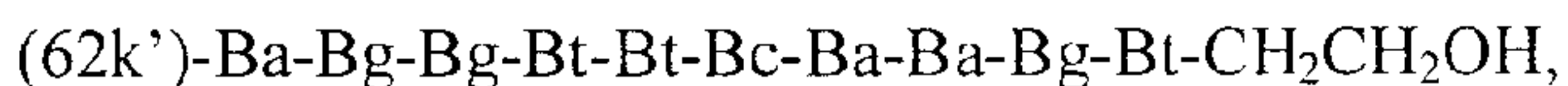
10 B_{B'6} is a group represented by any one of the following (62a') to (62m'):



15 (62e')-Ba-Bg-Bg-Bt-CH₂CH₂OH,



20 (62j')-Ba-Bg-Bg-Bt-Bt-Bc-Ba-Ba-Bg-CH₂CH₂OH,



where Bg, Ba, Bt and Bc are as described above;

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provided that at least one of the nucleosides constituting the compound represented by formula (VI') has 2'-O,4'-C-alkylene group.

[19] A compound represented by the following general formula (VII') or a pharmacologically acceptable salt thereof:



where $B_{T'7}$ is a group represented by any one of the following (7a') to (7f'):

(7a')HO-,

(7b')HO-Bt-,

(7c')HO-Ba-Bt-,

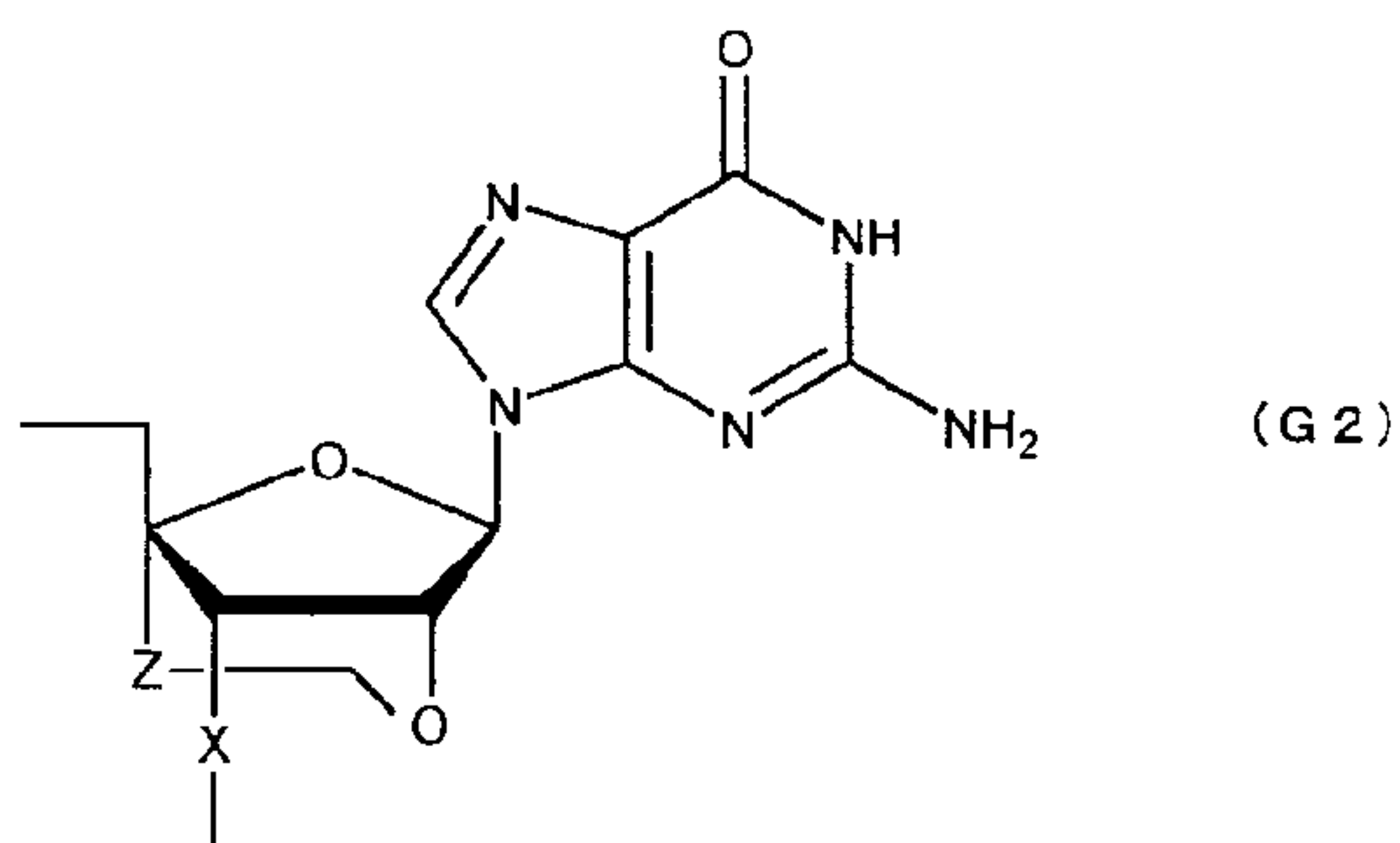
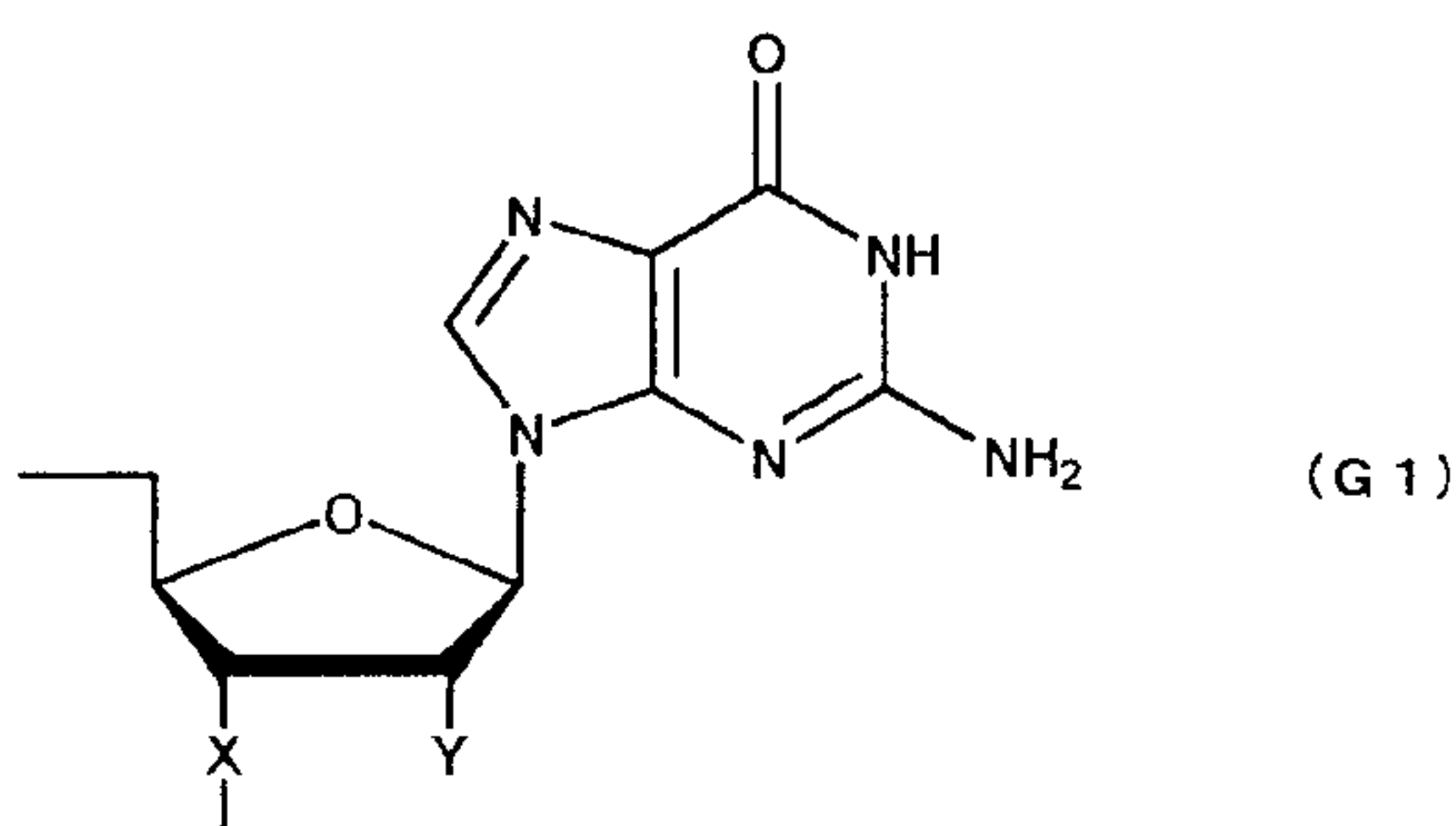
10 (7d')HO-Bt-Ba-Bt-,

(7e')HO-Bt-Bt-Ba-Bt-, or

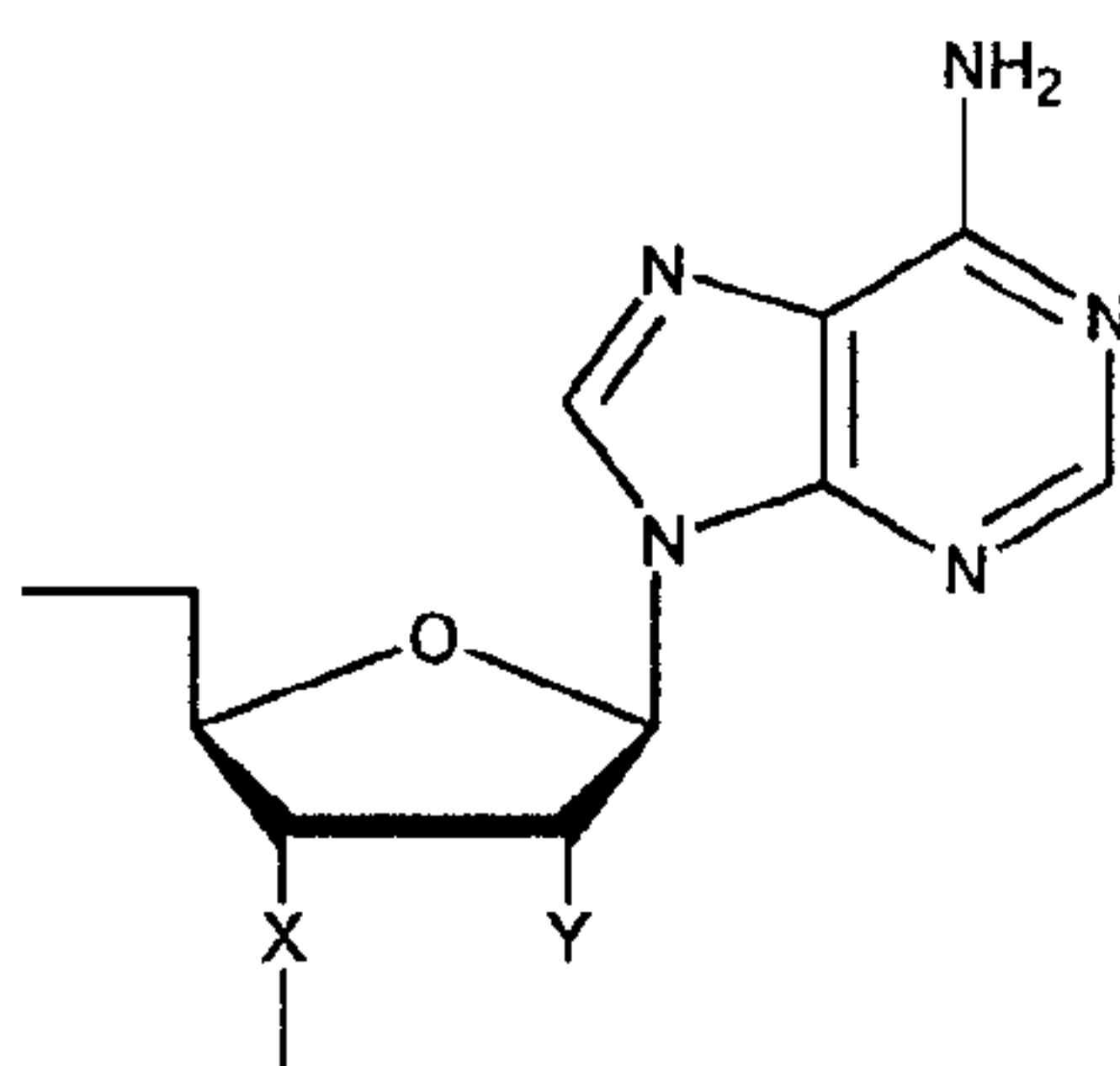
(7f')HO-Bg-Bt-Bt-Ba-Bt-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the

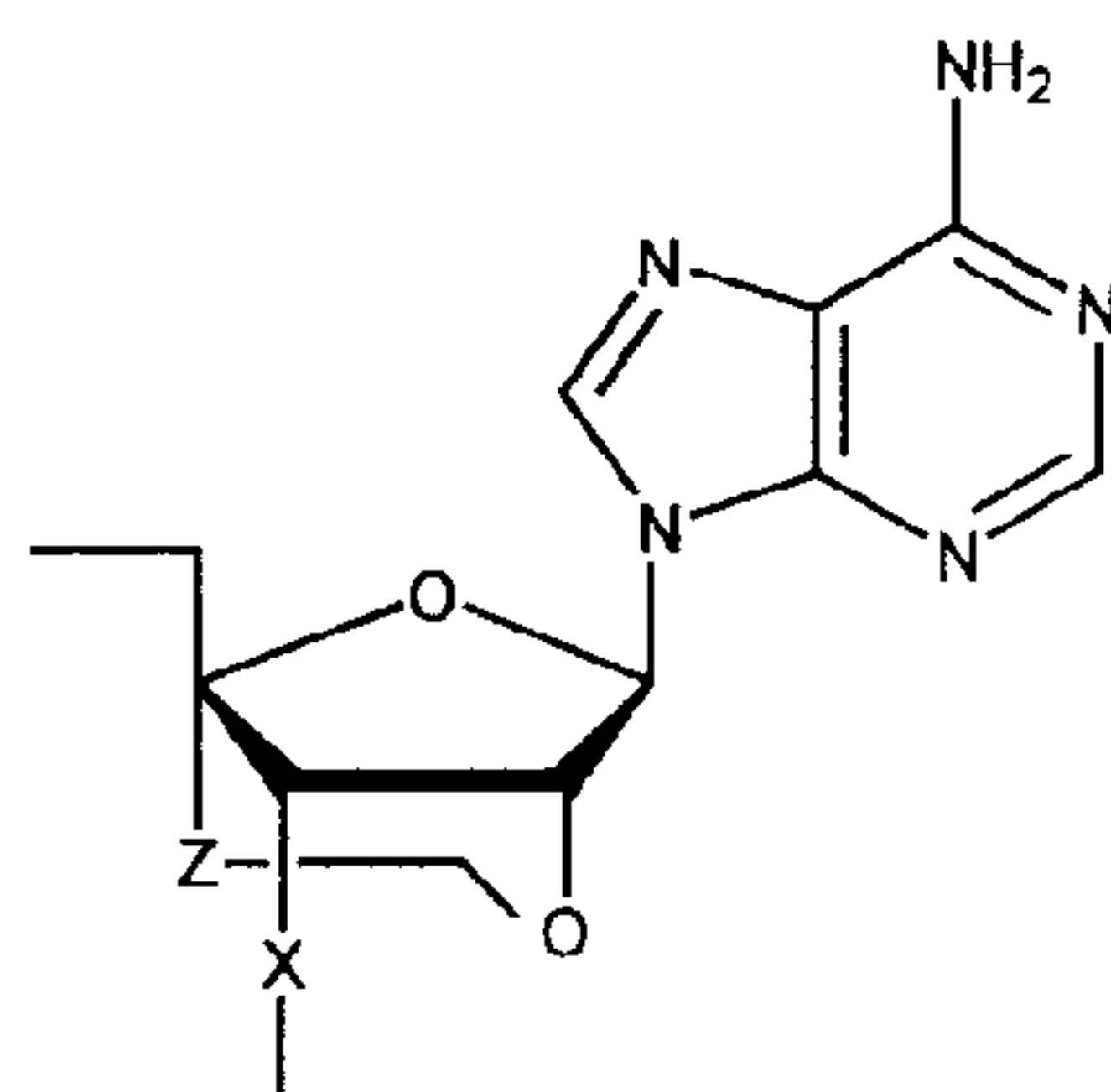
15 following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):



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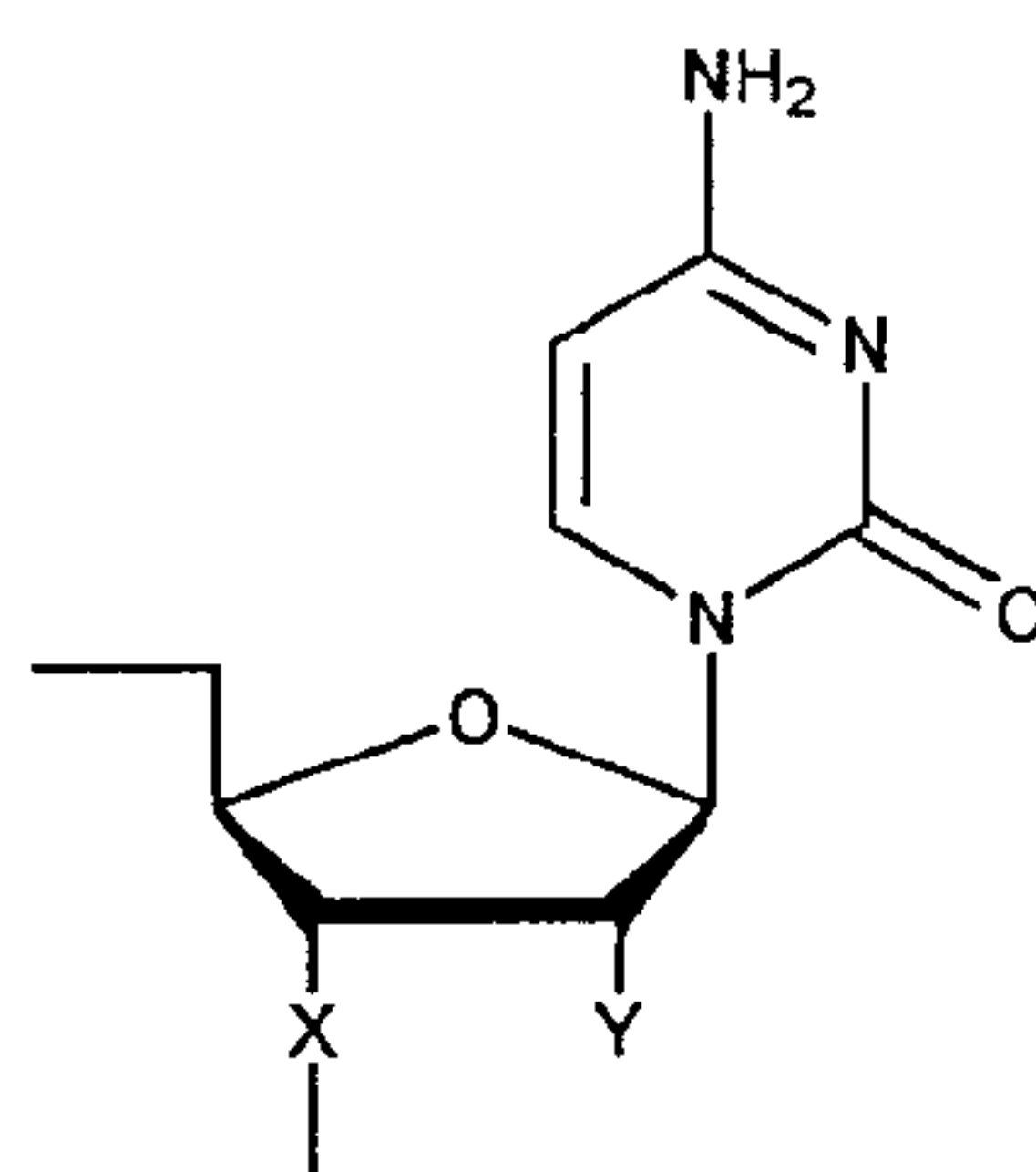


(A 1)



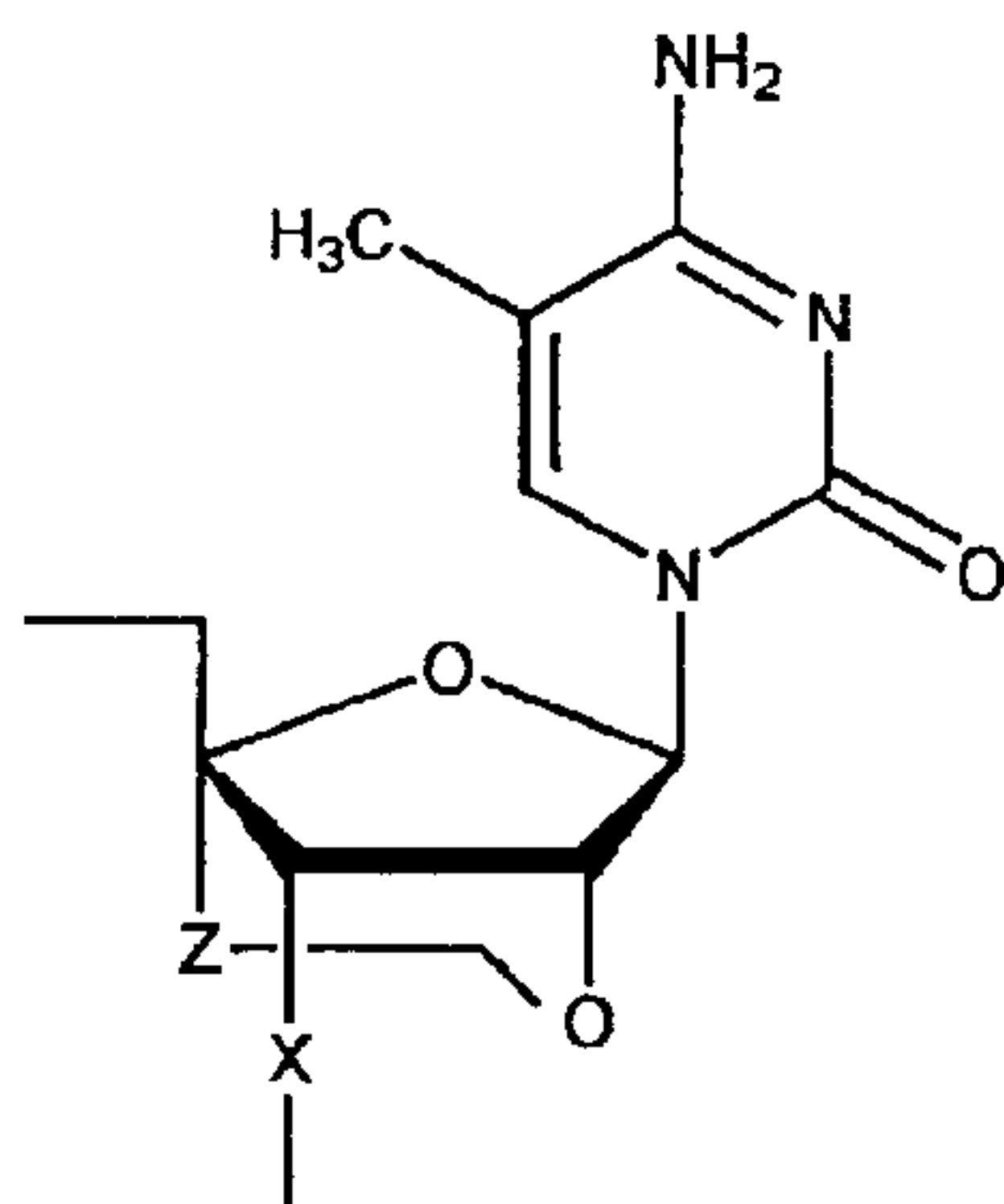
(A 2)

5

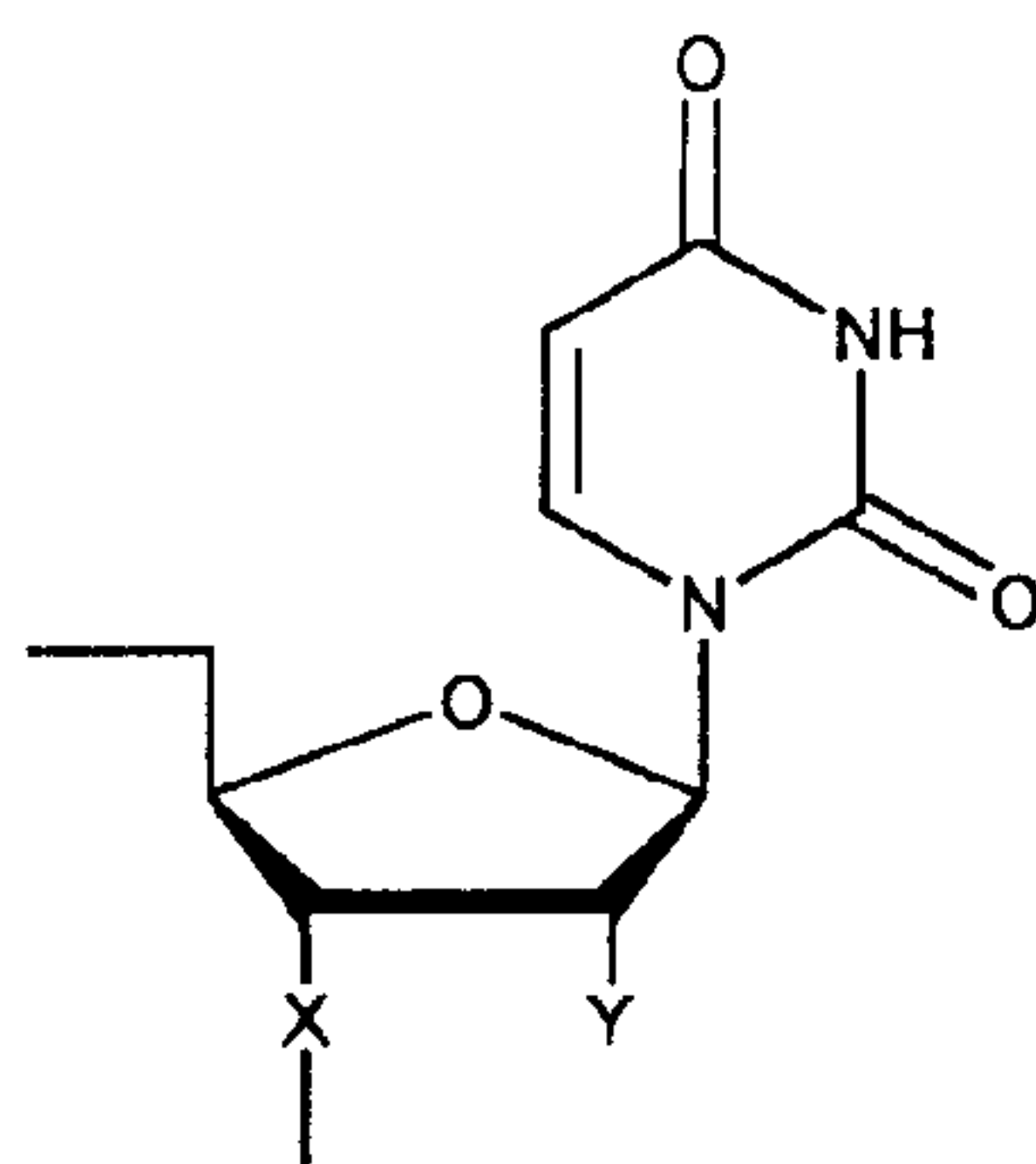


(C 1)

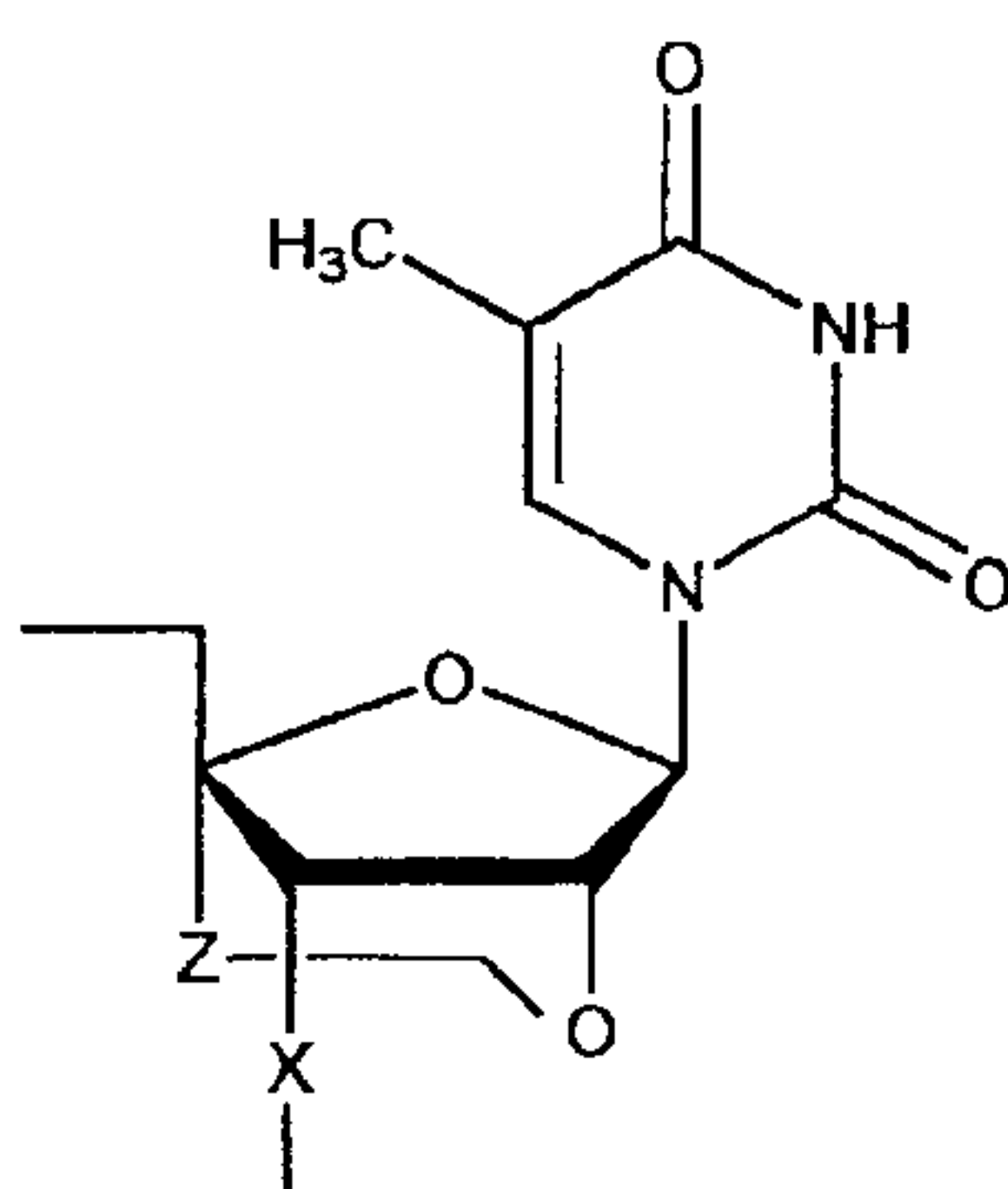
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(C 2)



(U 1)

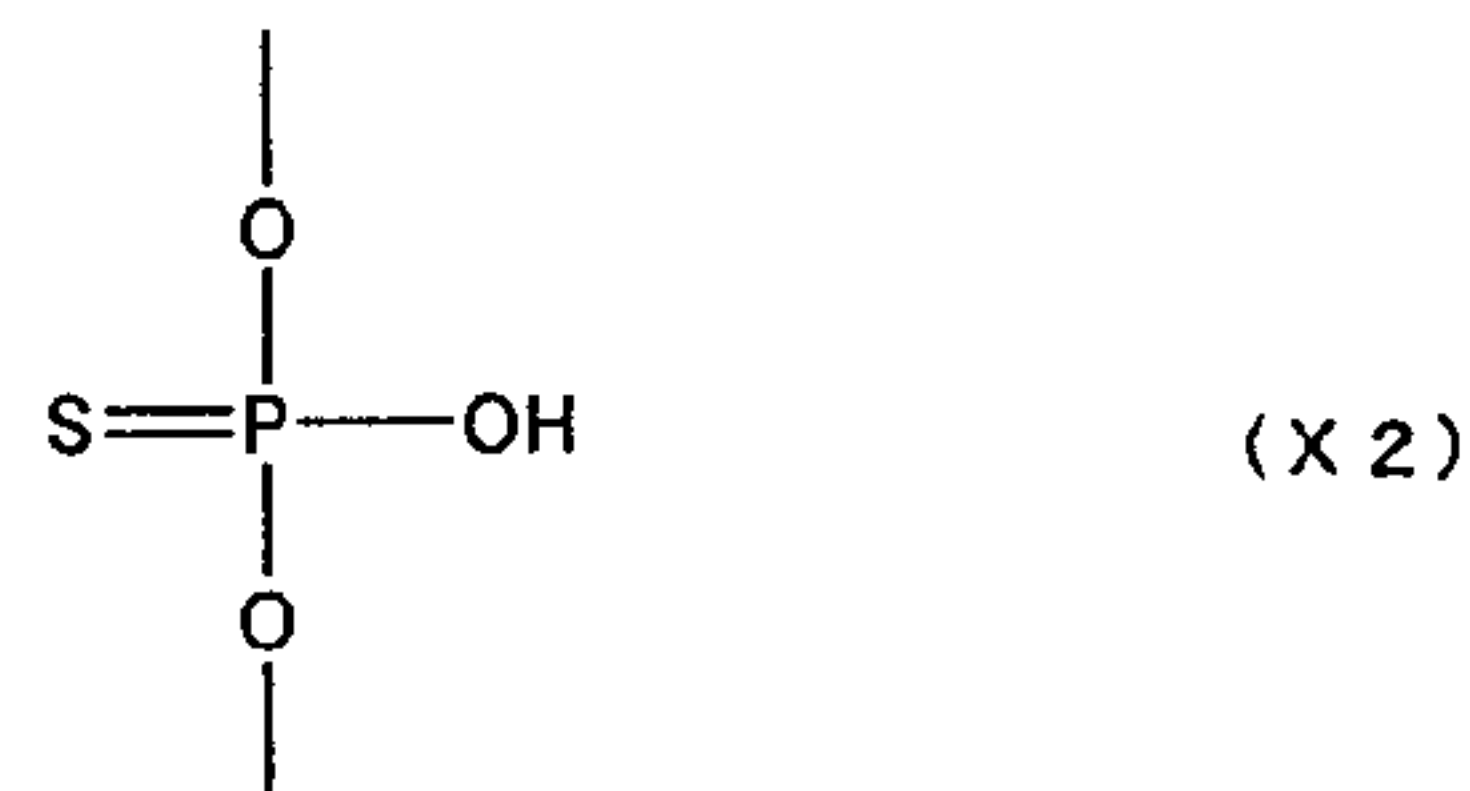
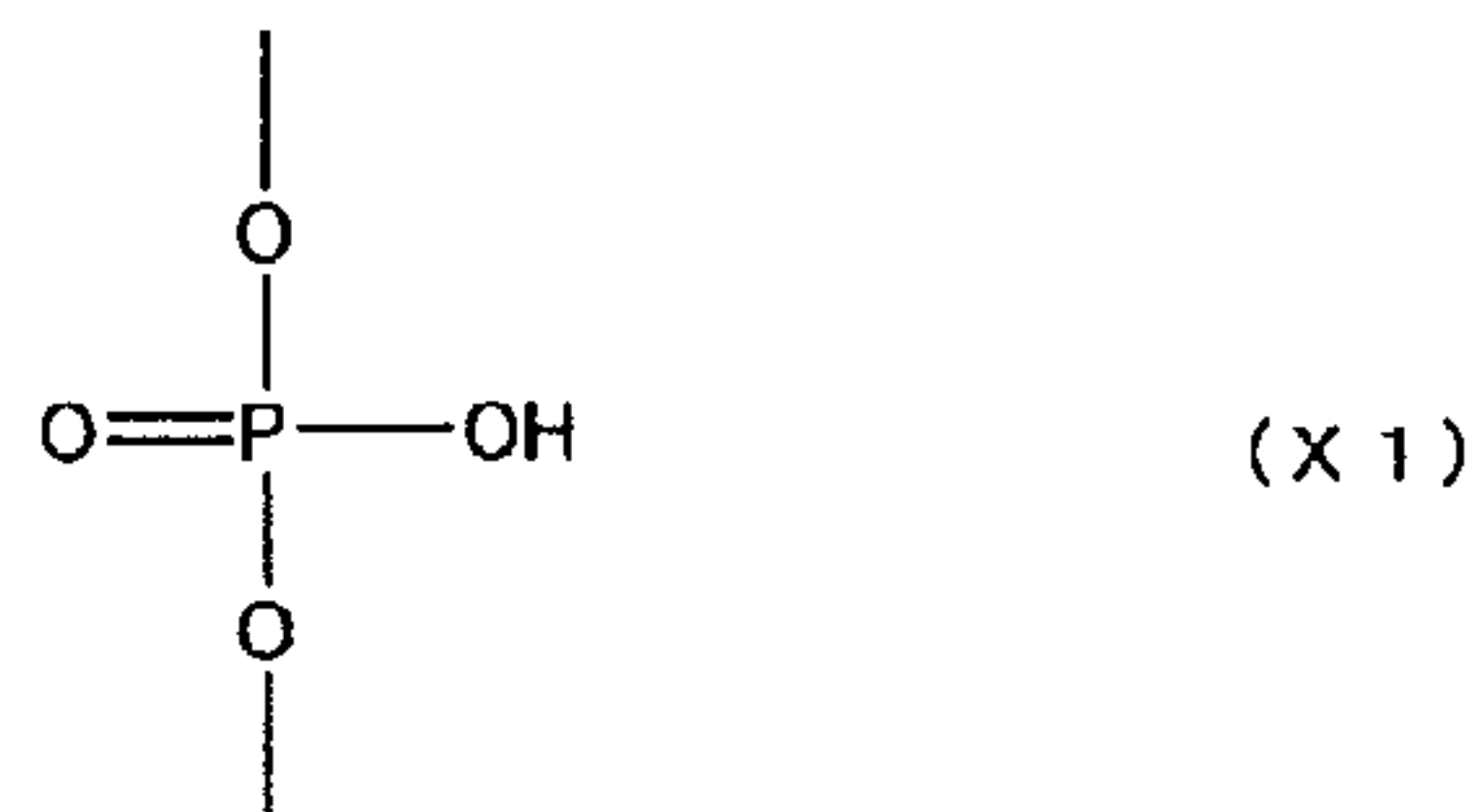


(T 2)

5

where X is individually and independently a group represented by the following formula (X1) or (X2):

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Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 5 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene
 group with 1-5 carbon atoms;

B_{M'7} is a group represented by the following formula (7'):



where Bg, Ba, Bt and Bc are as described above;

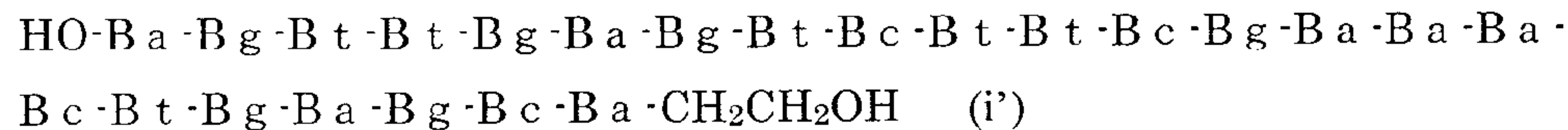
10 B_{B'7} is a group represented by the following (72a'):



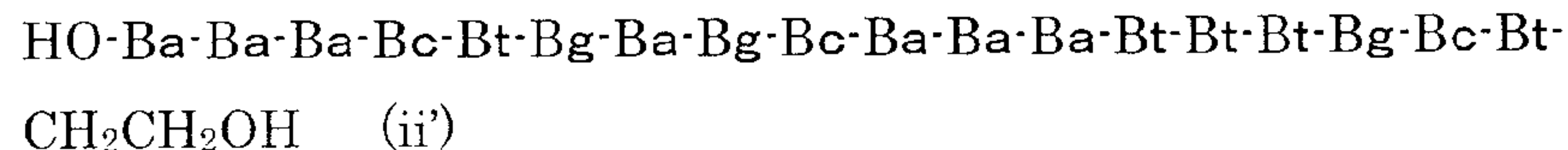
provided that at least one of the nucleosides constituting the compound represented by
 formula (VII') has 2'-O,4'-C-alkylene group.

[20] The compound of any one of [13] to [19] above which is selected from the group
 15 consisting of the following compounds (i') to (xiii'), or a pharmacologically acceptable salt
 thereof:

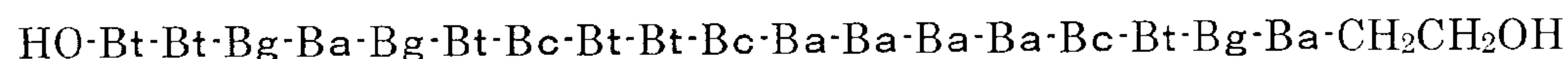
(i') a compound represented by the following formula (i'):



20 (ii') a compound represented by the following formula (ii'):



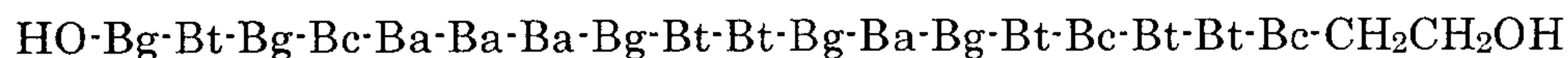
(iii') a compound represented by the following formula (iii'):



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(iii')

(iv') a compound represented by the following formula (iv'):

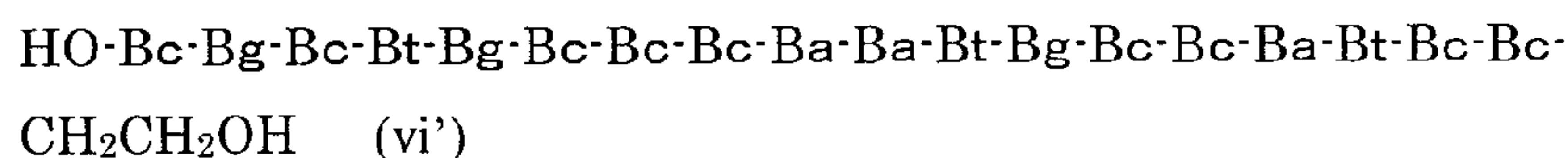


(iv')

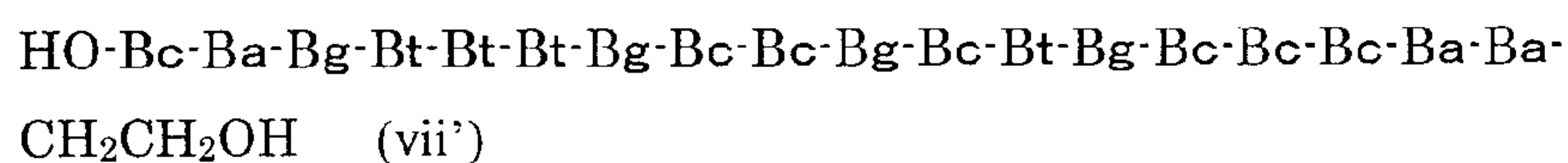
5 (v') a compound represented by the following formula (v'):



(vi') a compound represented by the following formula (vi'):



10 (vii') a compound represented by the following formula (vii'):

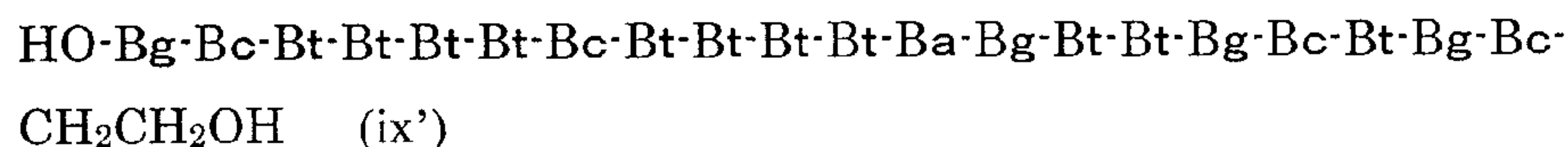


(viii') a compound represented by the following formula (viii'):



15 (viii')

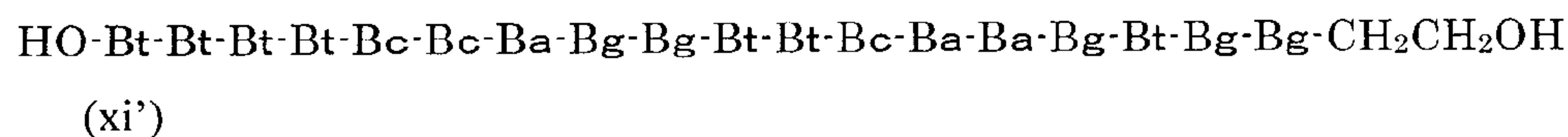
(ix') a compound represented by the following formula (ix'):



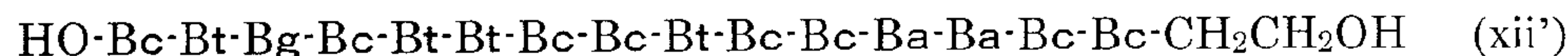
(x') a compound represented by the following formula (x'):

20
$$\text{HO-Bc-Bt-Bt-Bt-Bt-Ba-Bg-Bt-Bt-Bg-Bc-Bt-Bg-Bc-Bt-Bc-Bt-Bt-Bt-Bc-Bc-CH}_2\text{CH}_2\text{OH} \quad (\text{x}')$$

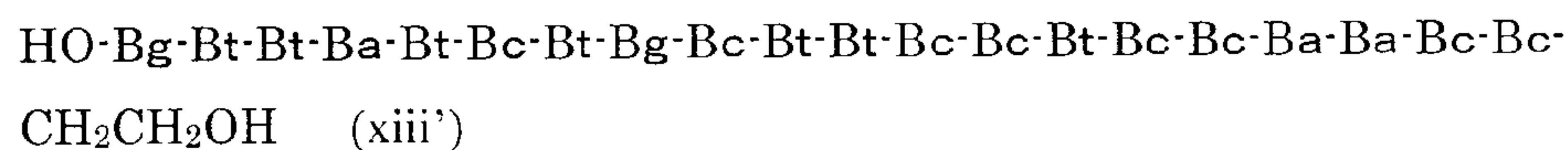
(xi') a compound represented by the following formula (xi'):



25 (xii') a compound represented by the following formula (xii'):



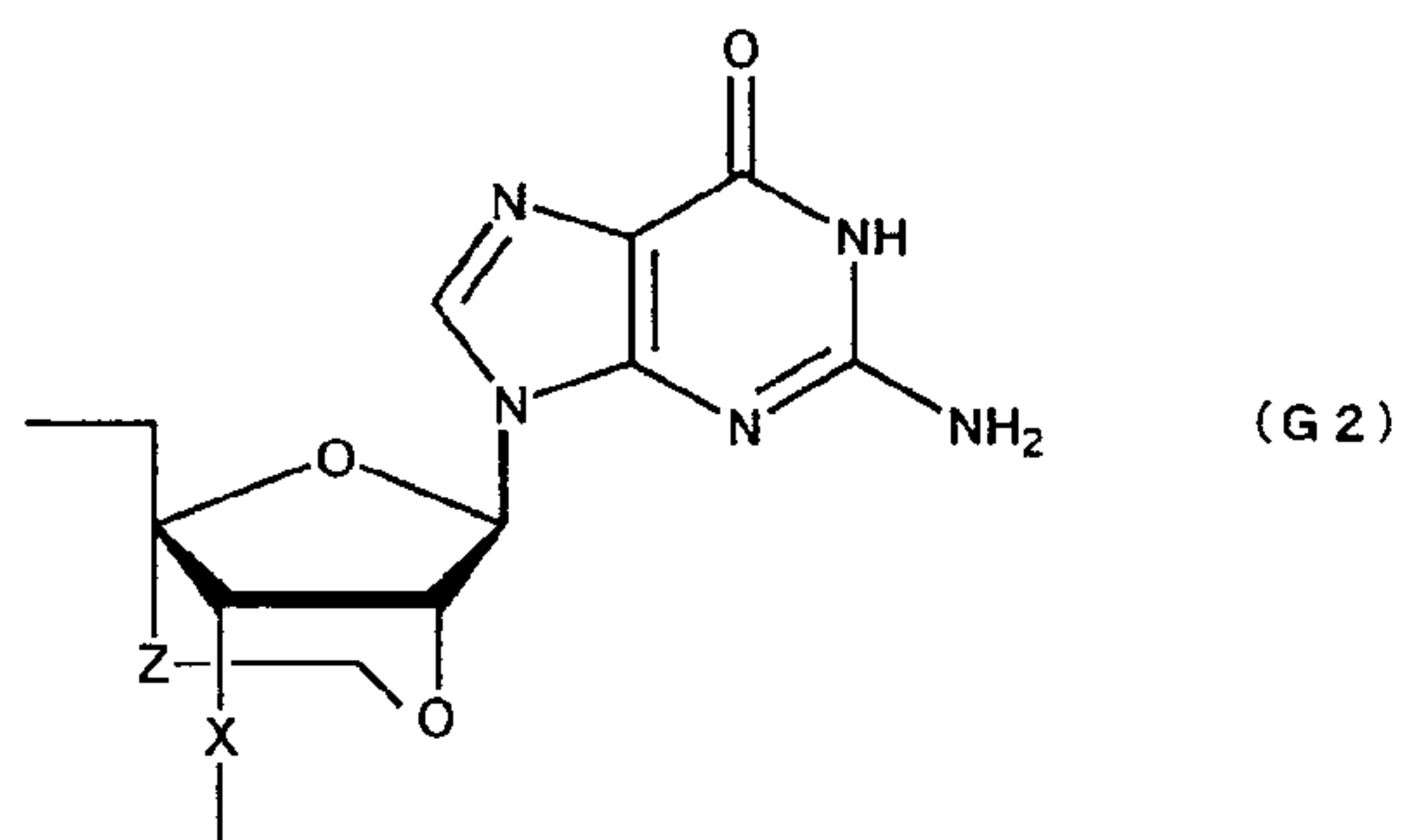
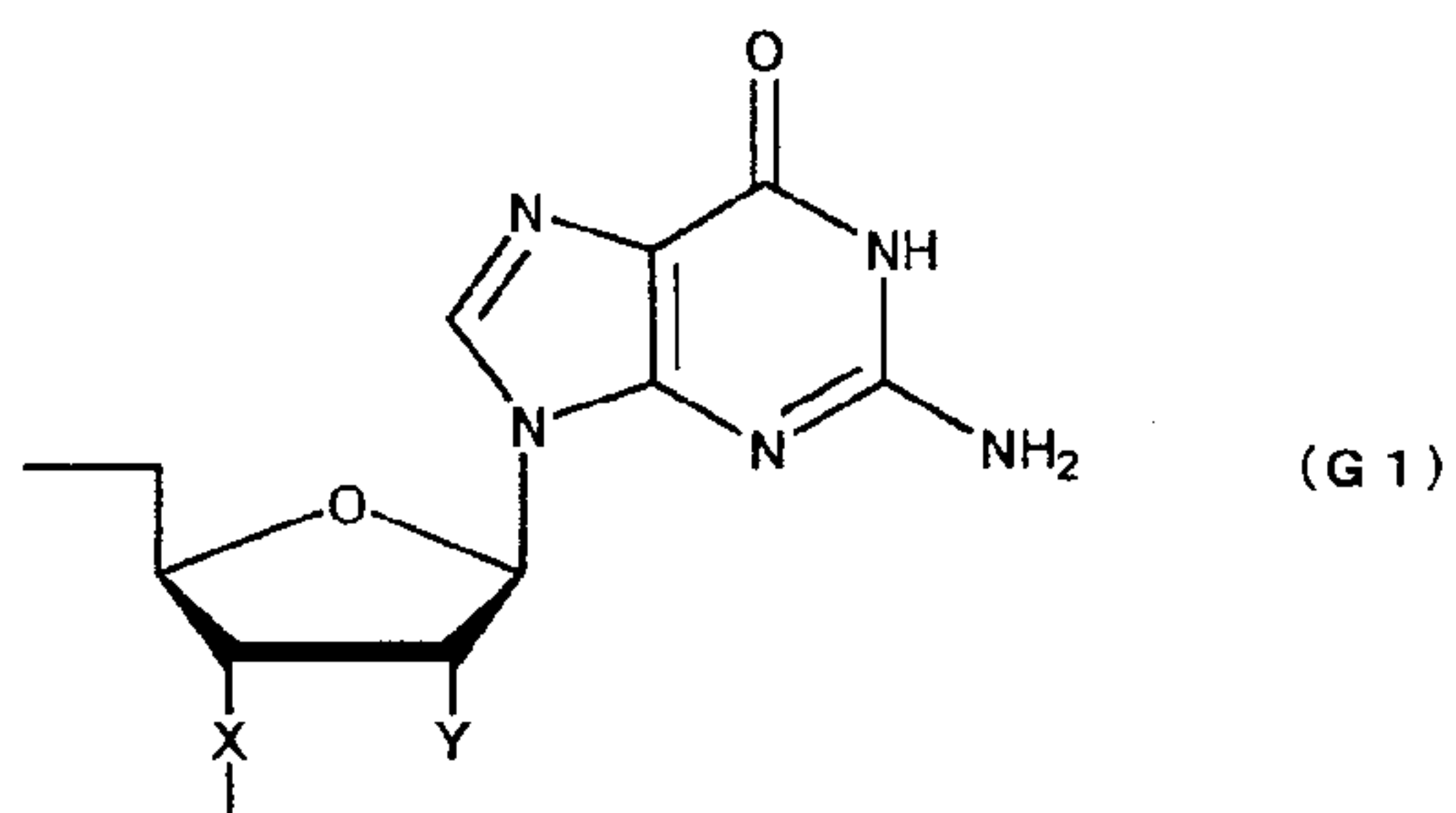
(xiii') a compound represented by the following formula (xiii'):



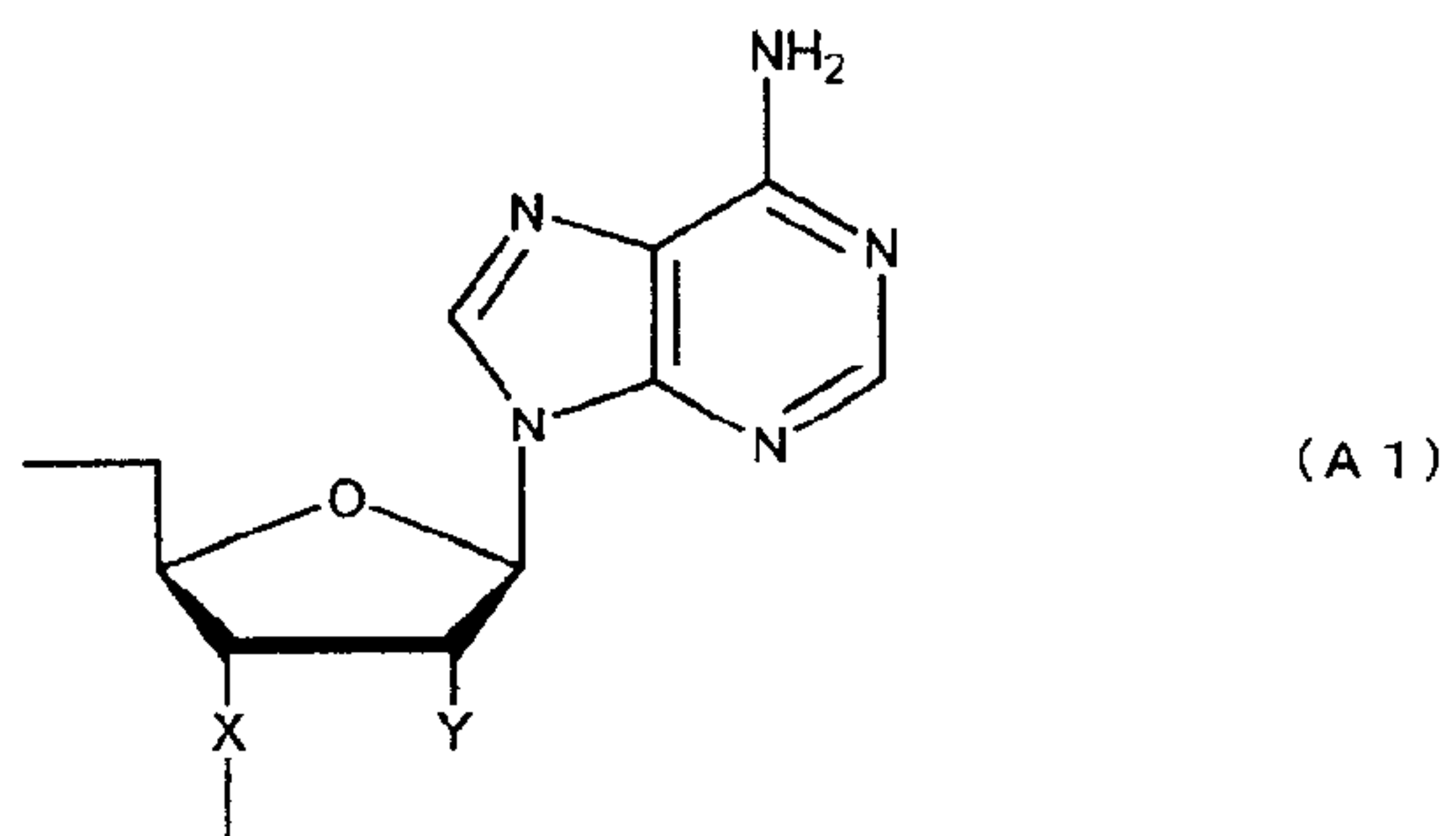
30 where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula

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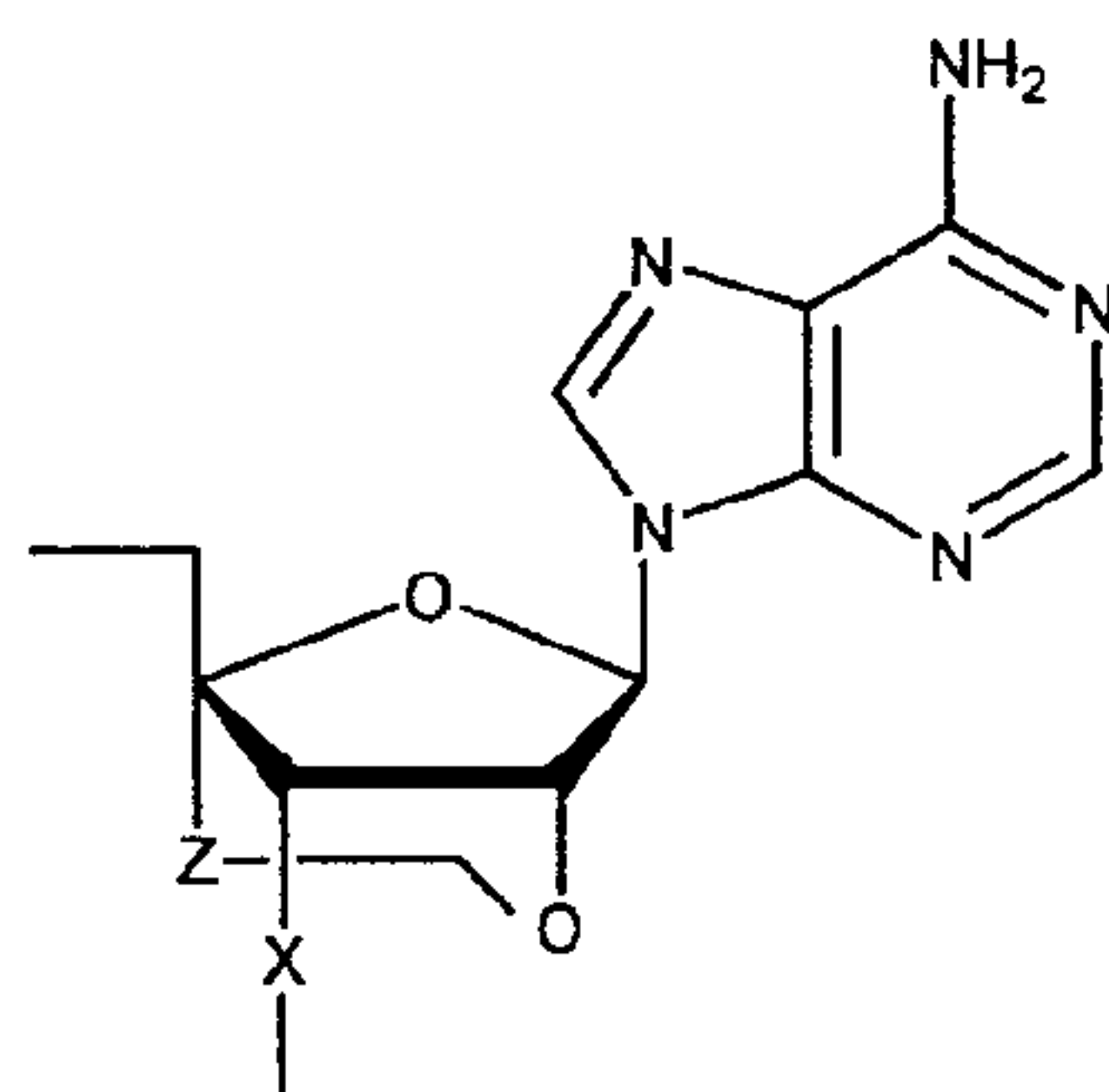
(U1) or (T2):



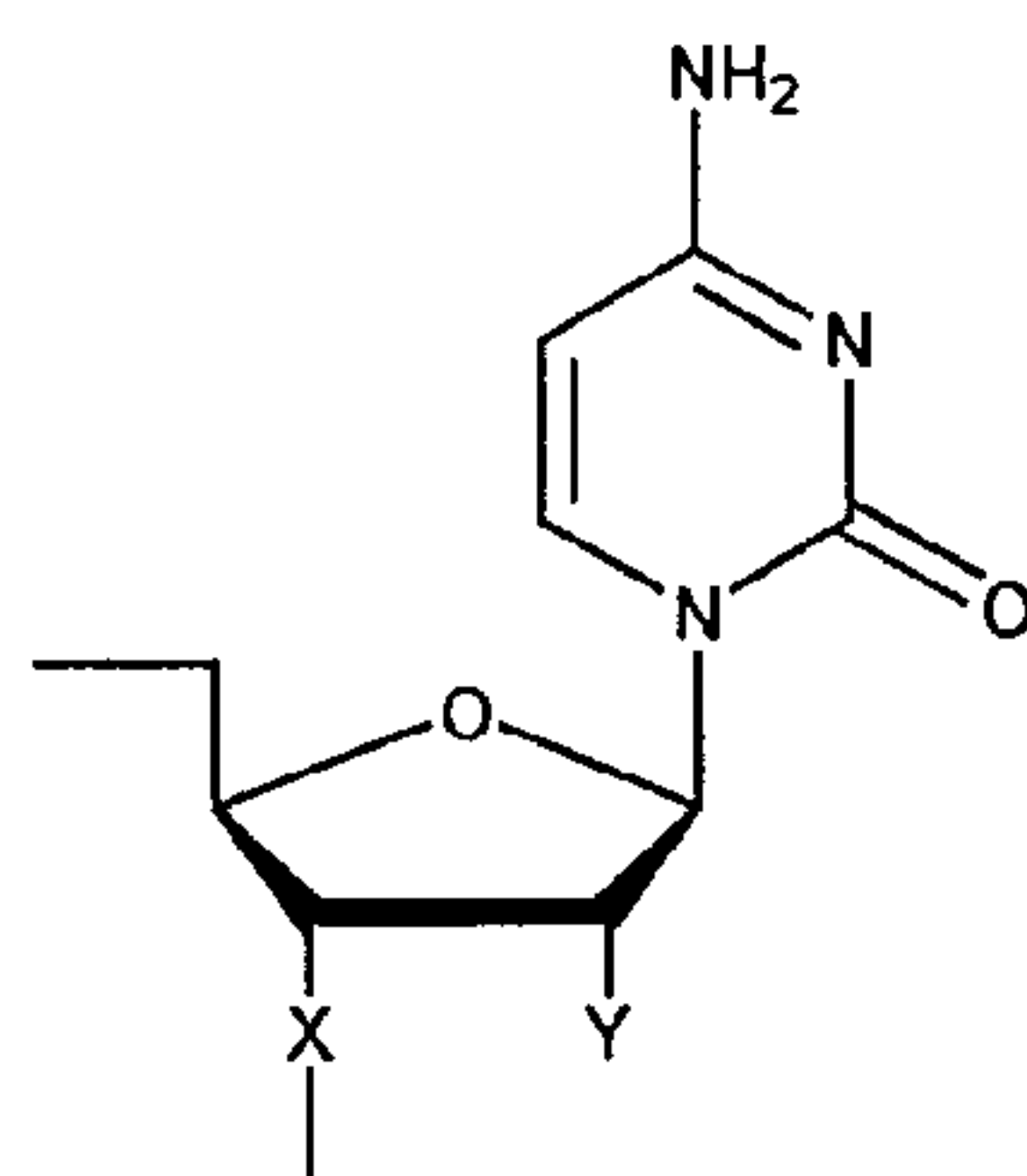
5



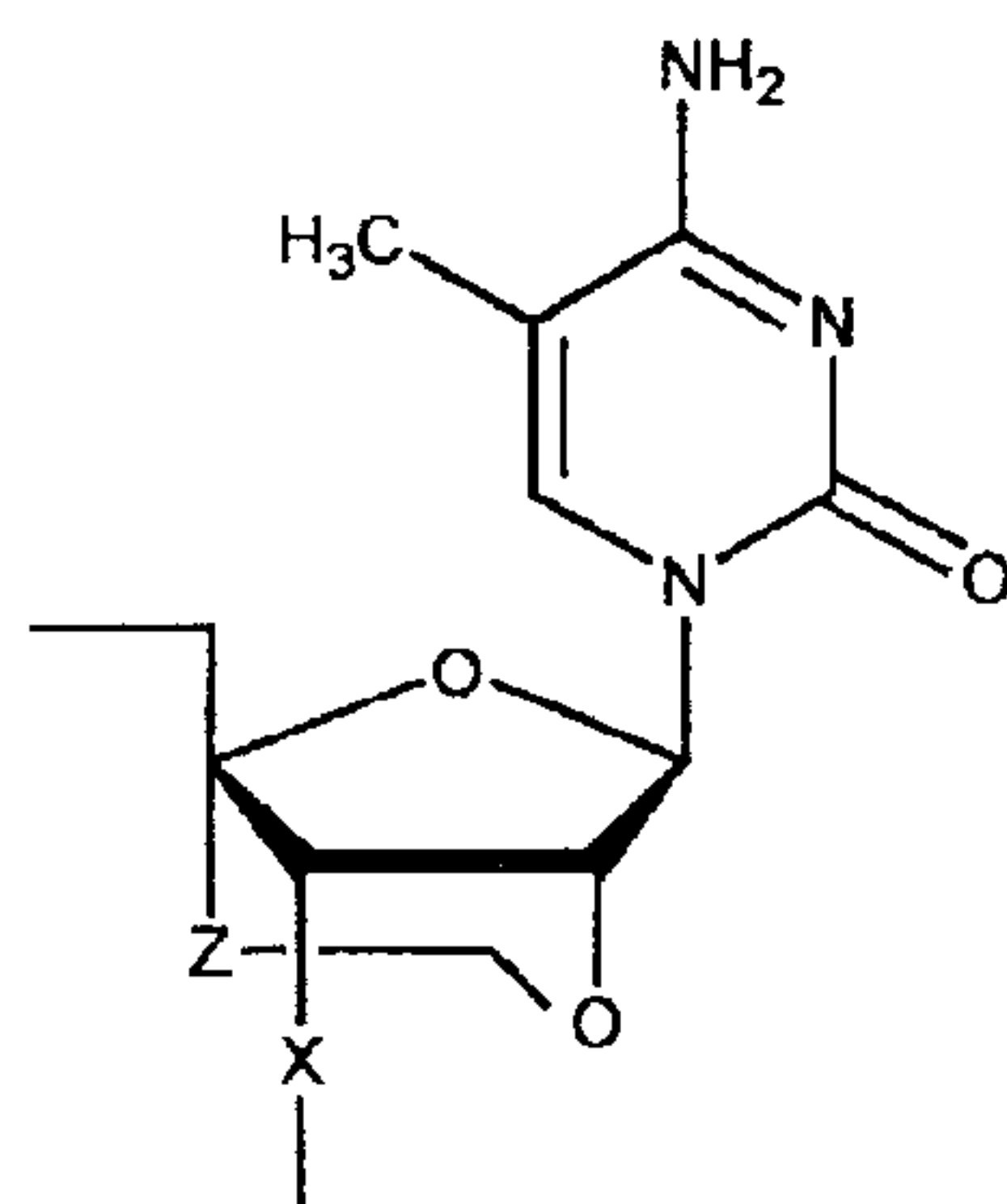
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(A 2)



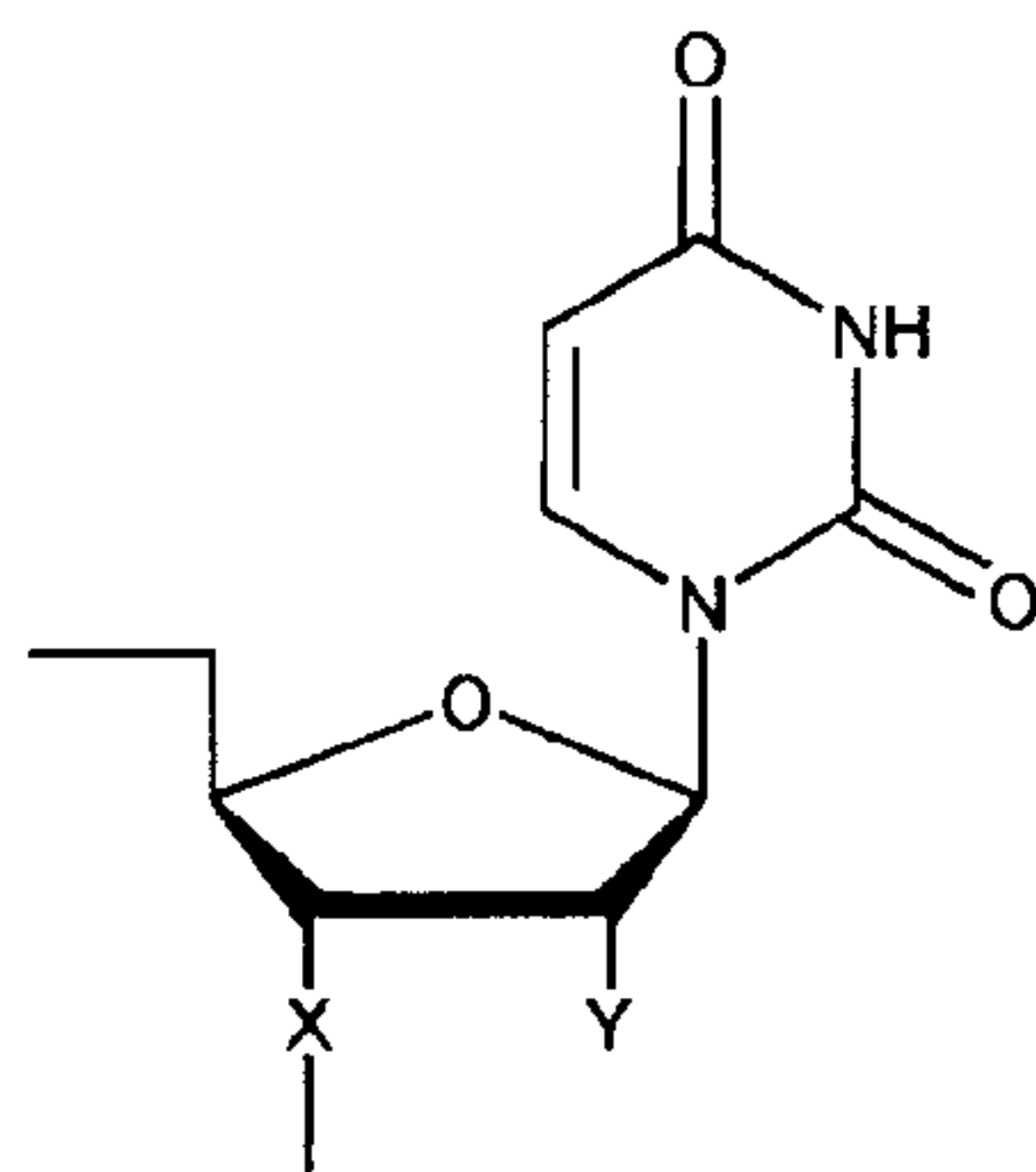
(C 1)



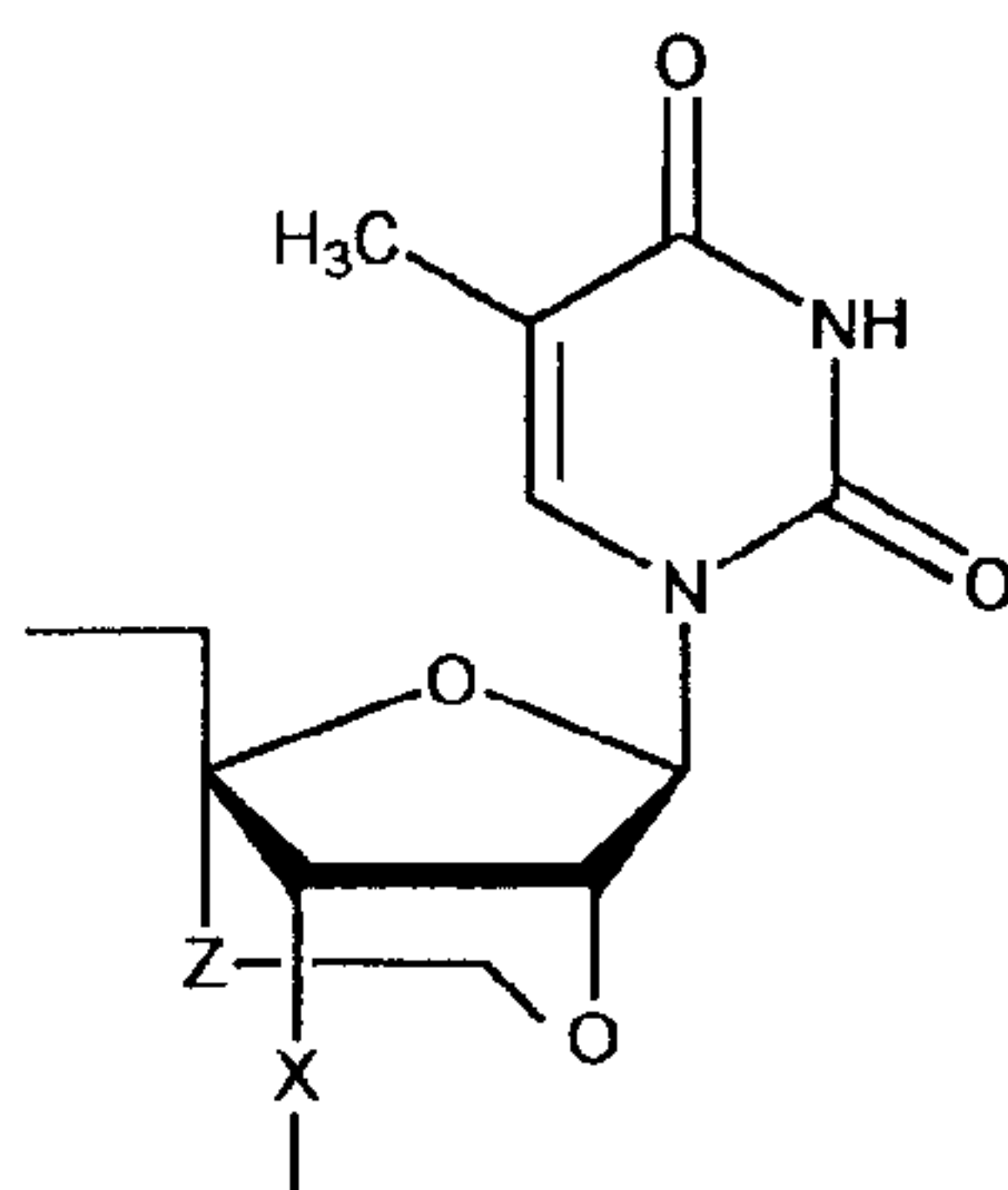
(C 2)

5

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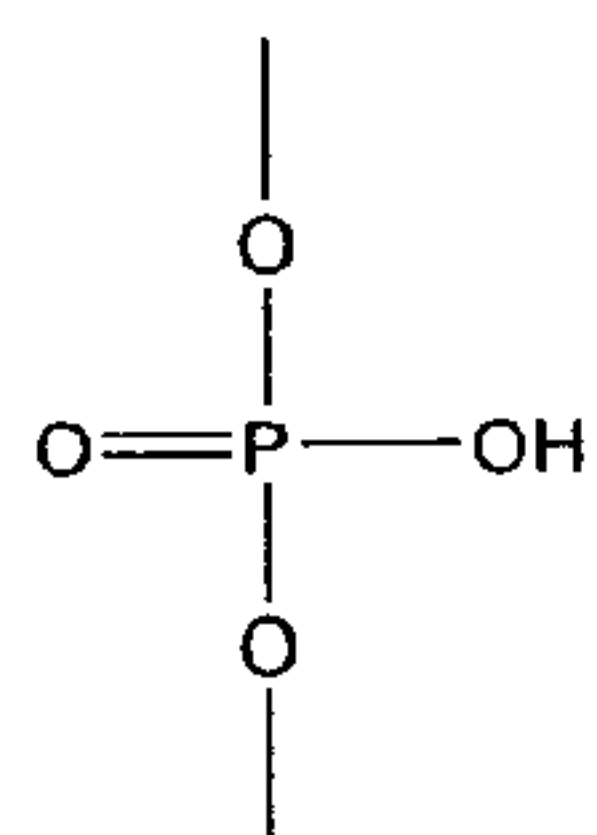
(U 1)



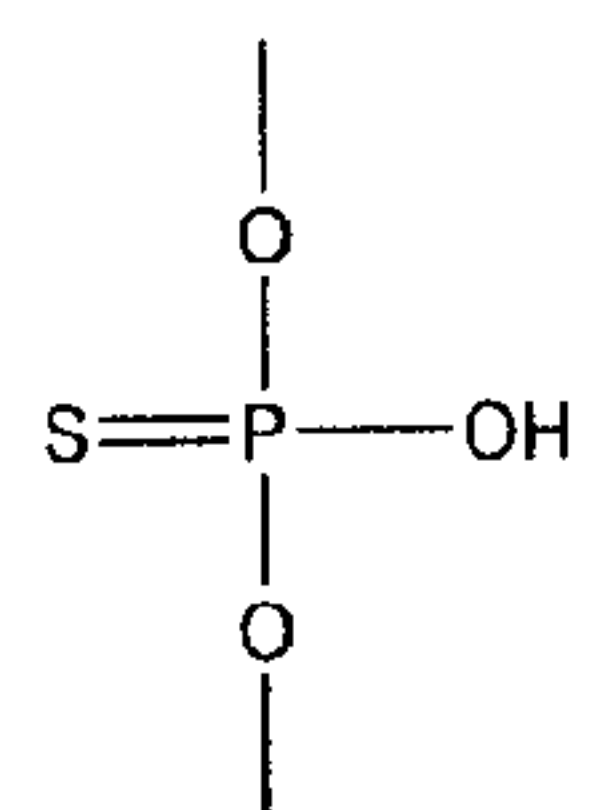
(T 2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



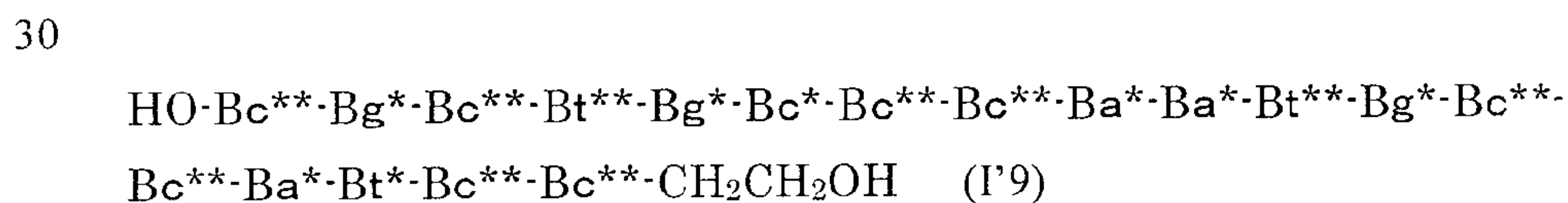
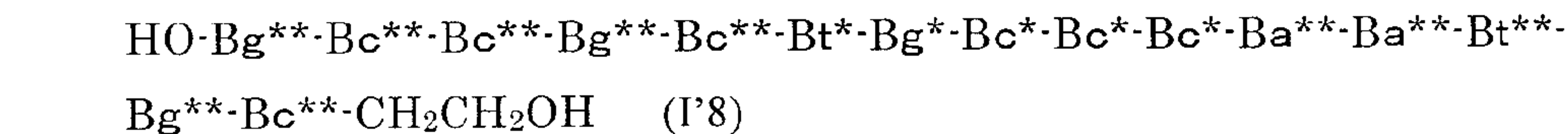
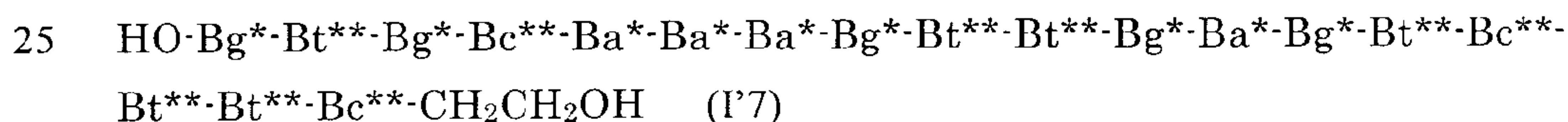
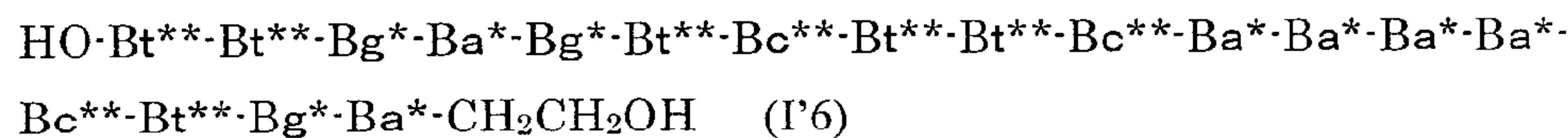
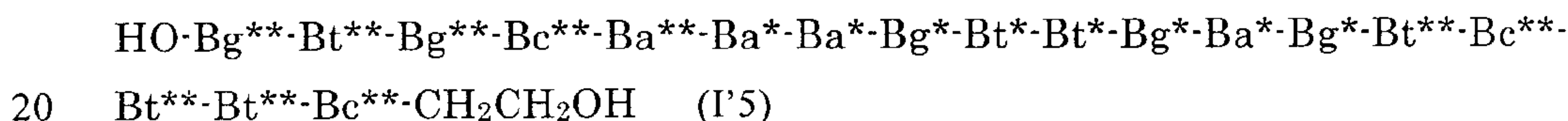
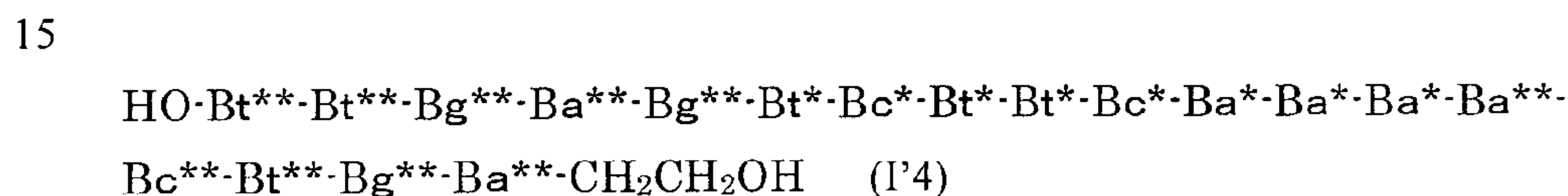
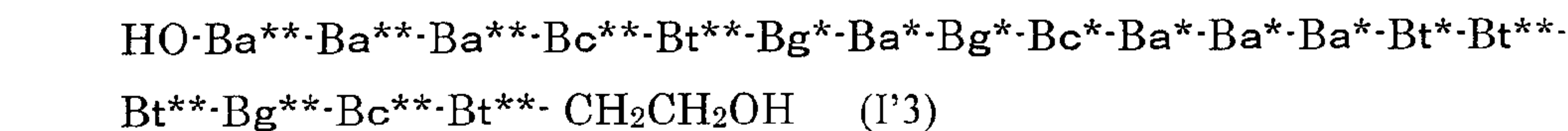
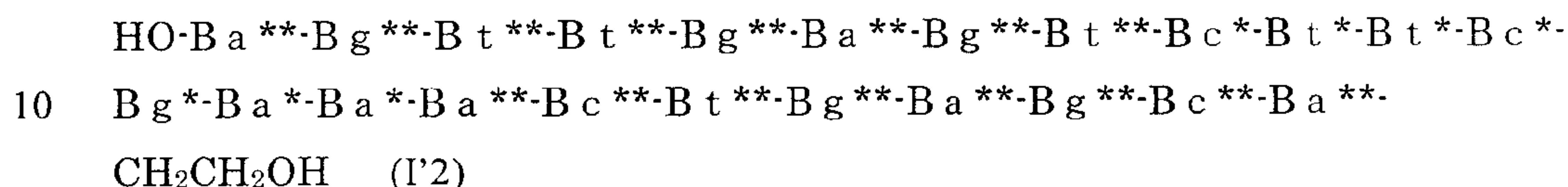
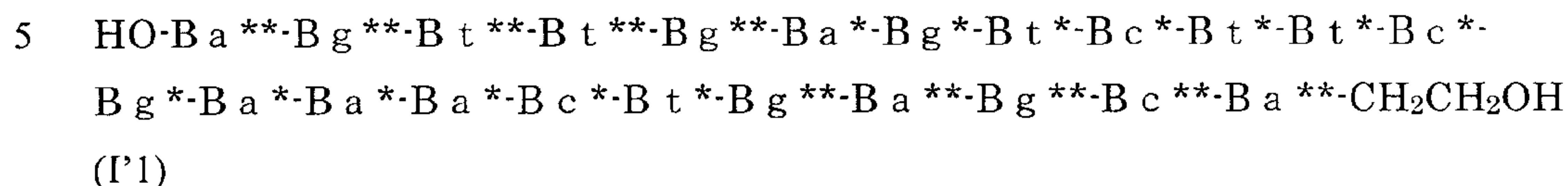
(X 2)

10 Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group

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with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms.

[21] The compound of any one of [13] to [20] above which is represented by any one of the following compounds (I'1) to (I'20), or a pharmacologically acceptable salt thereof:



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HO-Bc^{**}-Ba^{*}-Bg^{*}-Bt^{**}-Bt^{**}-Bt^{*}-Bg^{*}-Bc^{**}-Bc^{**}-Bg^{*}-Bc^{**}-Bt^{**}-Bg^{*}-
Bc^{**}-Bc^{**}-Bc^{**}-Ba^{*}-Ba^{*}-CH₂CH₂OH (I'10)

5 HO-Bt^{**}-Bg^{*}-Bt^{**}-Bt^{**}-Bc^{**}-Bt^{**}-Bg^{*}-Ba^{*}-Bc^{**}-Ba^{*}-Ba^{*}-Bc^{**}-Ba^{*}-Bg^{*}-
Bt^{**}-Bt^{**}-Bt^{**}-Bg^{*}-CH₂CH₂OH (I'11)

HO-Bc^{**}-Bg^{*}-Bc^{**}-Bt^{**}-Bg^{*}-Bc^{*}-Bc^{**}-Bc^{**}-Ba^{*}-Ba^{*}-Bt^{**}-Bg^{*}-Bc^{**}-
Bc^{**}-Ba^{*}-Bt^{*}-Bc^{**}-Bc^{**}-CH₂CH₂OH (I'12)

10

HO-Bg^{**}-Bc^{**}-Bt^{**}-Bt^{**}-Bt^{**}-Bt^{*}-Bc^{*}-Bt^{*}-Bt^{*}-Bt^{*}-Ba^{*}-Bg^{*}-Bt^{*}-Bt^{*}-
Bg^{**}-Bc^{**}-Bt^{**}-Bg^{**}-Bc^{**}-CH₂CH₂OH (I'13)

HO-Bc^{*}-Bt^{*}-Bt^{*}-Bt^{*}-Bt^{*}-Ba^{**}-Bg^{**}-Bt^{**}-Bt^{**}-Bg^{**}-Bc^{**}-Bt^{**}-Bg^{**}-Bc^{**}-
15 Bt^{**}-Bc^{**}-Bt^{**}-Bt^{*}-Bt^{*}-Bt^{*}-Bc^{*}-Bc^{*}-CH₂CH₂OH (I'14)

HO-Bc^{**}-Bt^{**}-Bg^{**}-Bc^{**}-Bt^{**}-Bt^{*}-Bc^{*}-Bc^{*}-Bt^{*}-Bc^{*}-Bc^{**}-Ba^{**}-Ba^{**}-Bc^{**}-
Bc^{**}-CH₂CH₂OH (I'15)

20 HO-Bg^{**}-Bt^{**}-Bt^{**}-Ba^{**}-Bt^{**}-Bc^{*}-Bt^{*}-Bg^{*}-Bc^{*}-Bt^{*}-Bt^{*}-Bc^{*}-Bc^{*}-Bt^{*}-Bc^{*}-
Bc^{**}-Ba^{**}-Ba^{**}-Bc^{**}-Bc^{**}-CH₂CH₂OH (I'16)

HO-Bc^{**}-Bt^{**}-Bt^{**}-Bt^{**}-Bt^{**}-Ba^{*}-Bg^{*}-Bt^{*}-Bt^{*}-Bg^{*}-Bc^{*}-Bt^{*}-Bg^{*}-Bc^{*}-Bt^{*}-
Bc^{*}-Bt^{*}-Bt^{**}-Bt^{**}-Bt^{**}-Bc^{**}-Bc^{**}-CH₂CH₂OH (I'17)

25

HO-Bt^{**}-Bt^{**}-Bt^{**}-Bt^{**}-Bc^{**}-Bc^{*}-Ba^{*}-Bg^{*}-Bg^{*}-Bt^{*}-Bt^{*}-Bc^{*}-Ba^{*}-Ba^{**}-
Bg^{**}-Bt^{**}-Bg^{**}-Bg^{**}-CH₂CH₂OH (I'18)

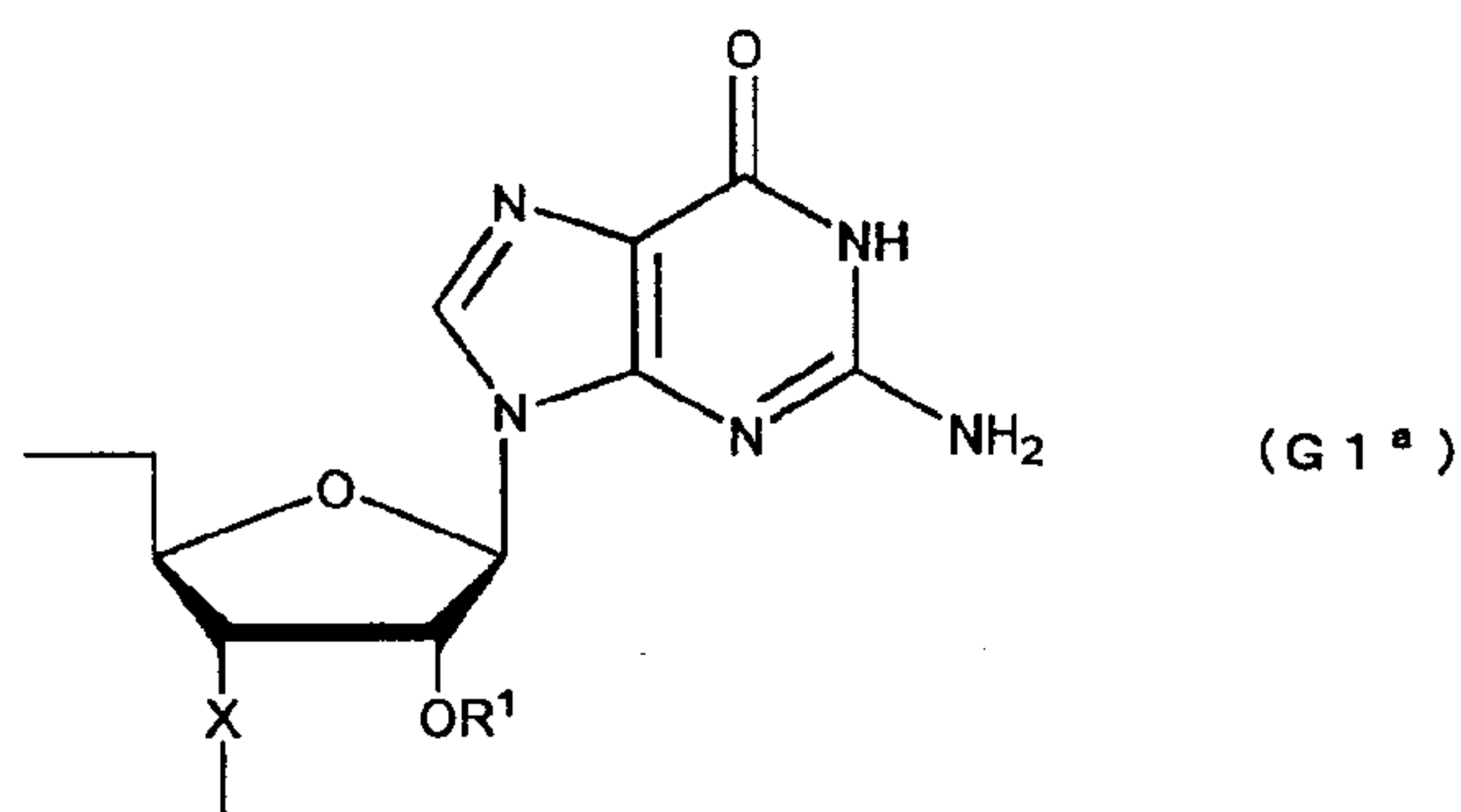
HO-Bc^{**}-Bt^{*}-Bg^{*}-Bc^{**}-Bt^{*}-Bt^{*}-Bc^{**}-Bc^{**}-Bt^{*}-Bc^{**}-Bc^{**}-Ba^{*}-Ba^{*}-Bc^{**}-
30 Bc^{**}-CH₂CH₂OH (I'19)

HO-Bc^{**}-Bt^{**}-Bg^{*}-Bc^{**}-Bt^{**}-Bt^{*}-Bc^{*}-Bc^{**}-Bt^{*}-Bc^{*}-Bc^{**}-Ba^{*}-Ba^{*}-Bc^{**}-

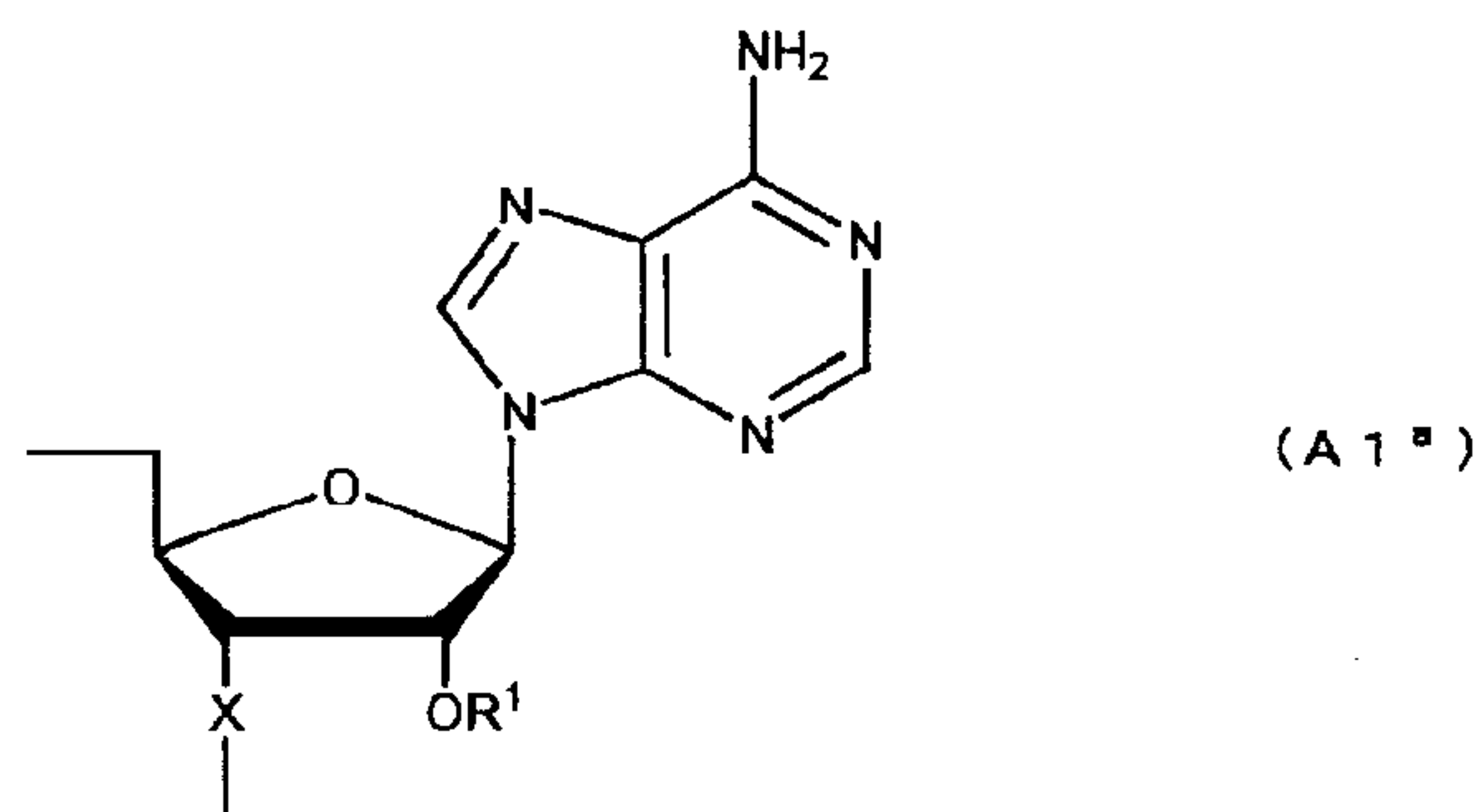
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Bc** $\cdot$ CH₂CH₂OH (I'20)

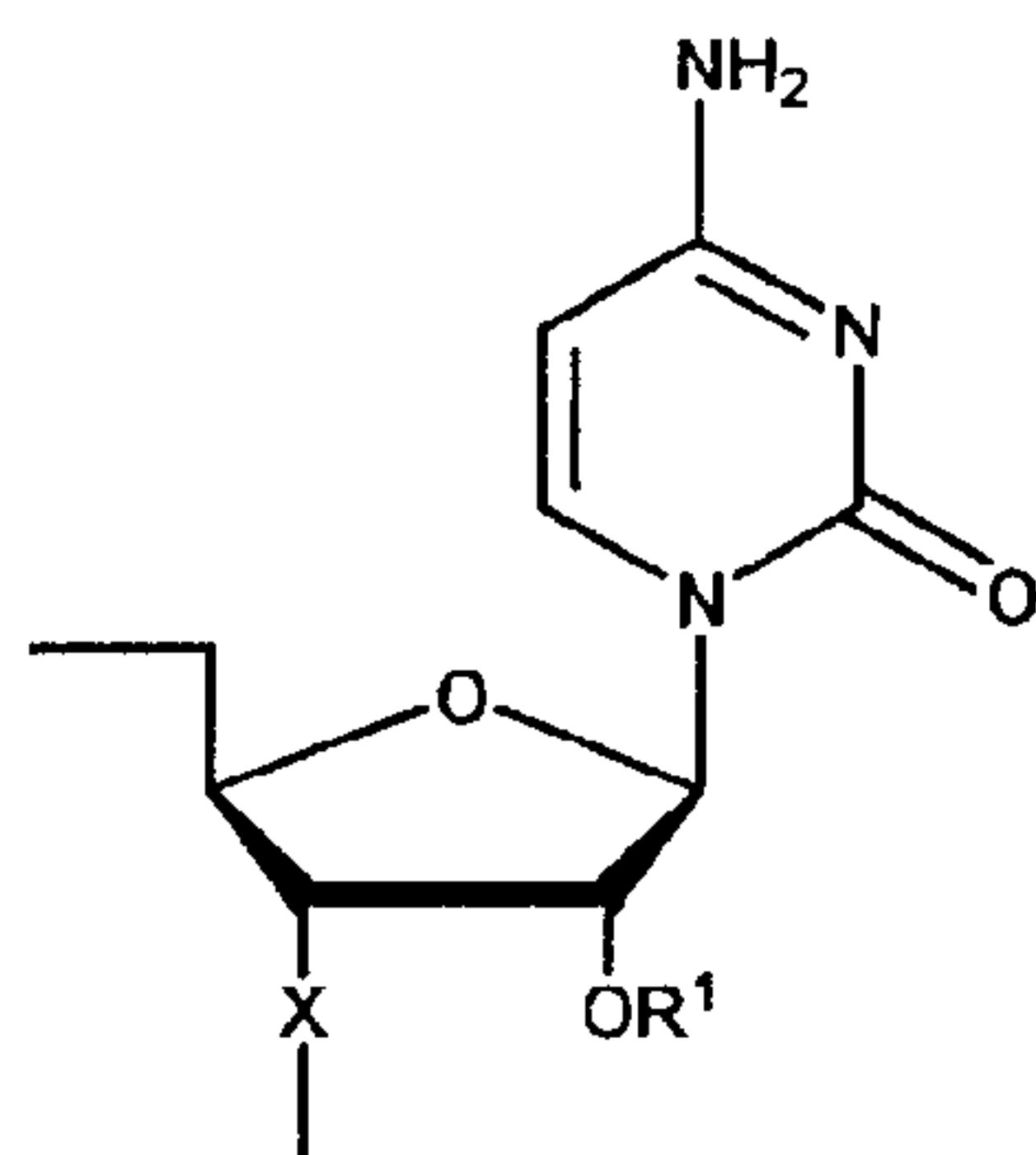
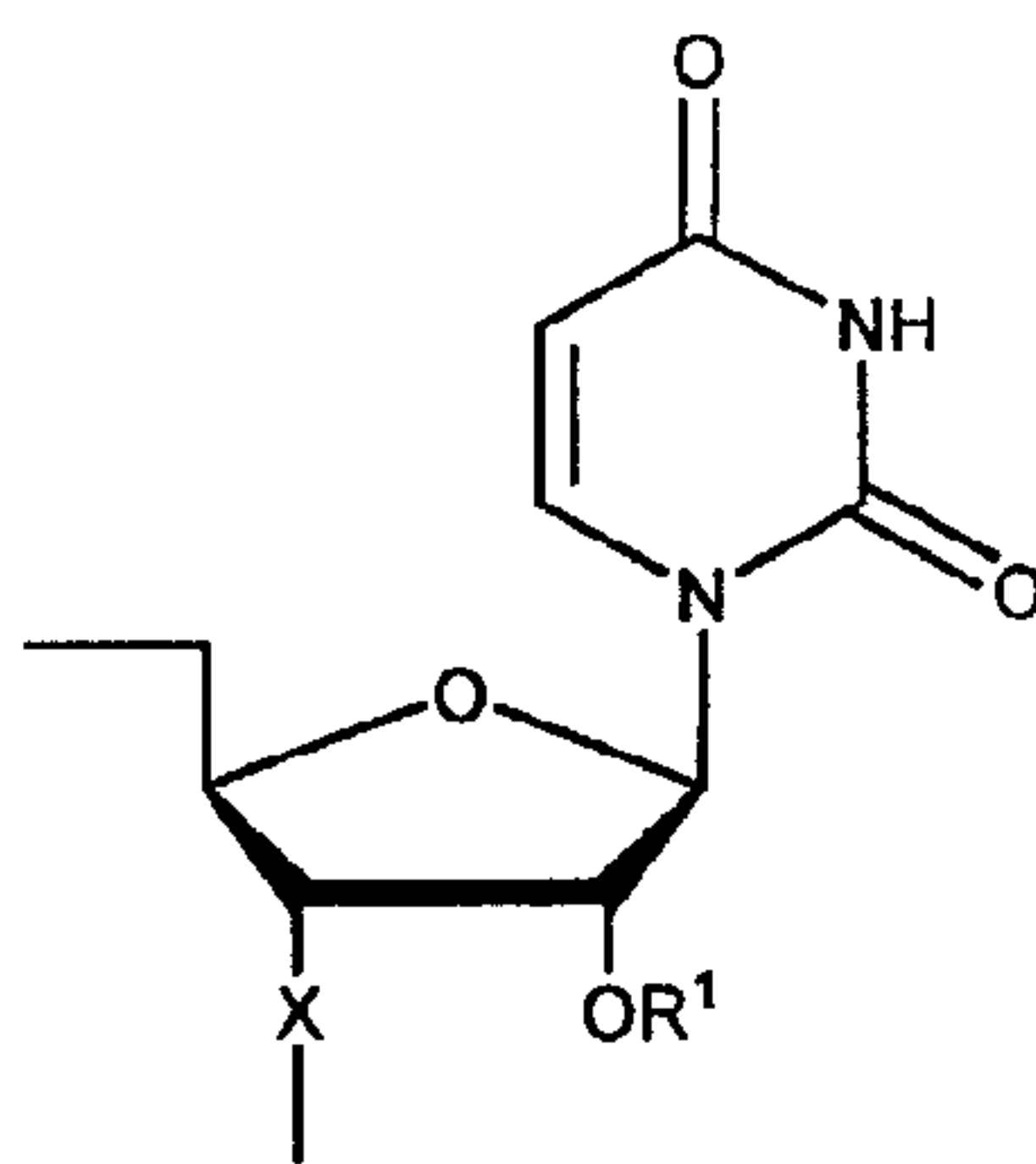
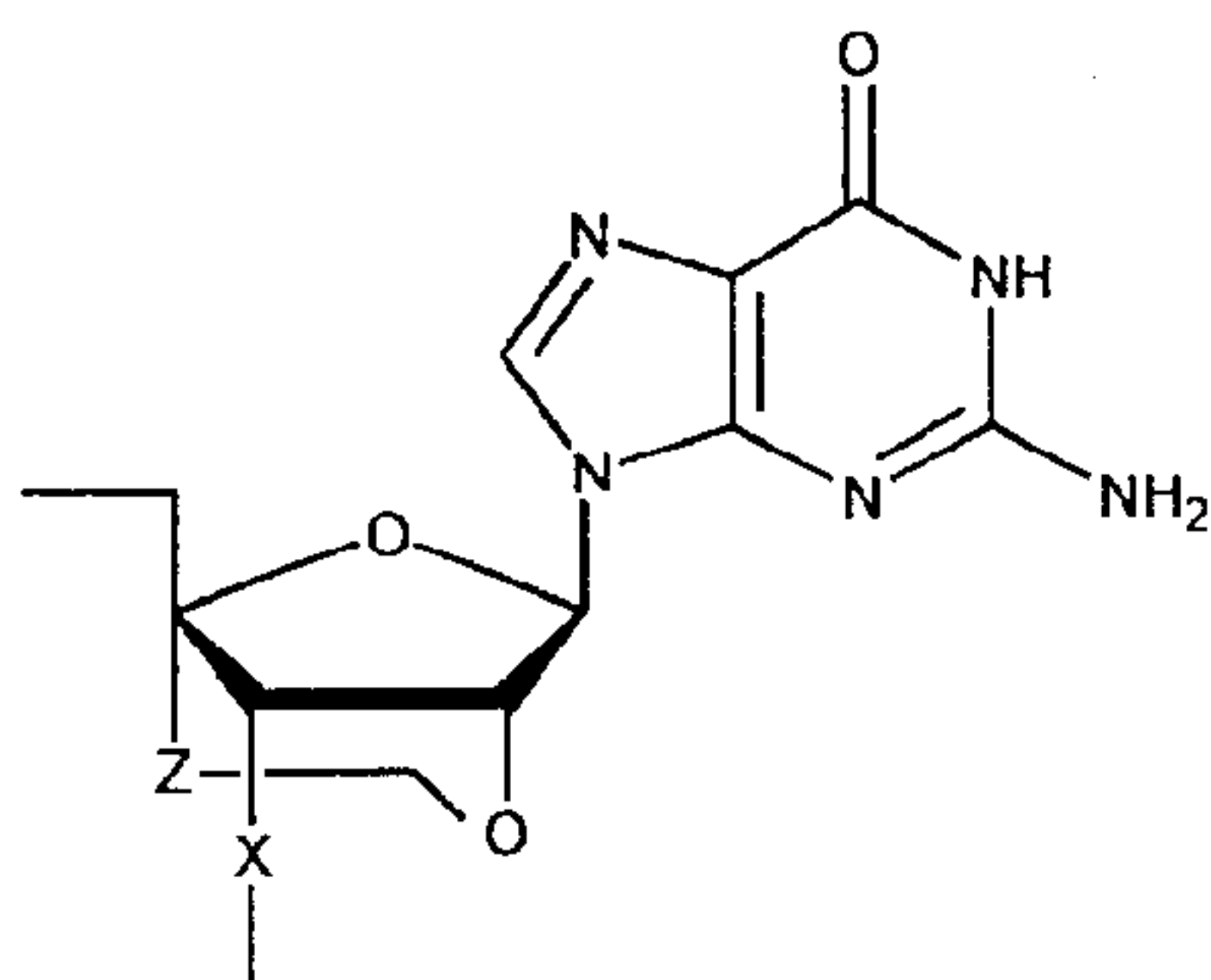
where Bg* is a group represented by the following formula (G1^a); Ba* is a group represented by the following formula (A1^a); Bc* is a group represented by the following
 5 formula (C1^a); Bt* is a group represented by the following formula (U1^a); Bg** is a group represented by the following formula (G2); Ba** is a group represented by the following formula (A2); Bc** is a group represented by the following formula (C2); and Bt** is a group represented by the following formula (T2):



10

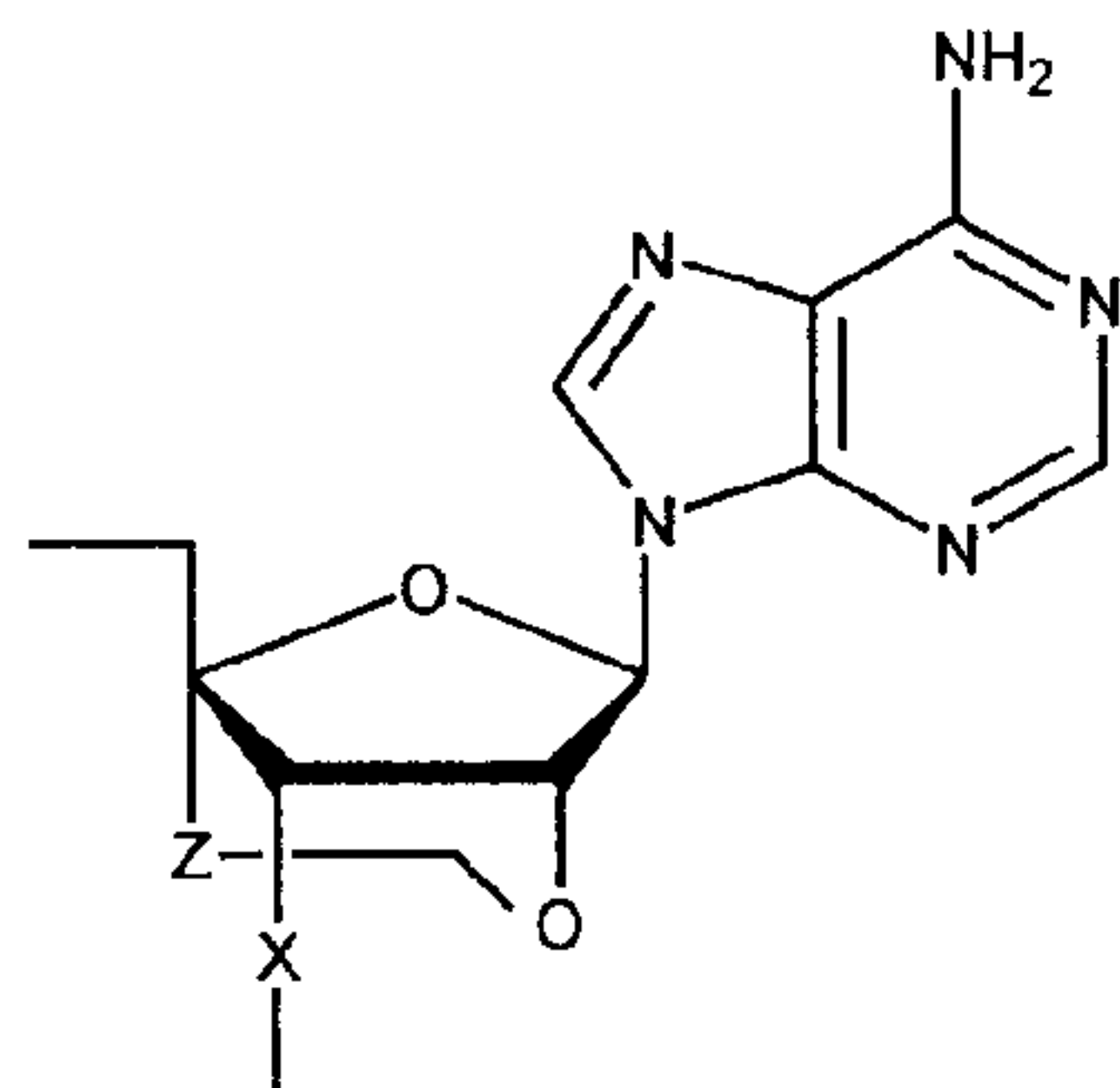


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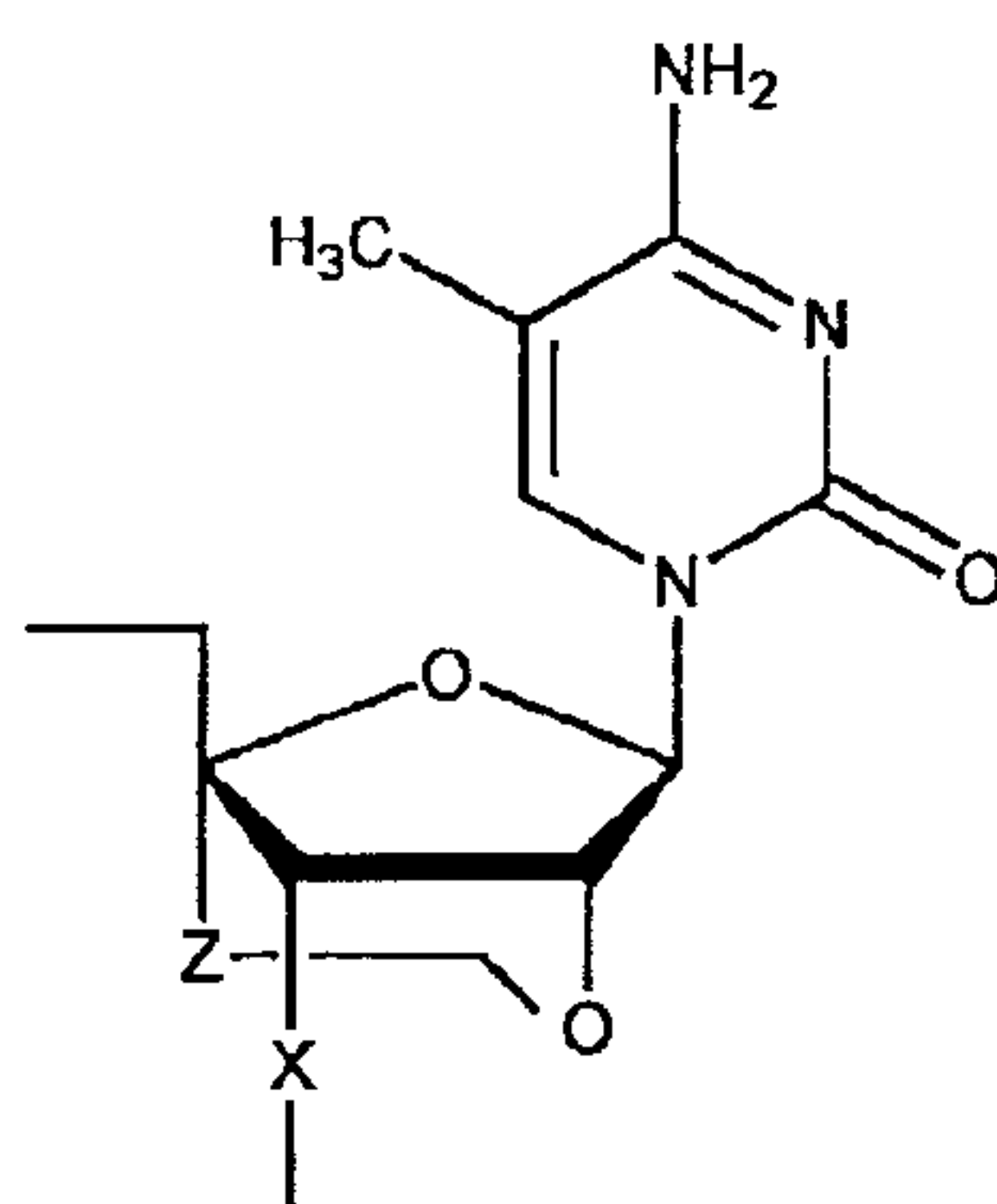
(C 1^a)(U 1^a)

(G 2)

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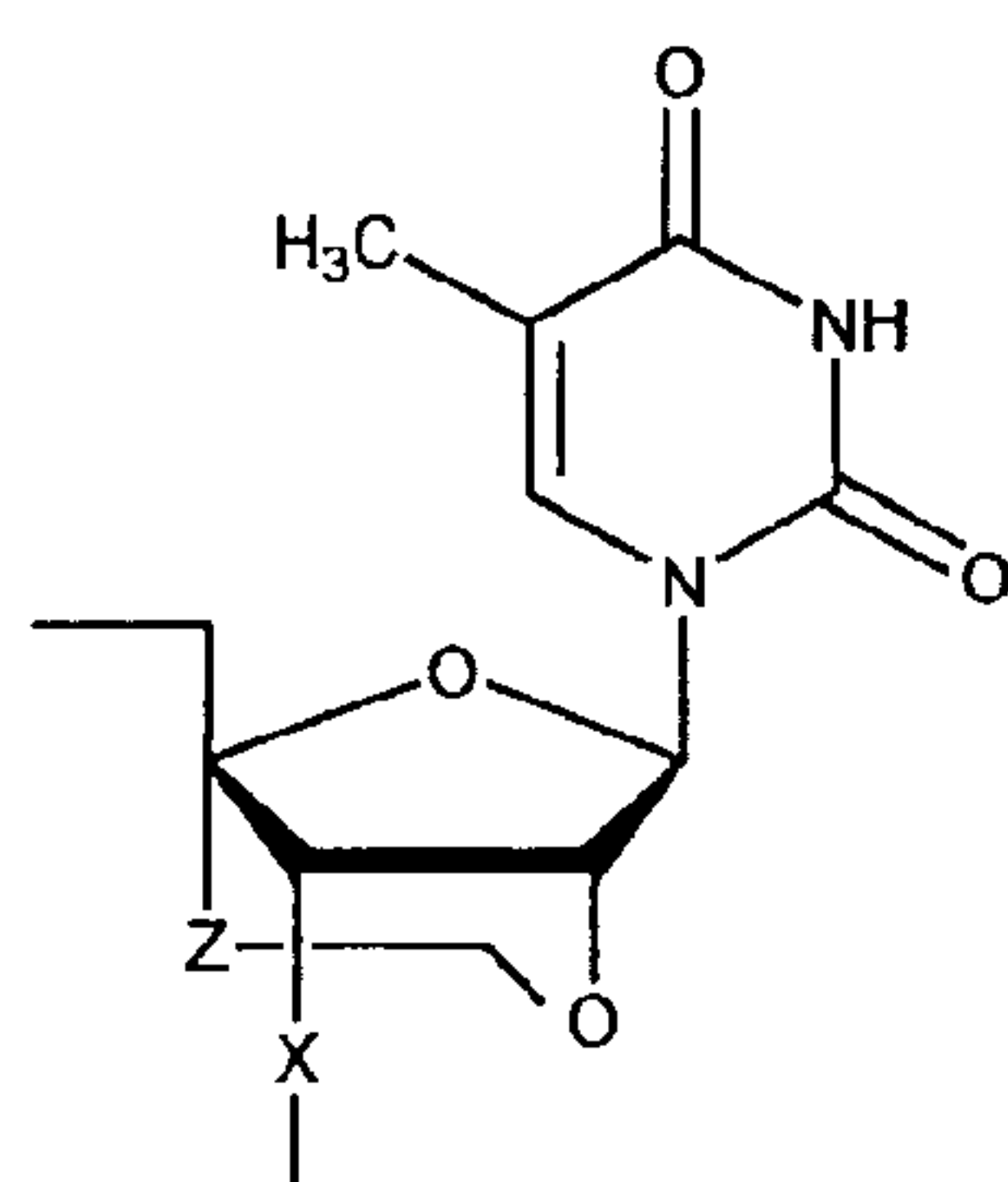


(A 2)



(C 2)

5

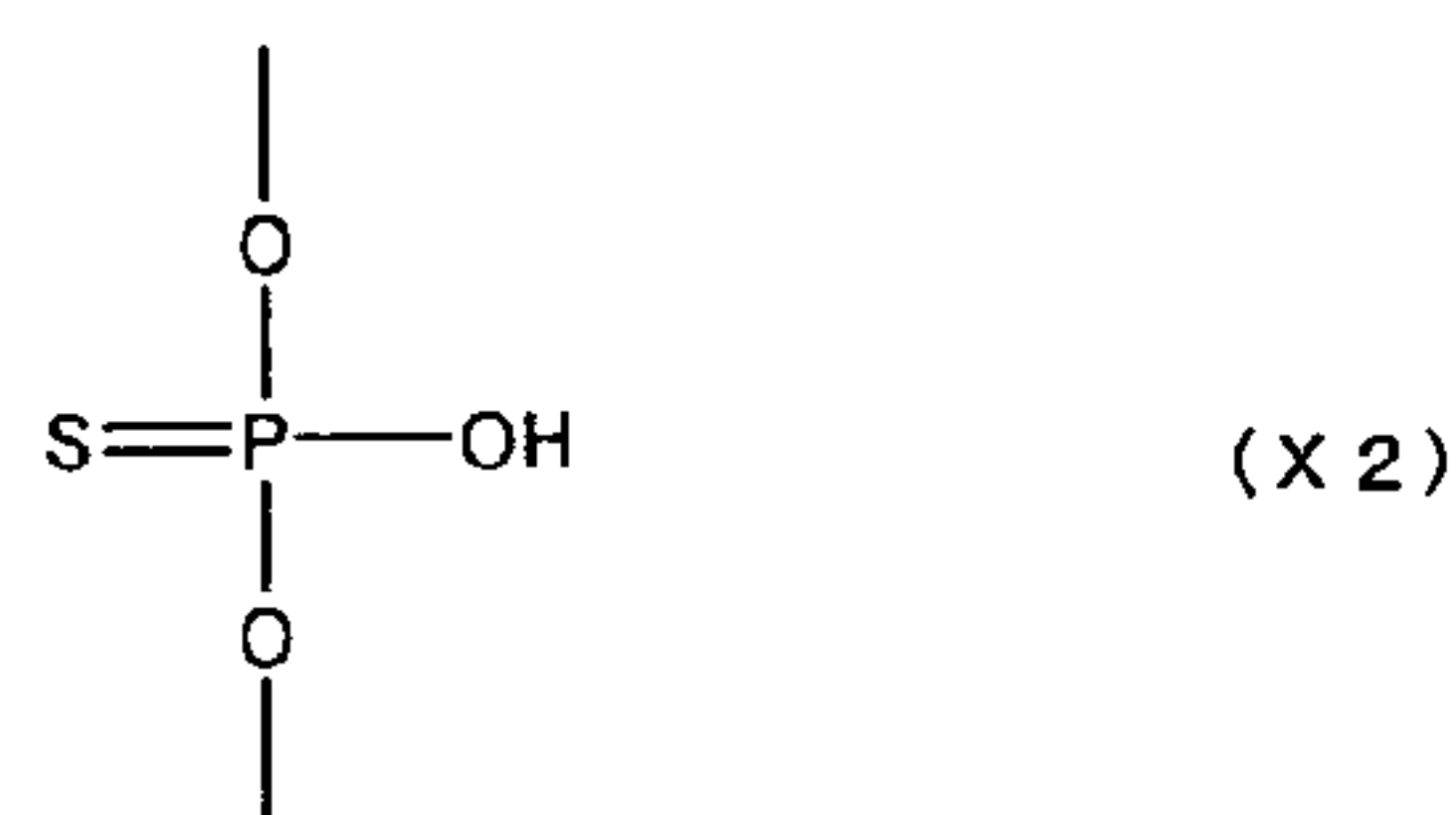
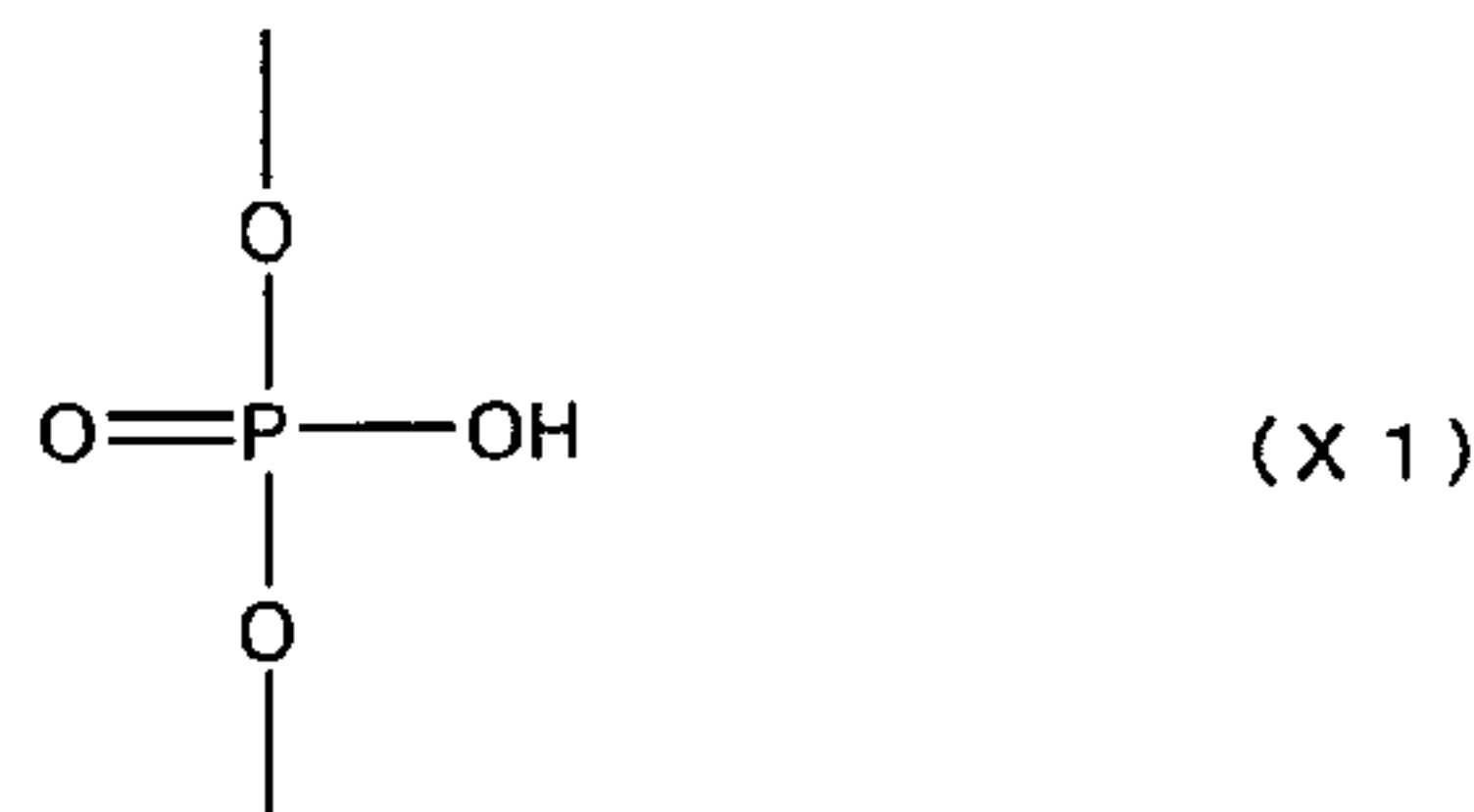


(T 2)

where X is individually and independently a group represented by the following formula
 10 (X1) or (X2); R¹ is individually and independently an alkyl group with 1-6 carbon atoms;

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and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms:



5

[22] The compound of [21] above where X in formulas (G1^a), (A1^a), (C1^a) and (U1^a) is a group represented by formula (X2) and X in formulas (G2), (A2), (C2) and (T2) is a group represented by formula (X1), or a pharmacologically acceptable salt thereof.

10 [23] The compound of [21] above where X in all the formulas (G1^a), (A1^a), (C1^a), (U1^a), (G2), (A2), (C2) and (T2) is a group represented by formula (X2), or a pharmacologically acceptable salt thereof.

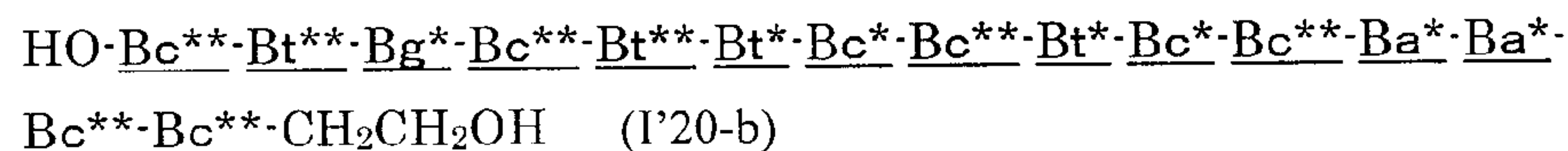
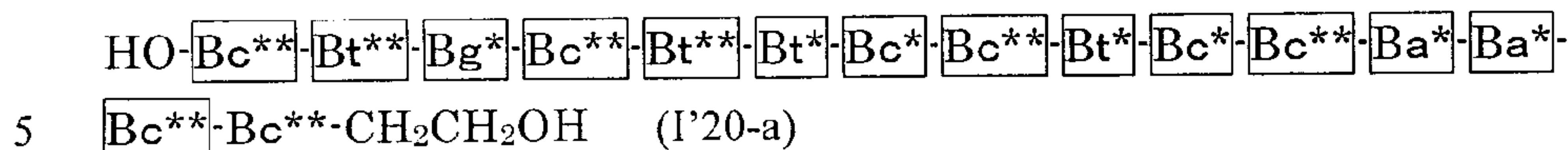
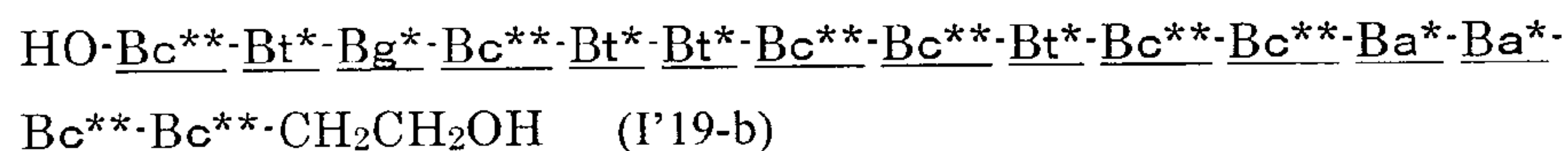
[24] The compound of [21] above which is represented by any one of the following formulas (I'1-a) to (I'20-b), or a pharmacologically acceptable salt thereof:

15 HO- $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B g}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B c}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B c}^{*}}$ - $\boxed{\text{B g}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B c}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B c}^{**}}$ - $\boxed{\text{B a}^{**}}$ -CH₂CH₂OH
(I'1-a)

20 HO- $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B c}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B c}^{*}}$ - $\boxed{\text{B g}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B c}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B c}^{**}}$ - $\boxed{\text{B a}^{**}}$ -CH₂CH₂OH (I'2-a)

HO- $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B a}^{**}}$ - $\boxed{\text{B c}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B g}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B g}^{*}}$ - $\boxed{\text{B c}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B a}^{*}}$ - $\boxed{\text{B t}^{*}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B t}^{**}}$ - $\boxed{\text{B g}^{**}}$ - $\boxed{\text{B c}^{**}}$ - $\boxed{\text{B t}^{**}}$ -CH₂CH₂OH (I'3-a)

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- 10 where Bg* is a group represented by formula (G1^a), Ba* is a group represented by formula (A1^a); Bc* is a group represented by formula (C1^a); Bt* is a group represented by formula (U1^a); Bg** is a group represented by formula (G2); Ba** is a group represented by formula (A2); Bc** is a group represented by formula (C2); Bt** is a group represented by formula (T2); and in individual formulas, at least one of Bg*, Ba*, Bc*, Bt*, Bg**, Ba**, Bc** and Bt** has a group represented by formula (X2) as X and all of Bg*, Ba*, Bc*, Bt*, Bg**, Ba**, Bc** and Bt** have a group represented by (X1) as X.

[25] The compound of any one of [13] to [24] above where Y in formulas (G1), (A1), (C1) and (U1) is a methoxy group and Z in formulas (G2), (A2), (C2) and (T2) is an ethylene group, or a pharmacologically acceptable salt thereof.

- 20 [26] A compound represented by the following general formula (I'') or a pharmacologically acceptable salt thereof:



where B_{Γ''1} is a group represented by any one of the following (1a'') to (1m''):

- (1a'')HO-,
 25 (1b'')HO-Bt-,
 (1c'')HO-Bt-Bt-,
 (1d'')HO-Bt-Bt-Bt-,
 (1e'')HO-Ba-Bt-Bt-Bt-,
 (1f'')HO-Bt-Ba-Bt-Bt-Bt-,
 30 (1g'')HO-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1h'')HO-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1i'')HO-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,

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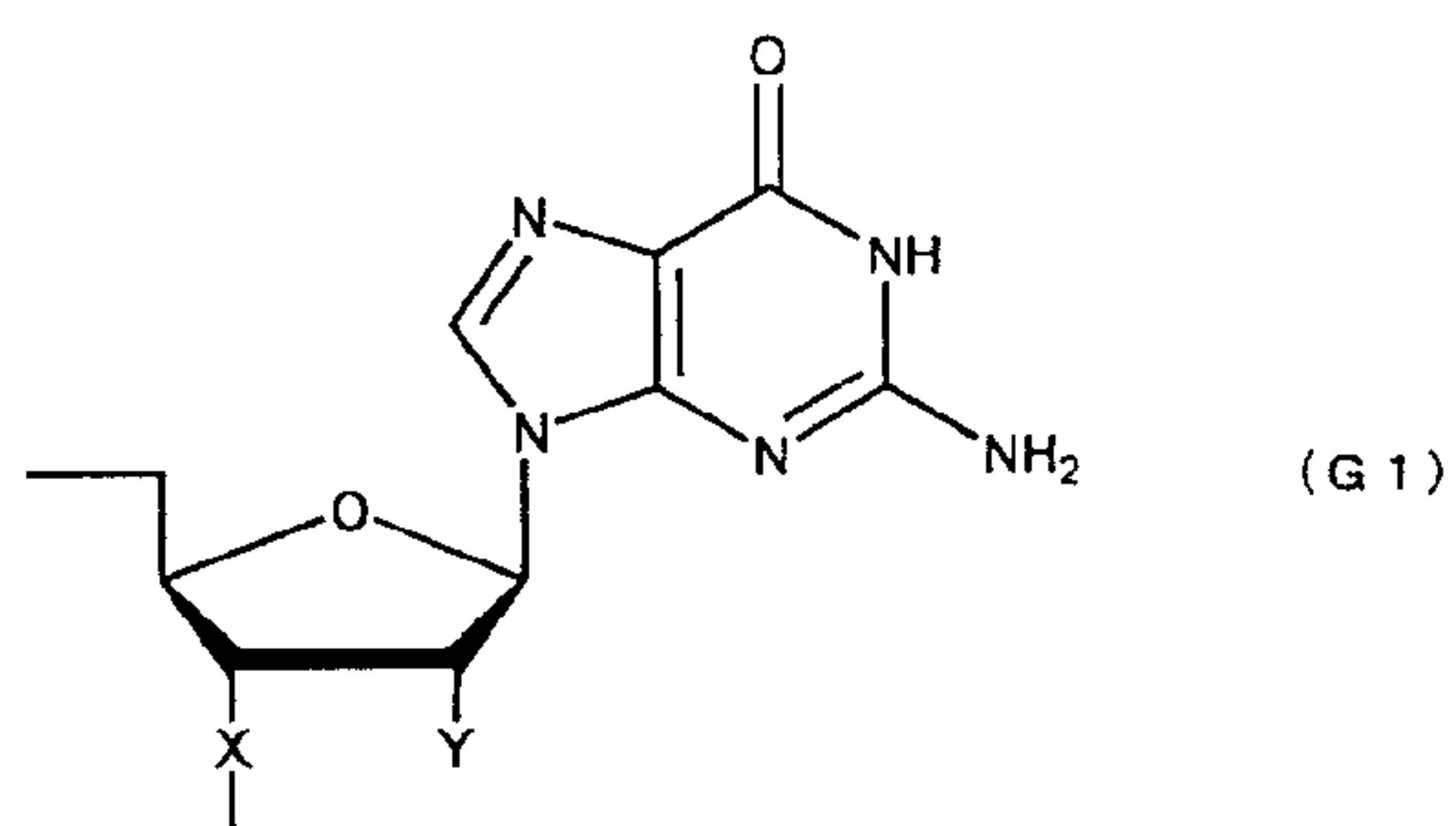
(1j'')HO-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,

(1k'')HO-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,

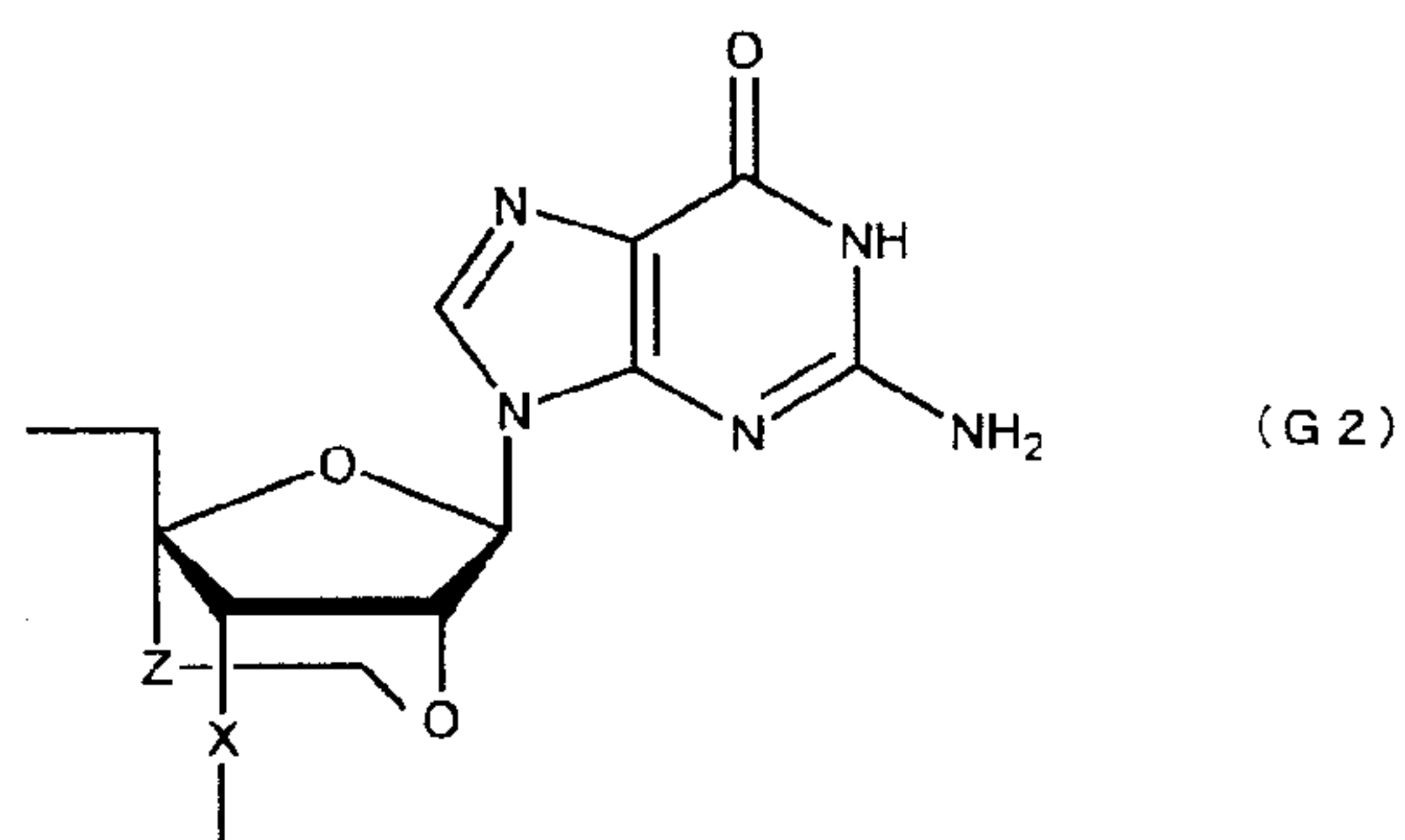
(1l'')HO-Bc-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-, or

(1m'')HO-Bc-Bc-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,

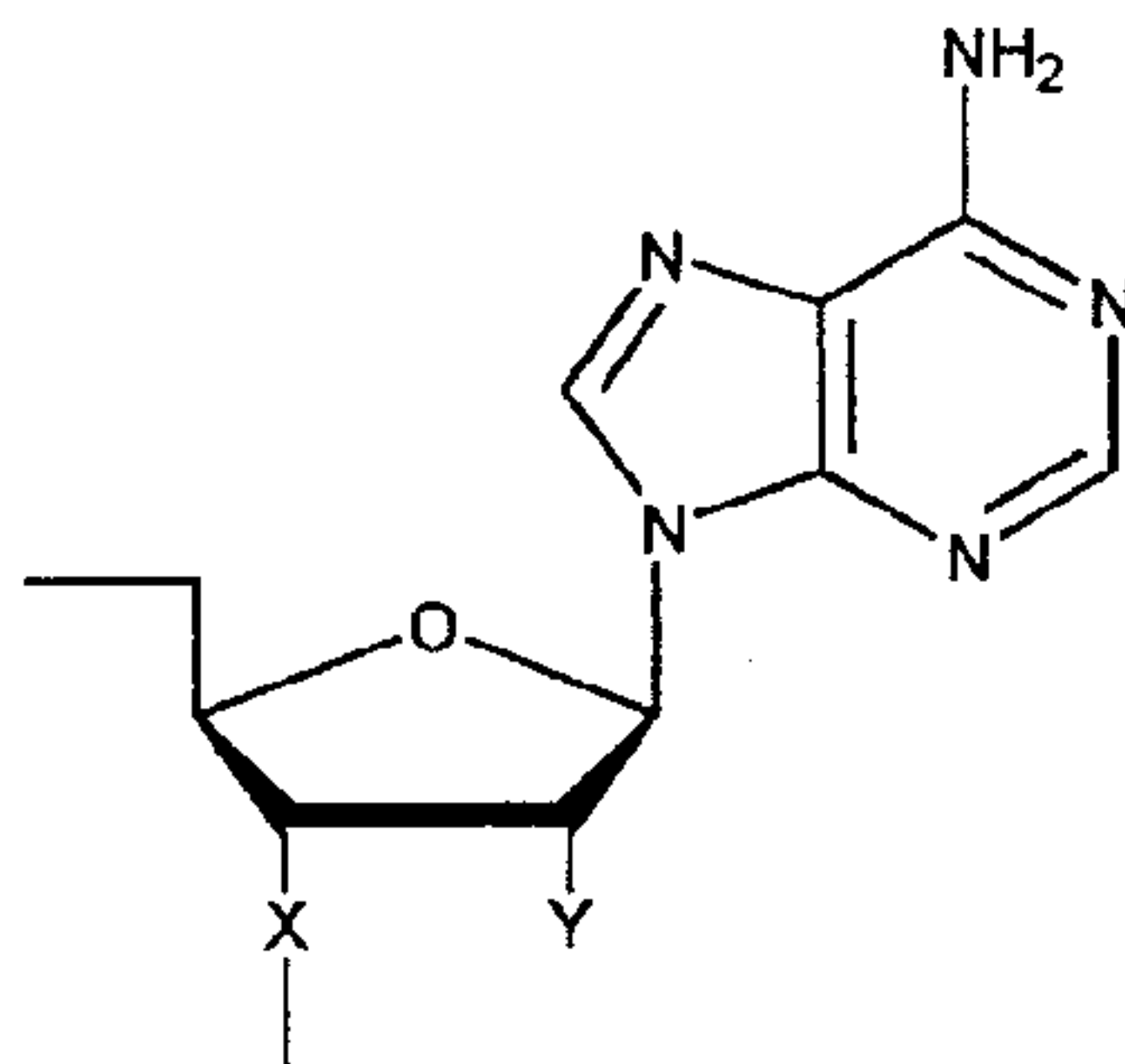
- 5 where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):



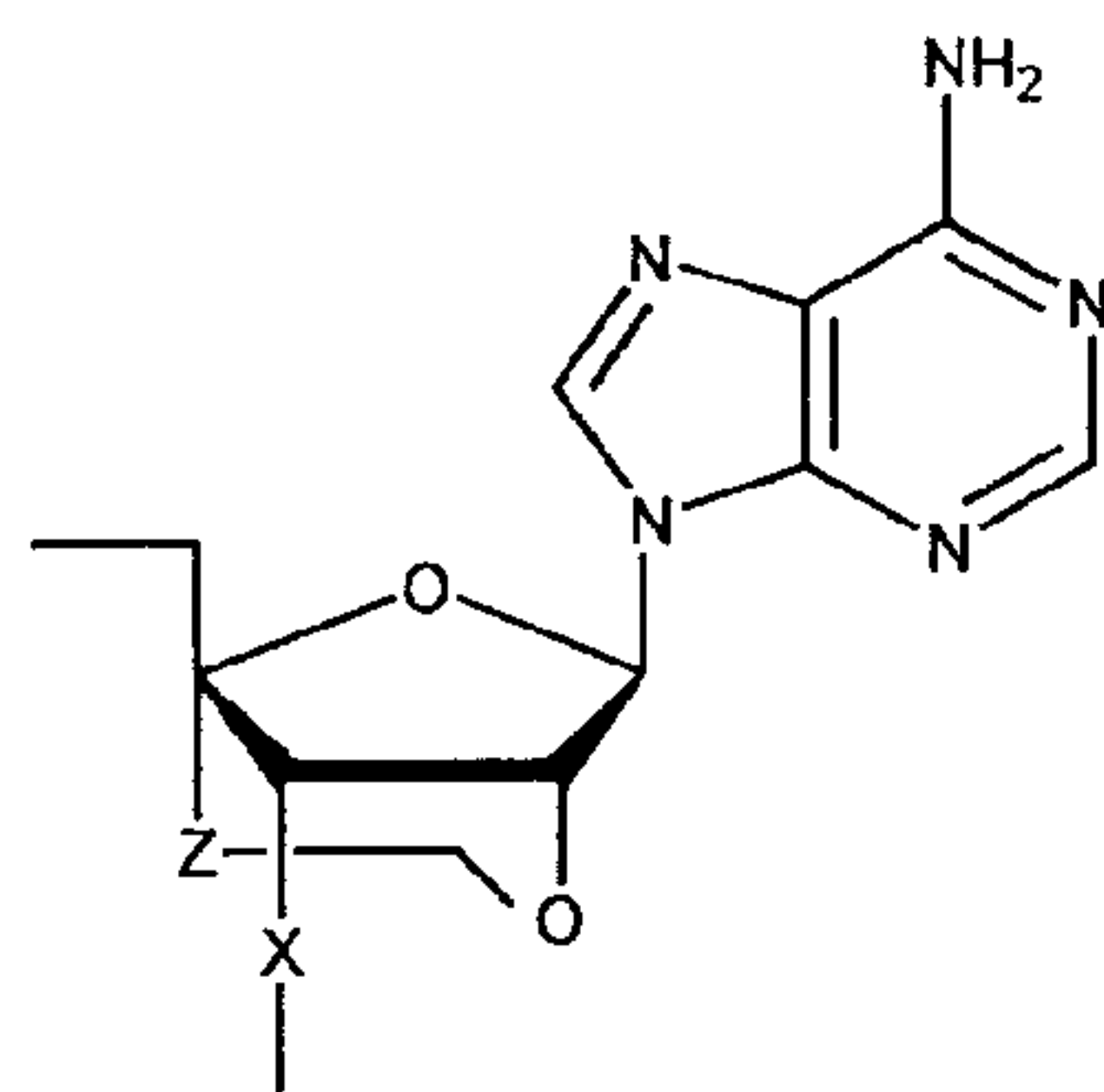
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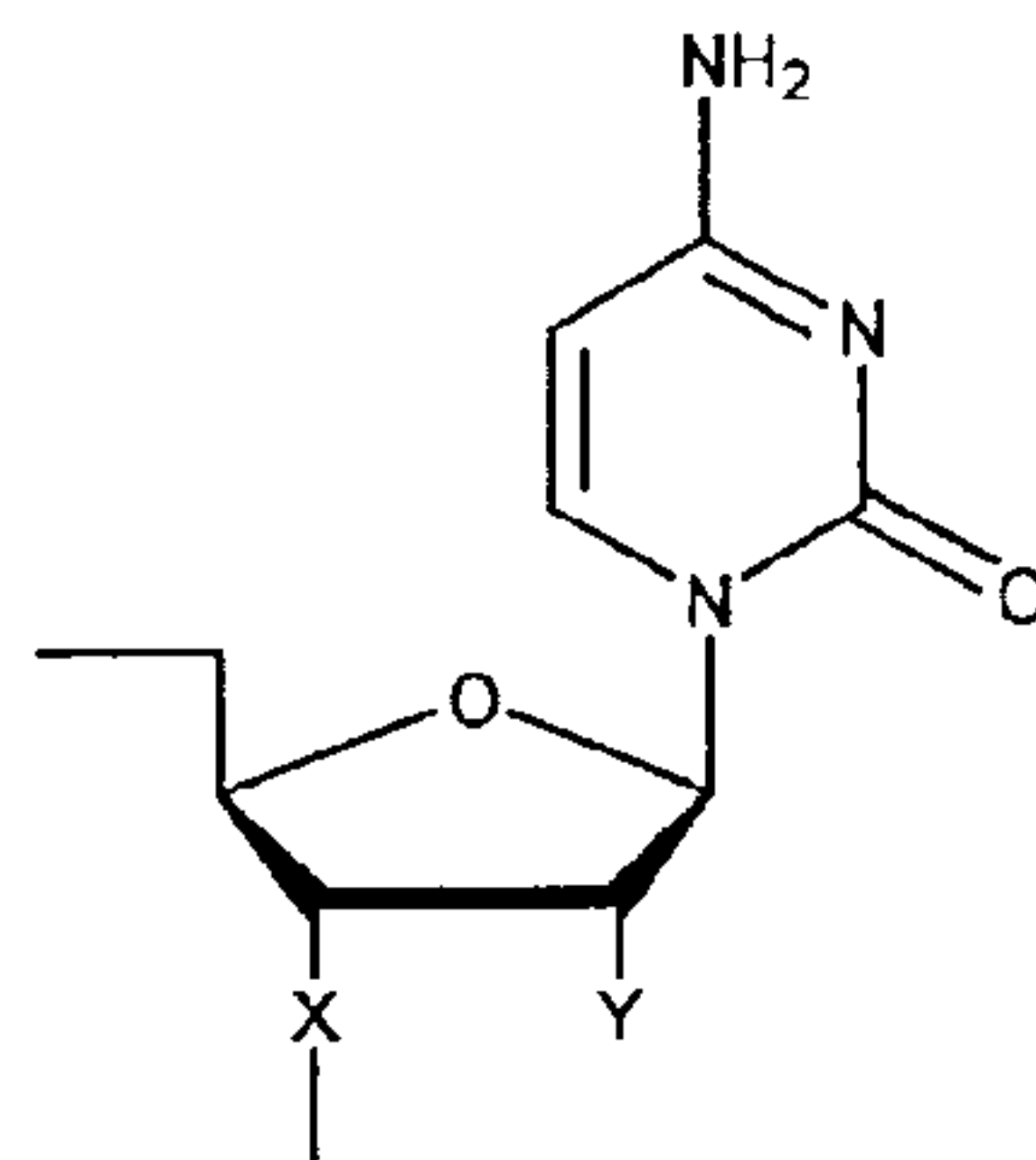
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(A 1)

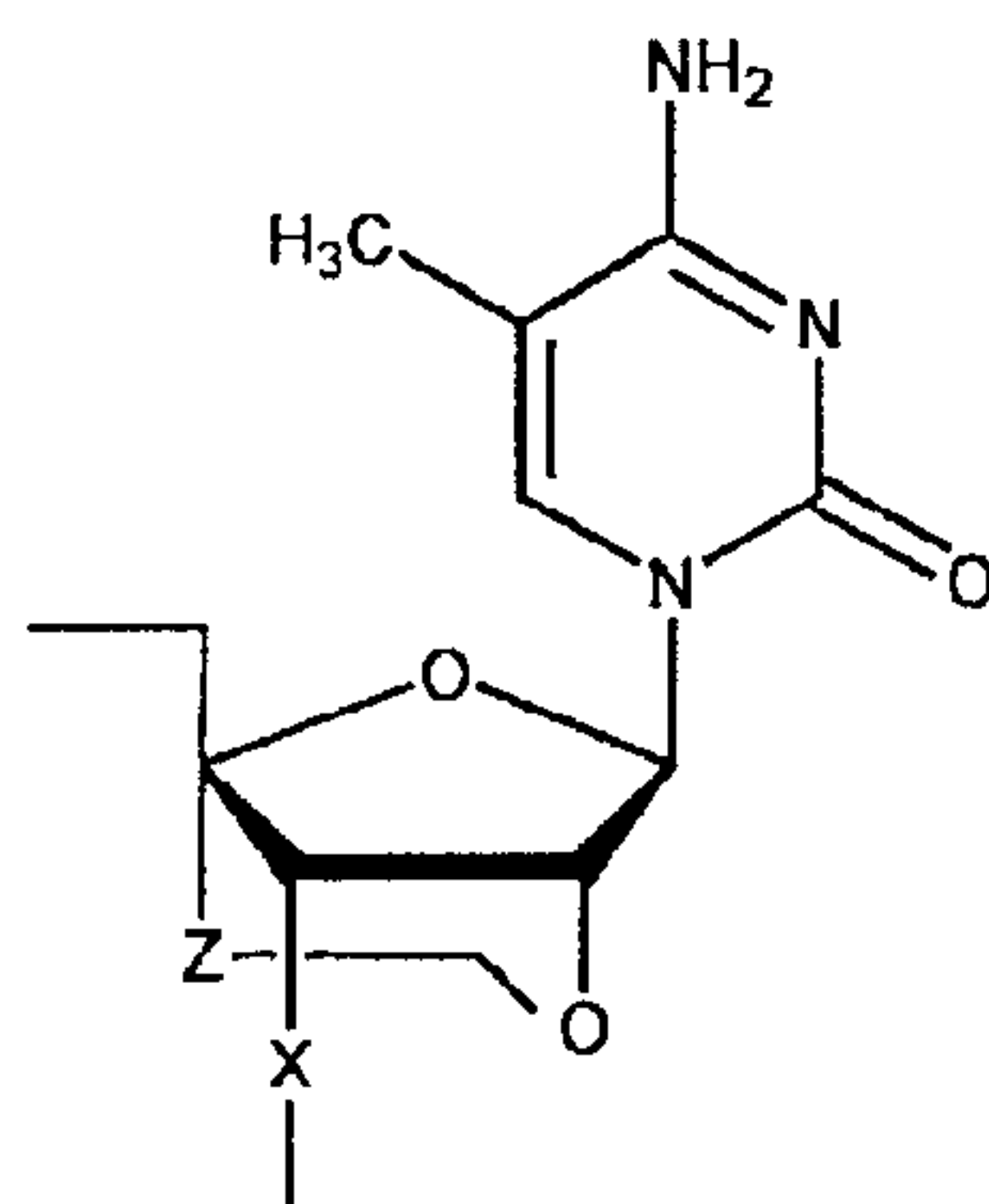


(A 2)

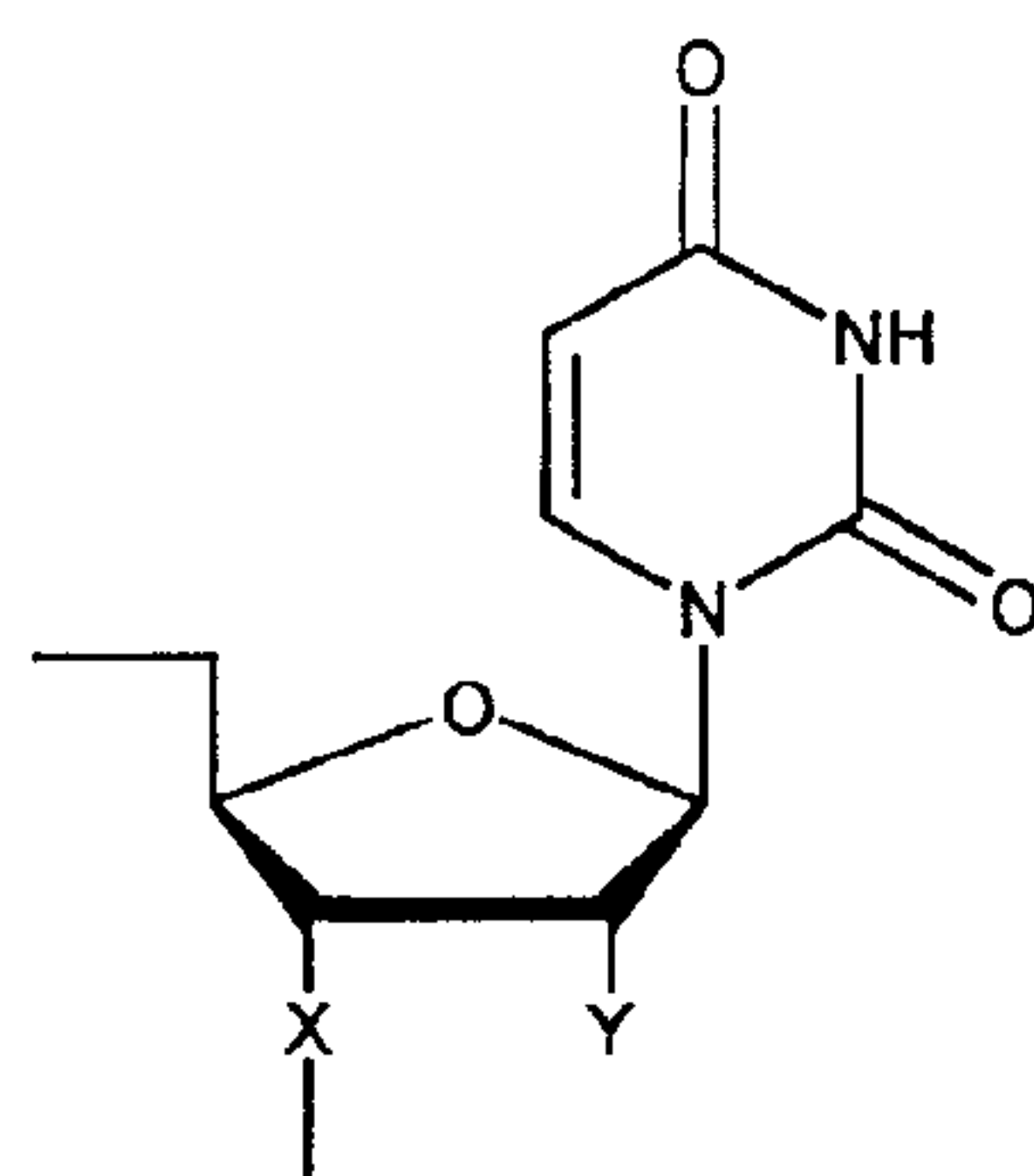


(C 1)

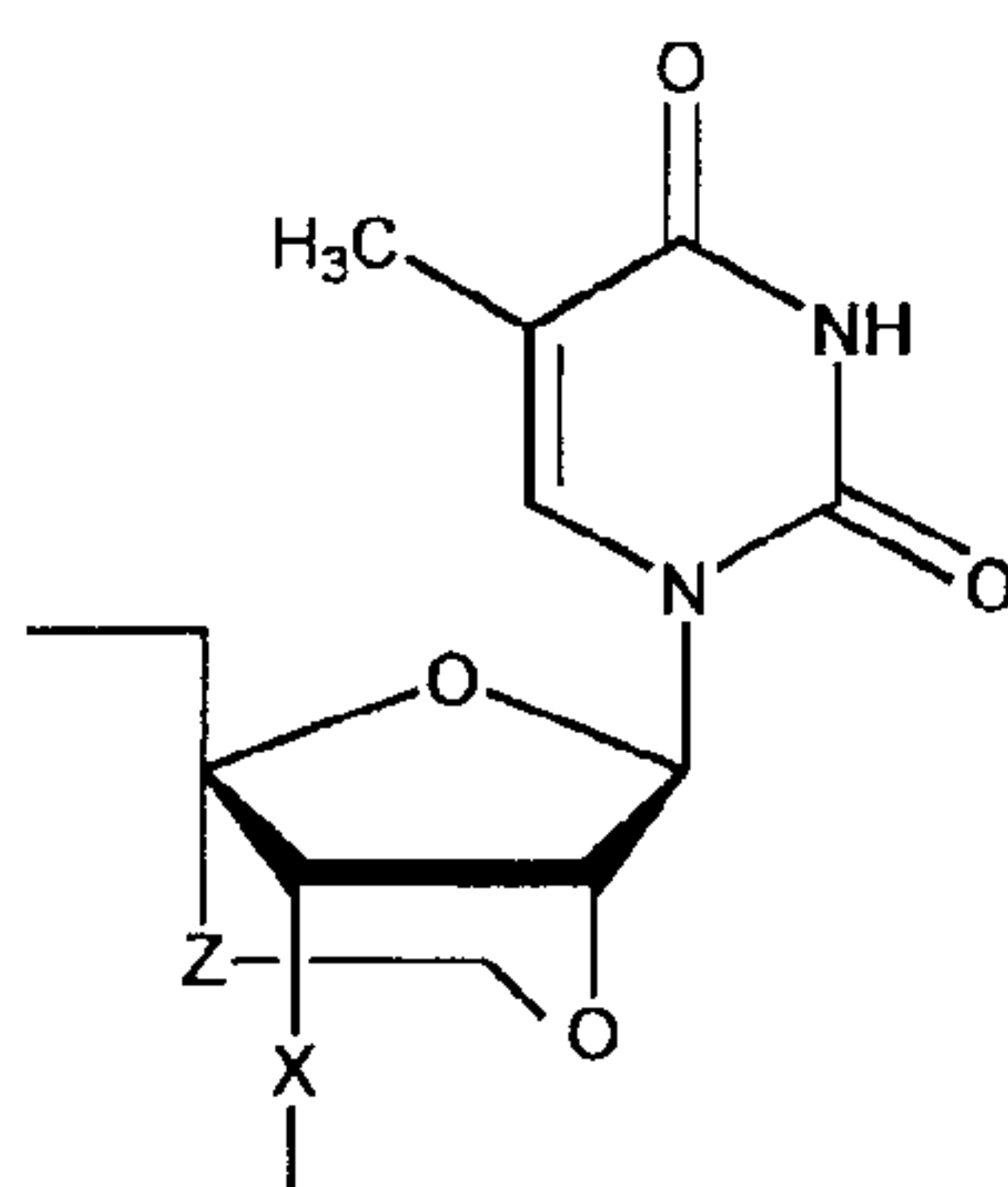
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(C 2)



(U 1)

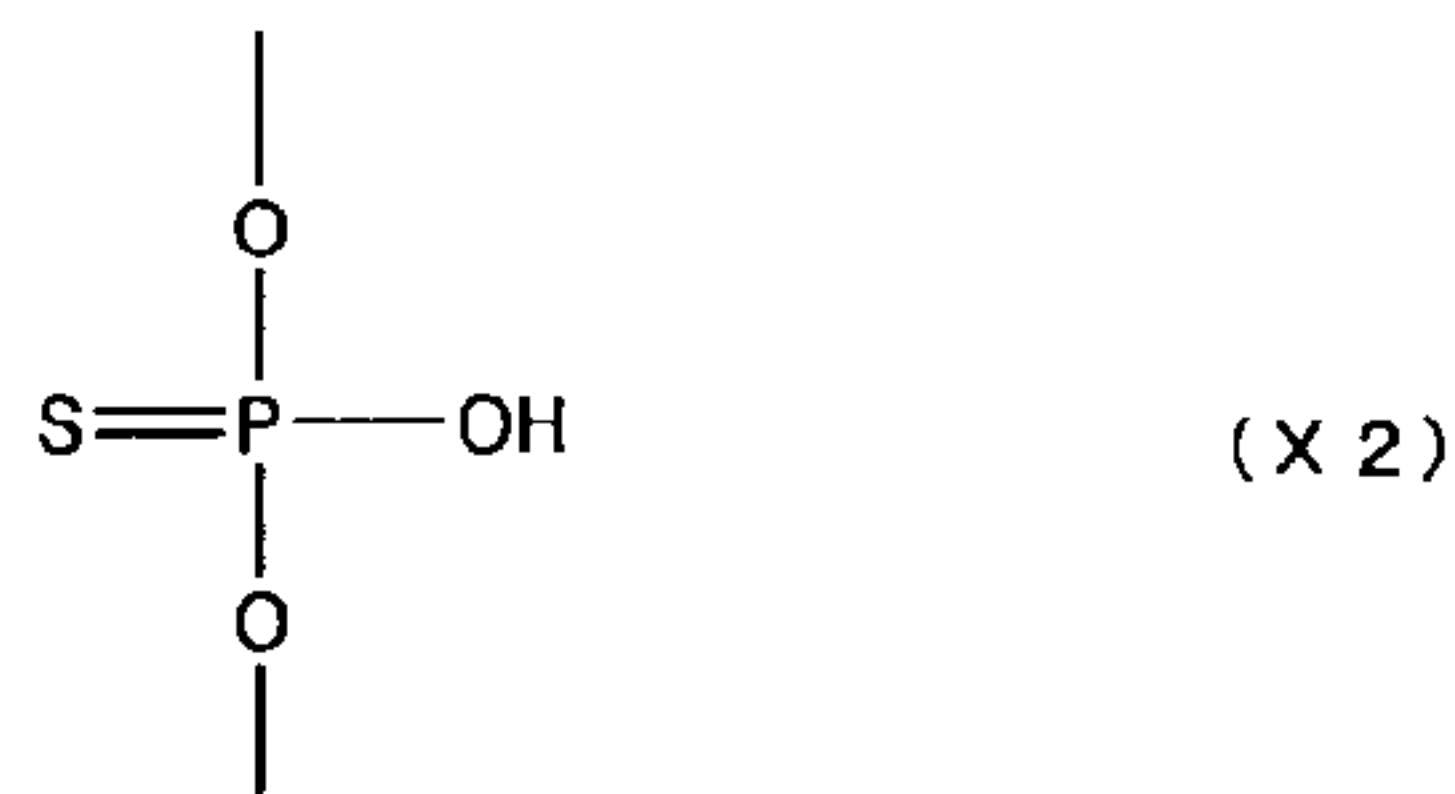
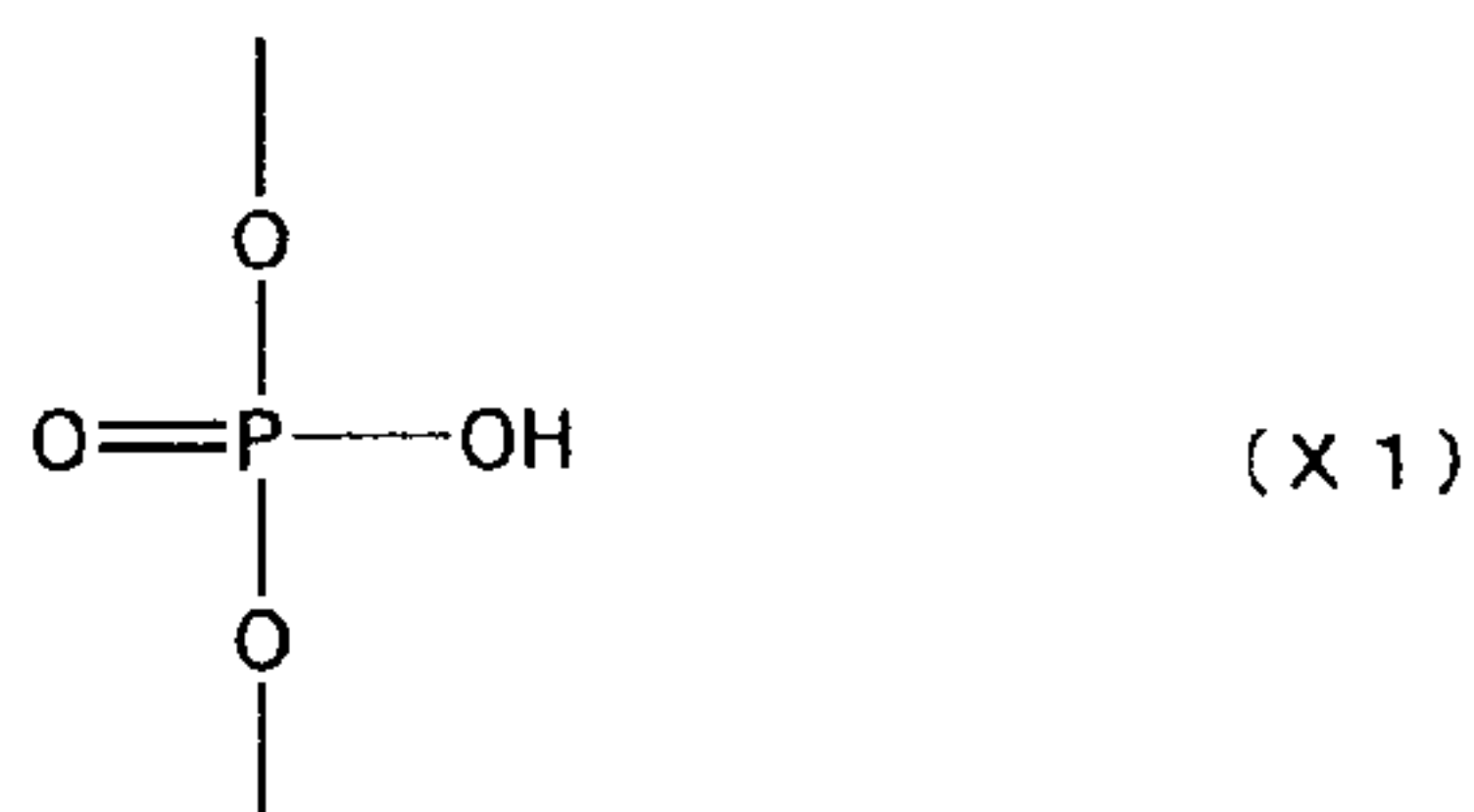


(T 2)

5

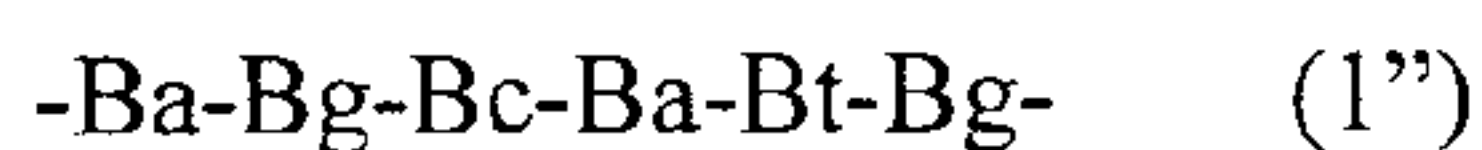
where X is individually and independently a group represented by the following formula (X1) or (X2):

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Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 5 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene
 group with 1-5 carbon atoms;

B_{M''1} is a group represented by the following formula (1''):

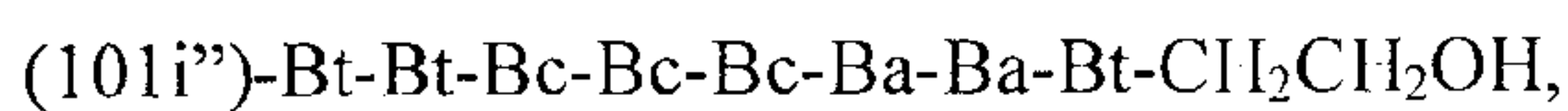
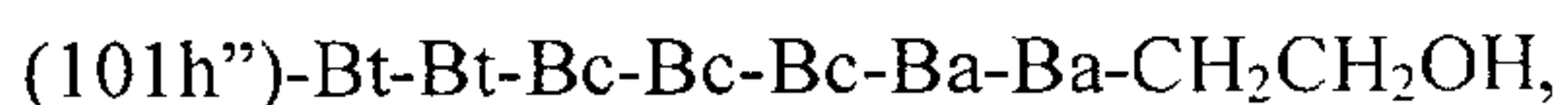
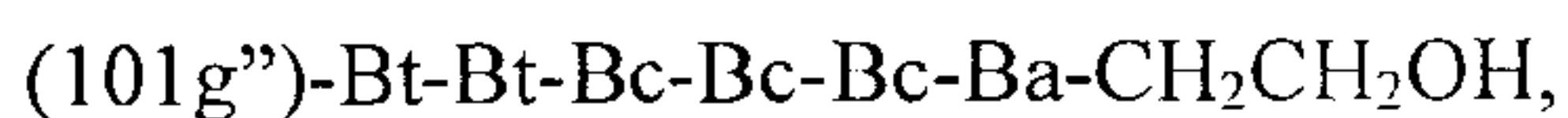
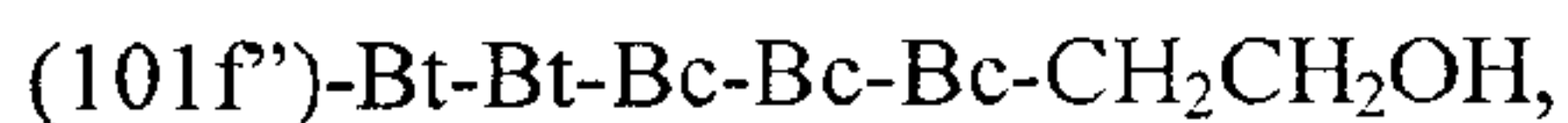


where Bg, Ba, Bt and Bc are as defined above;

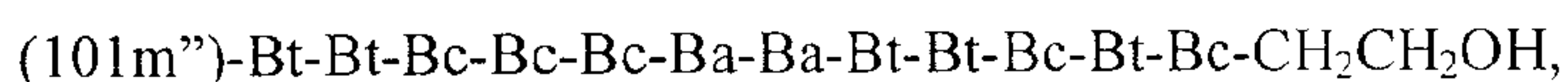
10 B_{B''1} is a group represented by any one of the following (101a'') to (101m''):



15 (101e'')-Bt-Bt-Bc-Bc-CH₂CH₂OH,



20 (101j'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-CH₂CH₂OH,



where Bg, Ba, Bt and Bc are as defined above;

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provided that at least one of the nucleosides constituting the compound represented by formula (I'') has 2''-O,4''-C-alkylene group.

[27] A compound represented by the following general formula (II'') or a pharmacologically acceptable salt thereof:



where $B_{T''2}$ is a group represented by any one of the following (2a'') to (2g''):

(2a'')HO-,

(2b'')HO-Bg-,

(2c'')HO-Bt-Bg-,

10 (2d'')HO-Ba-Bt-Bg-,

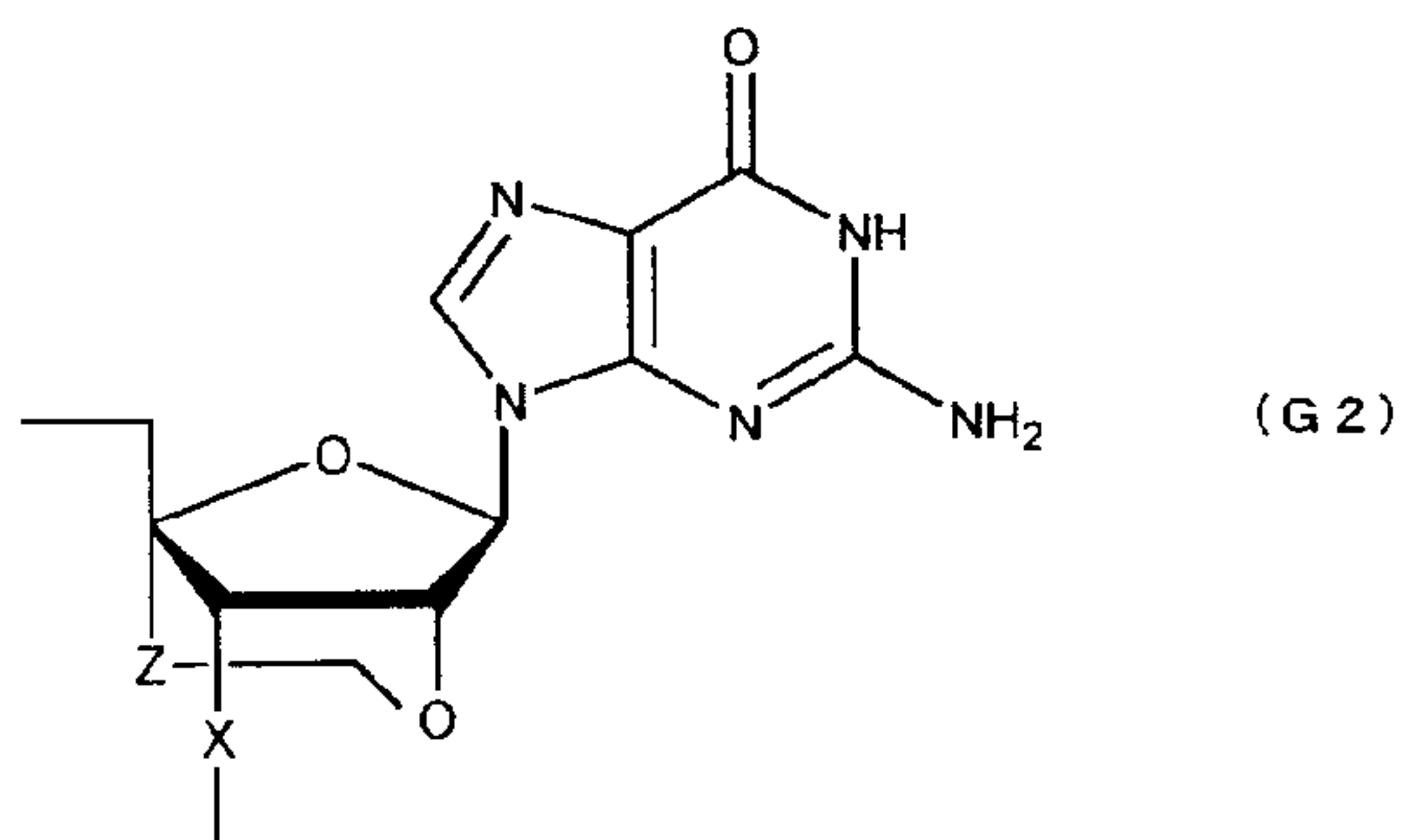
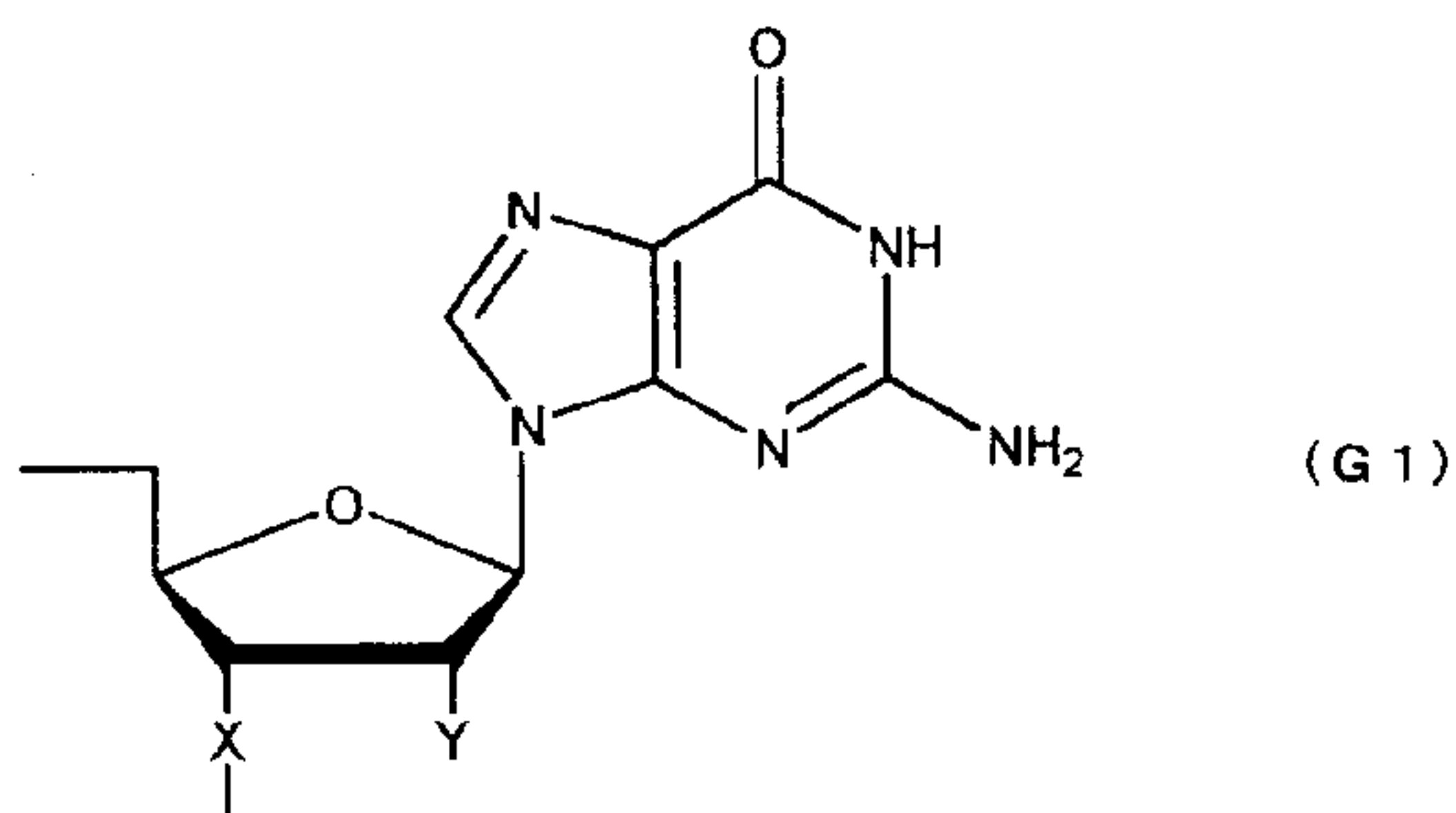
(2e'')HO-Bc-Ba-Bt-Bg-,

(2f'')HO-Bg-Bc-Ba-Bt-Bg-, or

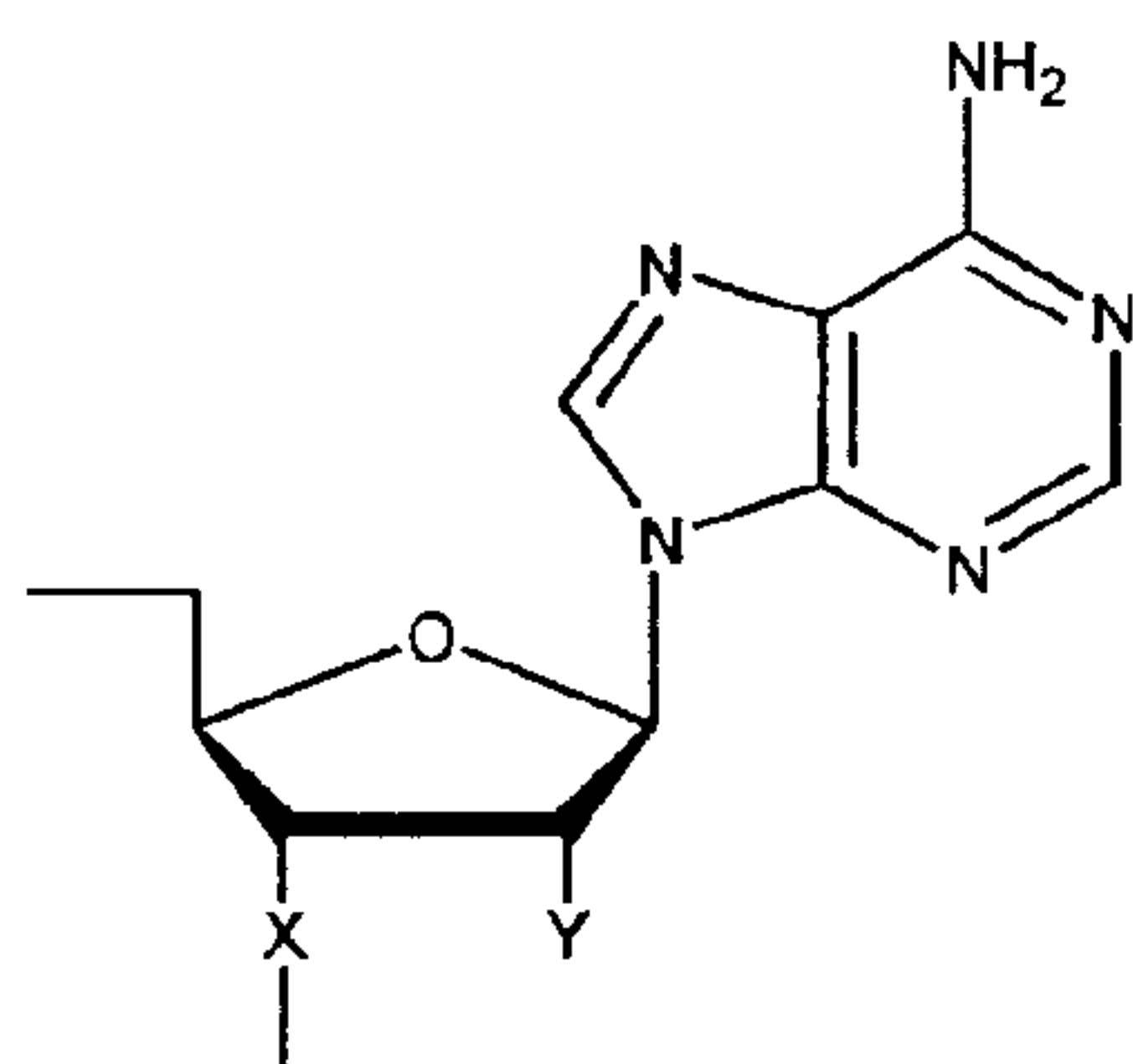
(2g'')HO-Ba-Bg-Bc-Ba-Bt-Bg-,

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group

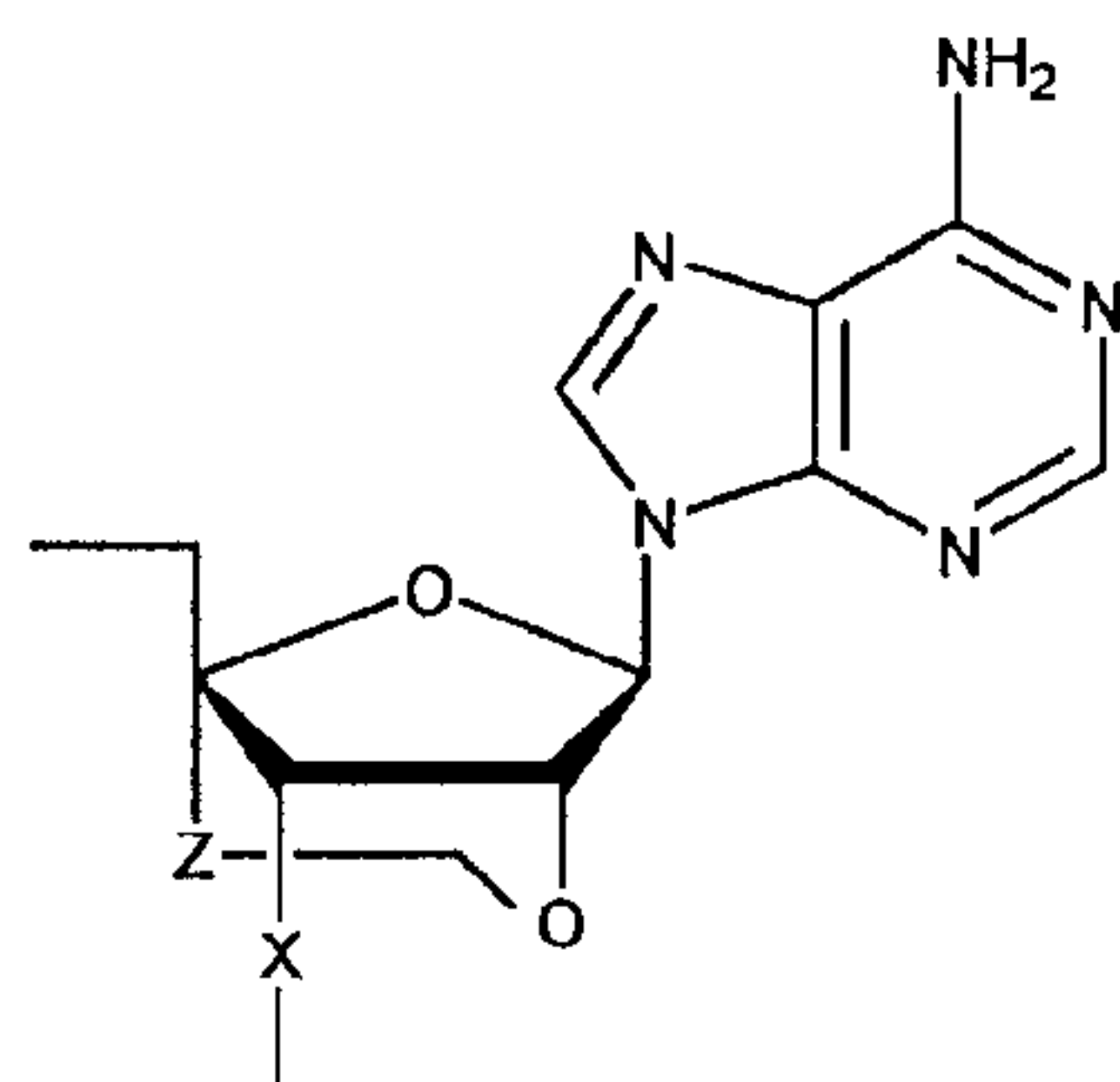
15 represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):



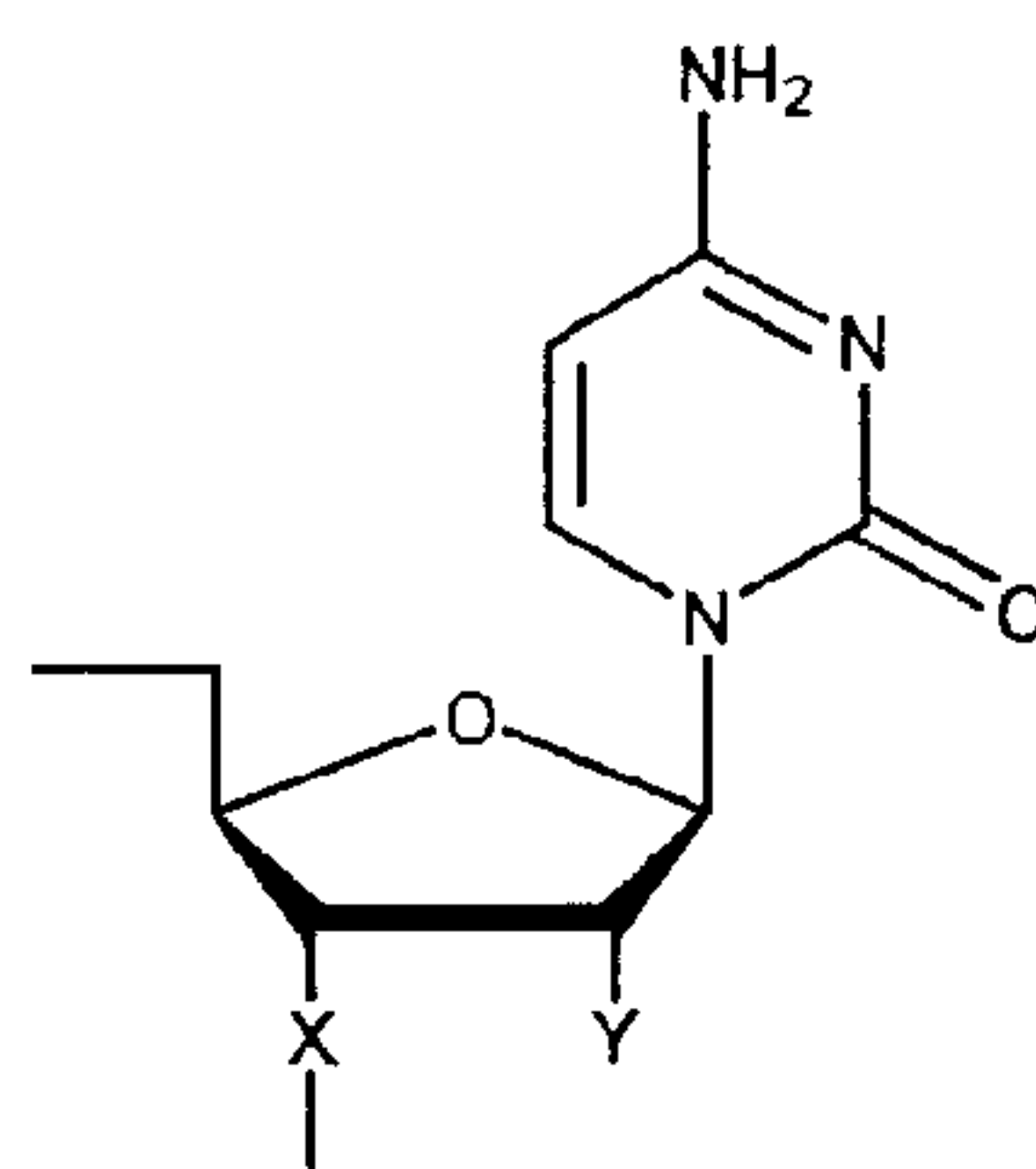
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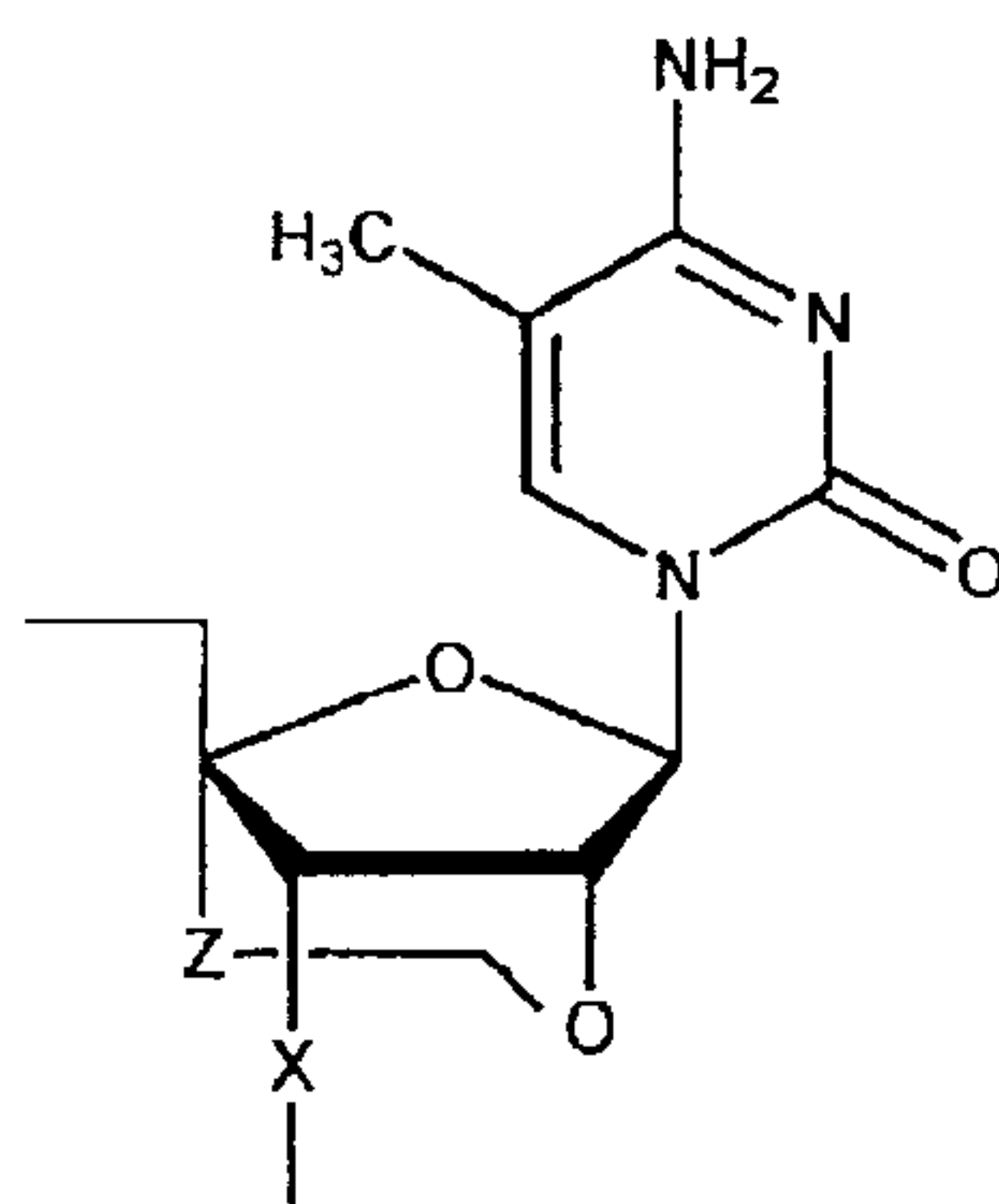
(A 1)



(A 2)

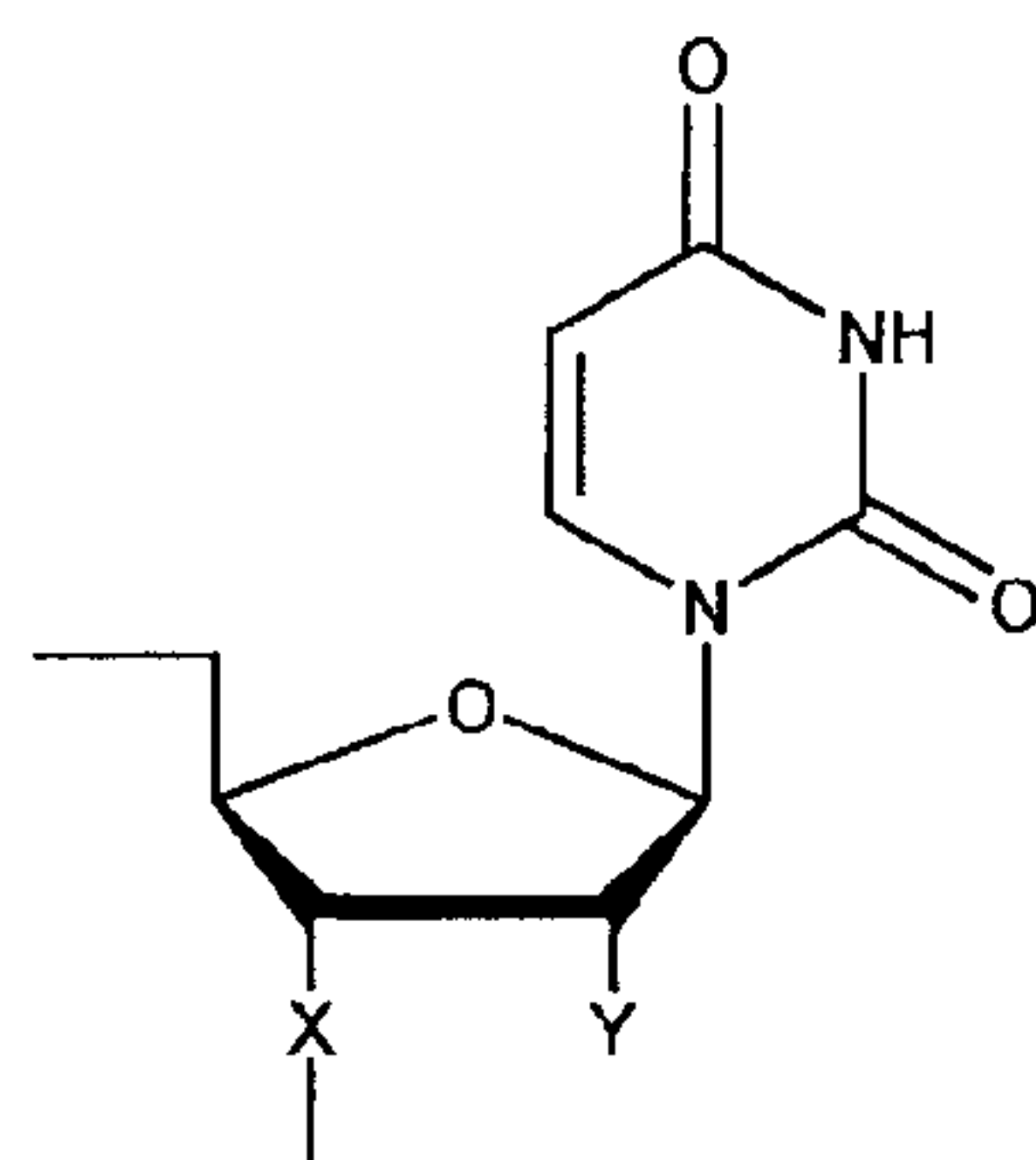


(C 1)

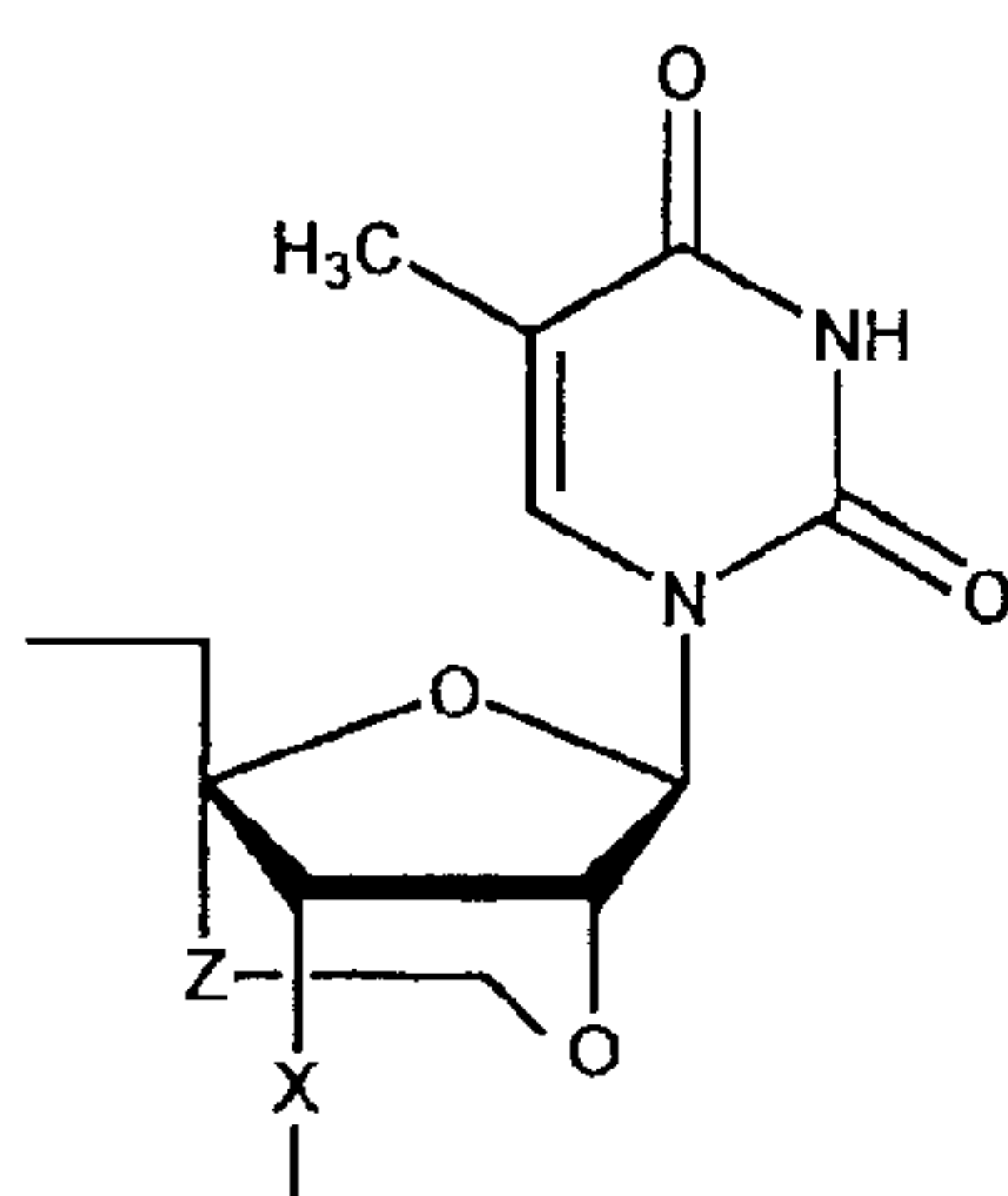


(C 2)

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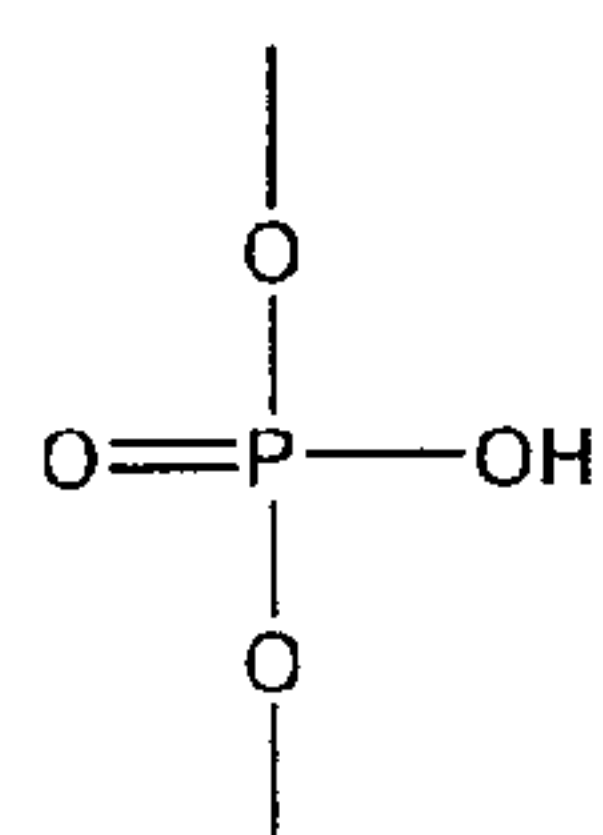


(U 1)

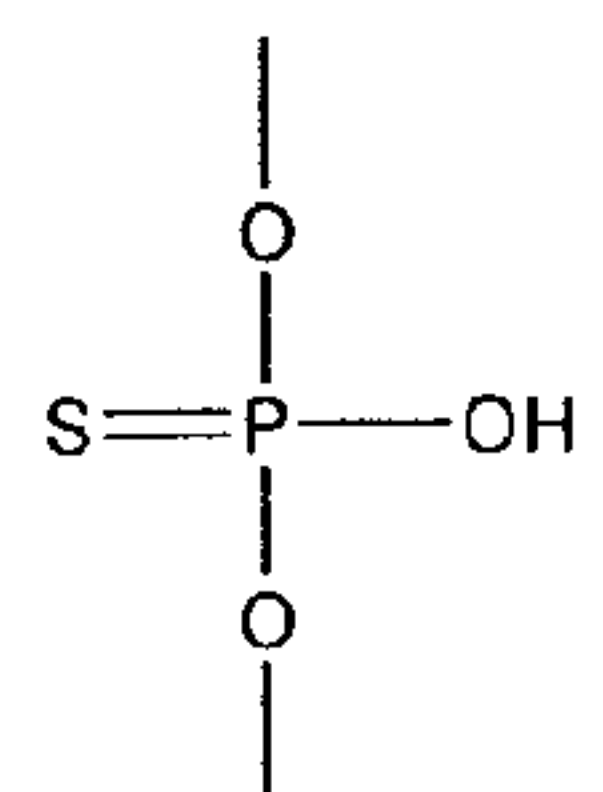


(T 2)

where X is individually and independently a group represented by the following formula (X1) or (X2):



(X 1)



(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

10 B_M'₂ is a group represented by the following formula (2''):

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-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-Bt-Bc- (2'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''2} is a group represented by any one of the following (102a'') to (102g''):

(102a'')-CH₂CH₂OH,

5 (102b'')-Ba-CH₂CH₂OH,

(102c'')-Ba-Bg-CH₂CH₂OH,

(102d'')-Ba-Bg-Bg-CH₂CH₂OH,

(102e'')-Ba-Bg-Bg-Ba-CH₂CH₂OH,

(102f'')-Ba-Bg-Bg-Ba-Ba-CH₂CH₂OH, or

10 (102g'')-Ba-Bg-Bg-Ba-Ba-Bt-CH₂CH₂OH,

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (II'') has 2''-O,4''-C-alkylene group.

[28] A compound represented by the following general formula (III'') or a
15 pharmacologically acceptable salt thereof:



where B_{T''3} is a group represented by any one of the following (3a'') to (3m''):

(3a'')HO-,

(3b'')HO-Bc-,

20 (3c'')HO-Ba-Bc-,

(3d'')HO-Ba-Ba-Bc-,

(3e'')HO-Ba-Ba-Ba-Bc-,

(3f'')HO-Ba-Ba-Ba-Ba-Bc-,

(3g'')HO-Bg-Ba-Ba-Ba-Ba-Bc-,

25 (3h'')HO-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,

(3i'')HO-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,

(3j'')HO-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,

(3k'')HO-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,

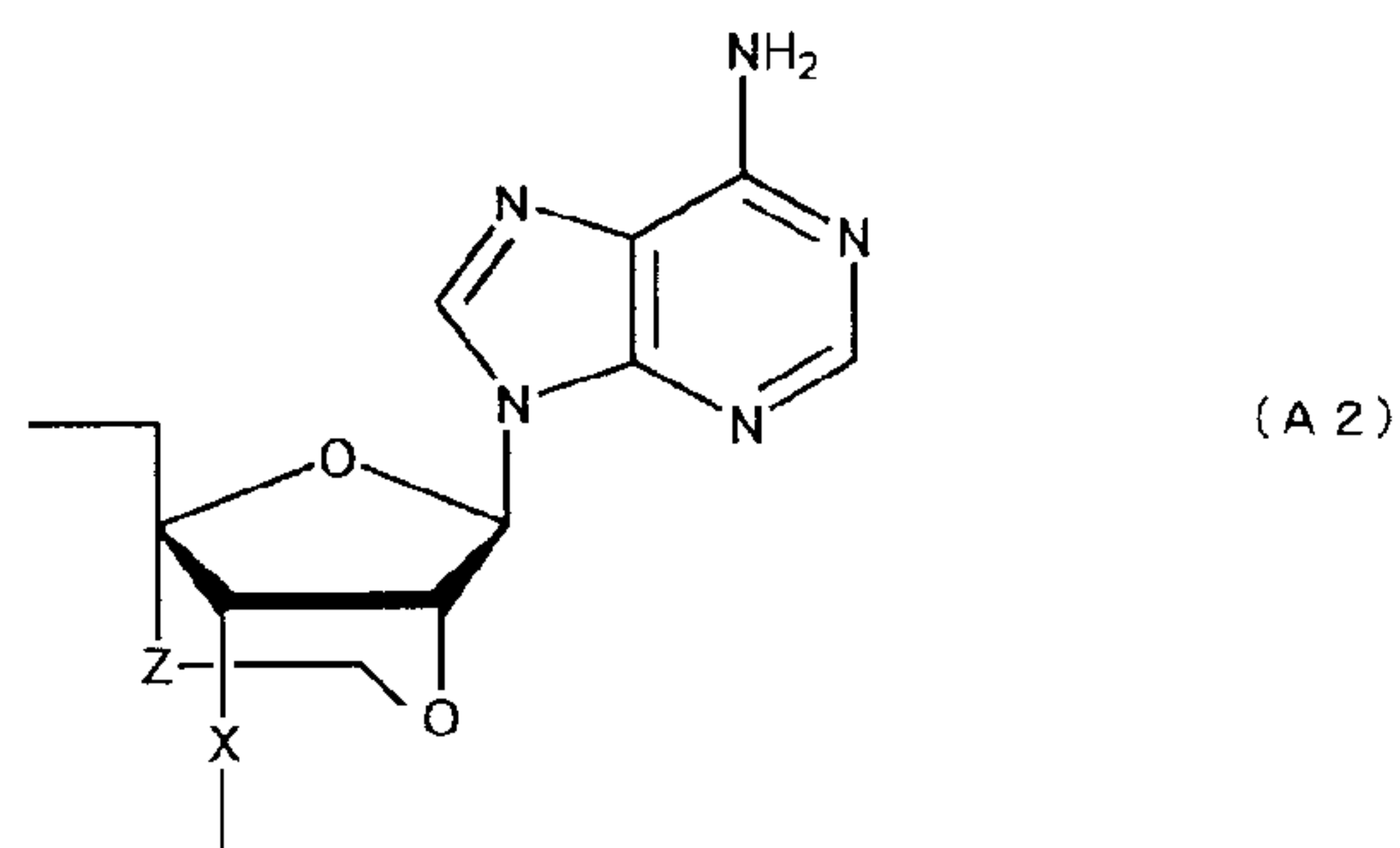
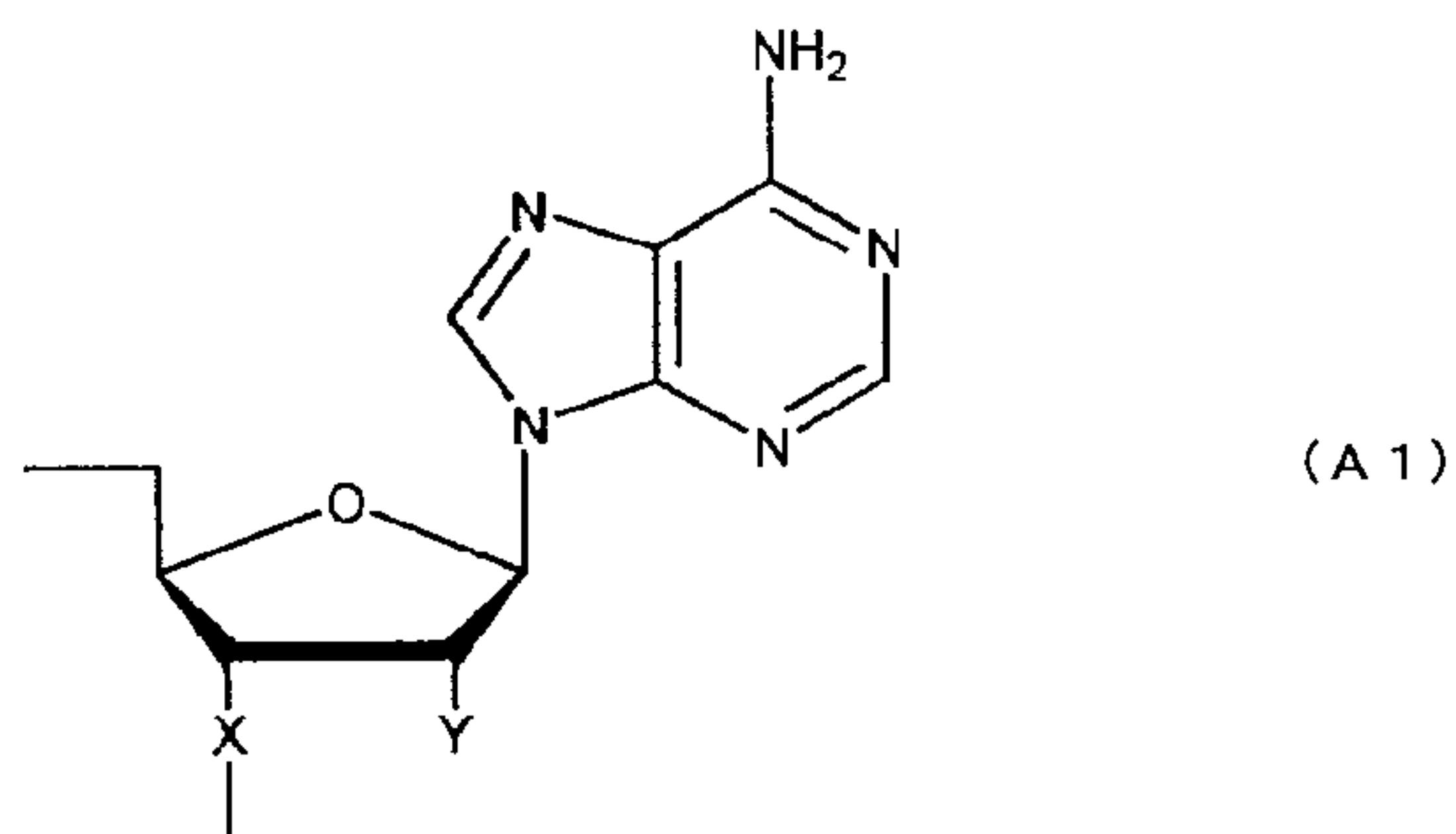
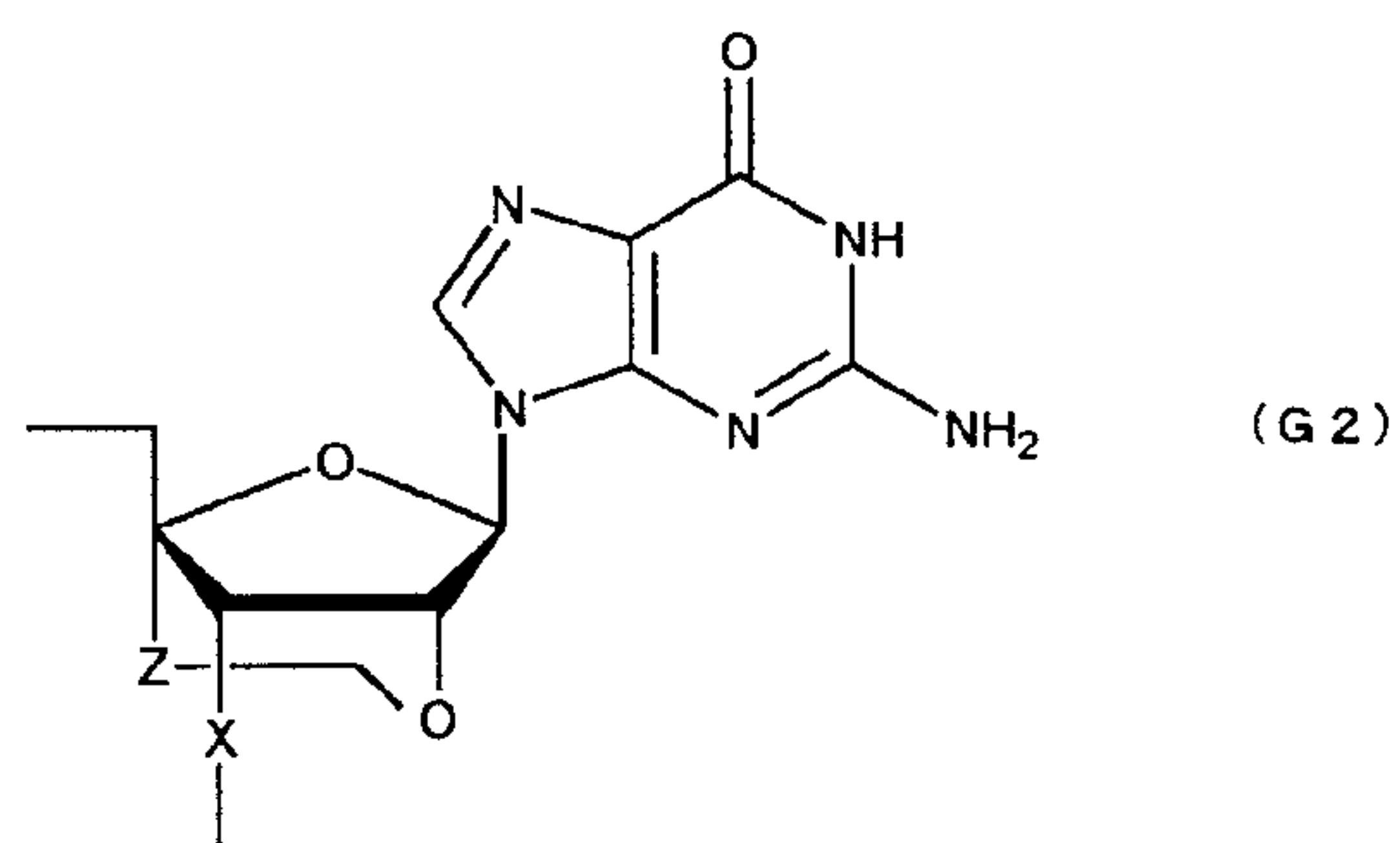
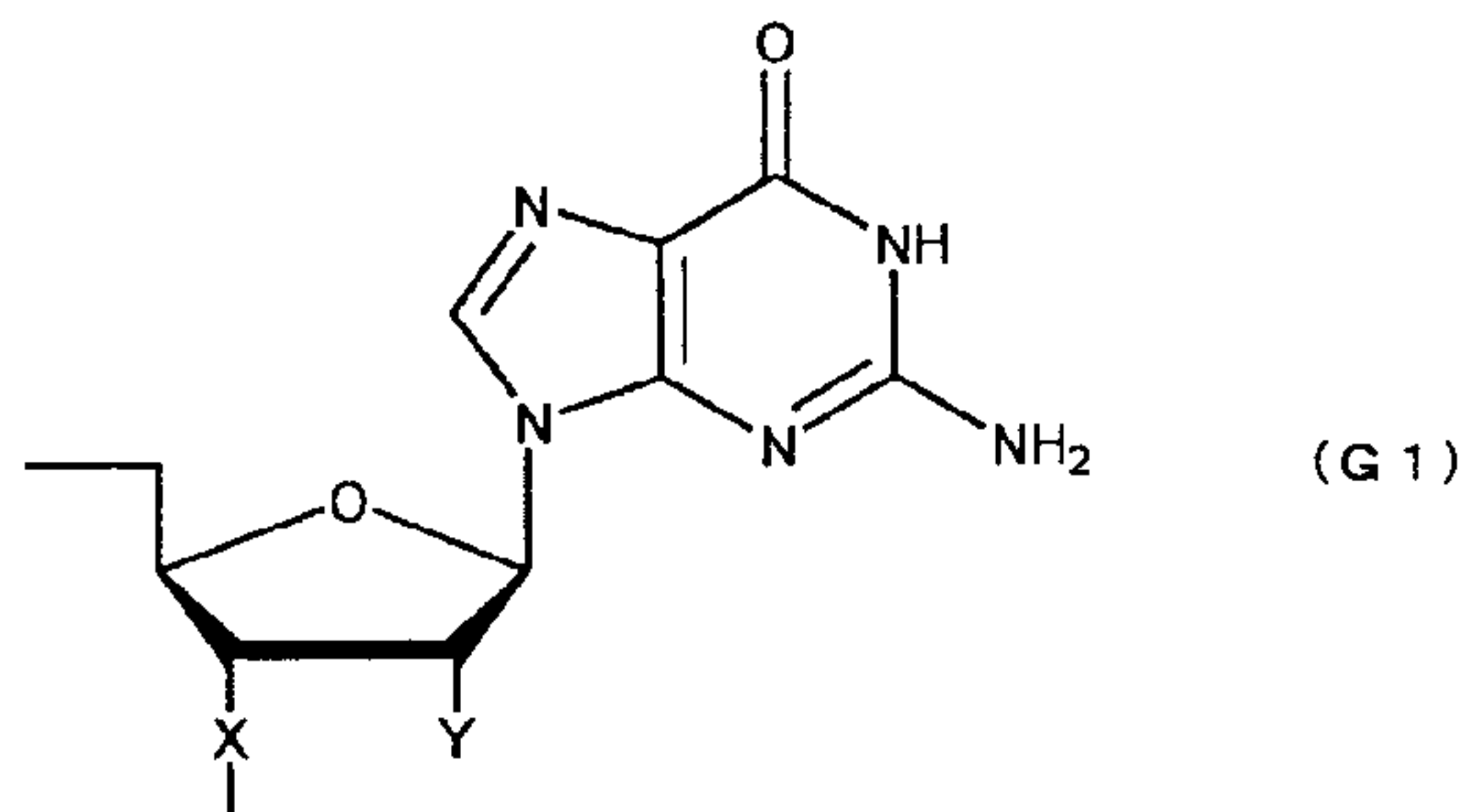
(3l'')HO-Ba-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-, or

30 (3m'')HO-Bc-Ba-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the

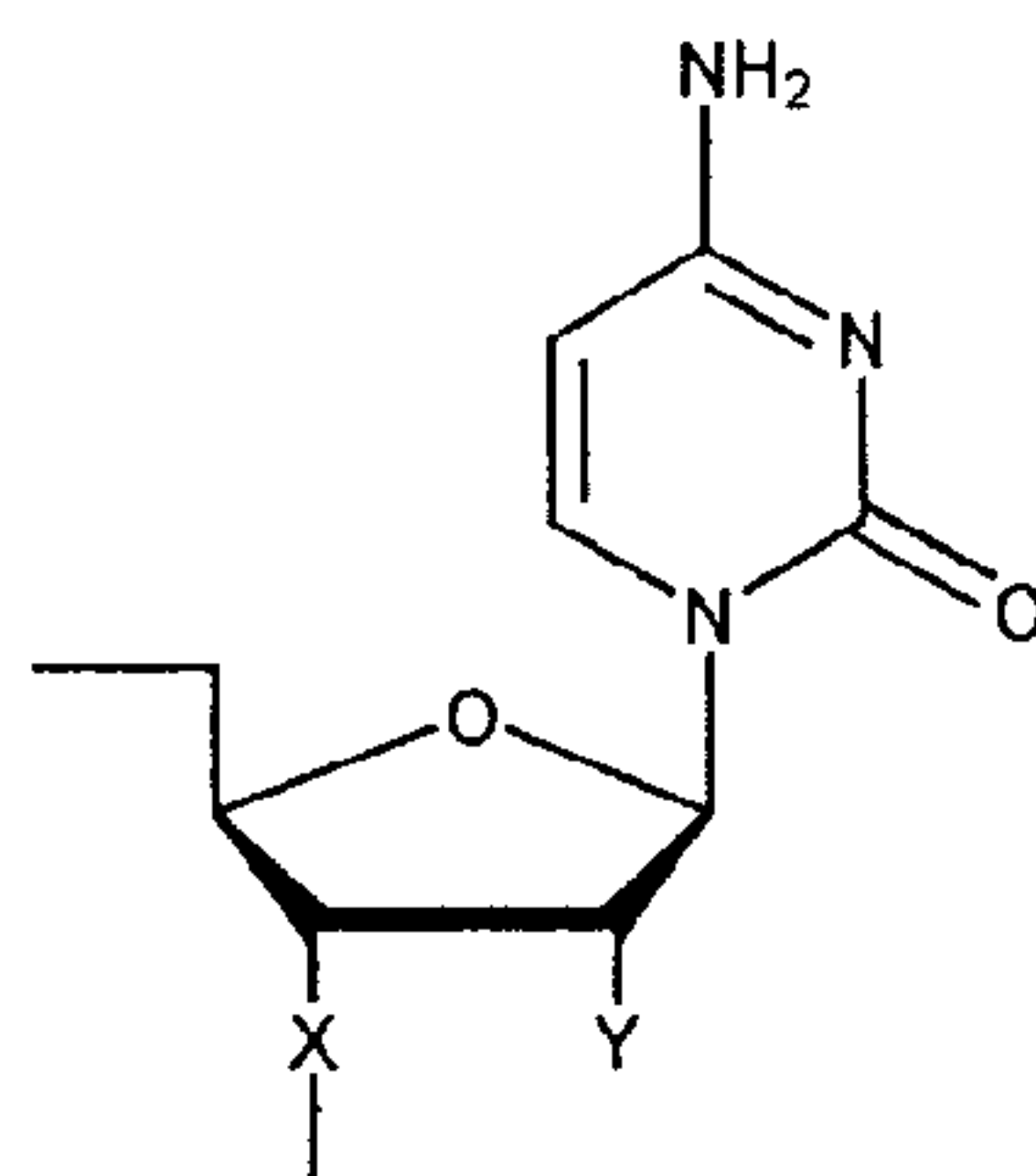
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following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

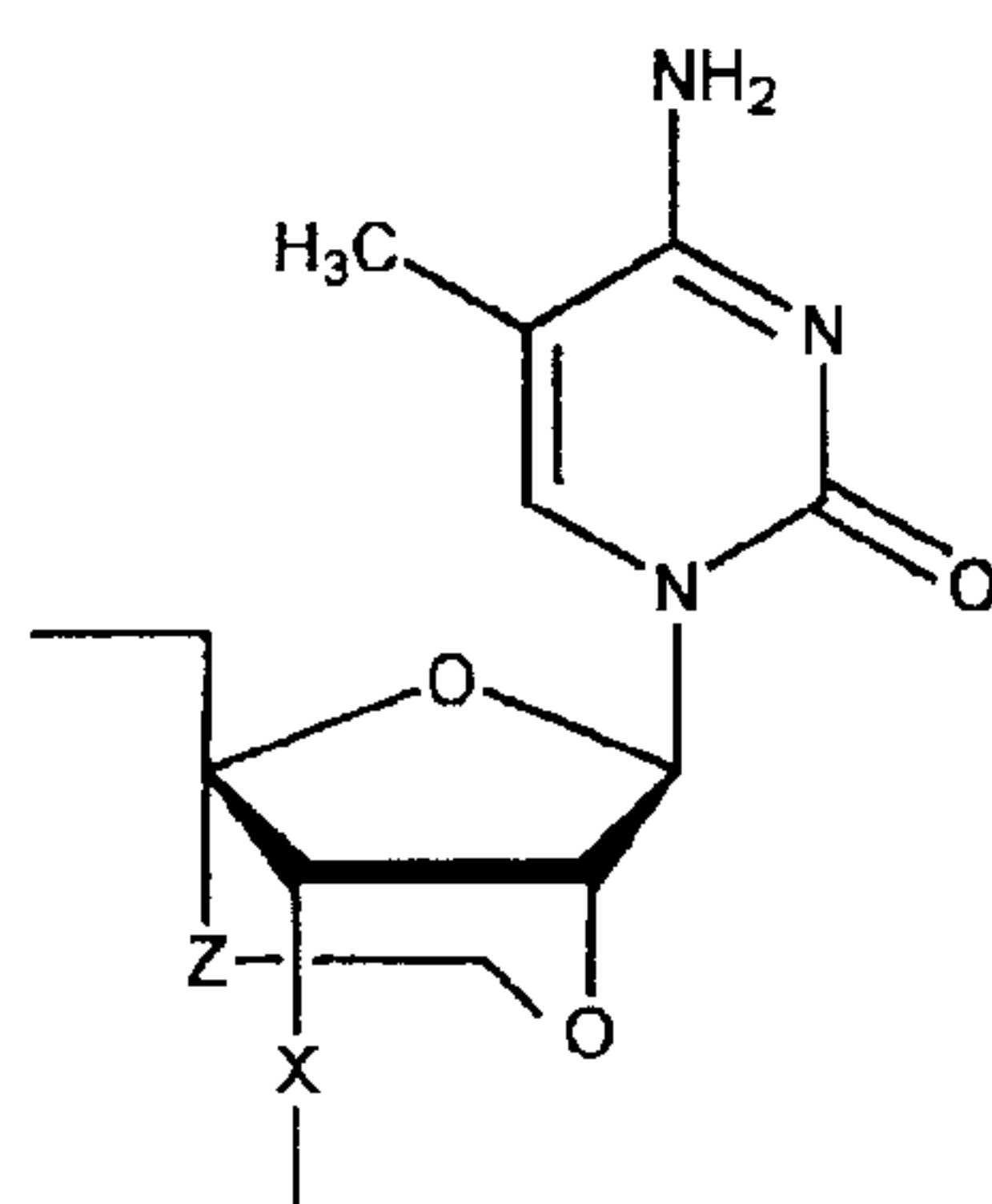


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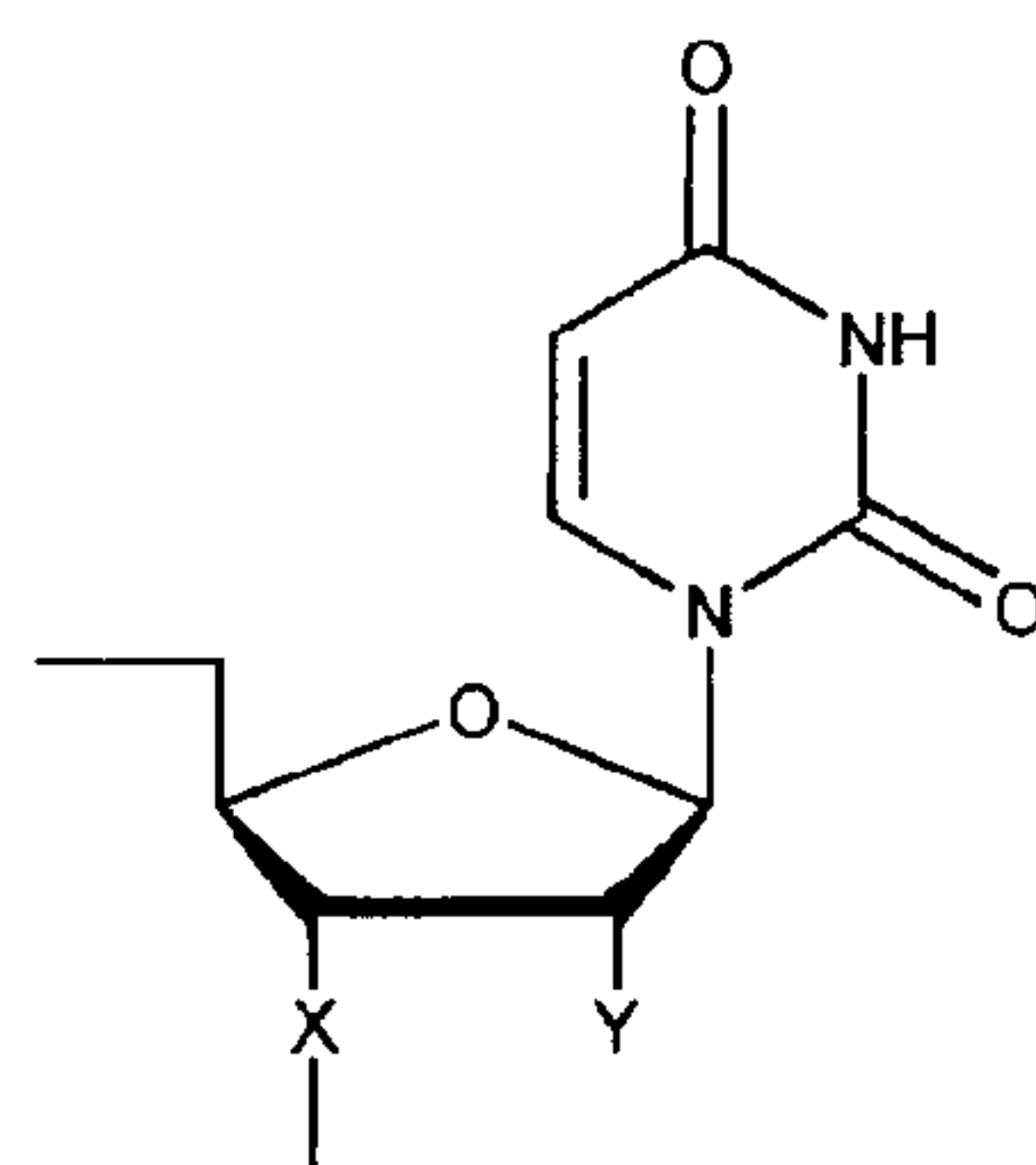
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(C 1)

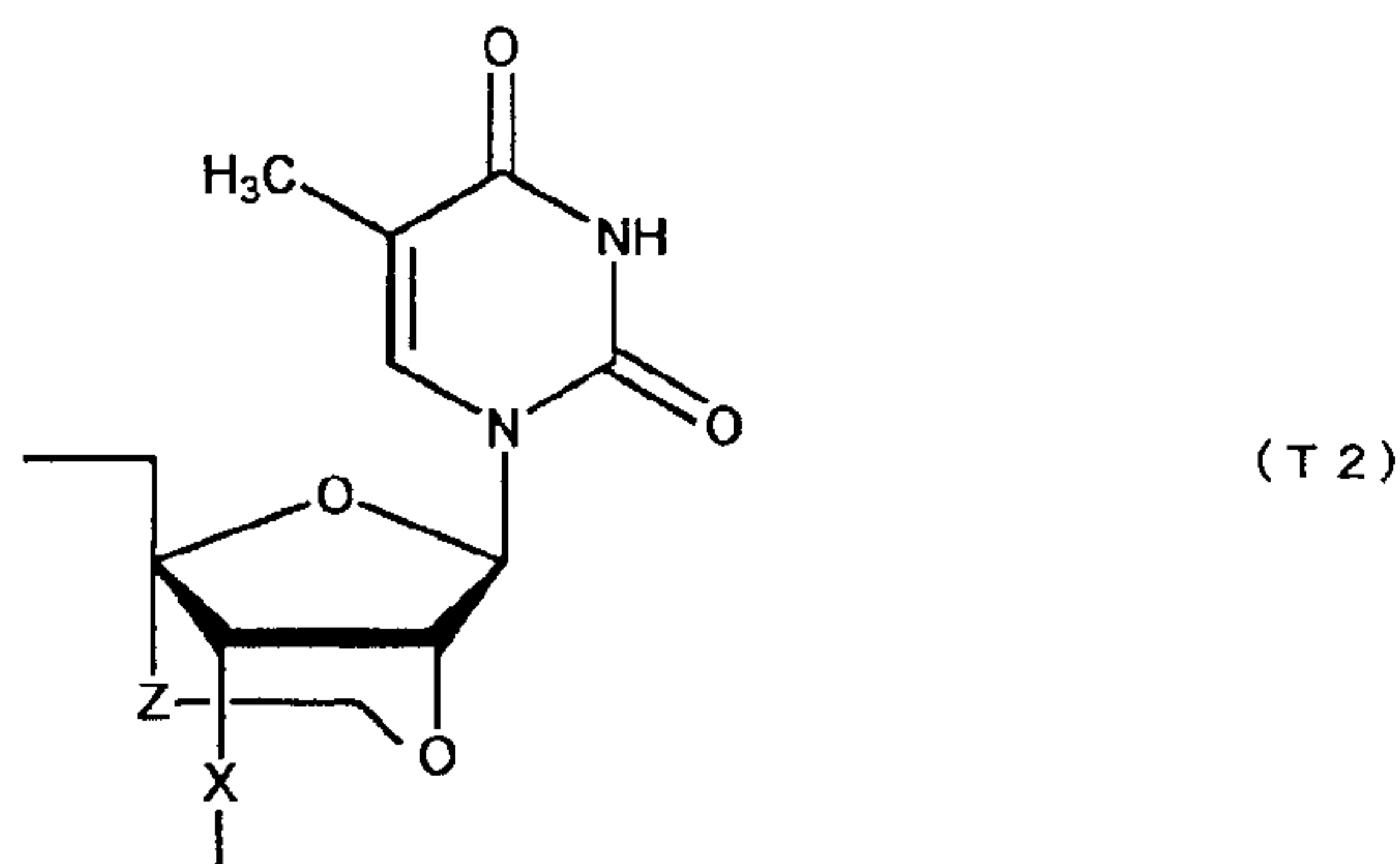


(C 2)

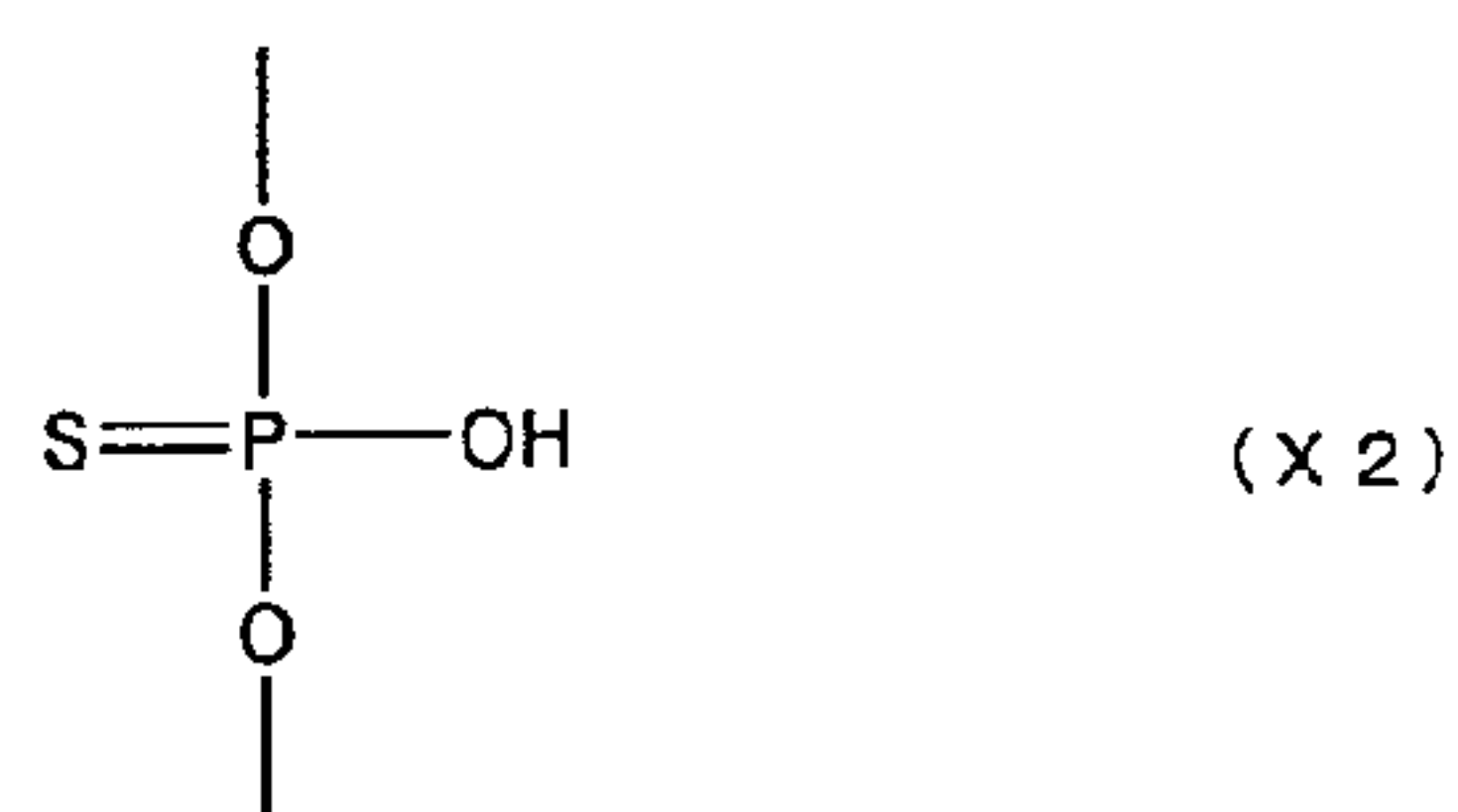
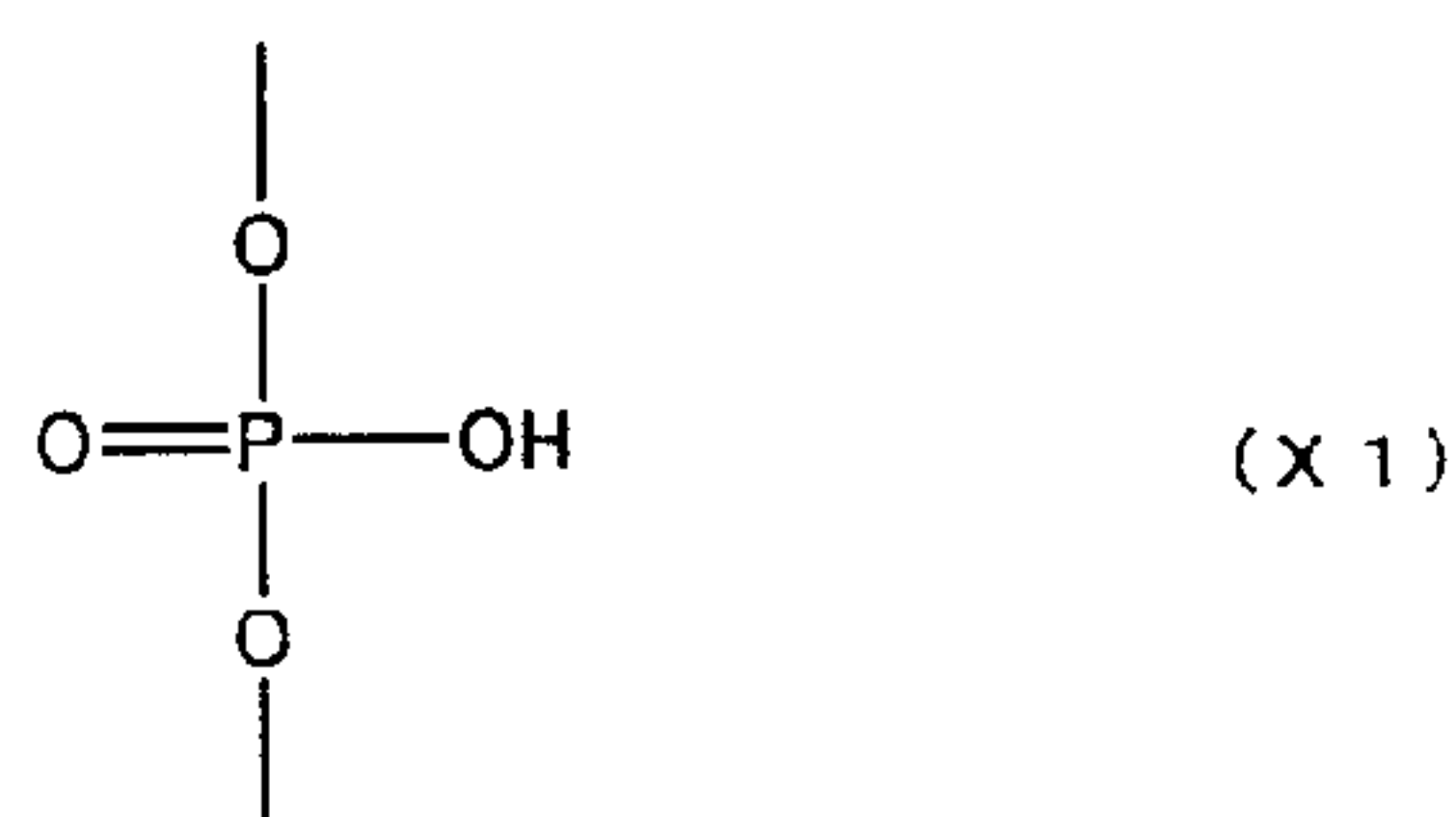


(U 1)

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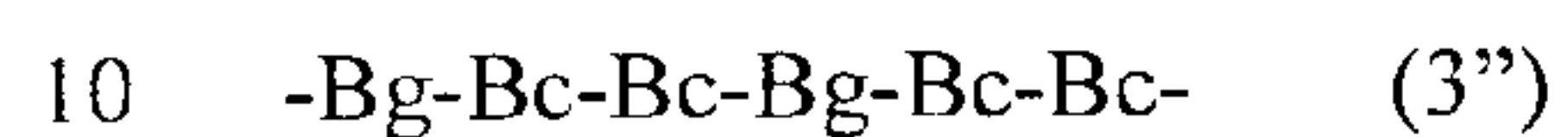
where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''3} is a group represented by the following formula (3''):



where Bg, Ba, Bt and Bc are as defined above;

B_{B''3} is a group represented by any one of the following (103a'') to (103m''):

(103a'')-CH₂CH₂OH,

(103b'')-Ba-CH₂CH₂OH,

15 (103c'')-Ba-Bt-CH₂CH₂OH,

(103d'')-Ba-Bt-Bt-CH₂CH₂OH,

(103e'')-Ba-Bt-Bt-Bt-CH₂CH₂OH,

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(103f'')-Ba-Bt-Bt-Bt-Bc-CH₂CH₂OH,(103g'')-Ba-Bt-Bt-Bt-Bc-Bt-CH₂CH₂OH,(103h'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-CH₂CH₂OH,(103i'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-CH₂CH₂OH,5 (103j'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-CH₂CH₂OH,(103k'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-CH₂CH₂OH,(103l'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-Ba-CH₂CH₂OH, or(103m'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-Ba-Bg-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

10 provided that at least one of the nucleosides constituting the compound represented by formula (III'') has 2''-O,4''-C-alkylene group.

[29] A compound represented by the following general formula (IV'') or a pharmacologically acceptable salt thereof:



15 where B_{T''4} is a group represented by any one of the following (4a'') to (4j''):

(4a'')HO-,

(4b'')HO-Ba-,

(4c'')HO-Bc-Ba-,

(4d'')HO-Bt-Bc-Ba-,

20 (4e'')HO-Bg-Bt-Bc-Ba-,

(4f'')HO-Bg-Bg-Bt-Bc-Ba-,

(4g'')HO-Ba-Bg-Bg-Bt-Bc-Ba-,

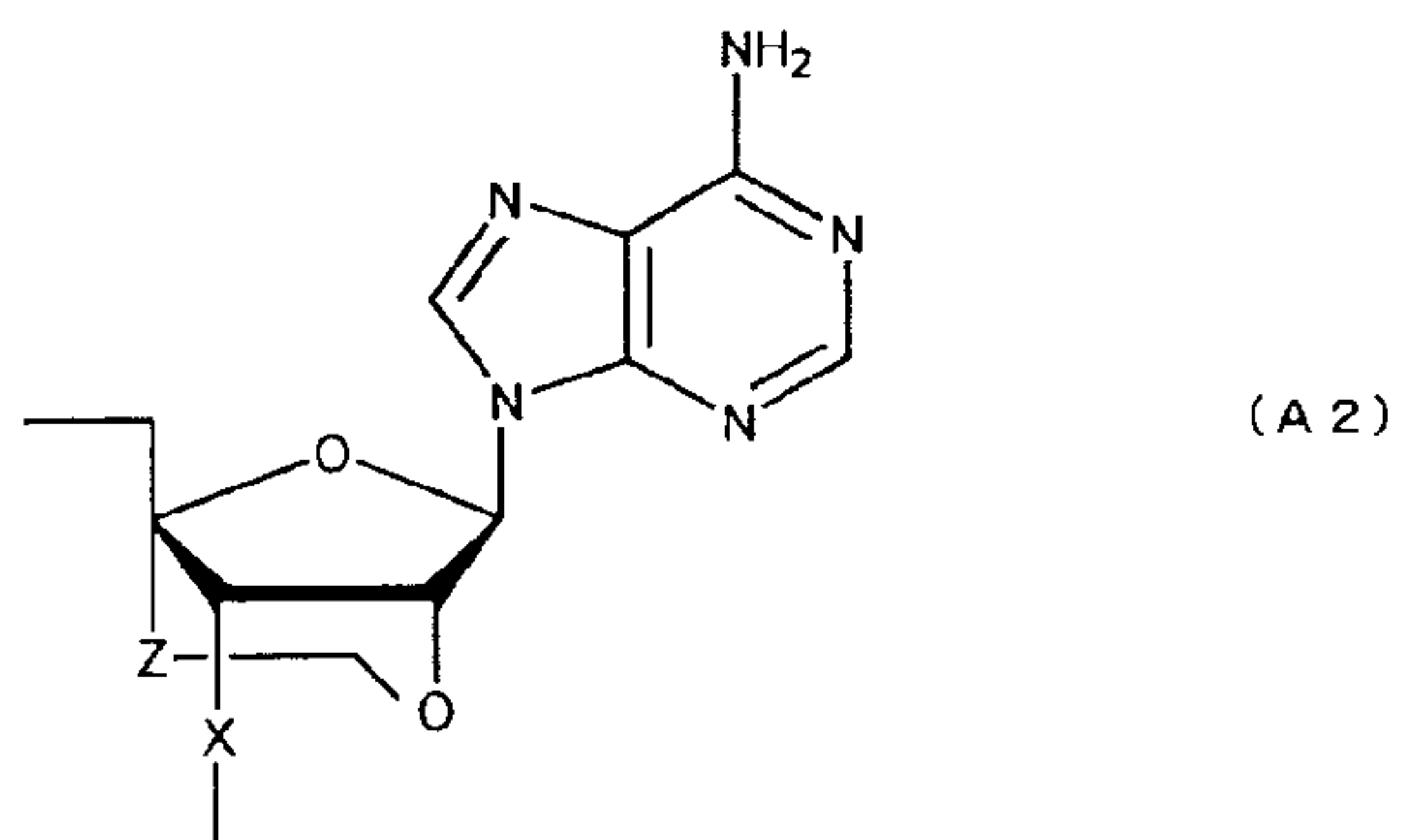
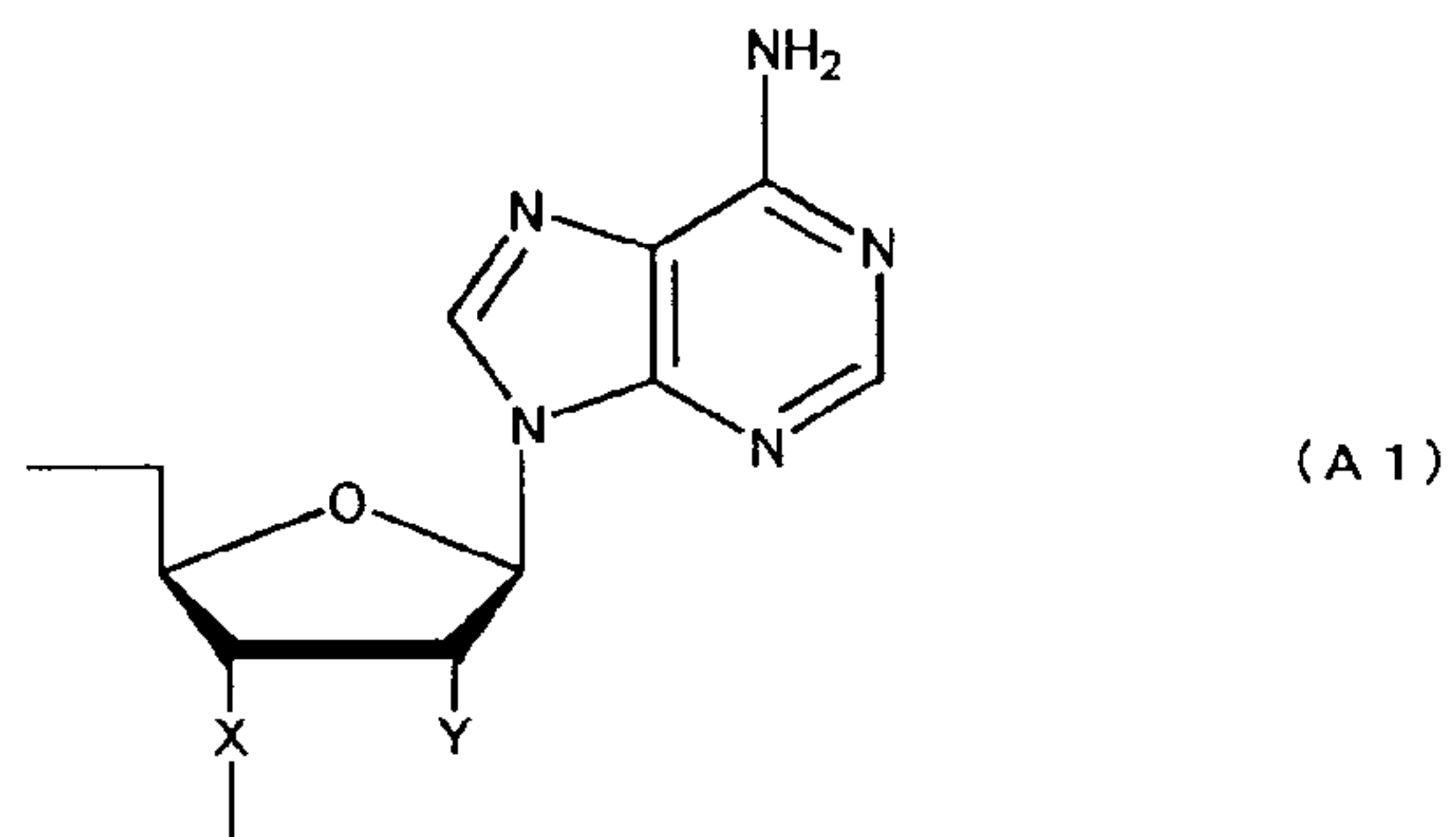
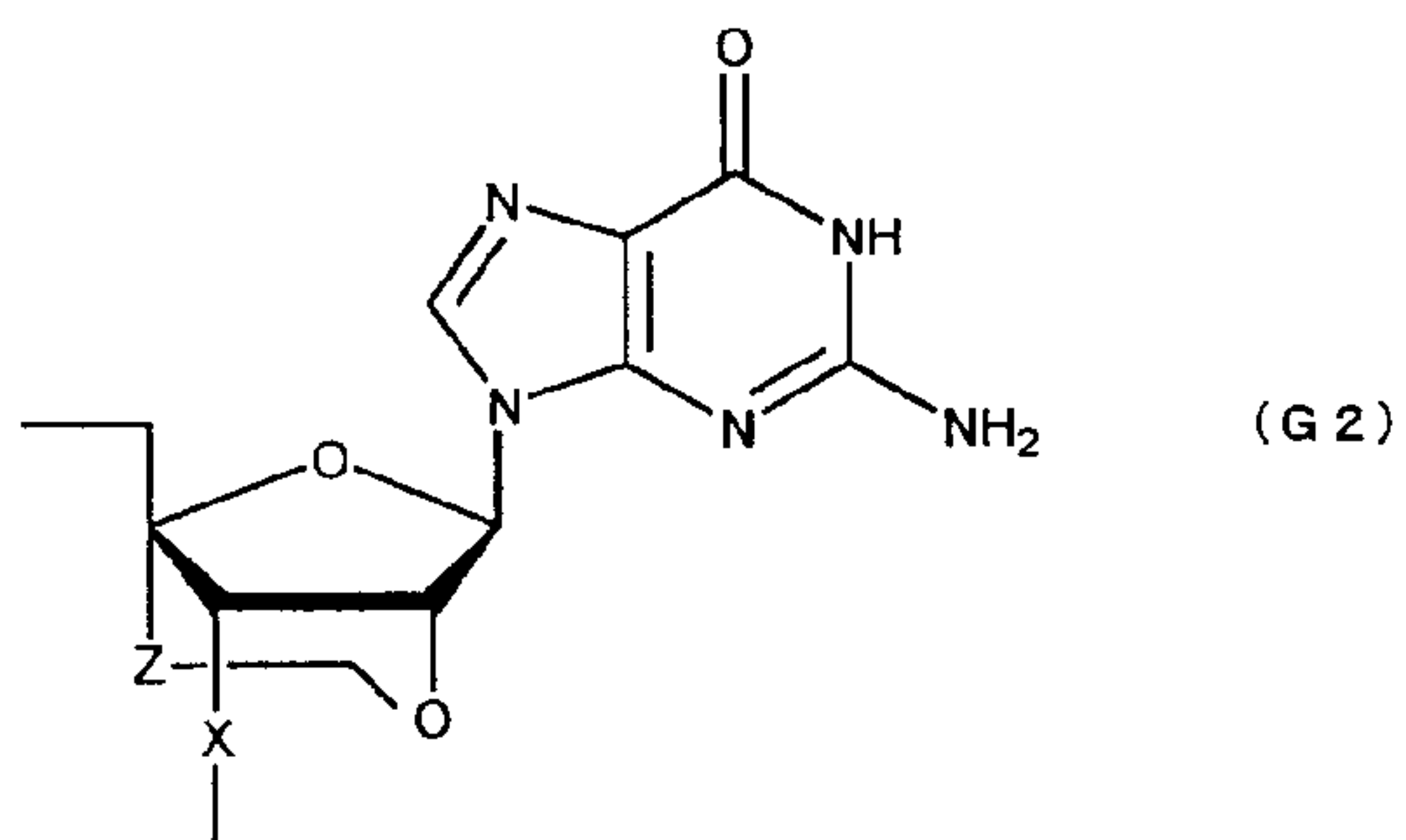
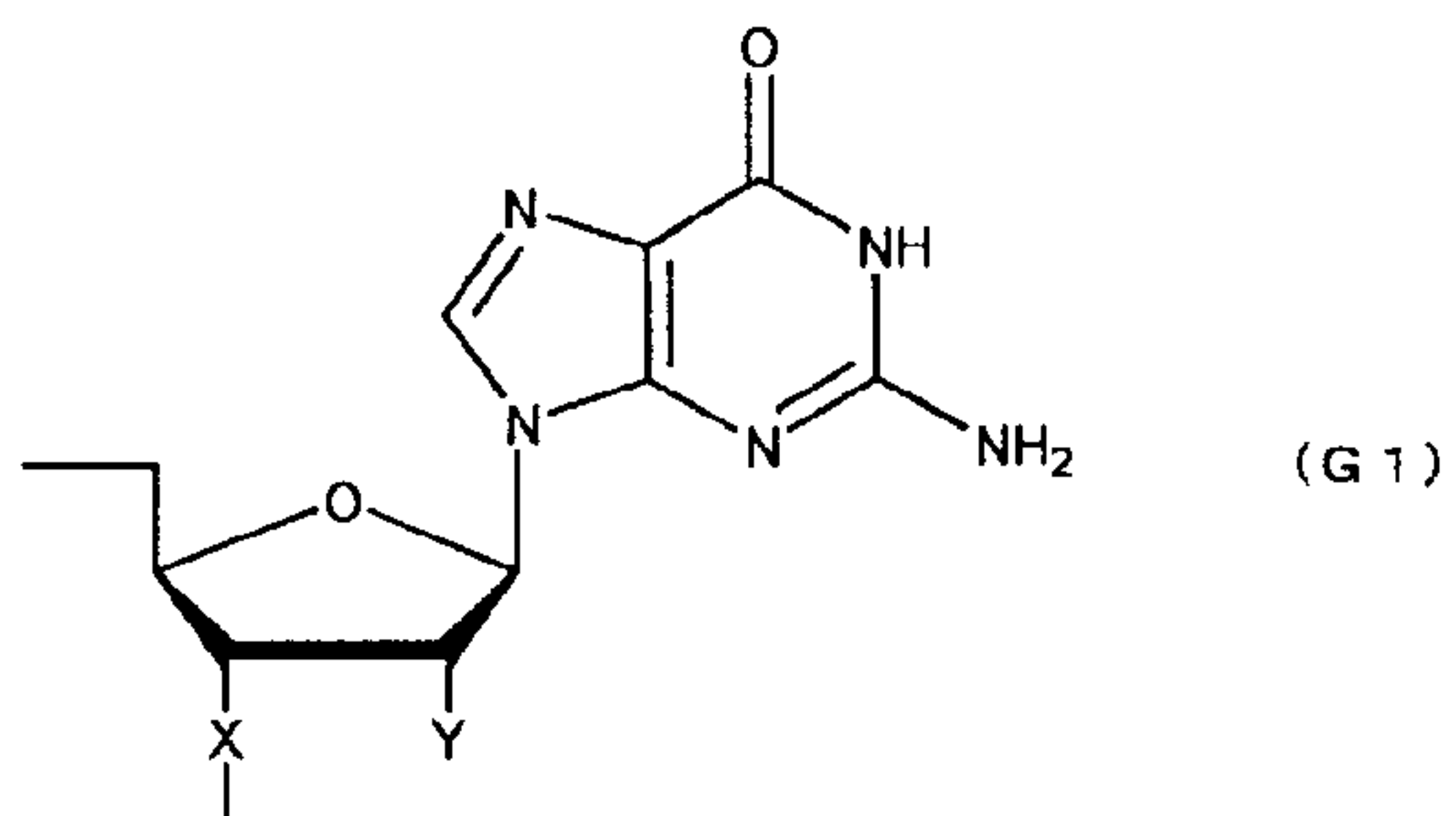
(4h'')HO-Bt-Ba-Bg-Bg-Bt-Bc-Ba-,

(4i'')HO-Bc-Bt-Ba-Bg-Bg-Bt-Bc-Ba-, or

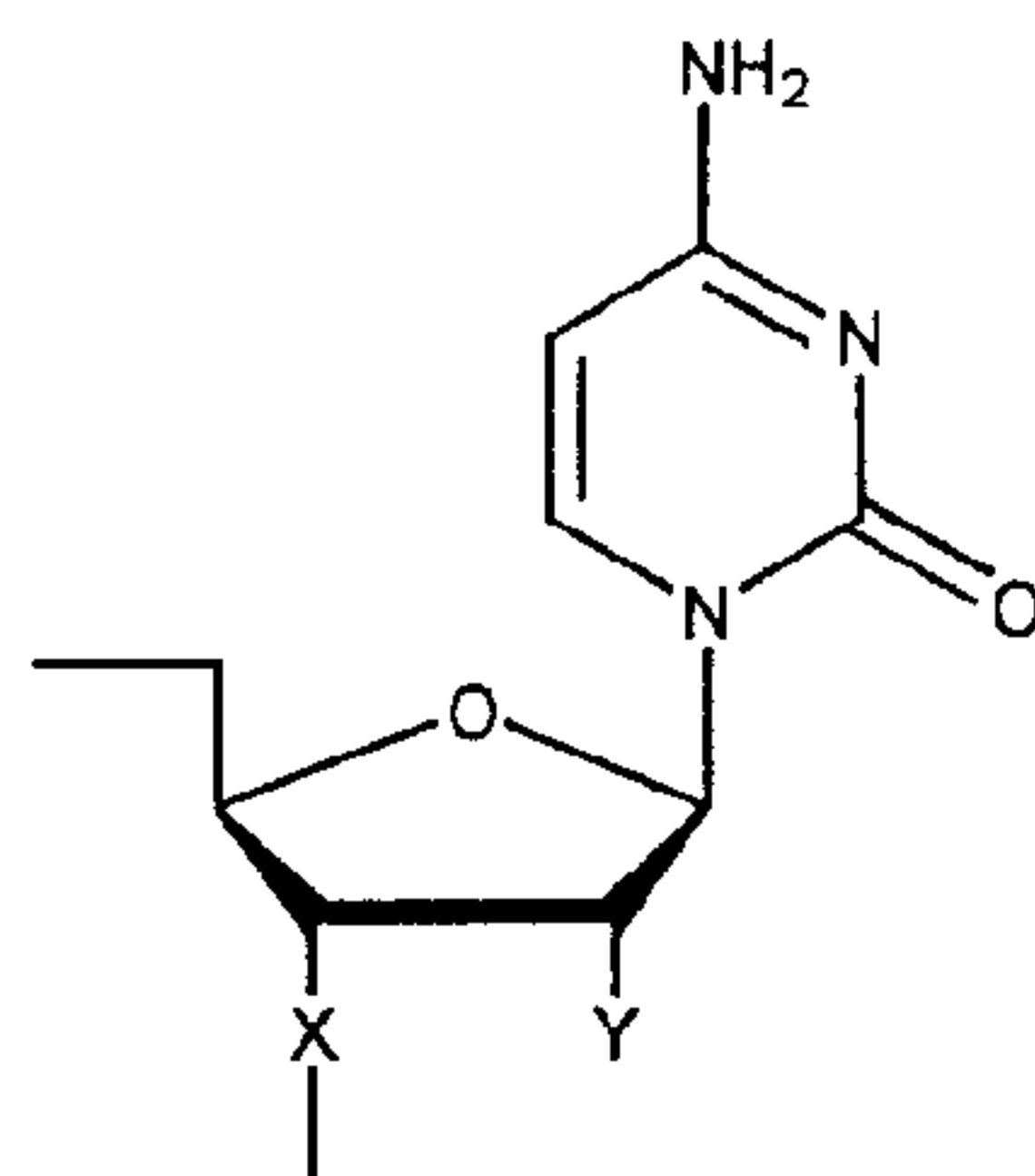
25 (4j'')HO-Bg-Bc-Bt-Ba-Bg-Bg-Bt-Bc-Ba-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

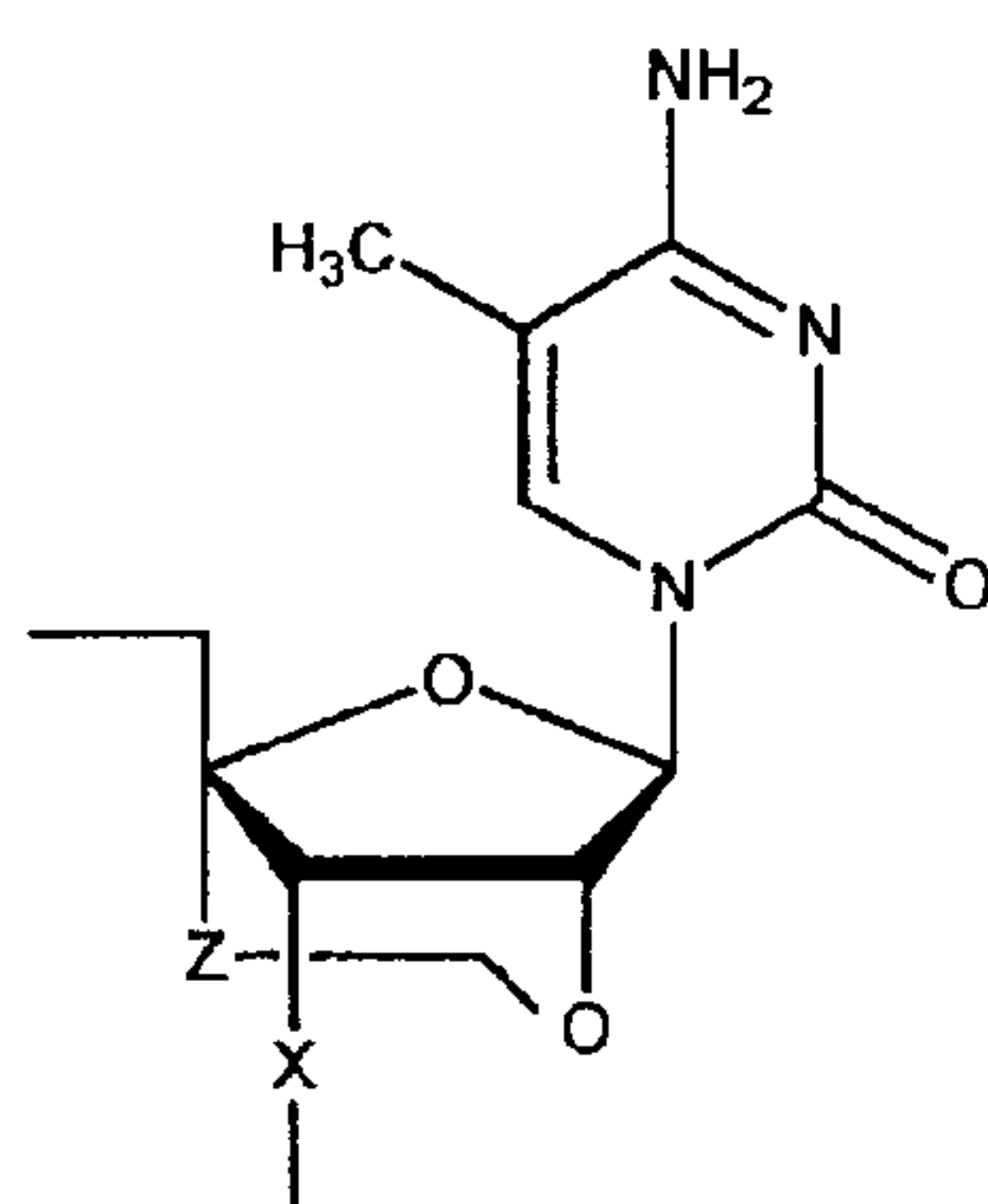
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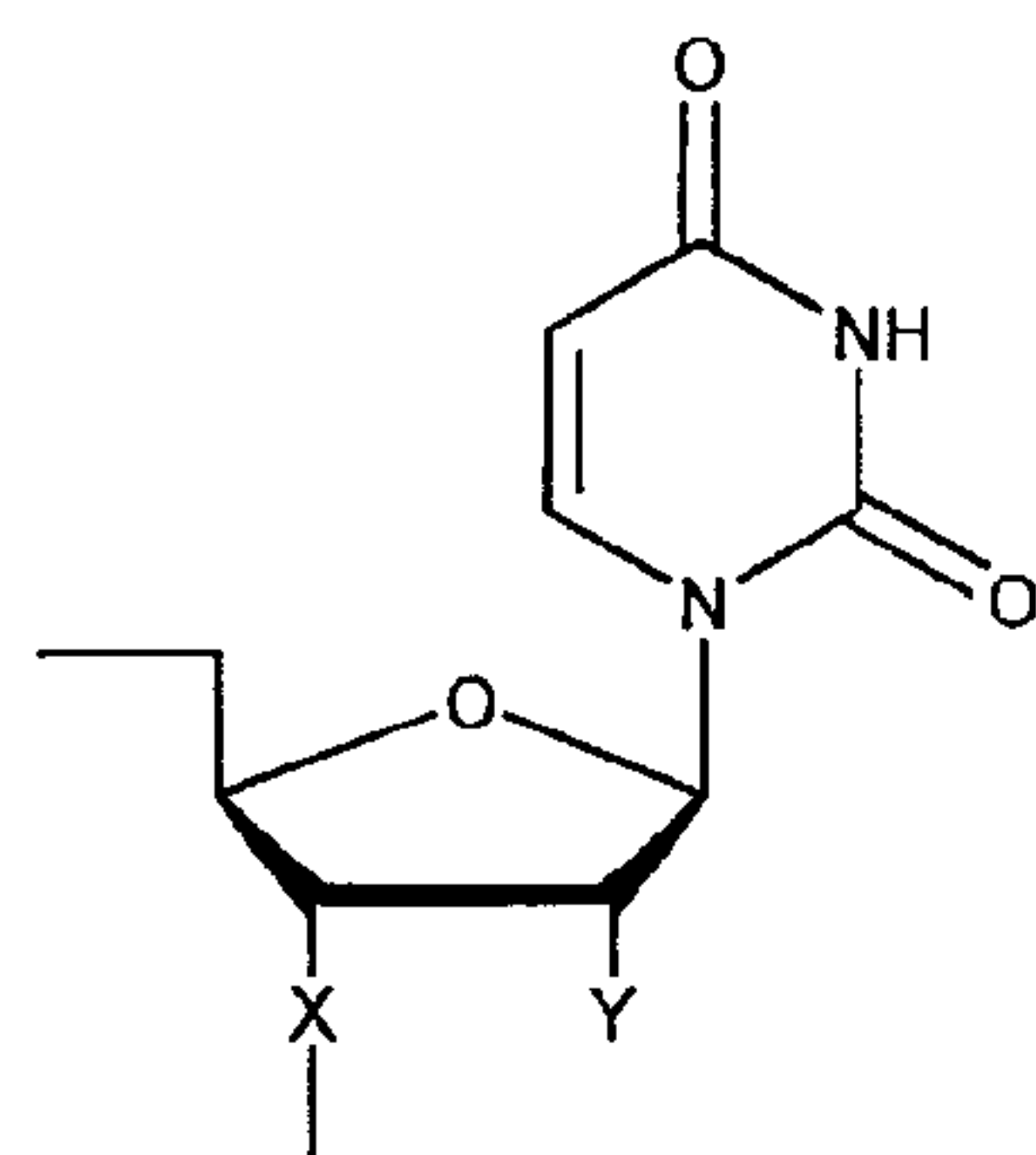
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(C 1)

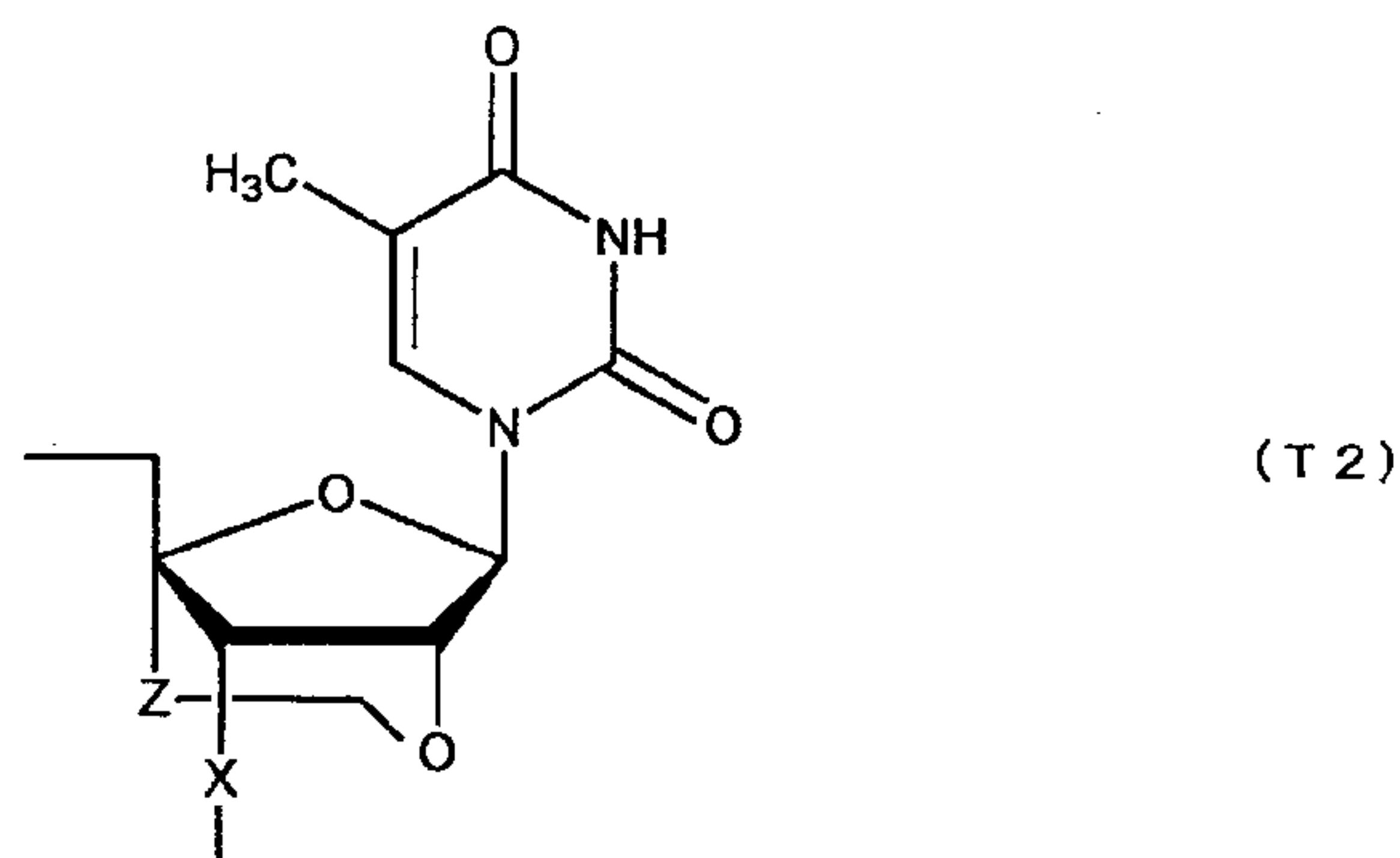


(C 2)

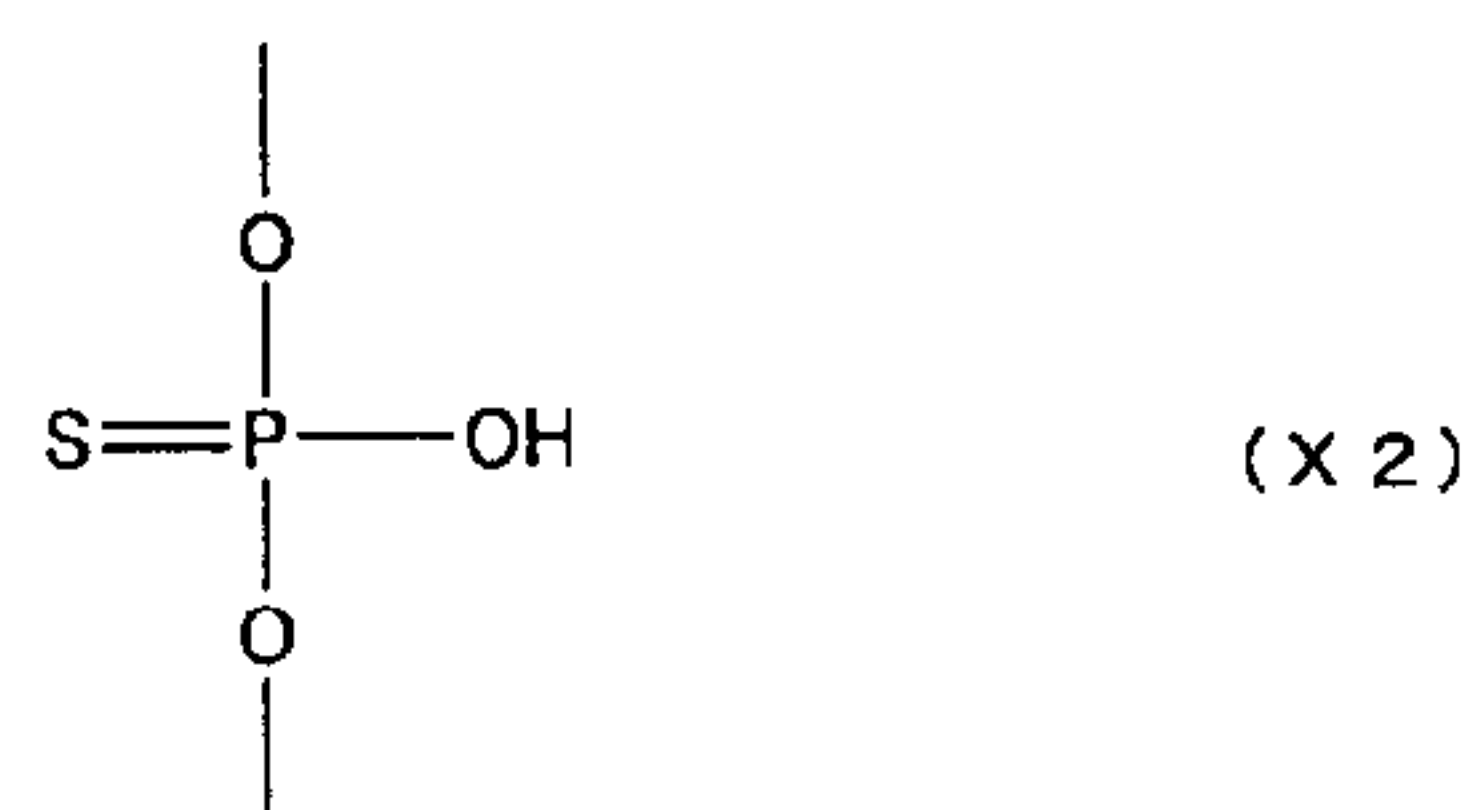
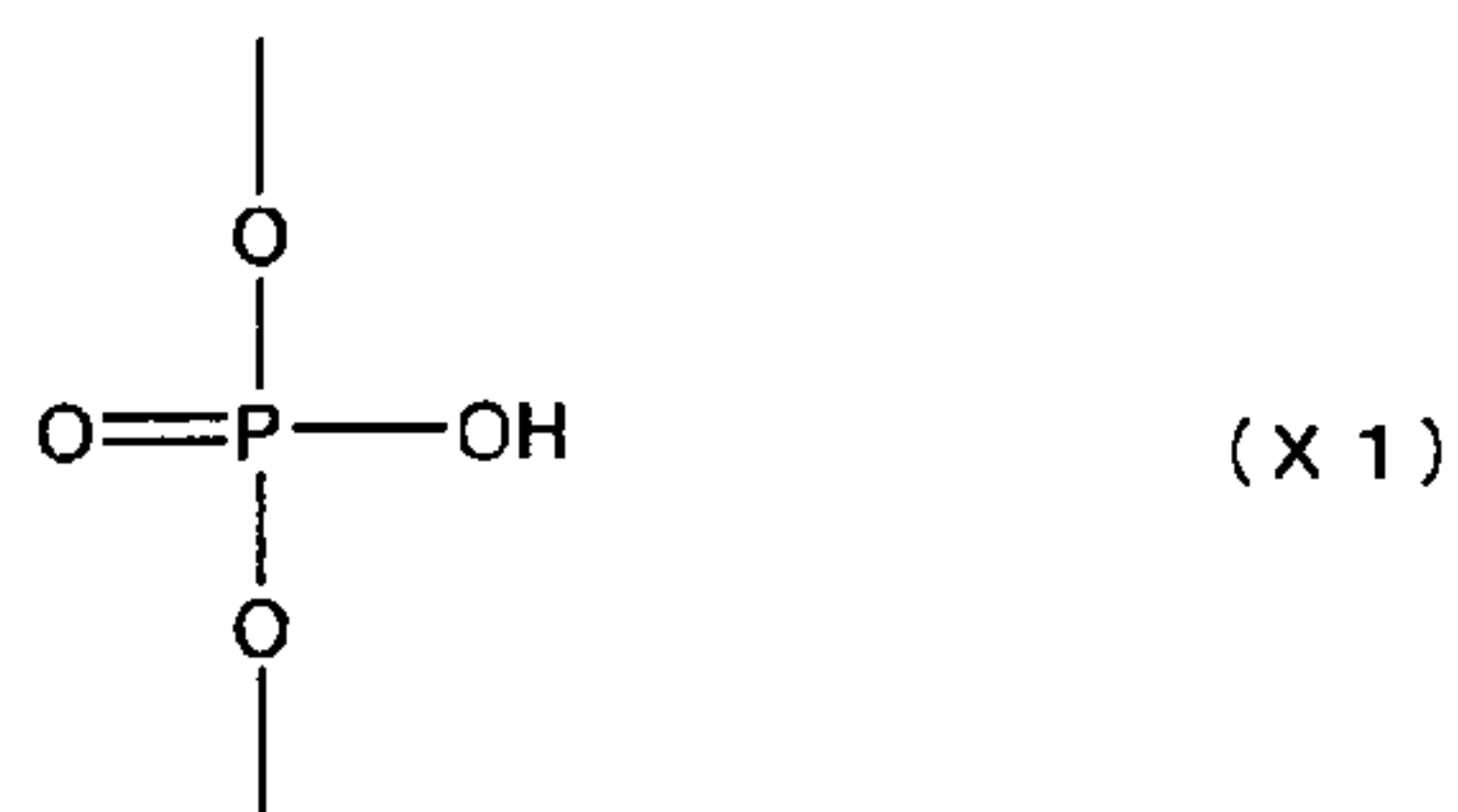


(U 1)

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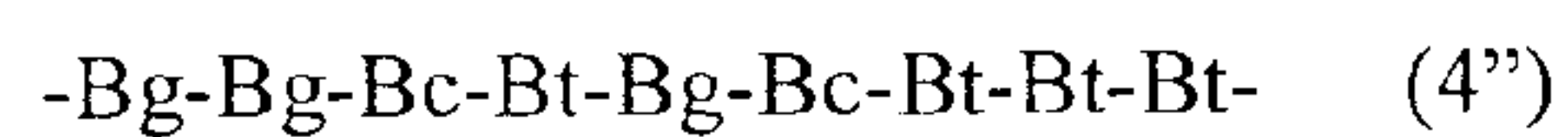


where X is individually and independently a group represented by the following formula (X1) or (X2):



Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

$B_{M''4}$ is a group represented by the following formula (4''):



where Bg, Ba, Bt and Bc are as defined above;

$B_{B''4}$ is a group represented by any one of the following (104a'') to (104j''):

- 15 (104a'')-CH₂CH₂OH,
 (104b'')-Bg-CH₂CH₂OH,
 (104c'')-Bg-Bc-CH₂CH₂OH,

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(104d'')-Bg-Bc-Bc-CH₂CH₂OH,(104e'')-Bg-Bc-Bc-Bc-CH₂CH₂OH,(104f'')-Bg-Bc-Bc-Bc-Bt-CH₂CH₂OH,(104g'')-Bg-Bc-Bc-Bc-Bt-Bc-CH₂CH₂OH,5 (104h'')-Bg-Bc-Bc-Bc-Bt-Bc-Ba-CH₂CH₂OH,(104i'')-Bg-Bc-Bc-Bc-Bt-Bc-Ba-Bg-CH₂CH₂OH, or(104j'')-Bg-Bc-Bc-Bc-Bt-Bc-Ba-Bg-Bc-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by

10 formula (IV'') has 2''-O,4''-C-alkylene group.

[30] A compound represented by the following general formula (V'') or a pharmacologically acceptable salt thereof:

where B_{T''5} is a group represented by any one of the following (5a'') to (5j''):

15 (5a'')HO-,

(5b'')HO-Ba-,

(5c'')HO-Bg-Ba-,

(5d'')HO-Bg-Bg-Ba-,

(5e'')HO-Ba-Bg-Bg-Ba-,

20 (5f'')HO-Bc-Ba-Bg-Bg-Ba-,

(5g'')HO-Bc-Bc-Ba-Bg-Bg-Ba-,

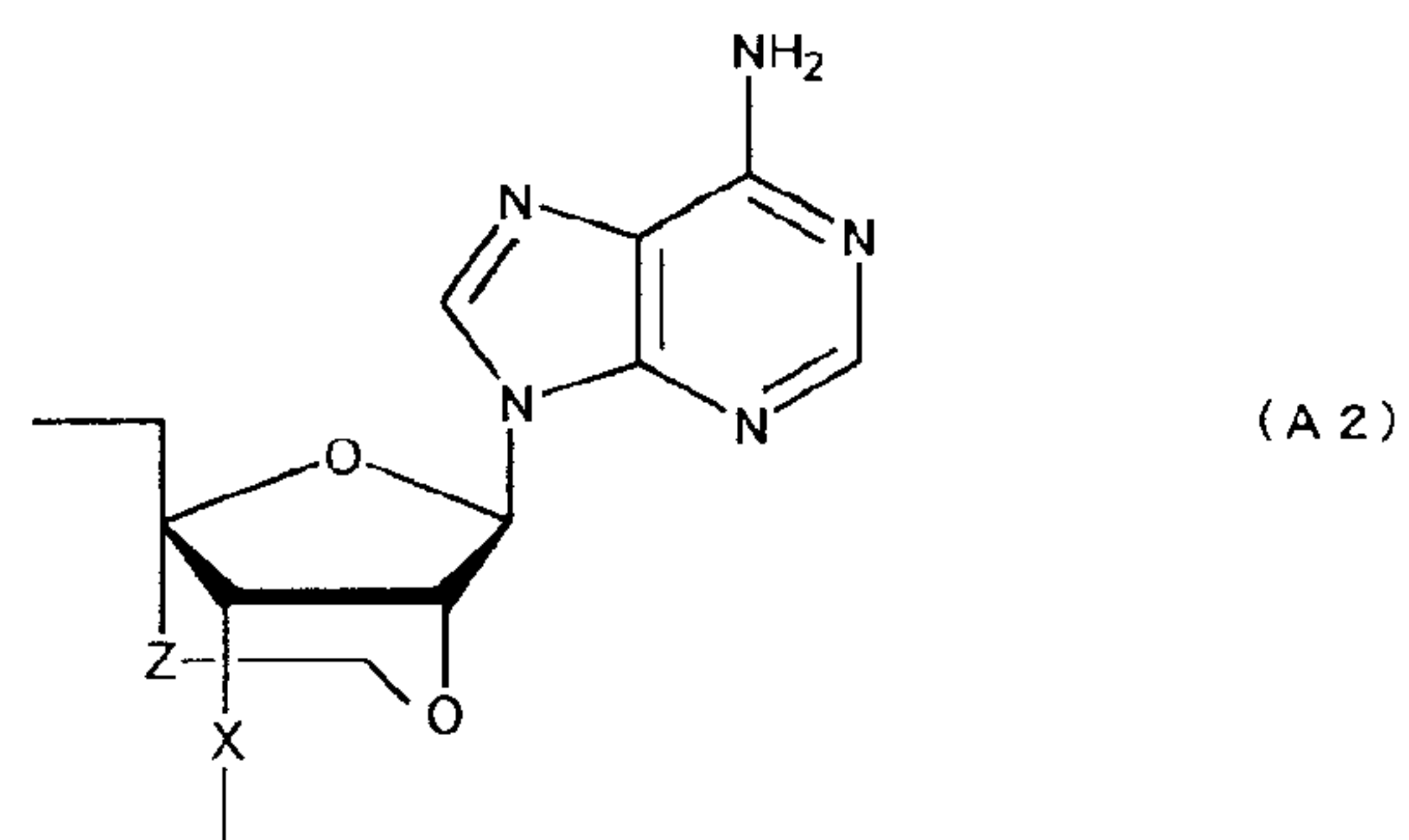
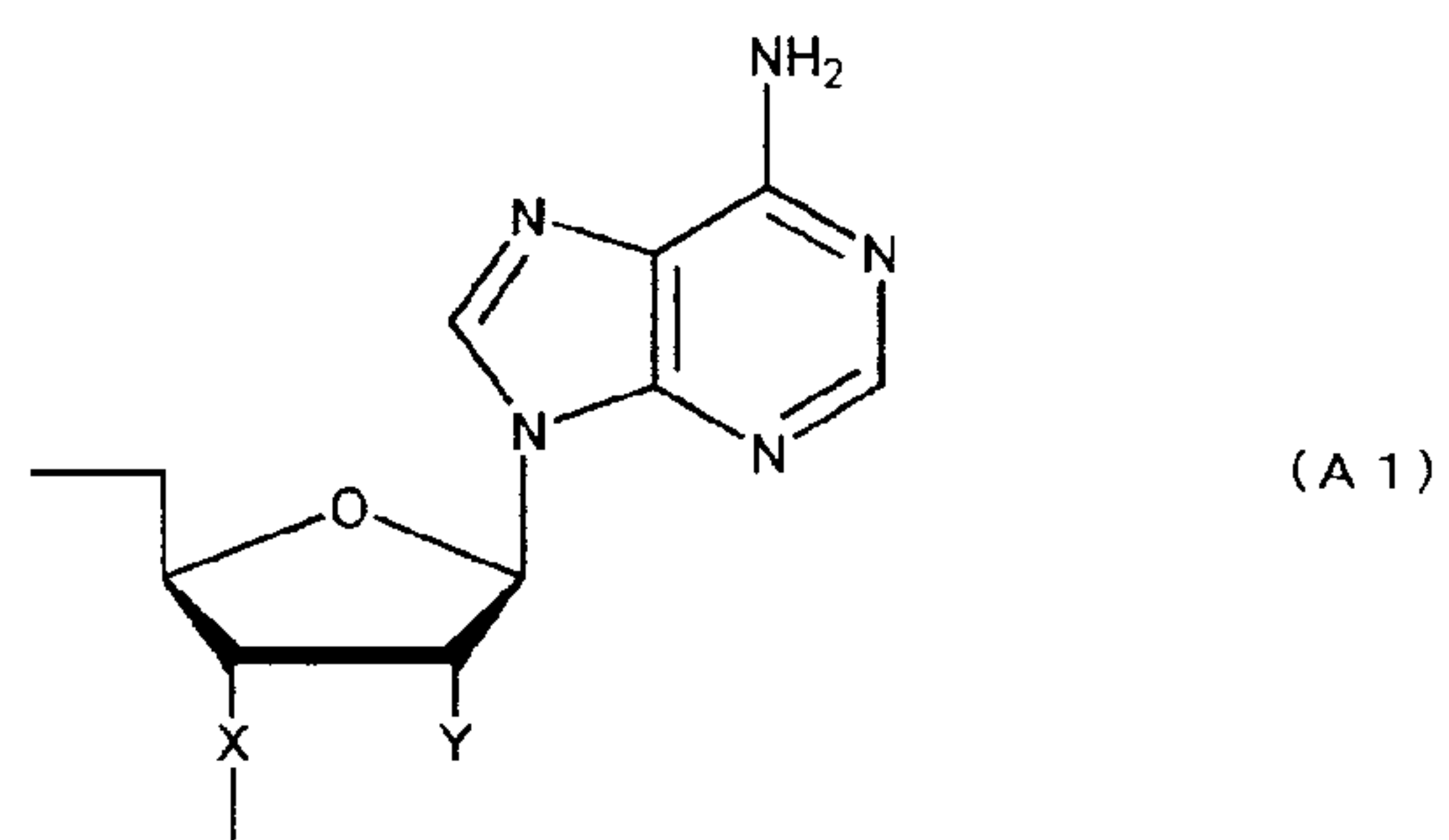
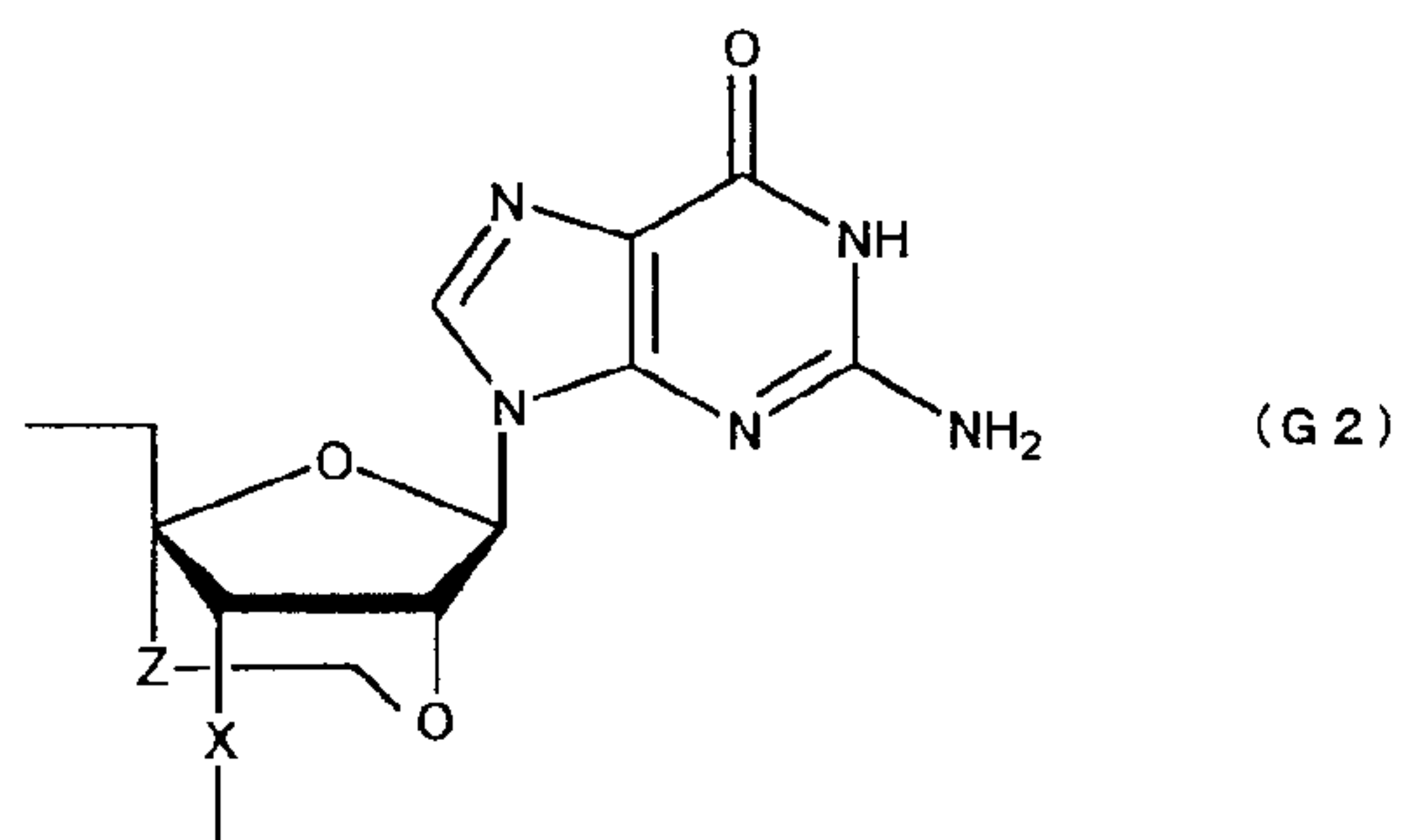
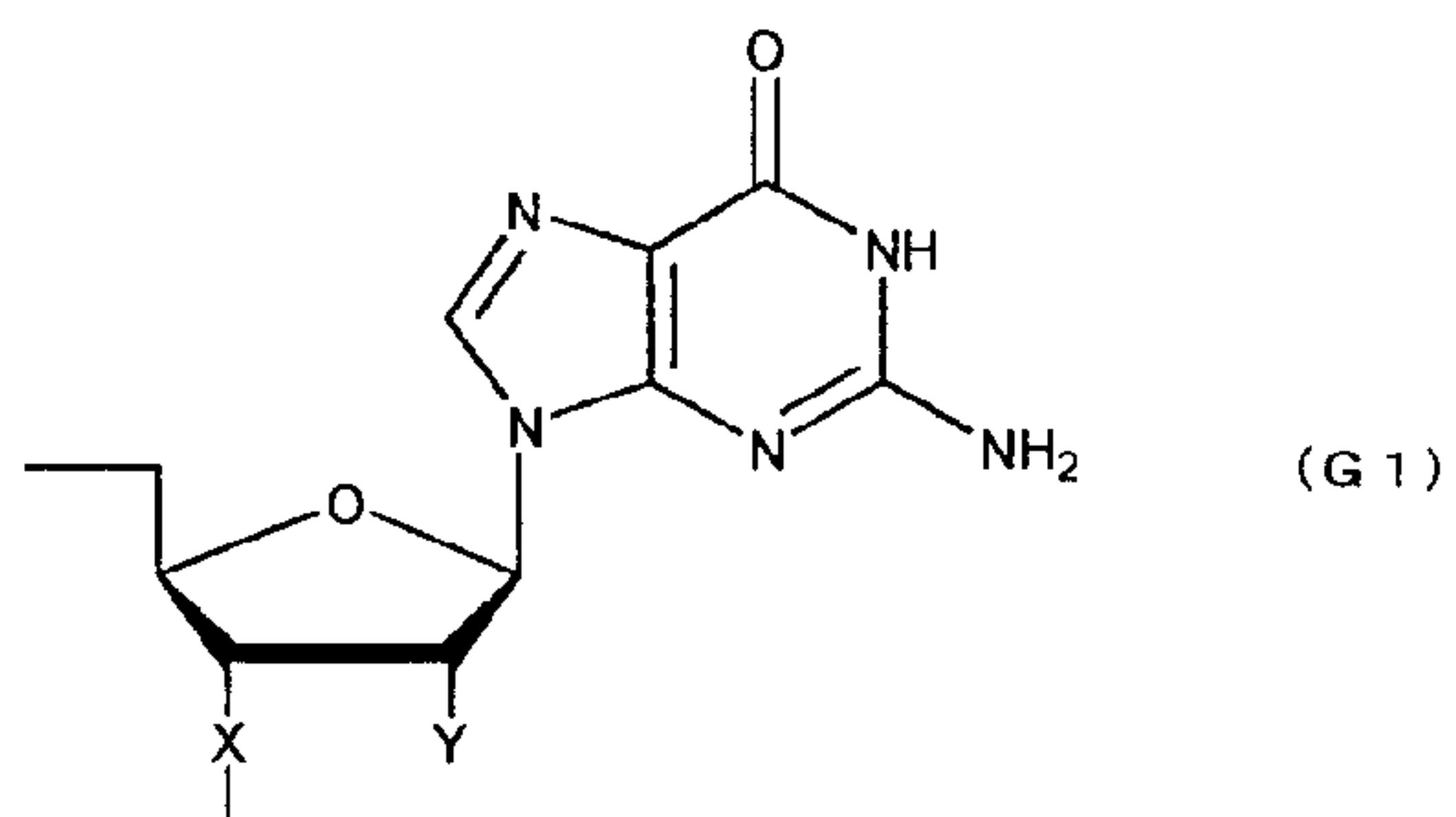
(5h'')HO-Bt-Bc-Bc-Ba-Bg-Bg-Ba-,

(5i'')HO-Bg-Bt-Bc-Bc-Ba-Bg-Bg-Ba-, or

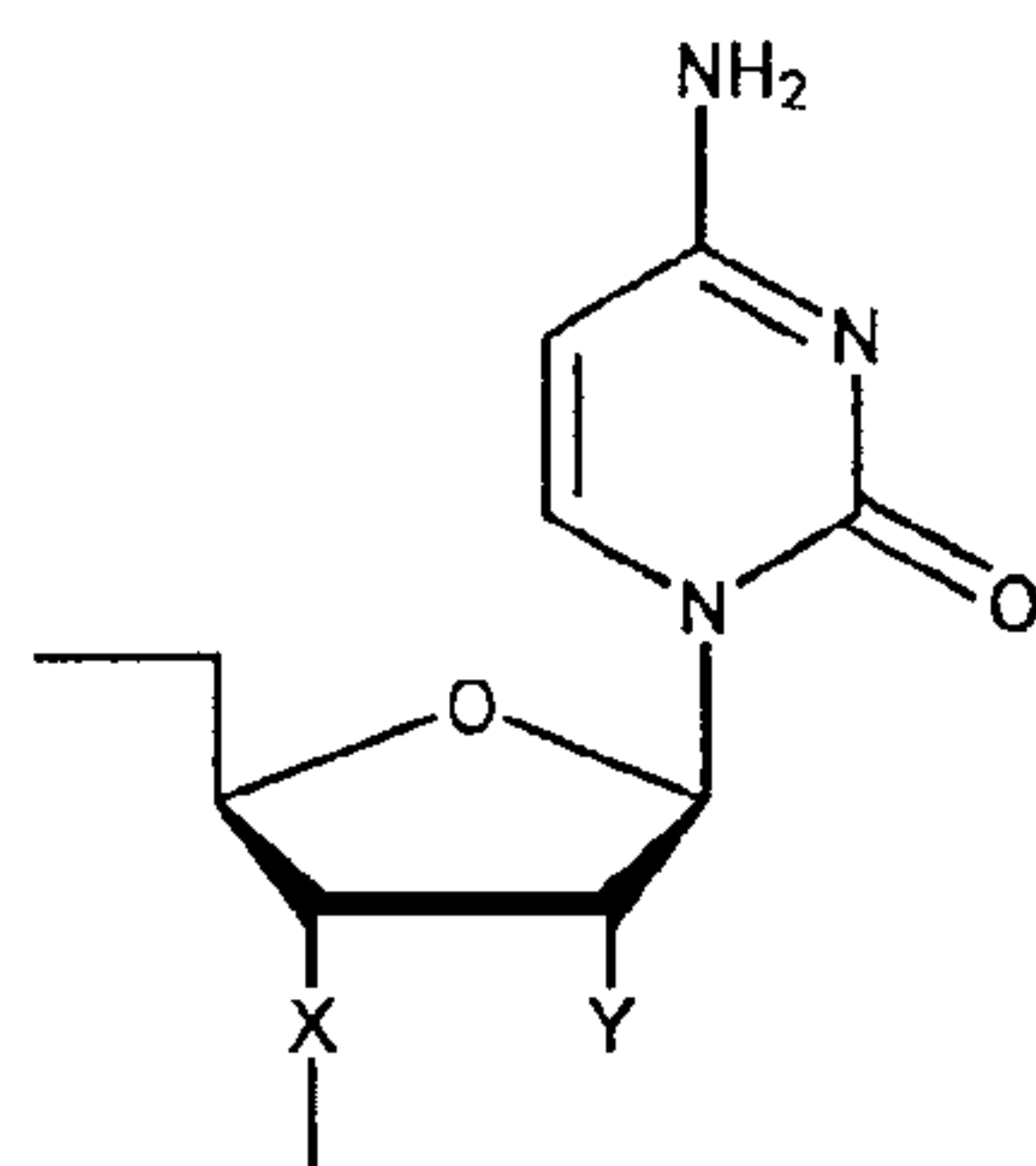
(5j'')HO-Ba-Bg-Bt-Bc-Bc-Ba-Bg-Bg-Ba-

25 where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

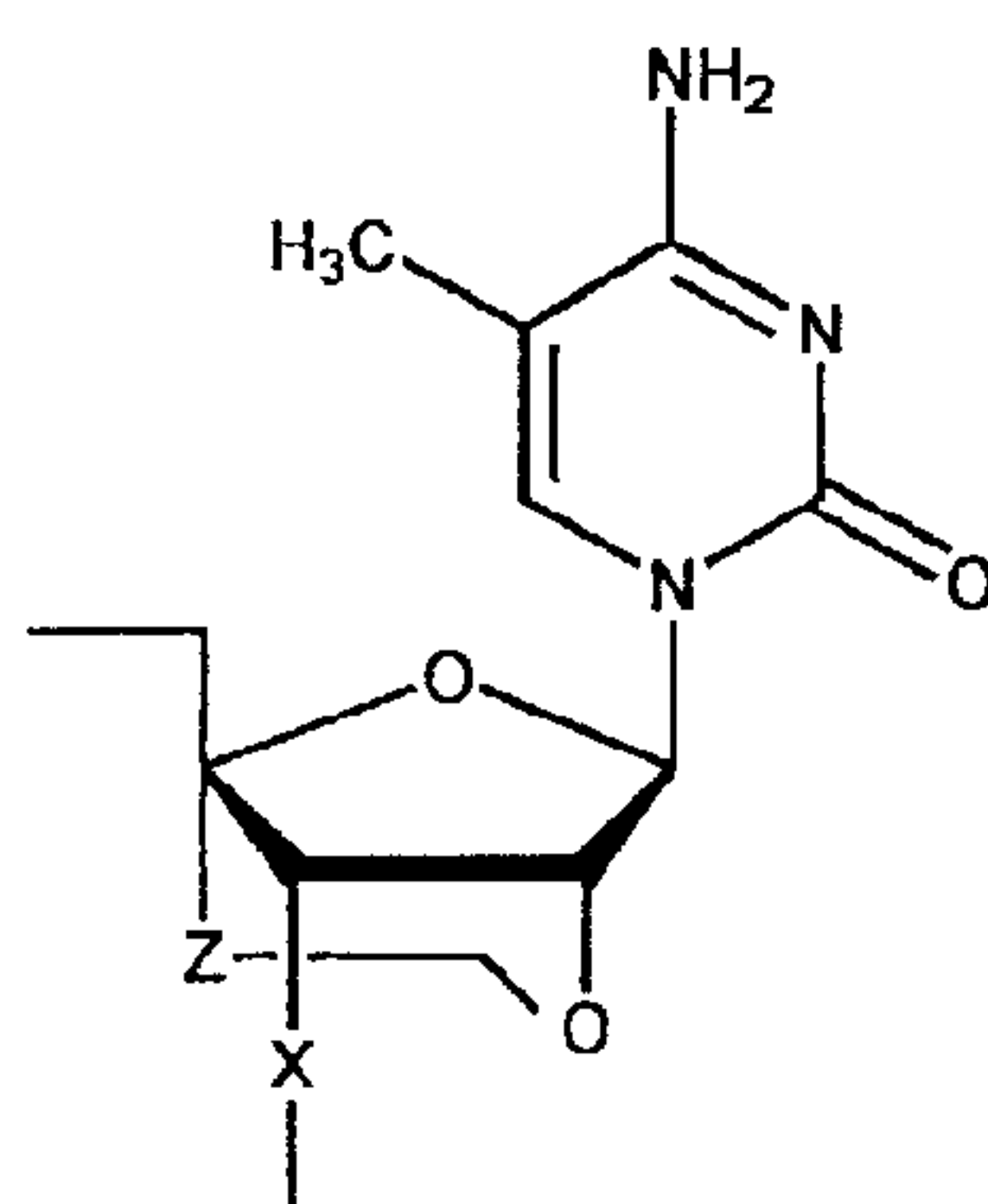
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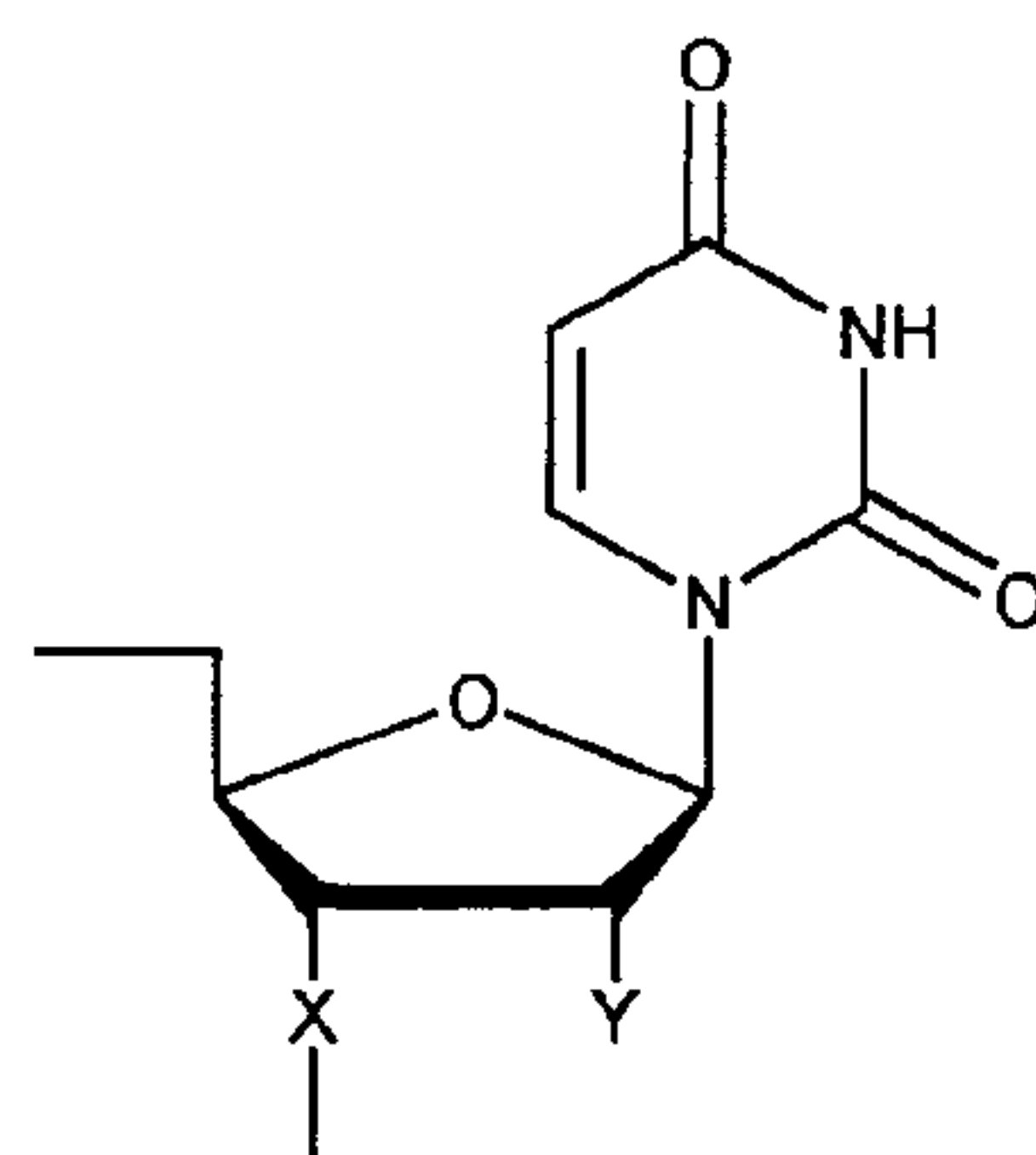
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(C 1)

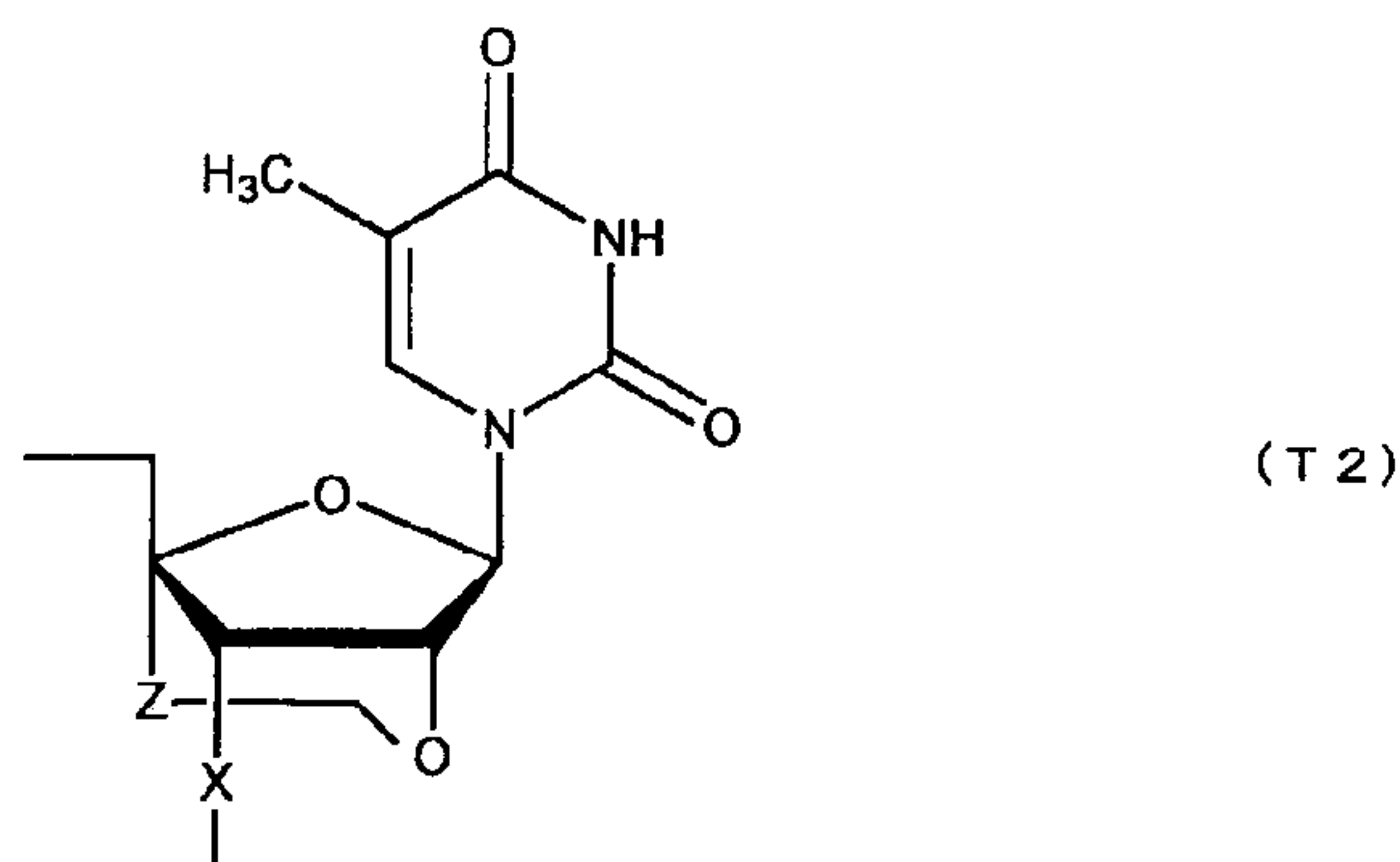


(C 2)

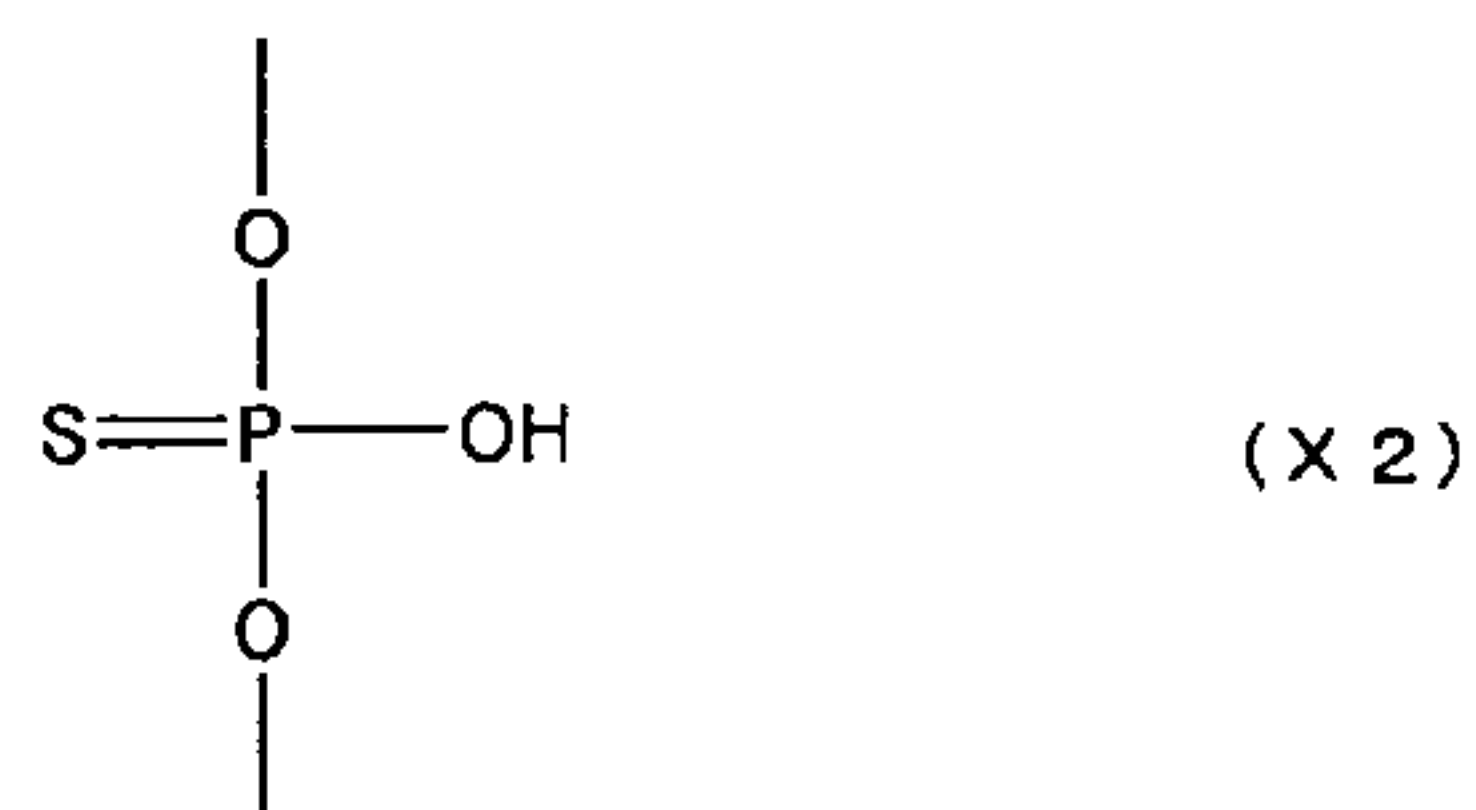
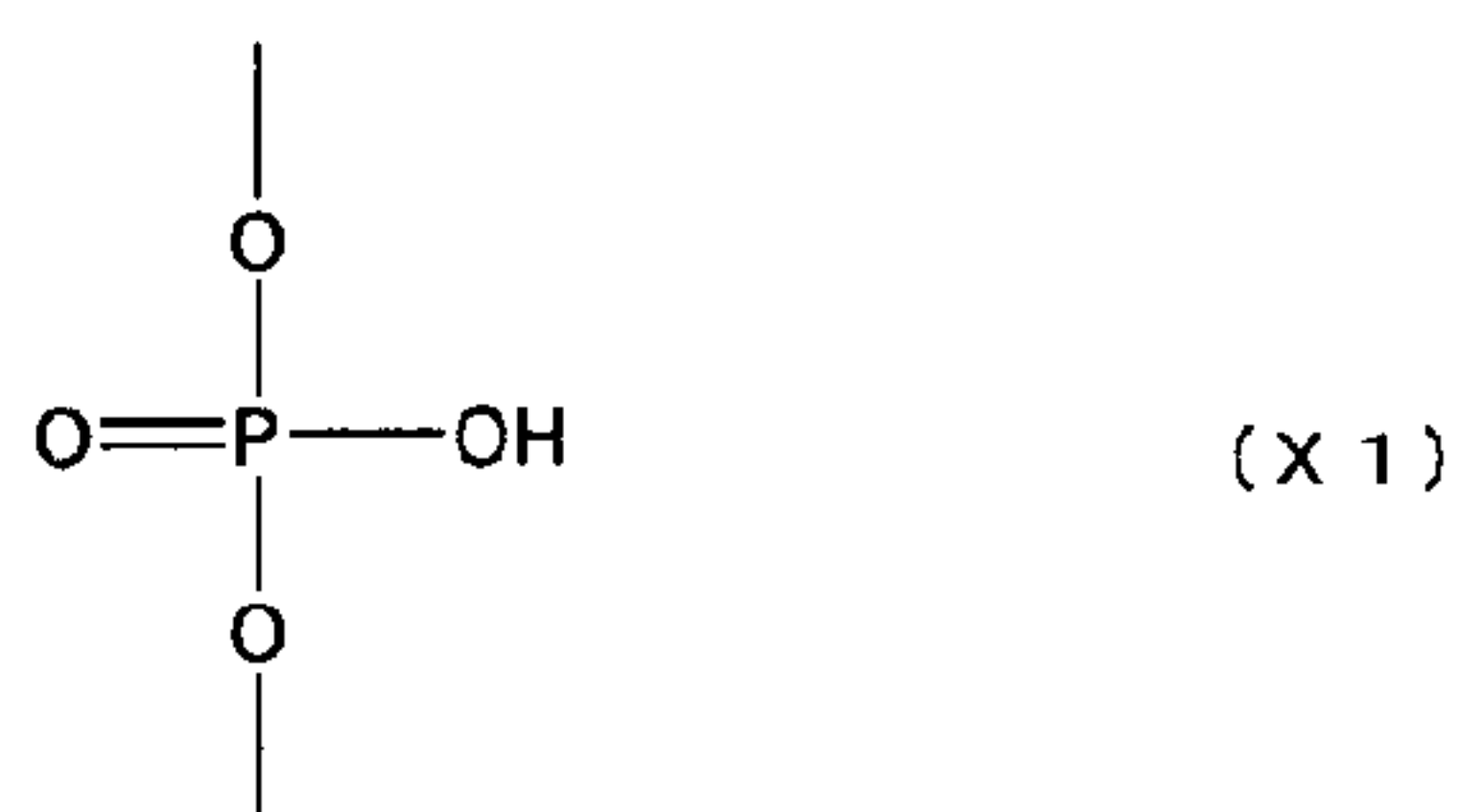


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''5} is a group represented by the following formula (5''):

10 -Bg-Bc-Bt-Ba-Bg-Bg-Bt-Bc-Ba- (5'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''5} is a group represented by any one of the following (105a'') to (105j''):

(105a'')-CH₂CH₂OH,

(105b'')-Bg-CH₂CH₂OH,

15 (105c'')-Bg-Bg-CH₂CH₂OH,

(105d'')-Bg-Bg-Bc-CH₂CH₂OH,

(105e'')-Bg-Bg-Bc-Bt-CH₂CH₂OH,

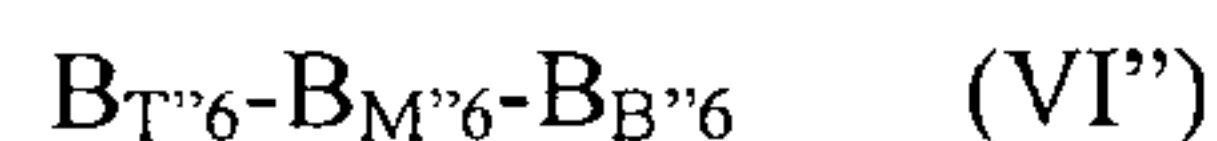
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(105f'')-Bg-Bg-Bc-Bt-Bg-CH₂CH₂OH,(105g'')-Bg-Bg-Bc-Bt-Bg-Bc-CH₂CH₂OH,(105h'')-Bg-Bg-Bc-Bt-Bg-Bc-Bt-CH₂CH₂OH,(105i'')-Bg-Bg-Bc-Bt-Bg-Bc-Bt-Bt-CH₂CH₂OH, or5 (105j'')-Bg-Bg-Bc-Bt-Bg-Bc-Bt-Bt-Bt-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (V'') has 2''-O,4''-C-alkylene group.

[31] A compound represented by the following general formula (VI'') or a
10 pharmacologically acceptable salt thereof:

where B_{T''6} is a group represented by any one of the following (6a'') to (6j''):

(6a'')HO-,

(6b'')HO-Ba-,

15 (6c'')HO-Ba-Ba-,

(6d'')HO-Ba-Ba-Ba-,

(6e'')HO-Bc-Ba-Ba-Ba-,

(6f'')HO-Bc-Bc-Ba-Ba-Ba-,

(6g'')HO-Bt-Bc-Bc-Ba-Ba-Ba-,

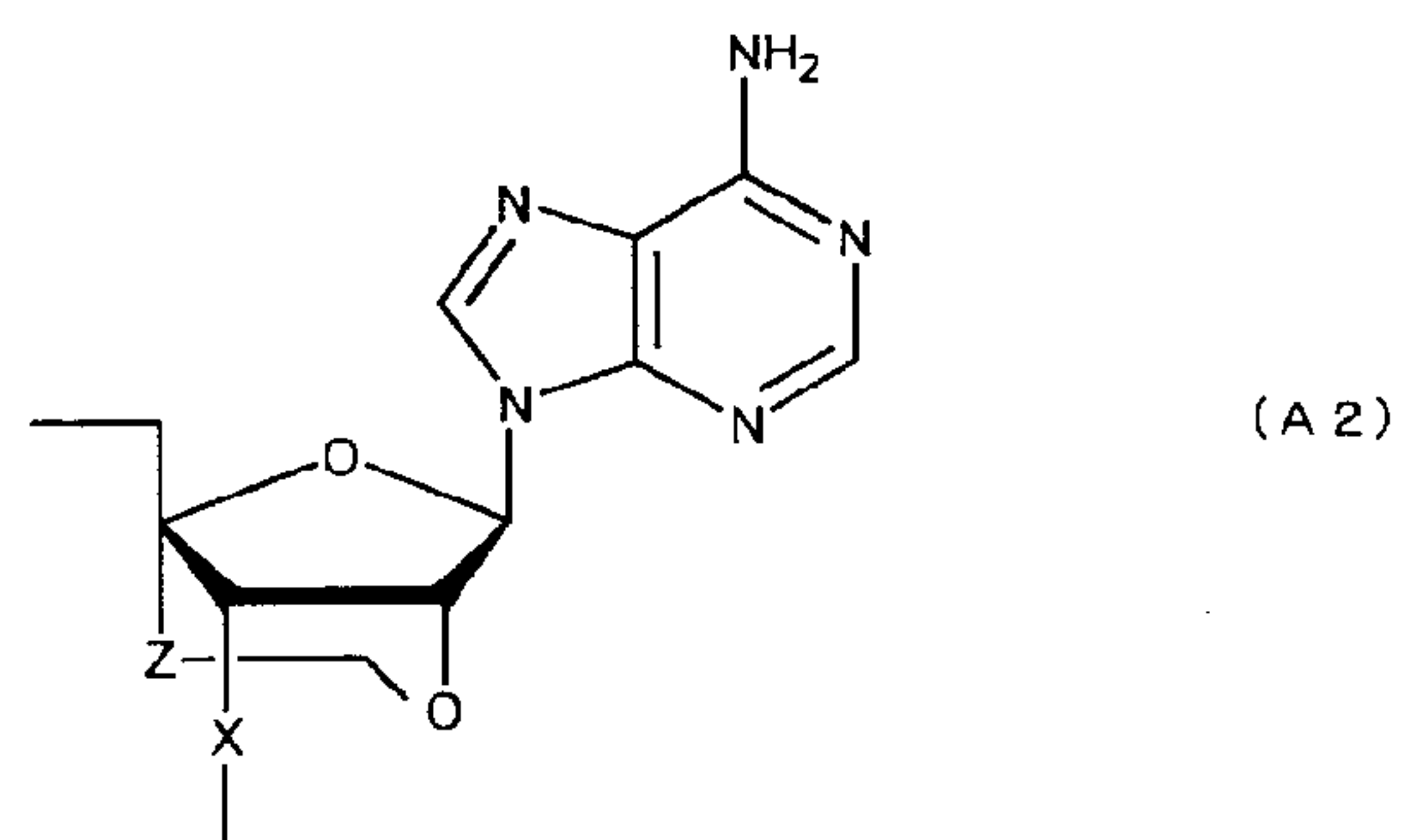
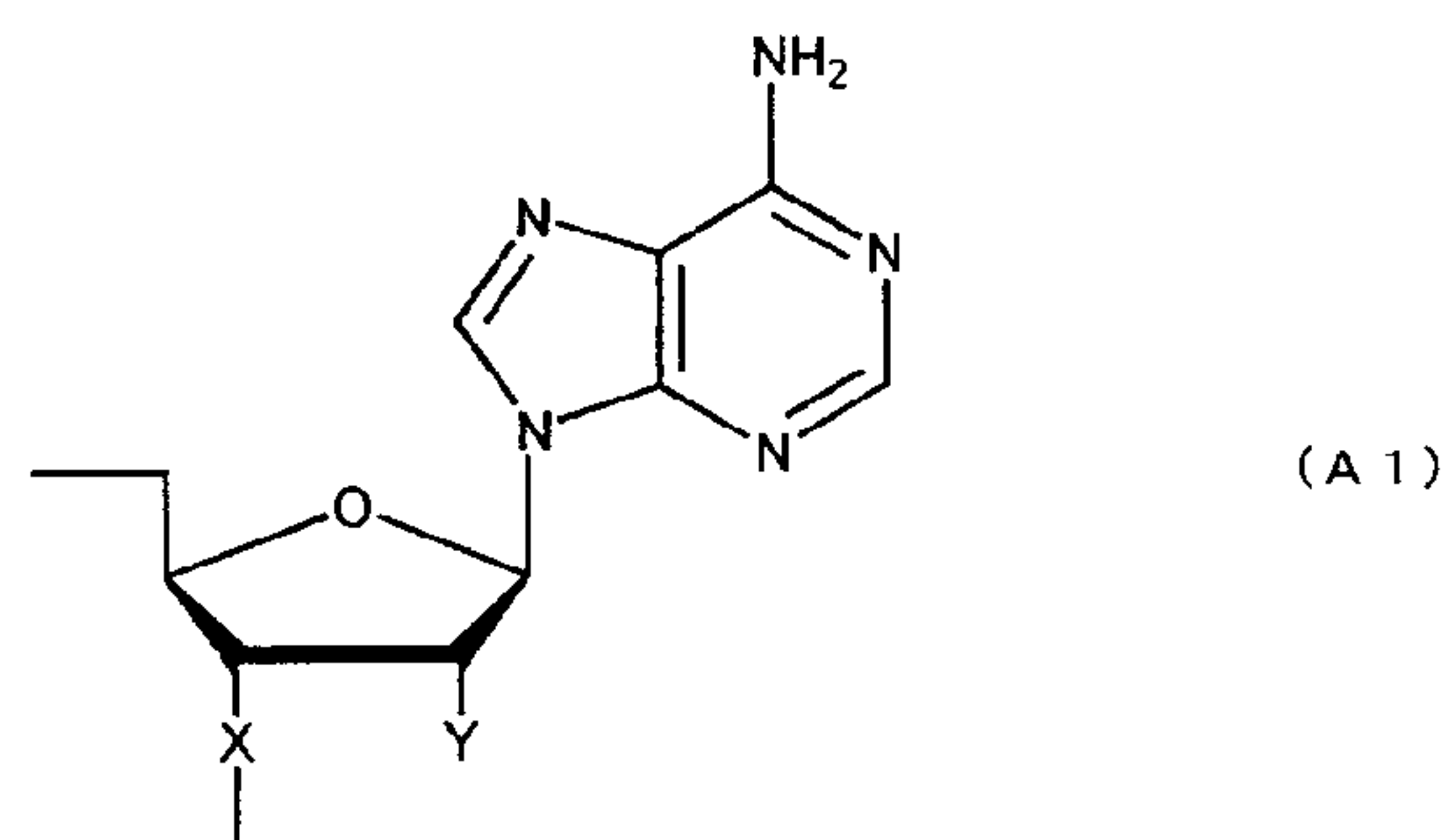
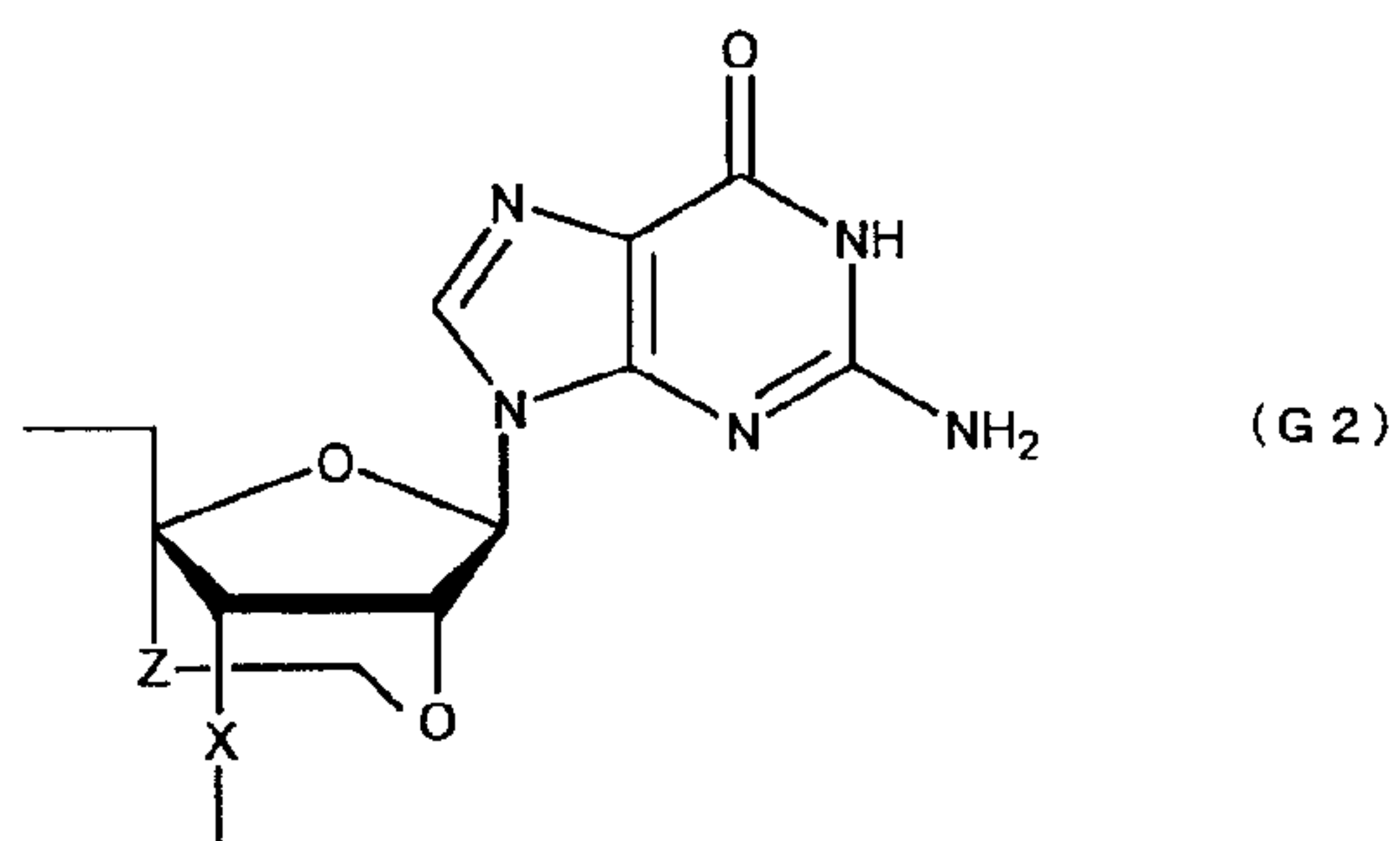
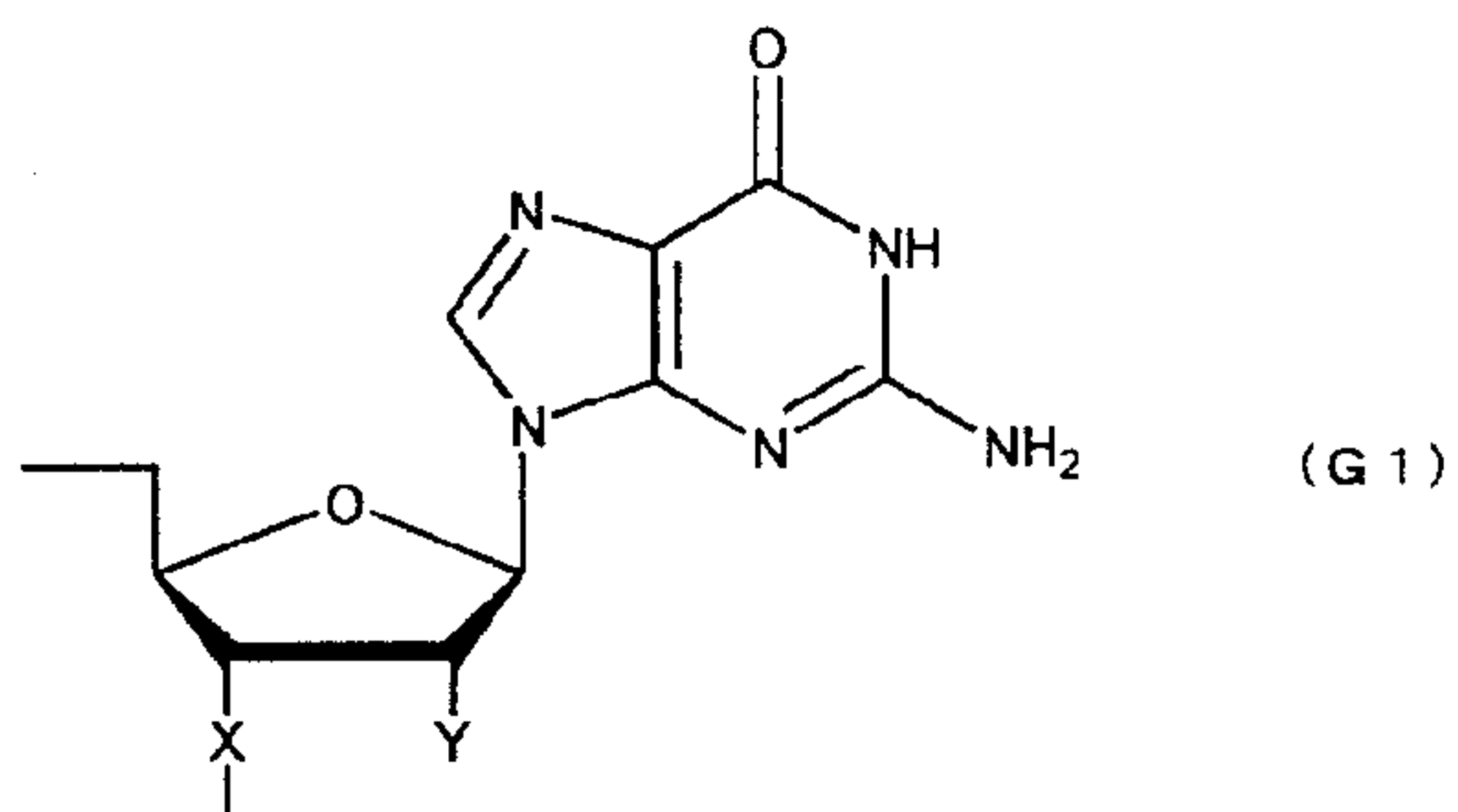
20 (6h'')HO-Bt-Bt-Bc-Bc-Ba-Ba-Ba-,

(6i'')HO-Bc-Bt-Bt-Bc-Bc-Ba-Ba-Ba-, or

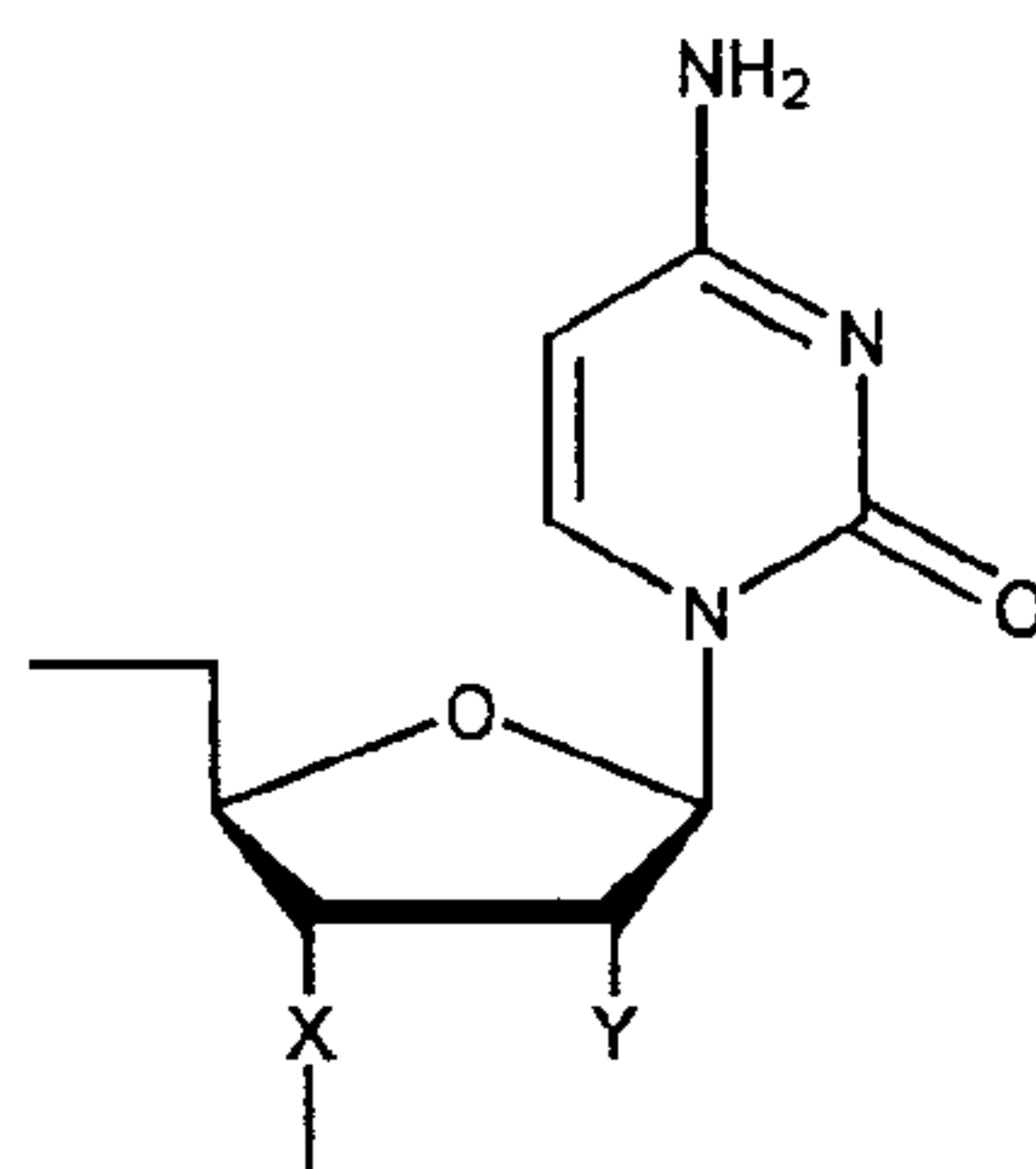
(6j'')HO-Bt-Bc-Bt-Bt-Bc-Bc-Ba-Ba-Ba-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group
represented by the following formula (A1) or (A2); Bc is a group represented by the
25 following formula (C1) or (C2); and Bt is a group represented by the following formula
(U1) or (T2):

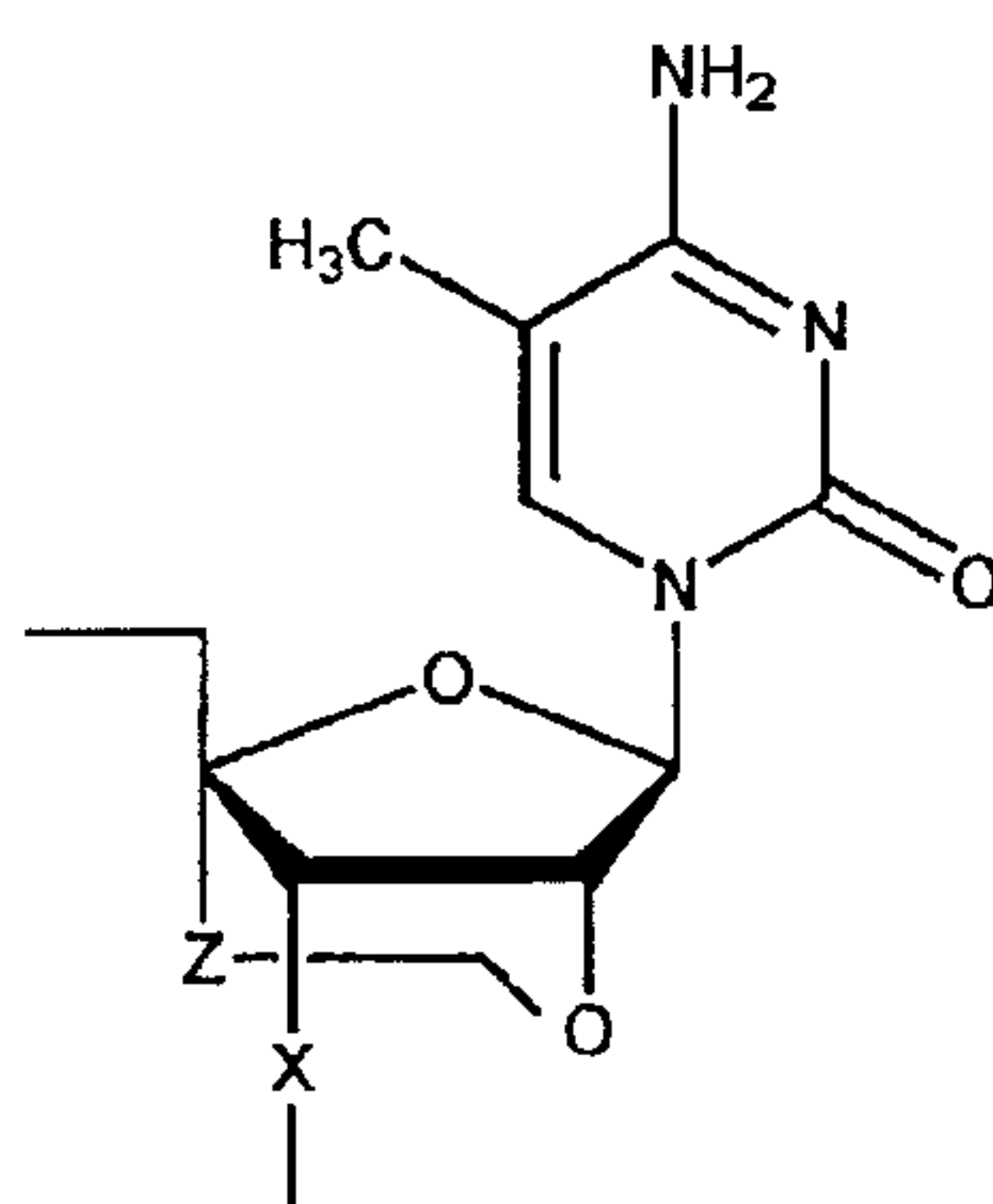
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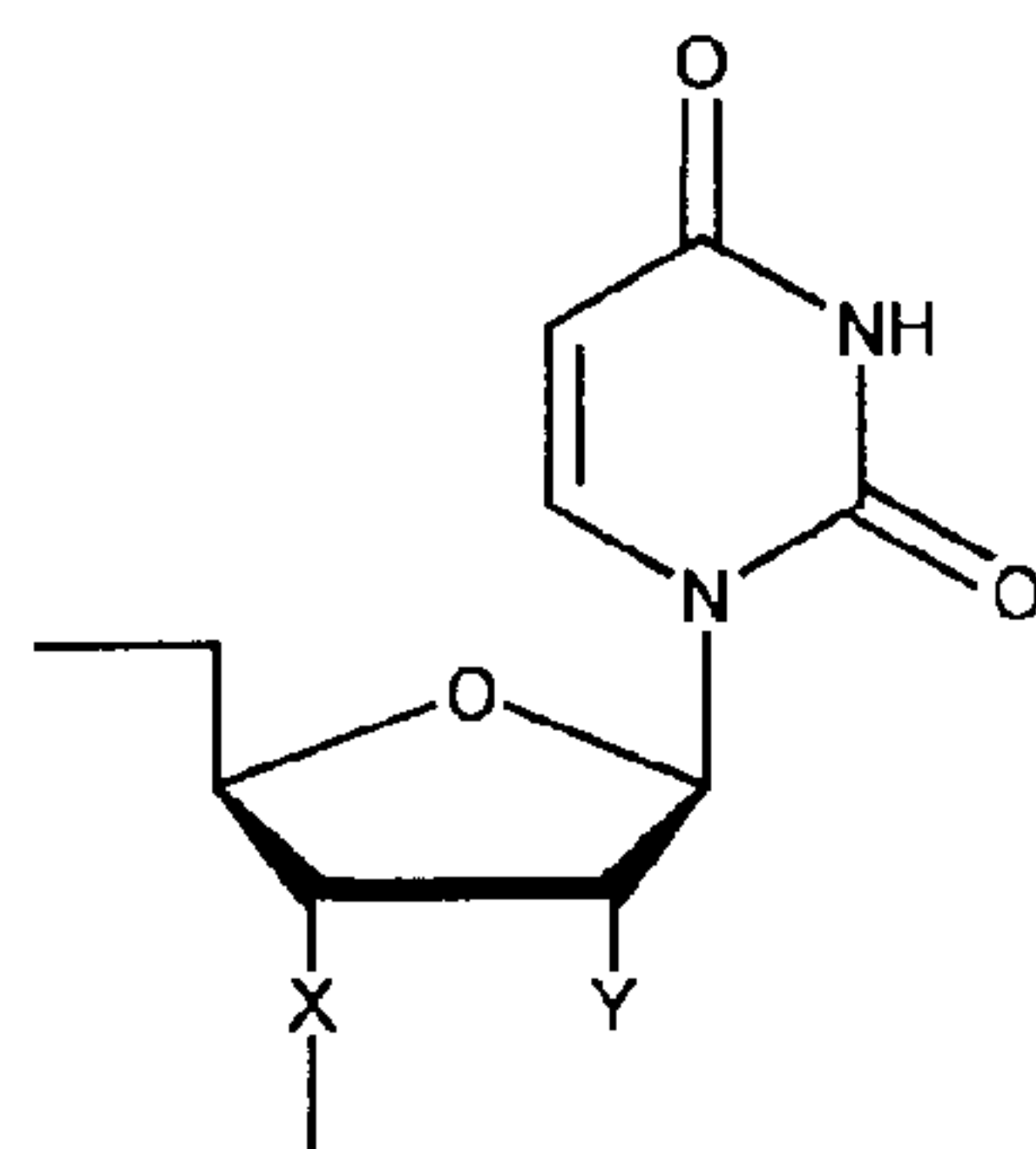
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(C 1)

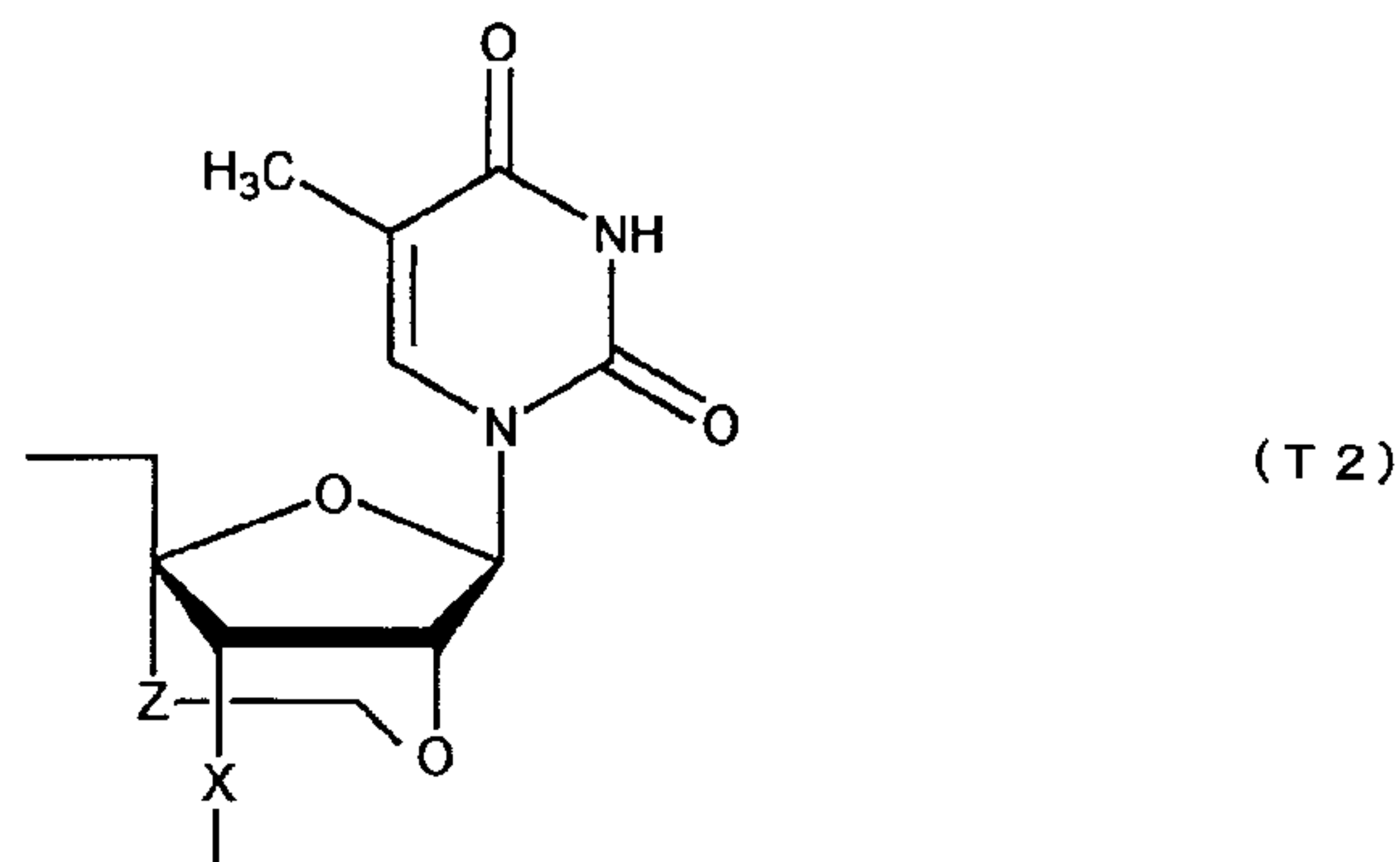


(C 2)

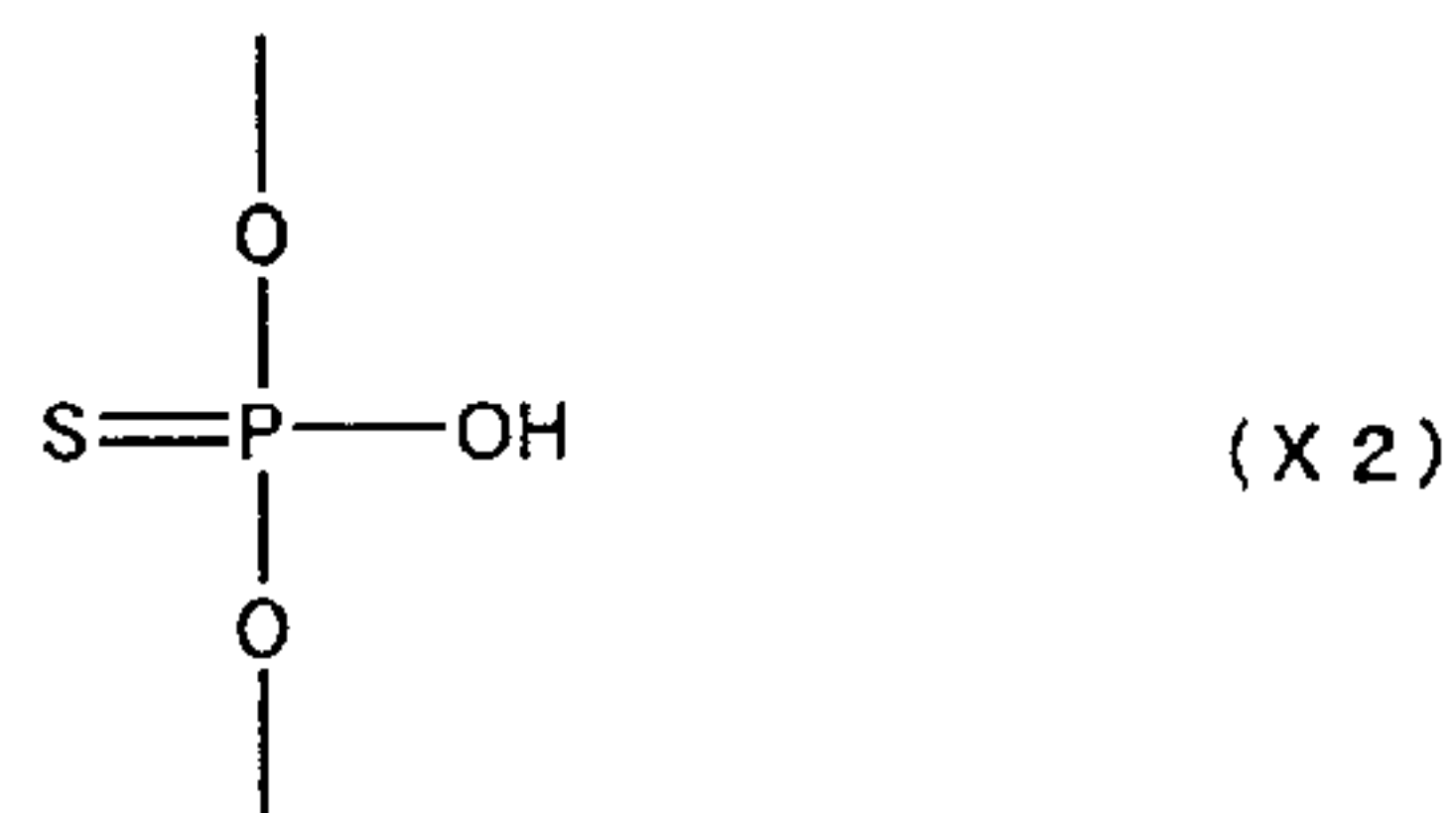
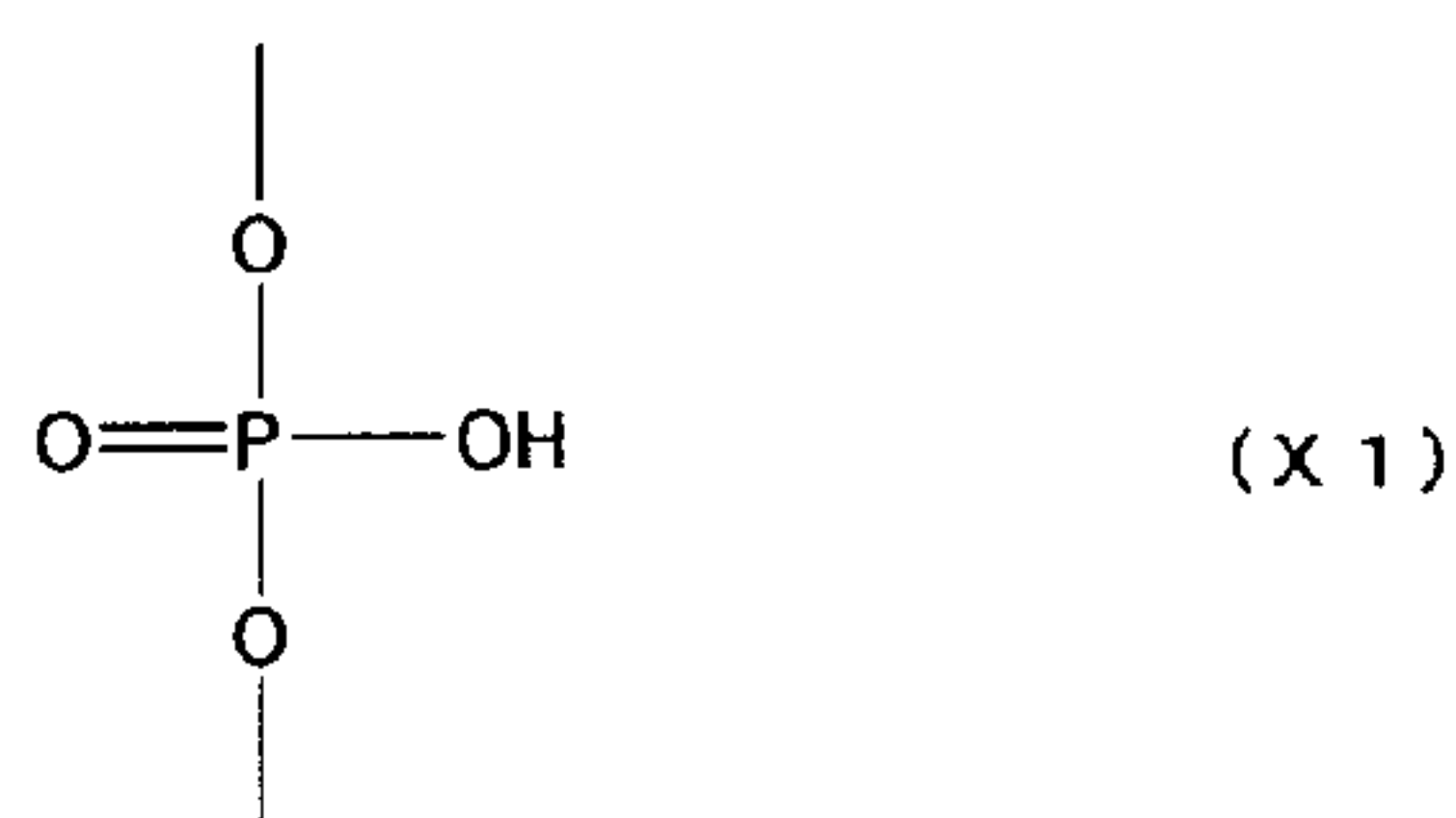


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''6} is a group represented by the following formula (6''):

10 -Bg-Bc-Ba-Bg-Bc-Bc-Bt-Bc-Bt- (6'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''6} is a group represented by any one of the following (106a'') to (106j''):

(106a'')-CH₂CH₂OH,

(106b'')-Bc-CH₂CH₂OH,

15 (106c'')-Bc-Bg-CH₂CH₂OH,

(106d'')-Bc-Bg-Bc-CH₂CH₂OH,

(106e'')-Bc-Bg-Bc-Bt-CH₂CH₂OH,

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(106f'')-Bc-Bg-Bc-Bt-Bc-CH₂CH₂OH,(106g'')-Bc-Bg-Bc-Bt-Bc-Ba-CH₂CH₂OH,(106h'')-Bc-Bg-Bc-Bt-Bc-Ba-Bc-CH₂CH₂OH,(106i'')-Bc-Bg-Bc-Bt-Bc-Ba-Bc-Bt-CH₂CH₂OH, or5 (106j'')-Bc-Bg-Bc-Bt-Bc-Ba-Bc-Bt-Bc-CH₂CH₂OH,

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (VI'') has 2''-O,4''-C-alkylene group.

[32] A compound represented by the following general formula (VII'') or a
10 pharmacologically acceptable salt thereof:



where B_{T''7} is a group represented by any one of the following (7a'') to (7j''):

(7a'')HO-,

(7b'')HO-Bt-,

15 (7c'')HO-Bt-Bt-,

(7d'')HO-Bg-Bt-Bt-,

(7e'')HO-Ba-Bg-Bt-Bt-,

(7f'')HO-Bg-Ba-Bg-Bt-Bt-,

(7g'')HO-Bt-Bg-Ba-Bg-Bt-Bt-,

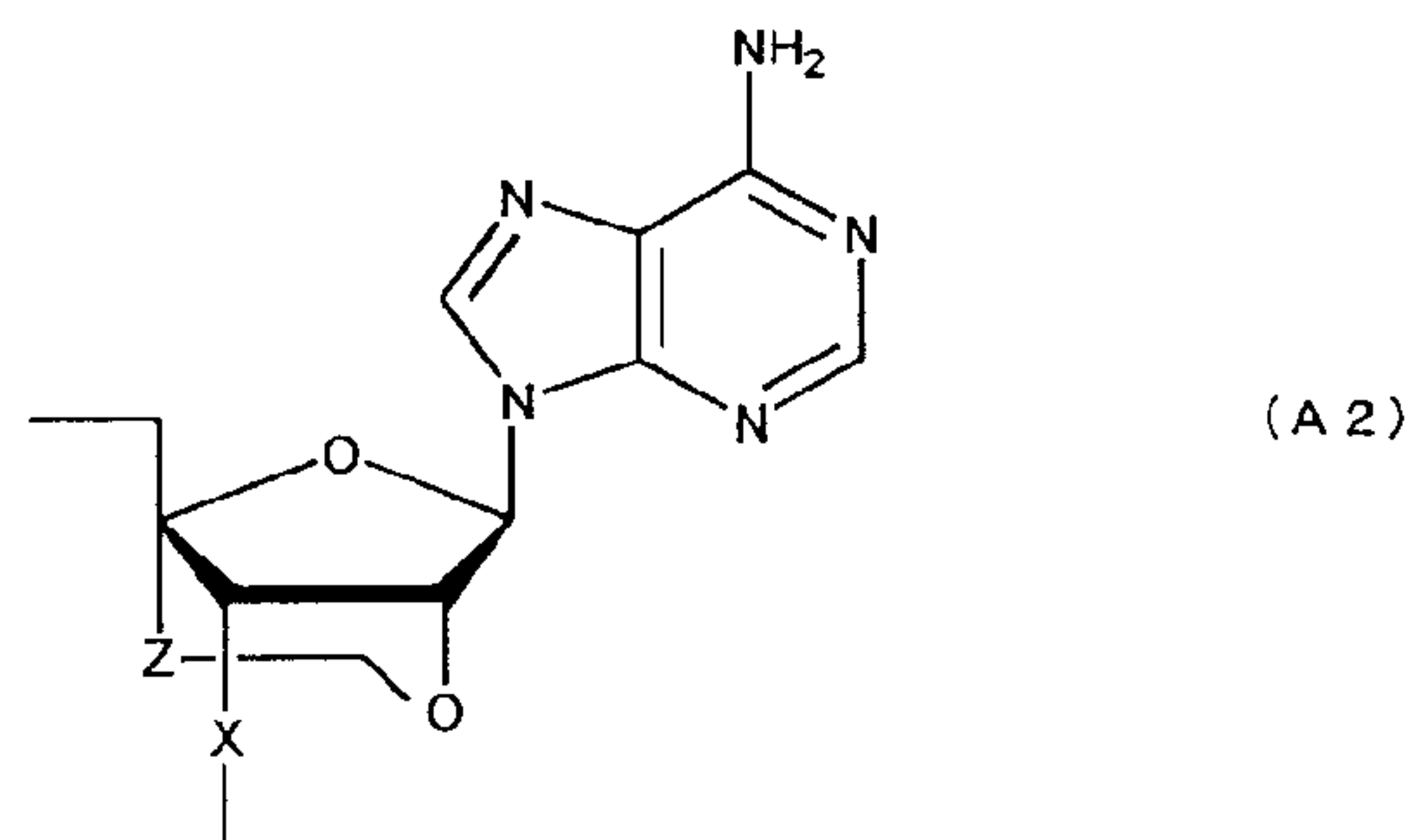
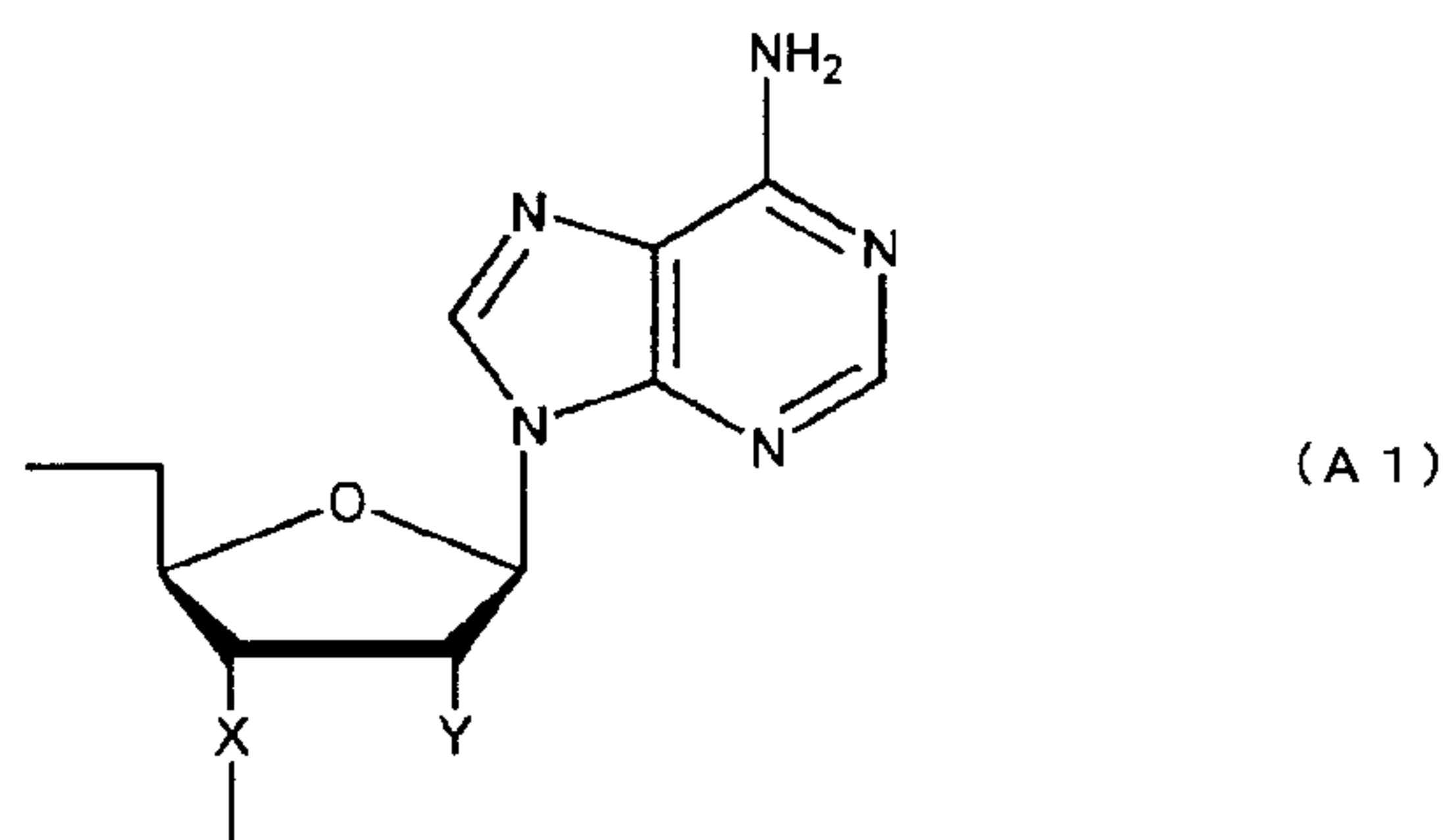
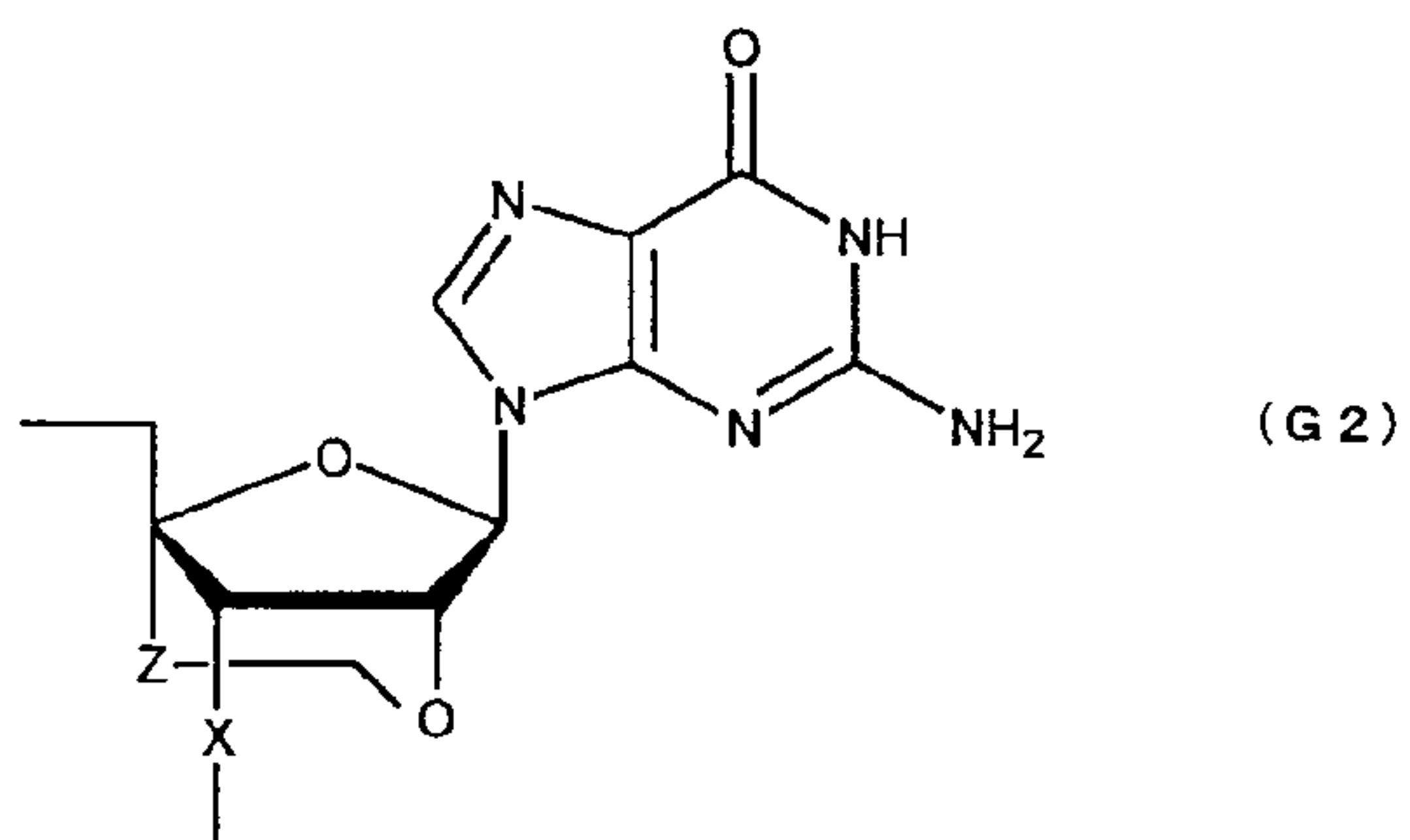
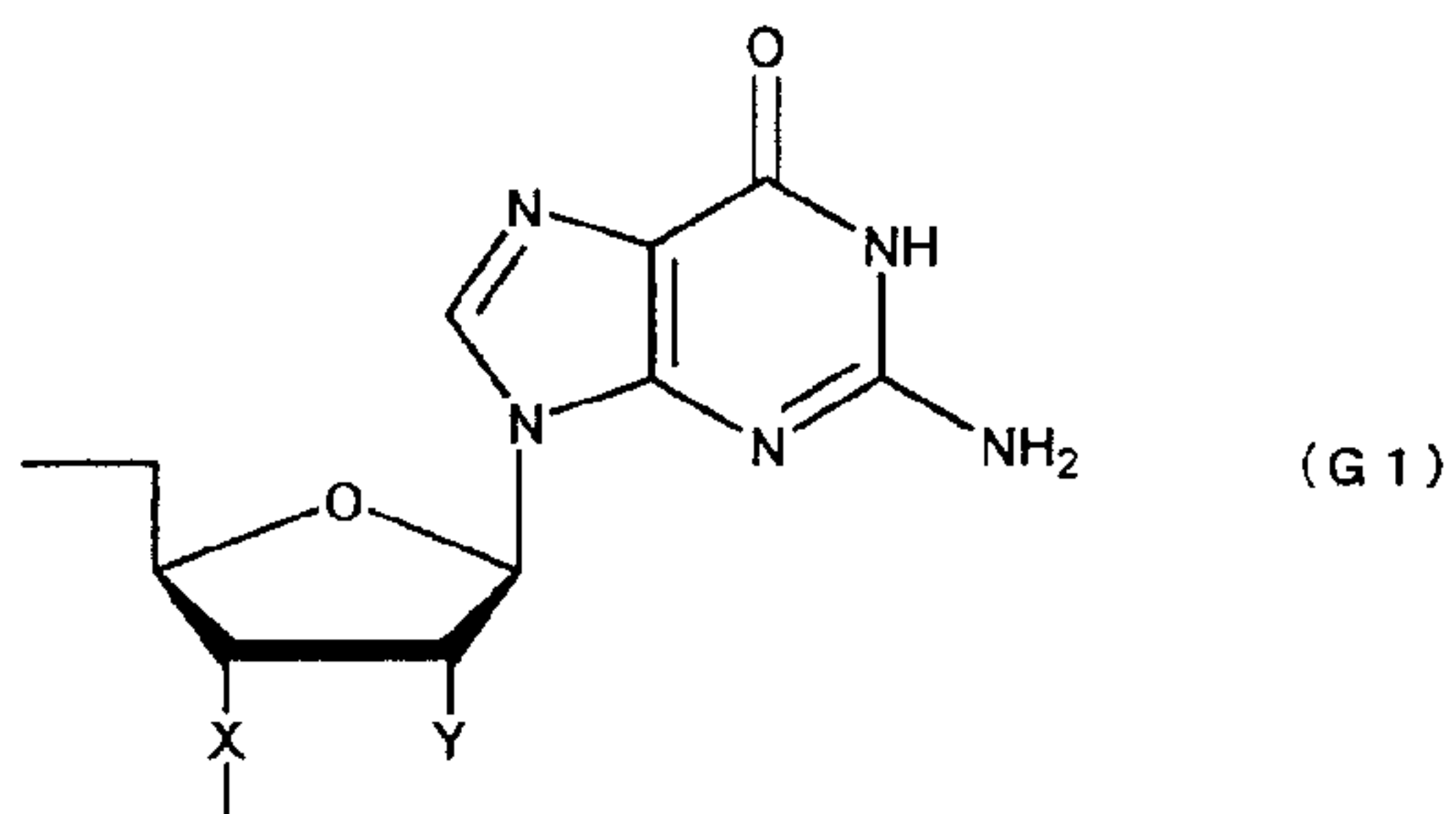
20 (7h'')HO-Ba-Bt-Bg-Ba-Bg-Bt-Bt-,

(7i'')HO-Bt-Ba-Bt-Bg-Ba-Bg-Bt-Bt-, or

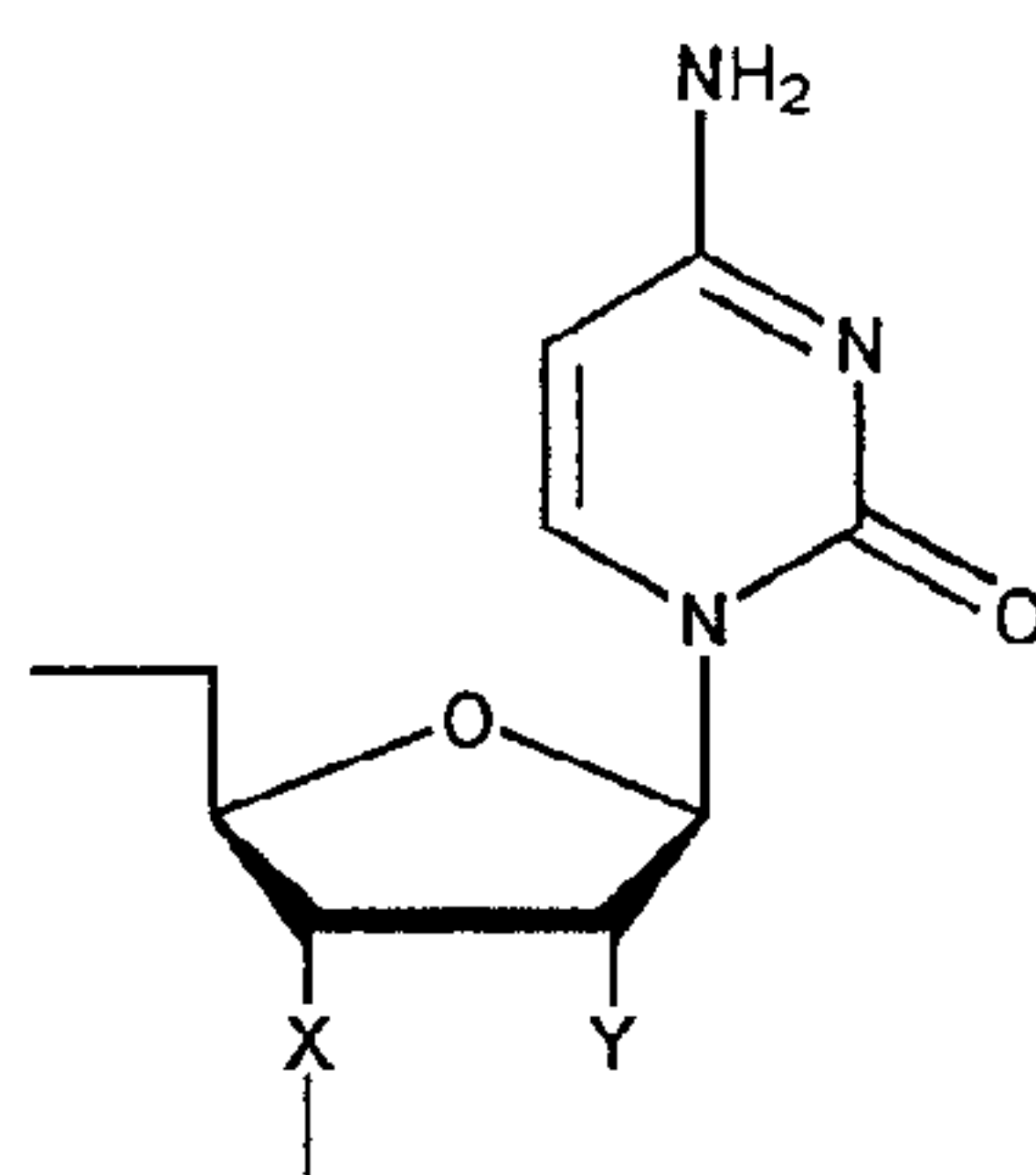
(7j'')HO-Bc-Bt-Ba-Bt-Bg-Ba-Bg-Bt-Bt-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the
25 following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

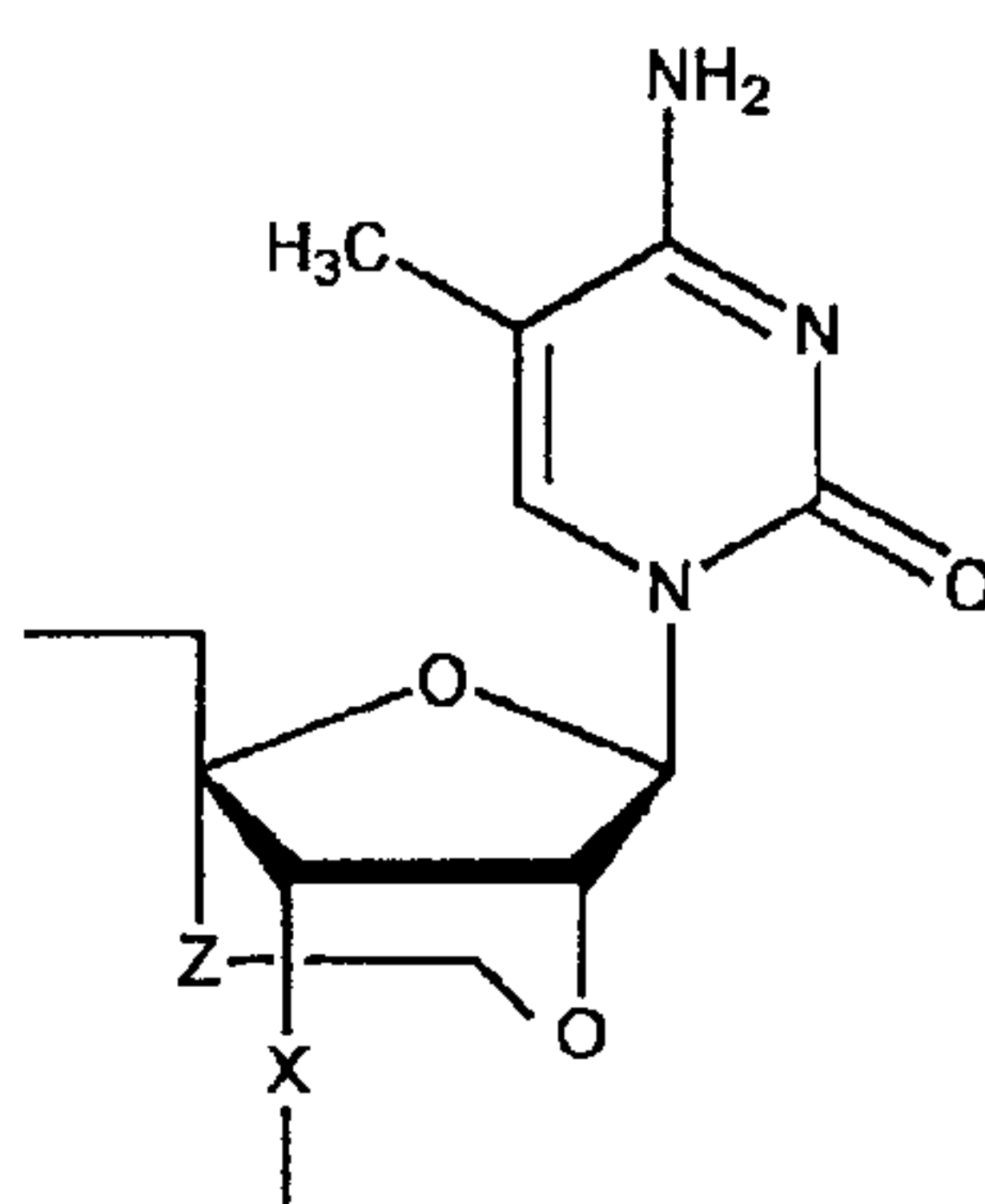
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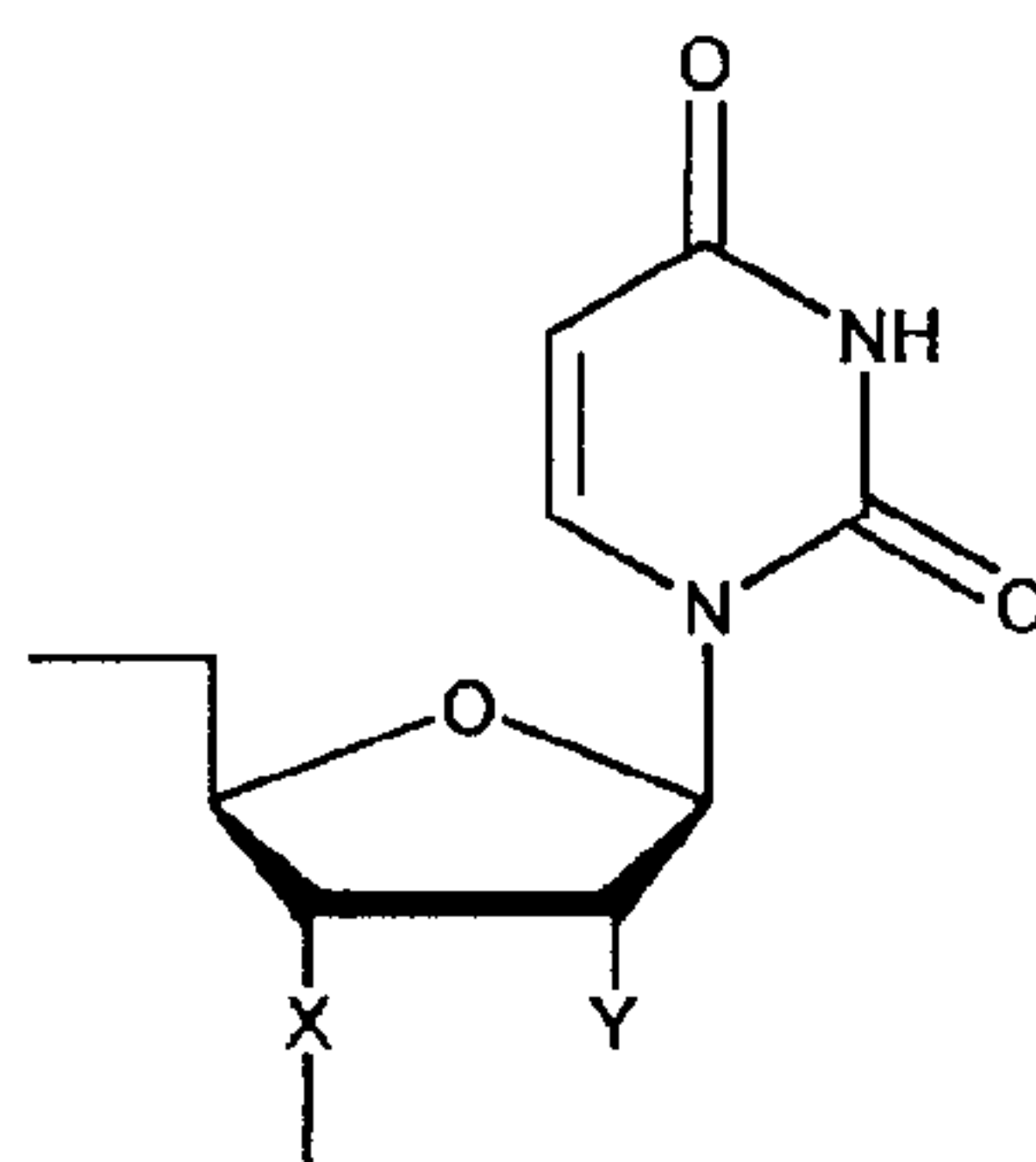
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(C 1)

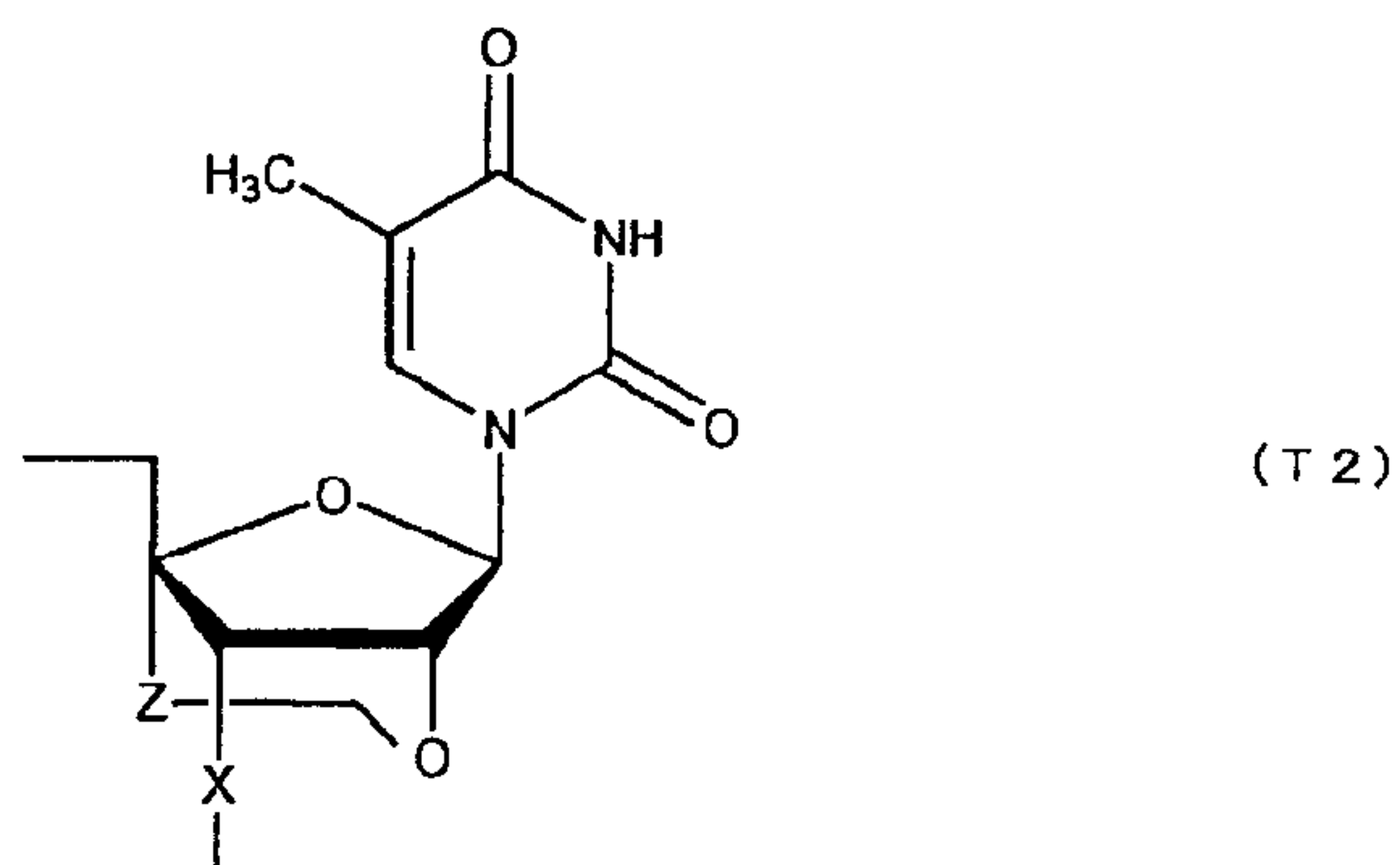


(C 2)

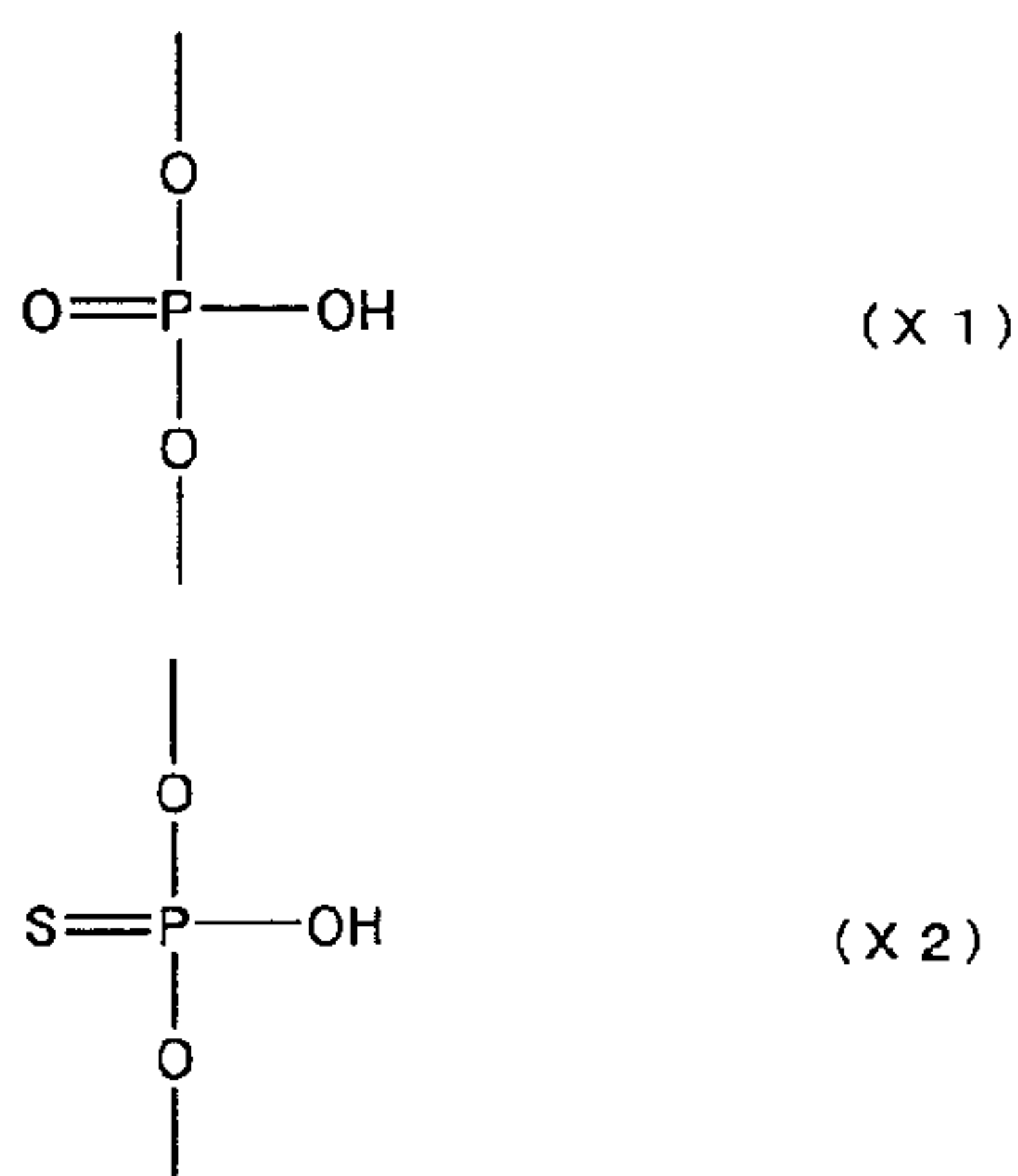


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_Mⁿ⁷ is a group represented by the following formula (7''):

10 -Bt-Bc-Bt-Bt-Bc-Bc-Ba-Ba-Ba- (7'')

where Bg, Ba, Bt and Bc are as defined above;

B_Bⁿ⁷ is a group represented by any one of the following (107a'') to (107j''):

(107a'')-CH₂CH₂OH,

(107b'')-Bg-CH₂CH₂OH,

15 (107c'')-Bg-Bc-CH₂CH₂OH,

(107d'')-Bg-Bc-Ba-CH₂CH₂OH,

(107e'')-Bg-Bc-Ba-Bg-CH₂CH₂OH,

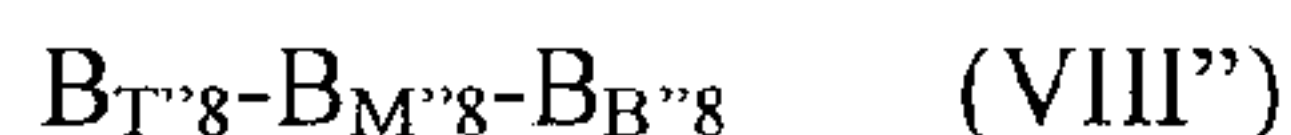
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(107f'')-Bg-Bc-Ba-Bg-Bc-CH₂CH₂OH,(107g'')-Bg-Bc-Ba-Bg-Bc-Bc-CH₂CH₂OH,(107h'')-Bg-Bc-Ba-Bg-Bc-Bc-Bt-CH₂CH₂OH,(107i'')-Bg-Bc-Ba-Bg-Bc-Bc-Bt-Bc-CH₂CH₂OH, or5 (107j'')-Bg-Bc-Ba-Bg-Bc-Bc-Bt-Bc-Bt-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (VII'') has 2''-O,4''-C-alkylene group.

[33] A compound represented by the following general formula (VIII'') or a
10 pharmacologically acceptable salt thereof:



where B_{T''8} is a group represented by any one of the following (8a'') to (8n''):

(8a'')HO-,

(8b'')HO-Bc-,

15 (8c'')HO-Bt-Bc-,

(8d'')HO-Ba-Bt-Bc-,

(8e'')HO-Bc-Ba-Bt-Bc-,

(8f'')HO-Bt-Bc-Ba-Bt-Bc-,

(8g'')HO-Bt-Bt-Bc-Ba-Bt-Bc-,

20 (8h'')HO-Bt-Bt-Bt-Bc-Ba-Bt-Bc-,

(8i'')HO-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-,

(8j'')HO-Bt-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-,

(8k'')HO-Bt-Bt-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-,

(8l'')HO-Ba-Bt-Bt-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-,

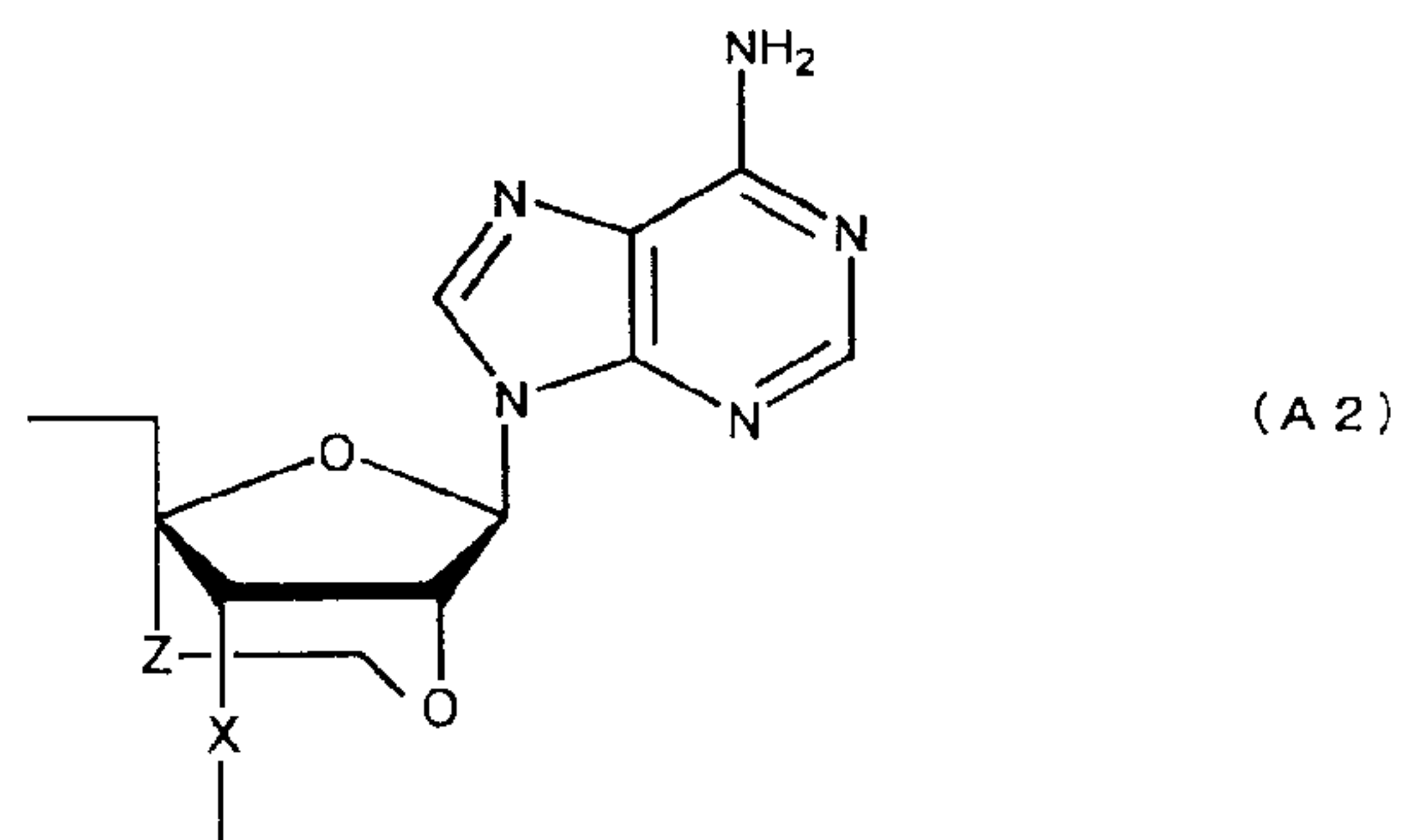
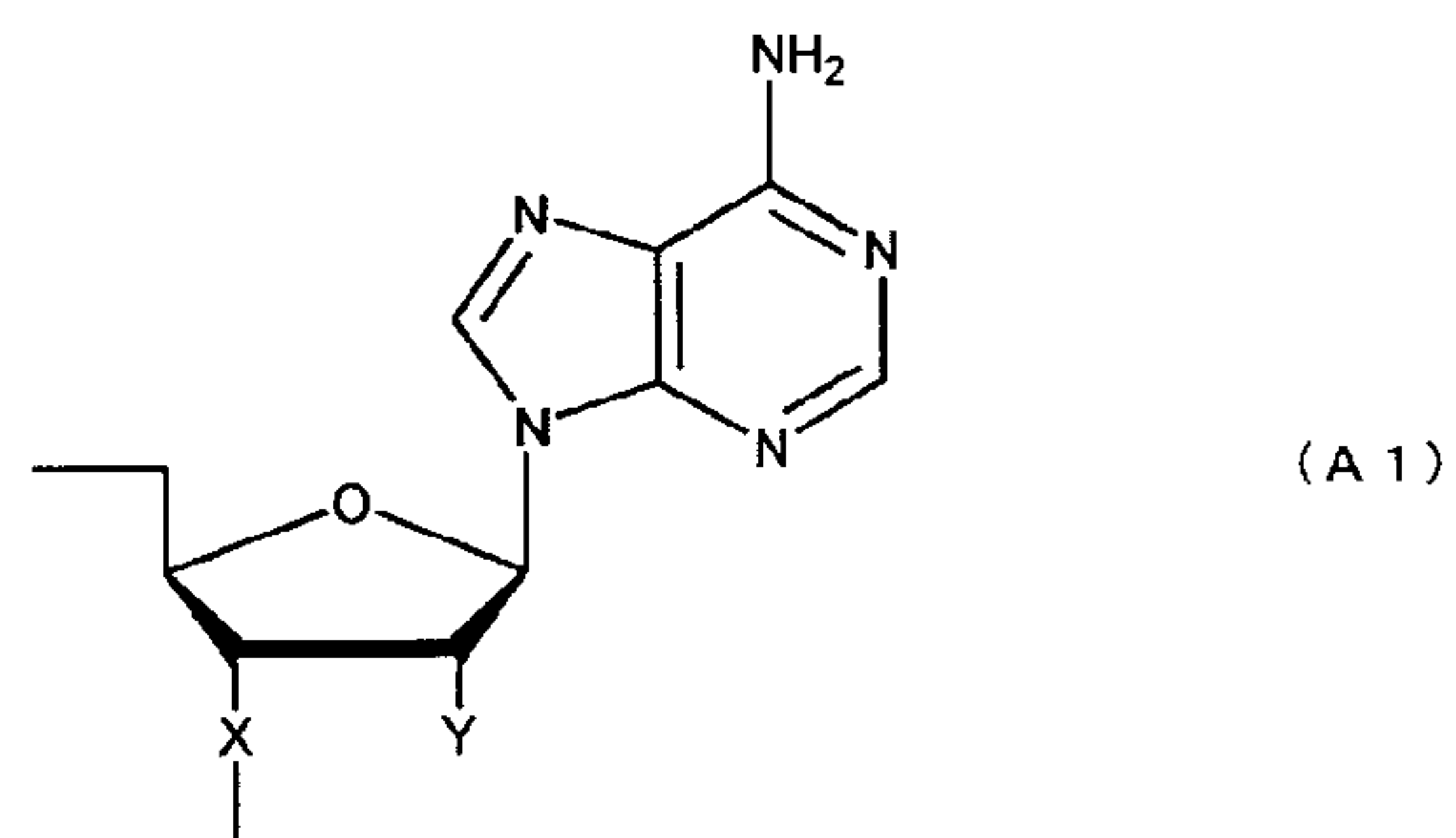
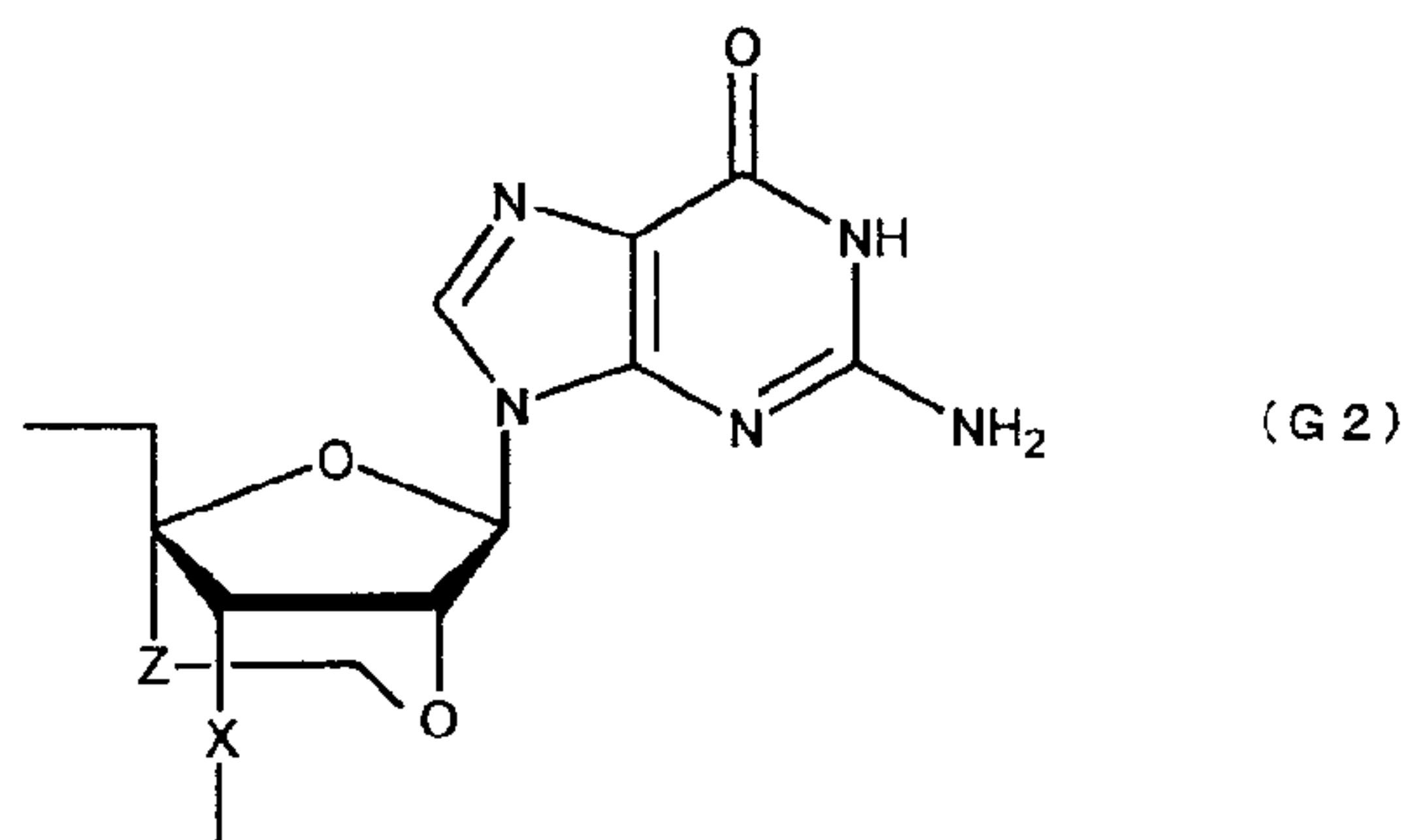
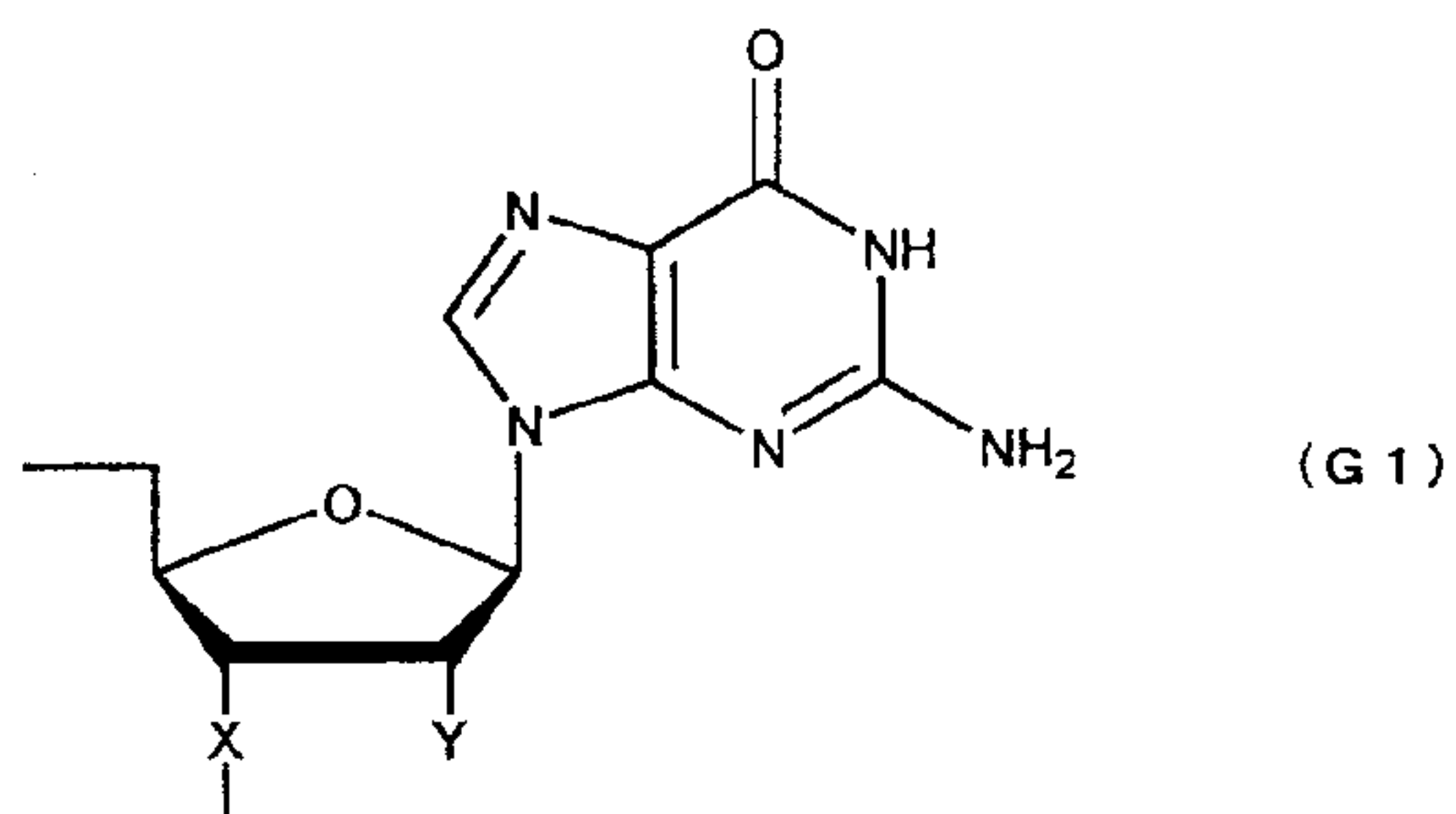
25 (8m'')HO-Bc-Ba-Bt-Bt-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-, or

(8n'')HO-Bc-Bc-Ba-Bt-Bt-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-

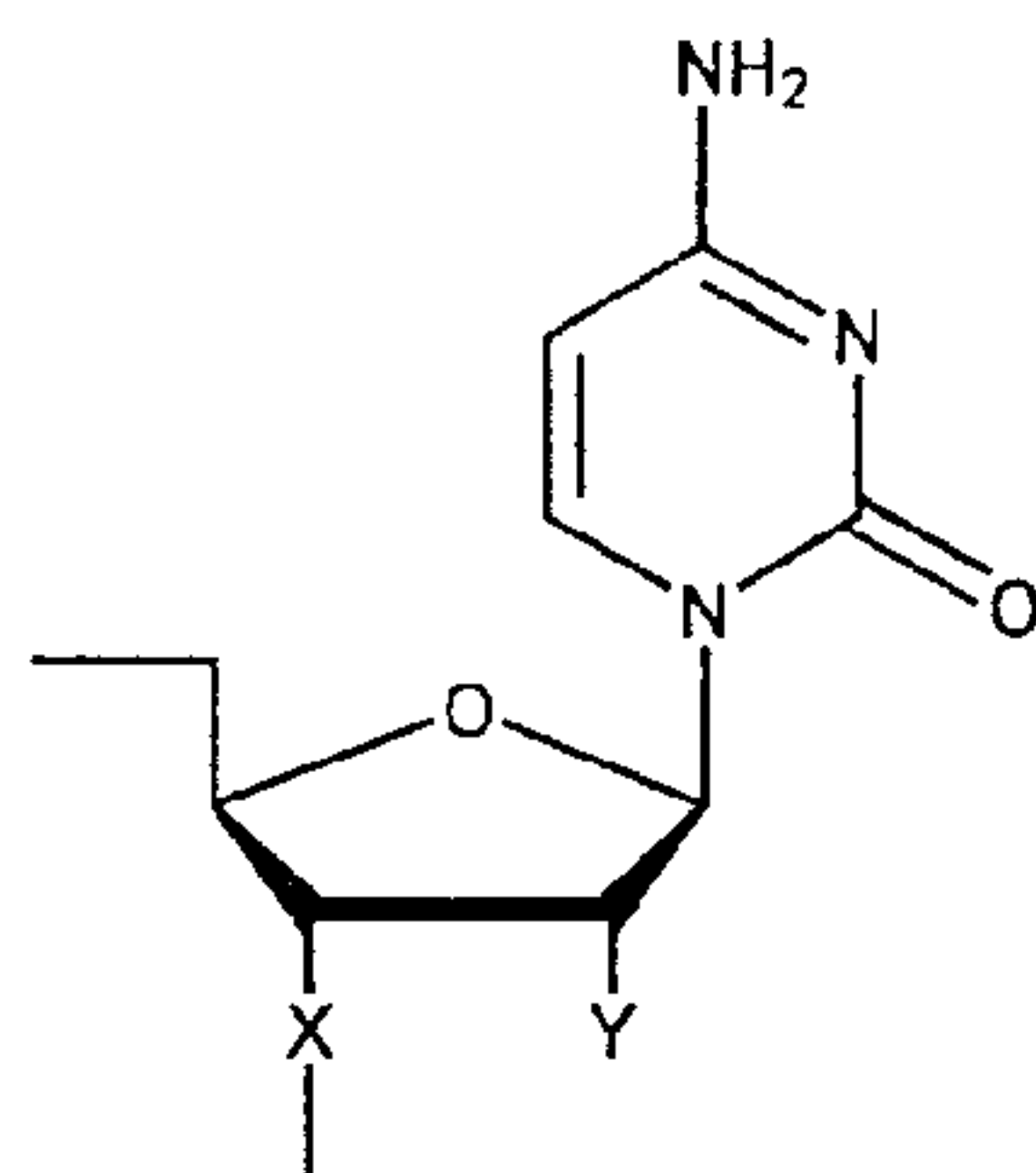
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula

30 (U1) or (T2):

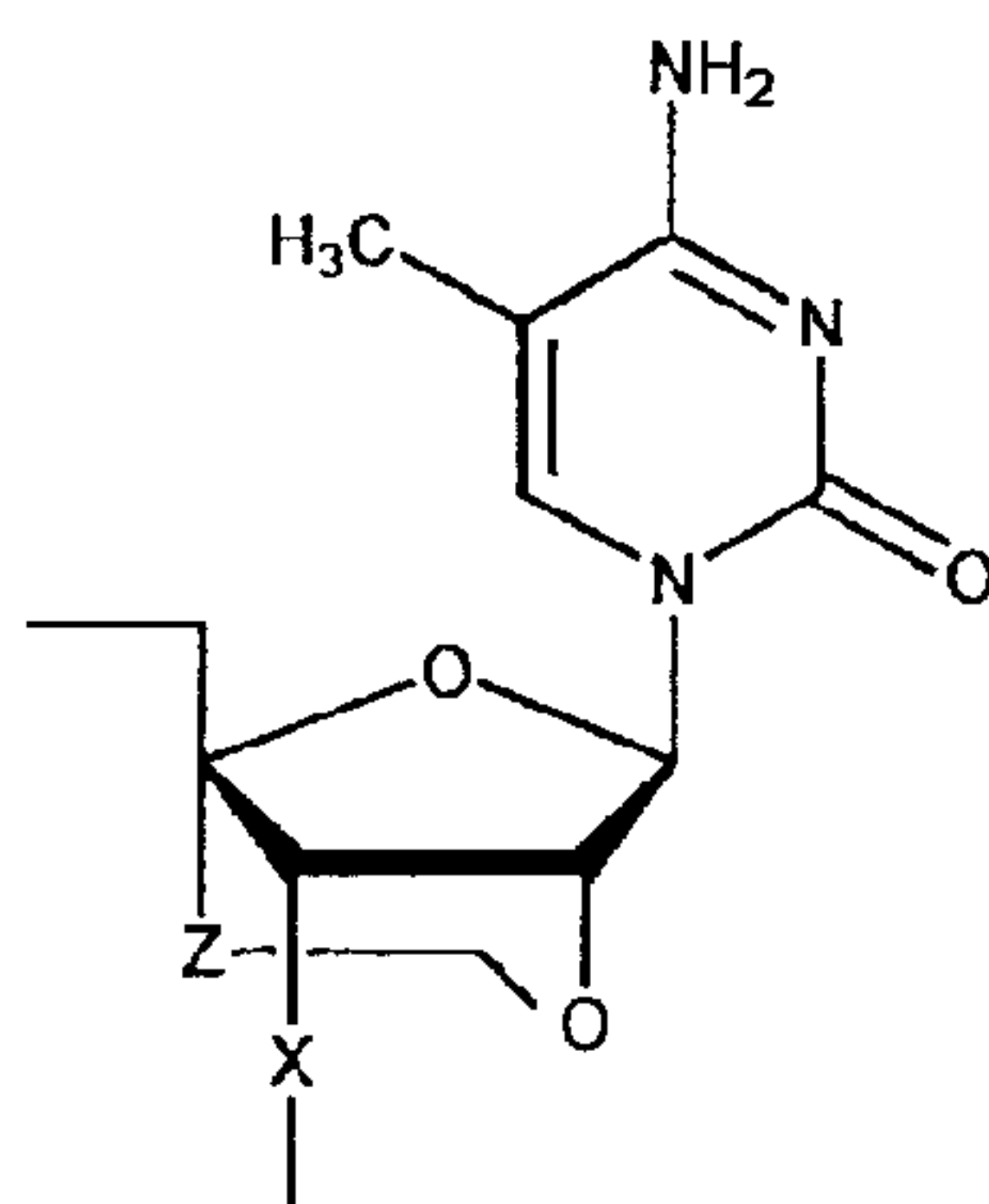
79861-7D



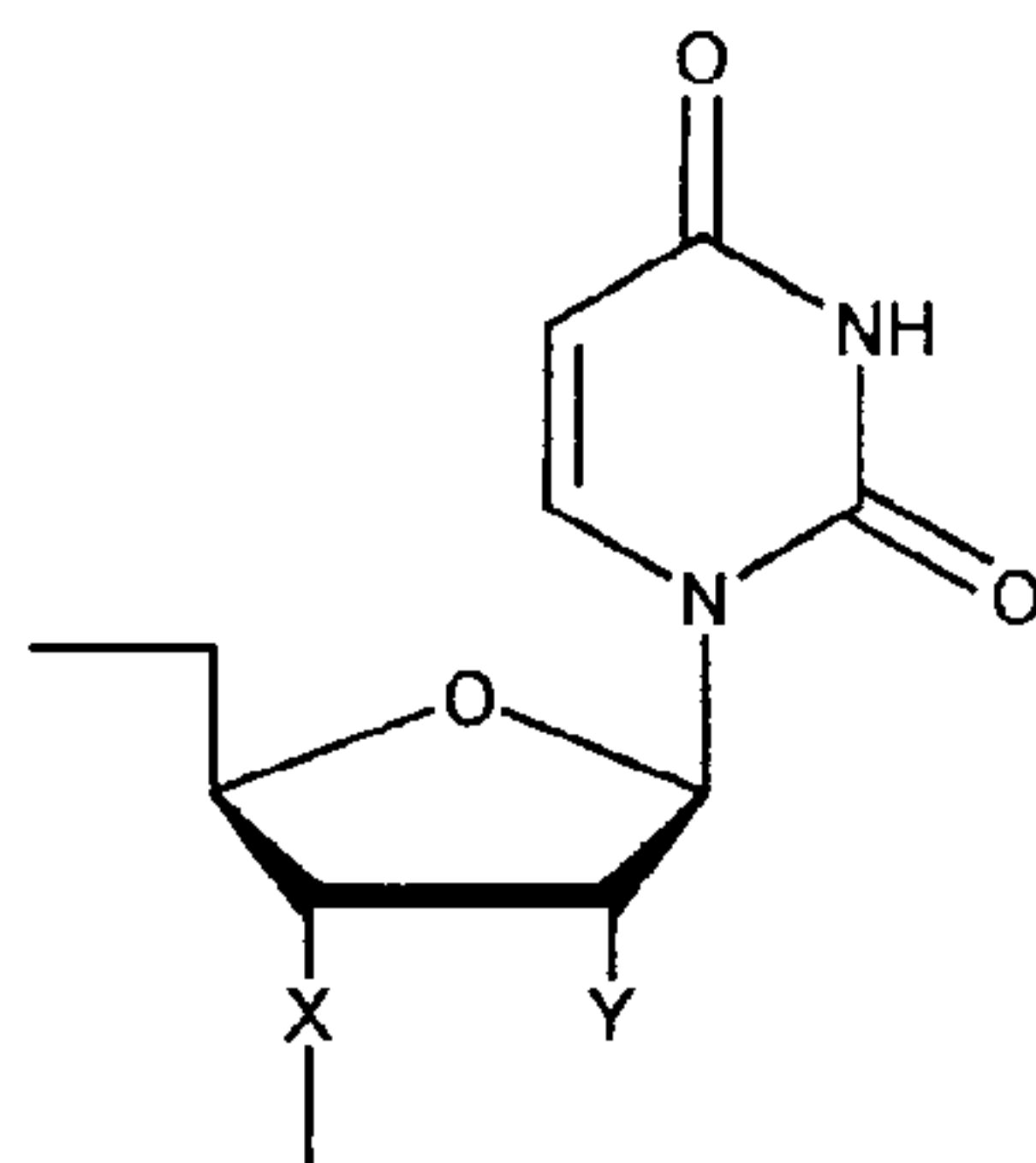
79861-7D



(C 1)

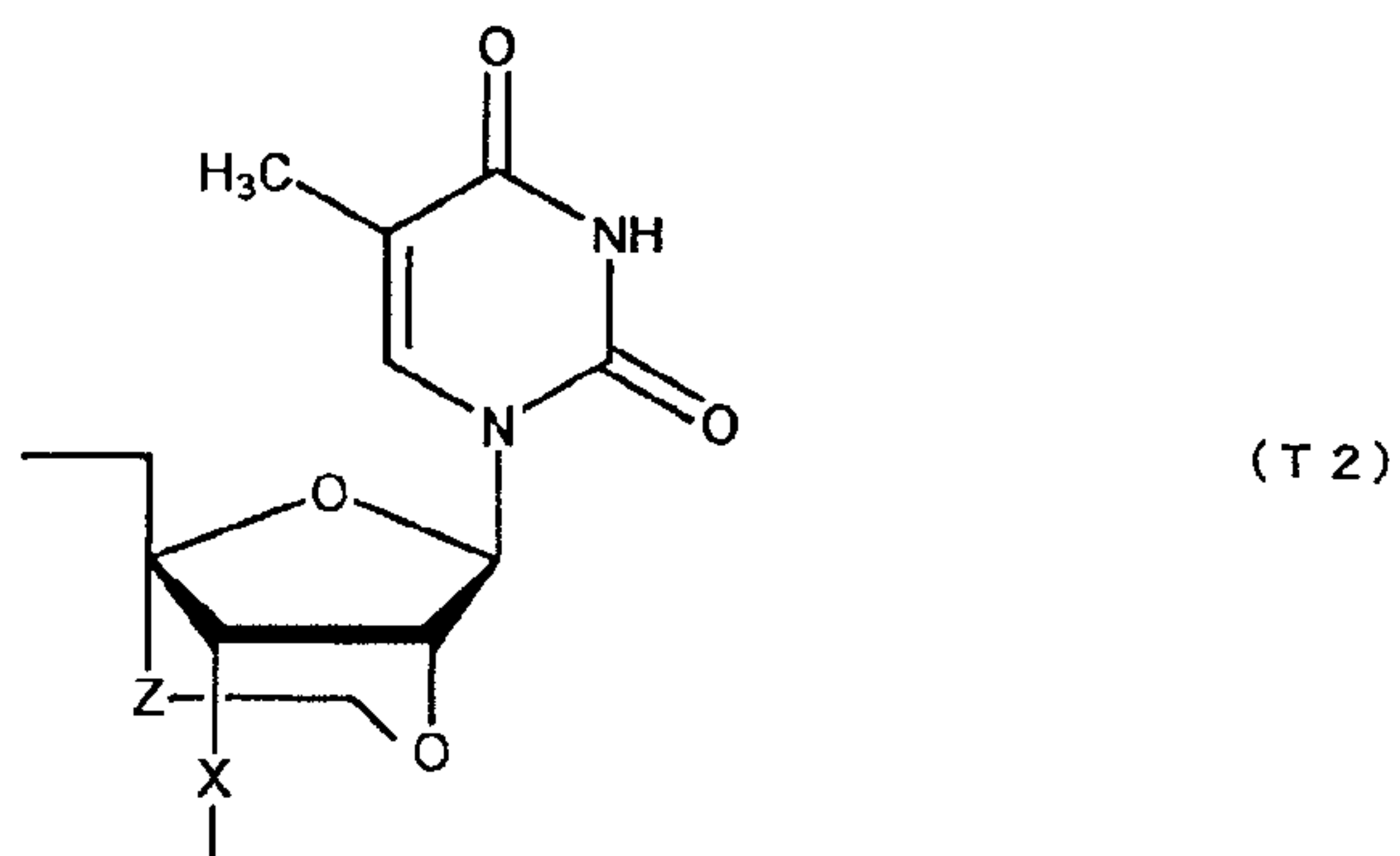


(C 2)

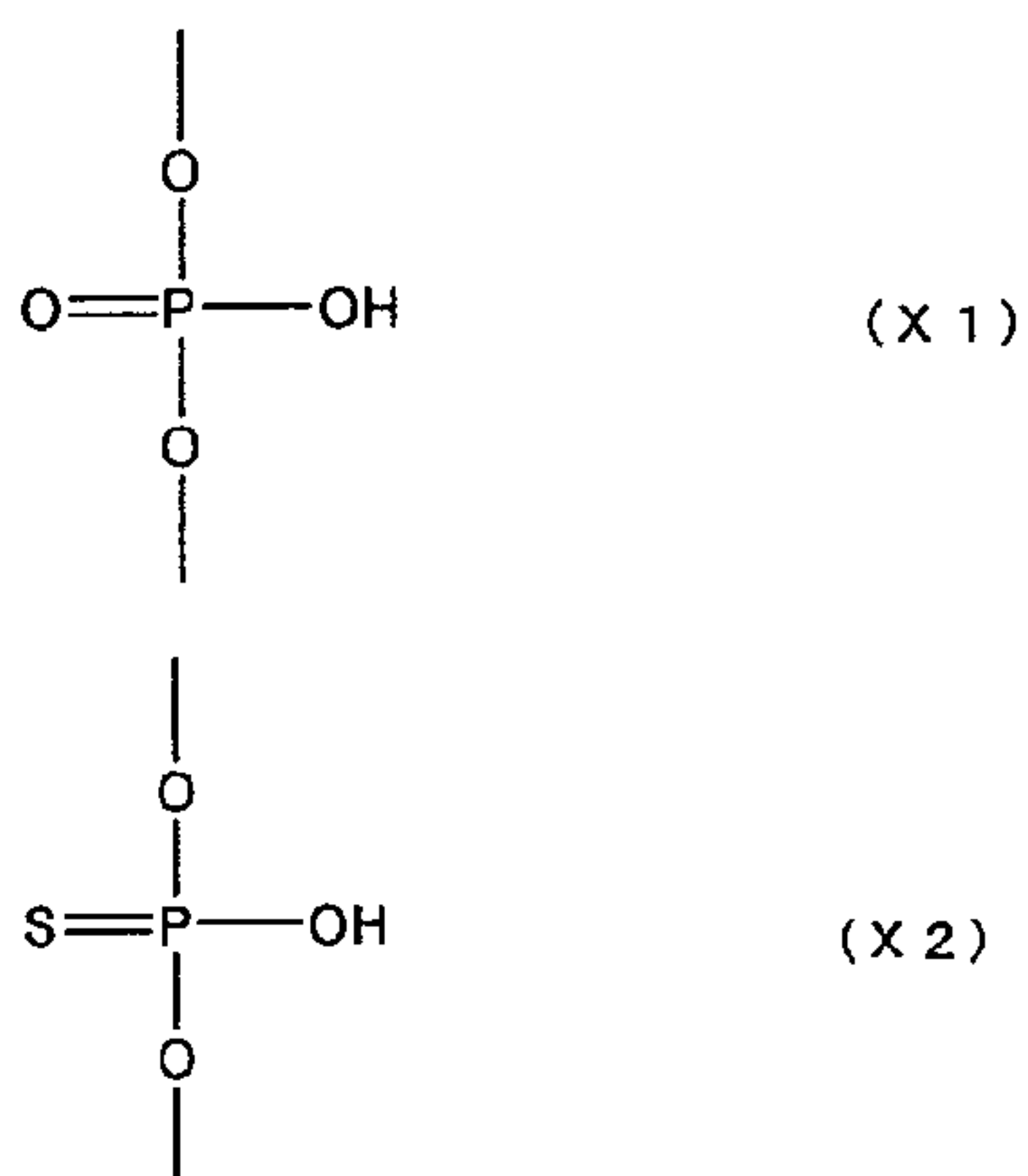


(U 1)

79861-7D



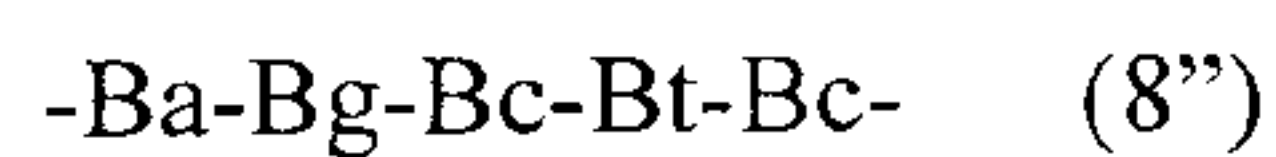
where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

10 $B_{M''8}$ is a group represented by the following formula (8''):

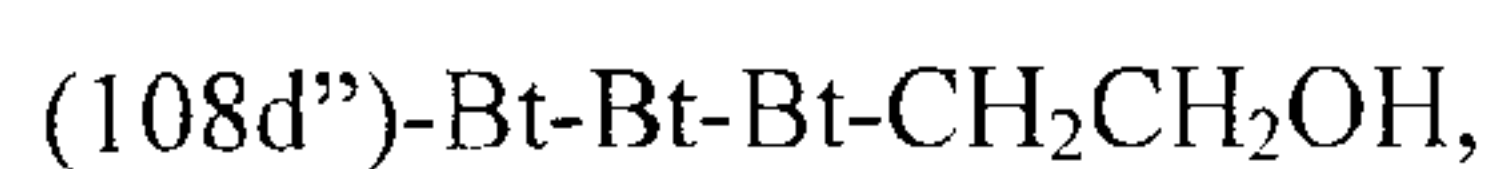
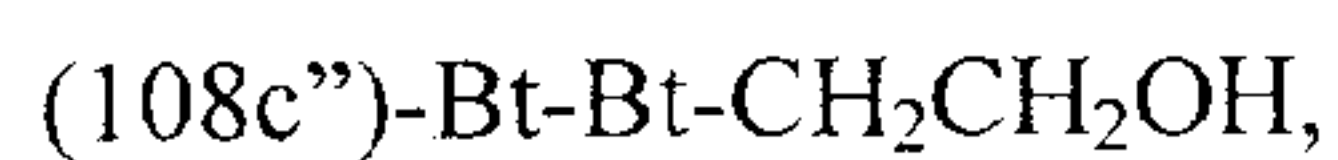


where Bg, Ba, Bt and Bc are as defined above;

$B_{B''8}$ is a group represented by any one of the following (108a'') to (108n''):



15 (108b'')-Bt-CH₂CH₂OH,



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- (108e'')-Bt-Bt-Bt-Bt-CH₂CH₂OH,
 (108f'')-Bt-Bt-Bt-Bt-Ba-CH₂CH₂OH,
 (108g'')-Bt-Bt-Bt-Bt-Ba-Bc-CH₂CH₂OH,
 (108h'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-CH₂CH₂OH,
 5 (108i'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-Bc-CH₂CH₂OH,
 (108j'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-Bc-Bc-CH₂CH₂OH,
 (108k'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-Bc-Bc-Bc-CH₂CH₂OH,
 (108l'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-Bc-Bc-Bc-Bt-CH₂CH₂OH,
 (108m'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-Bc-Bc-Bc-Bt-Bt-CH₂CH₂OH, or
 10 (108n'')-Bt-Bt-Bt-Bt-Ba-Bc-Bt-Bc-Bc-Bc-Bt-Bt-Bg-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (VIII'') has 2''-O,4''-C-alkylene group.

- [34] A compound represented by the following general formula (IX'') or a
 15 pharmacologically acceptable salt thereof:



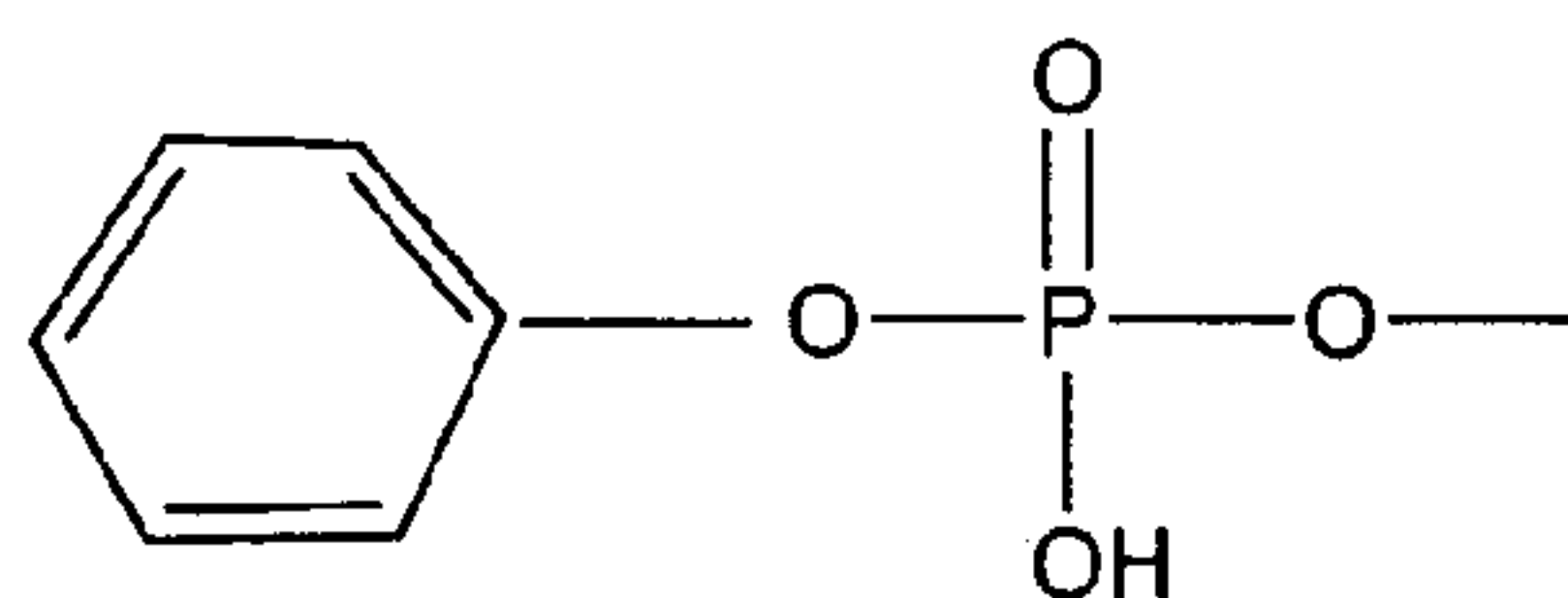
where B_{T''} is a group represented by any one of the following (9a'') to (9n''):

- (9a'')D-,
 (9b'')D-Bg-,
 20 (9c'')D-Ba-Bg-,
 (9d'')D-Bg-Ba-Bg-,
 (9e'')D-Ba-Bg-Ba-Bg-,
 (9f'')D-Bc-Ba-Bg-Ba-Bg-,
 (9g'')D-Bc-Bc-Ba-Bg-Ba-Bg-,
 25 (9h'')D-Ba-Bc-Bc-Ba-Bg-Ba-Bg-,
 (9i'')D-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-,
 (9j'')D-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-,
 (9k'')D-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-,
 (9l'')D-Bt-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-,
 30 (9m'')D-Bg-Bt-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-, or
 (9n'')D-Bt-Bg-Bt-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-

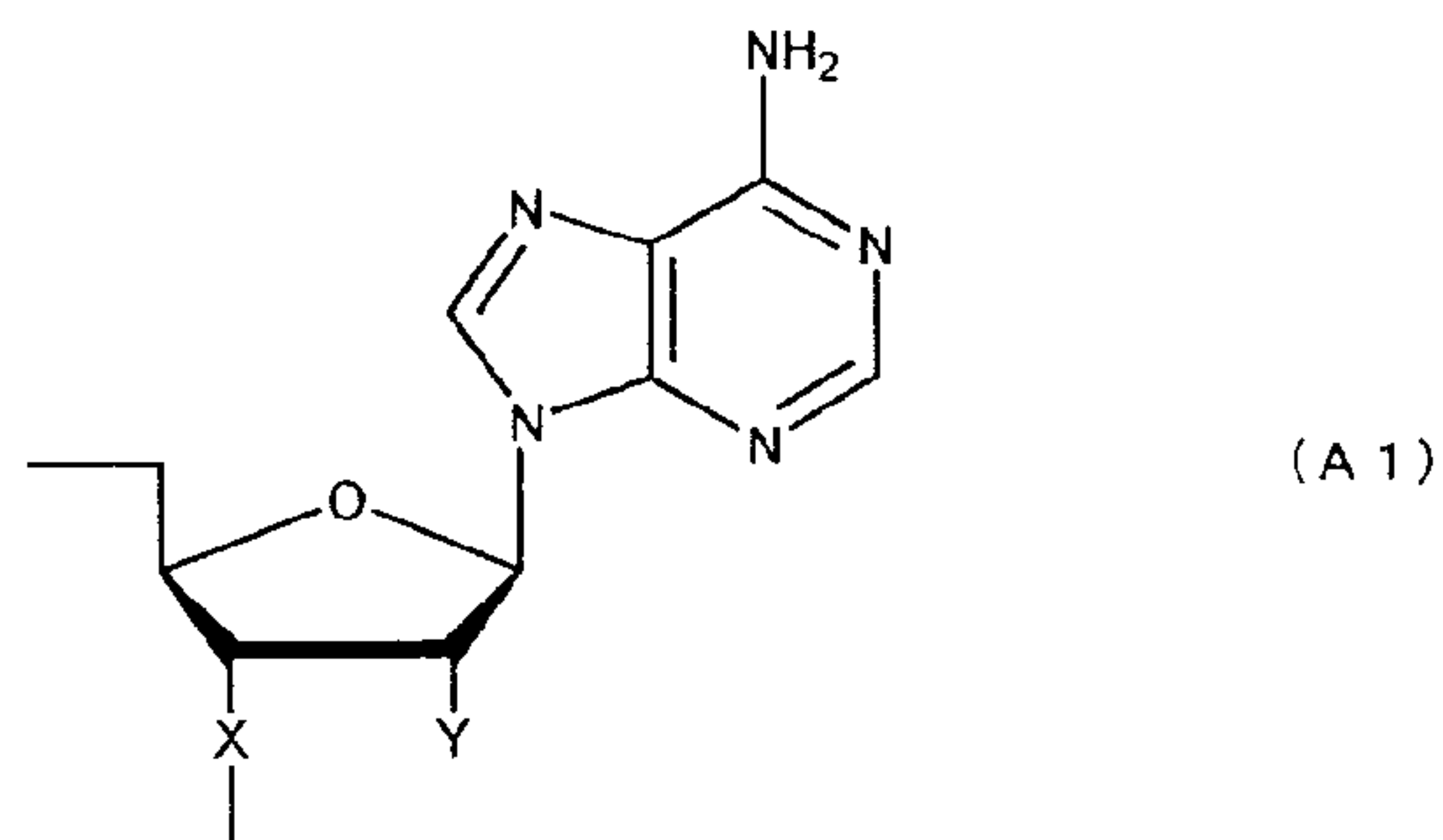
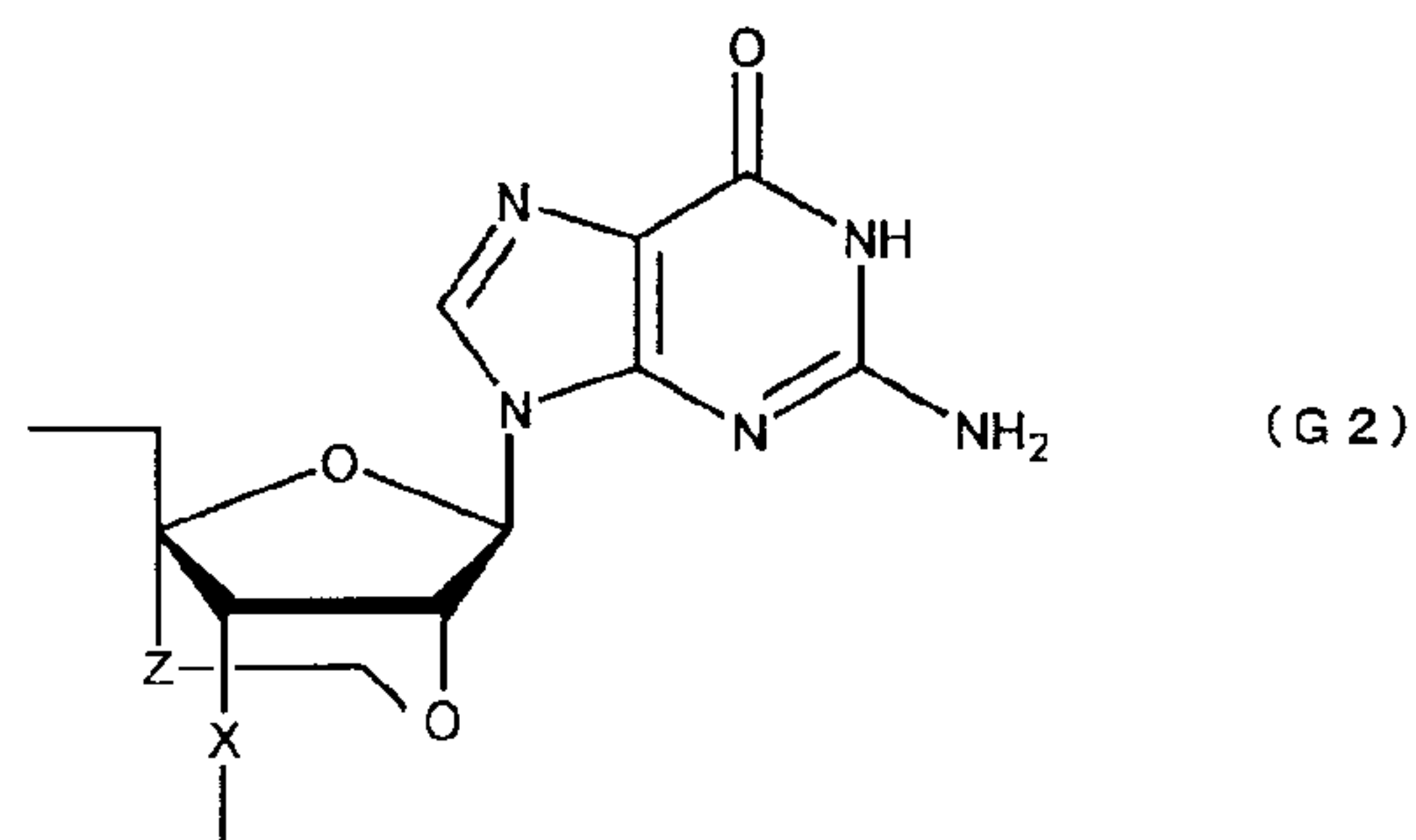
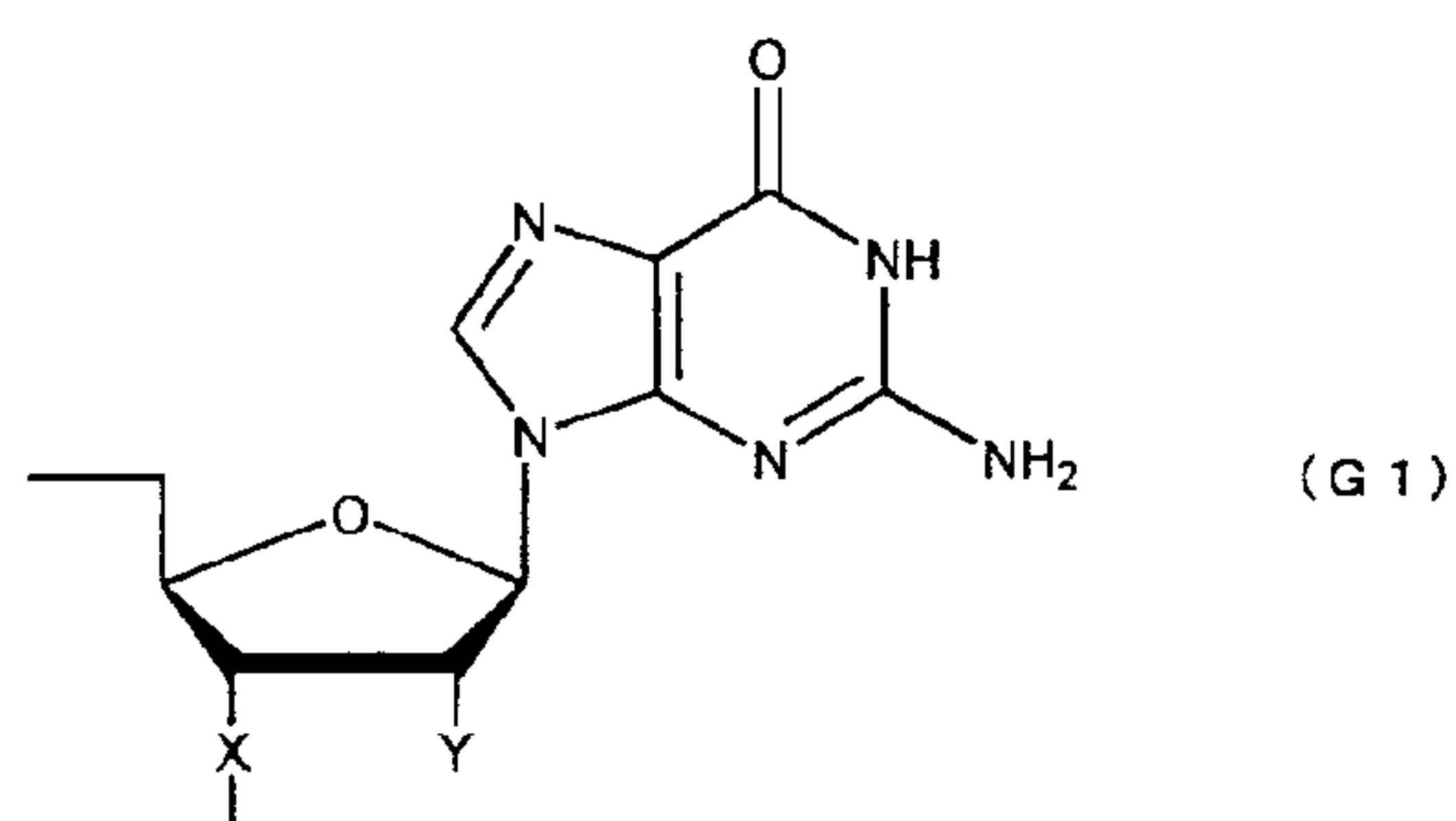
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group

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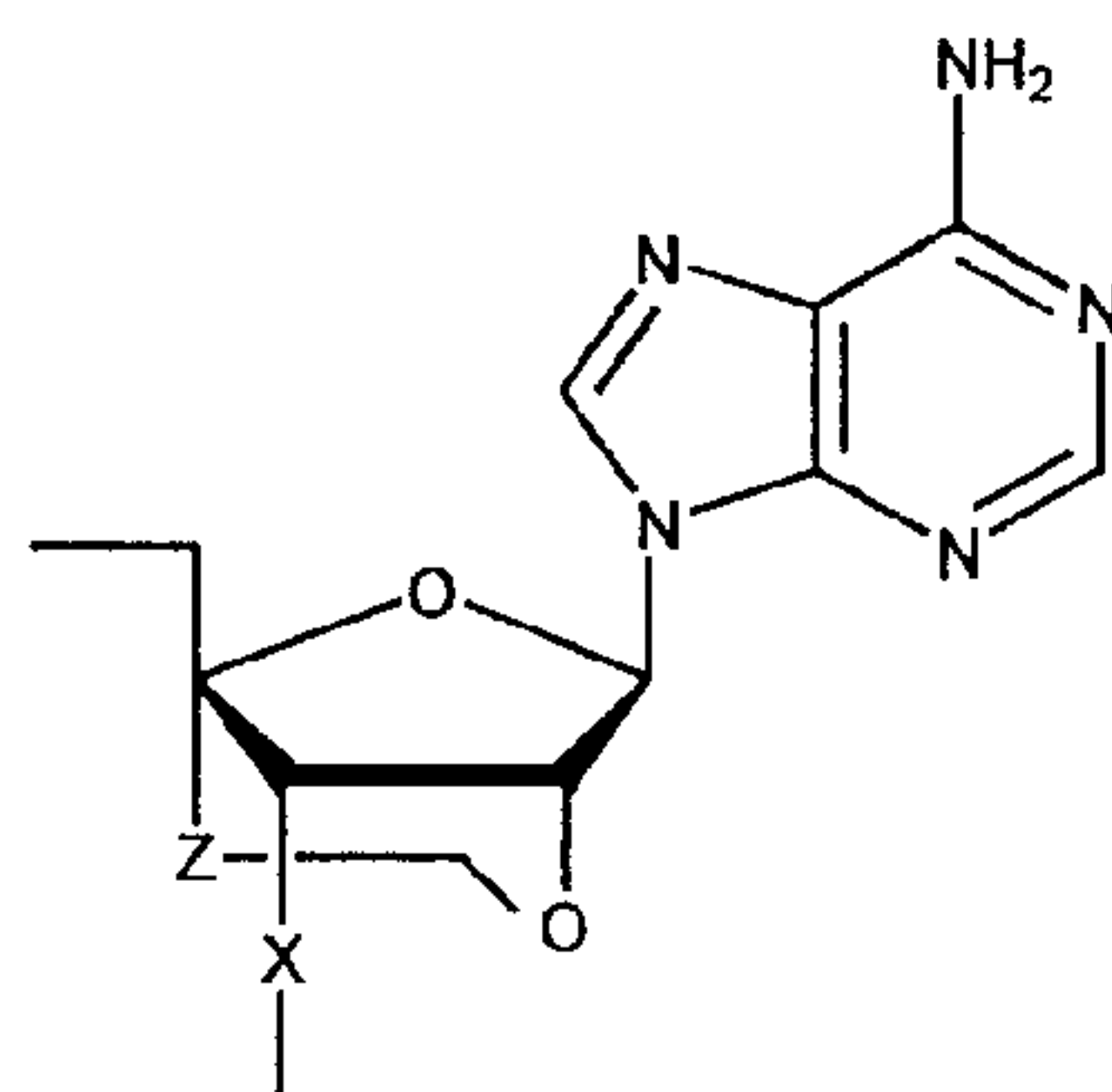
represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); Bt is a group represented by the following formula (U1) or (T2); and D is HO- or Ph- wherein Ph- is a group represented by the following first formula:



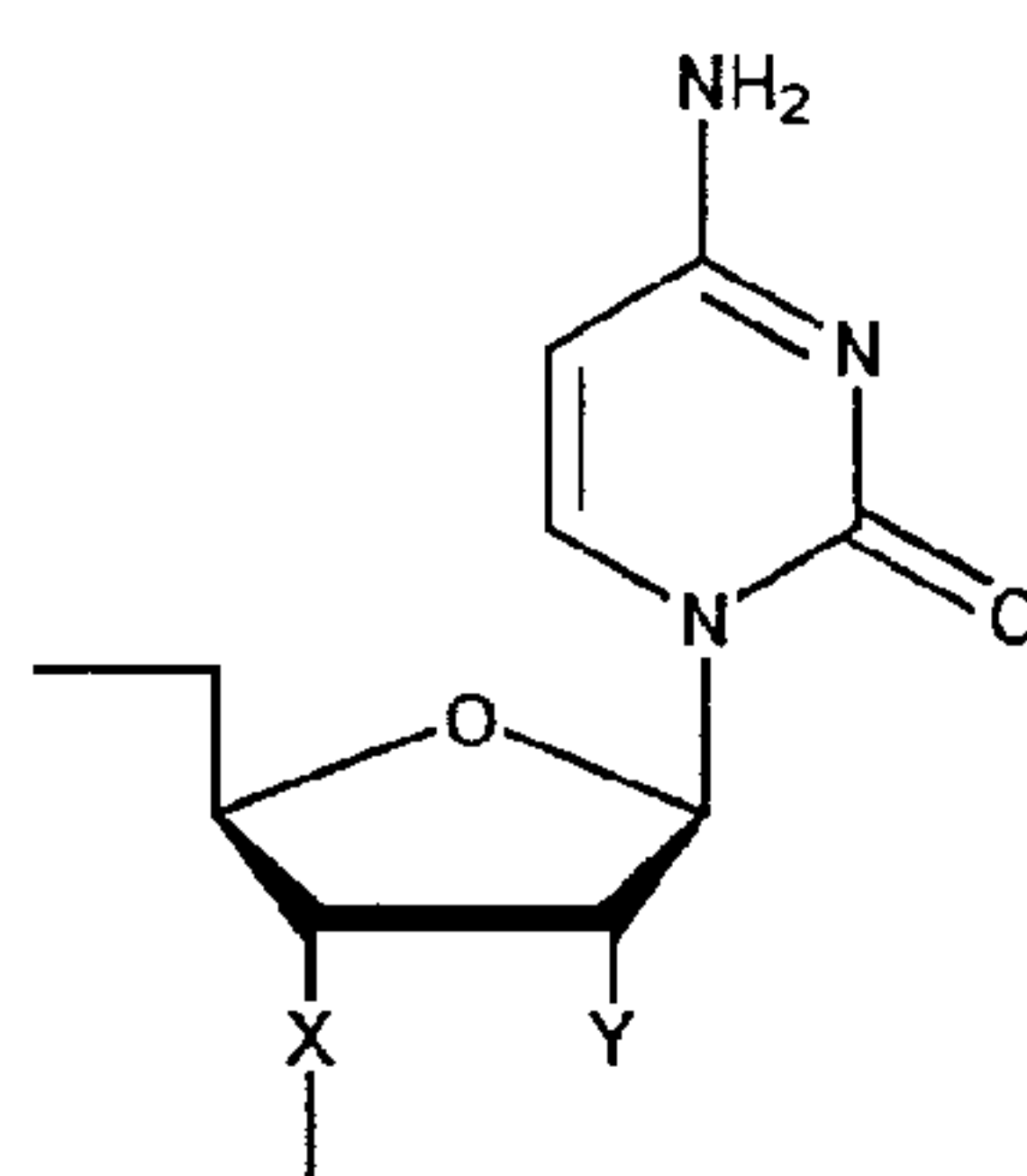
5



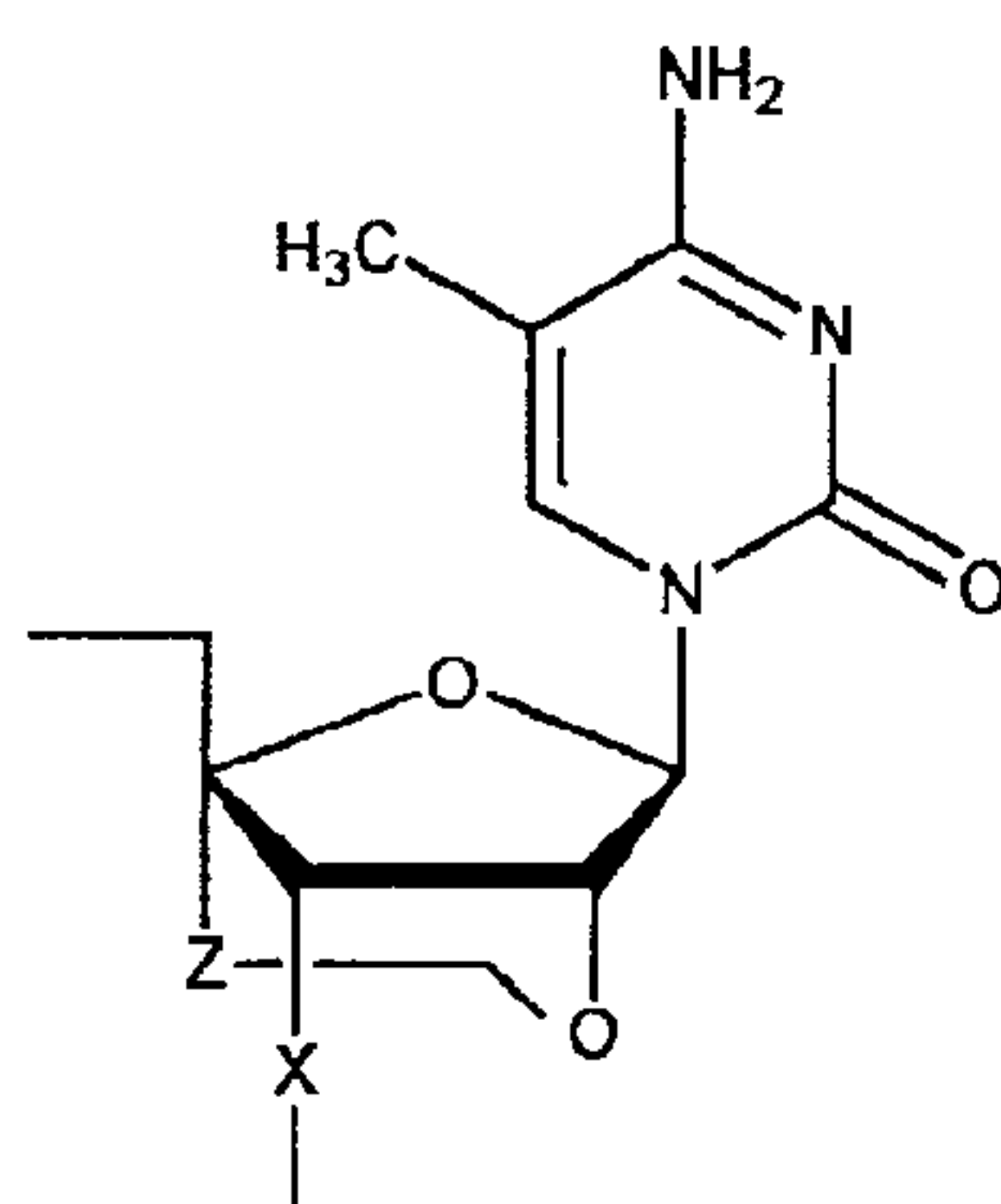
79861-7D



(A 2)

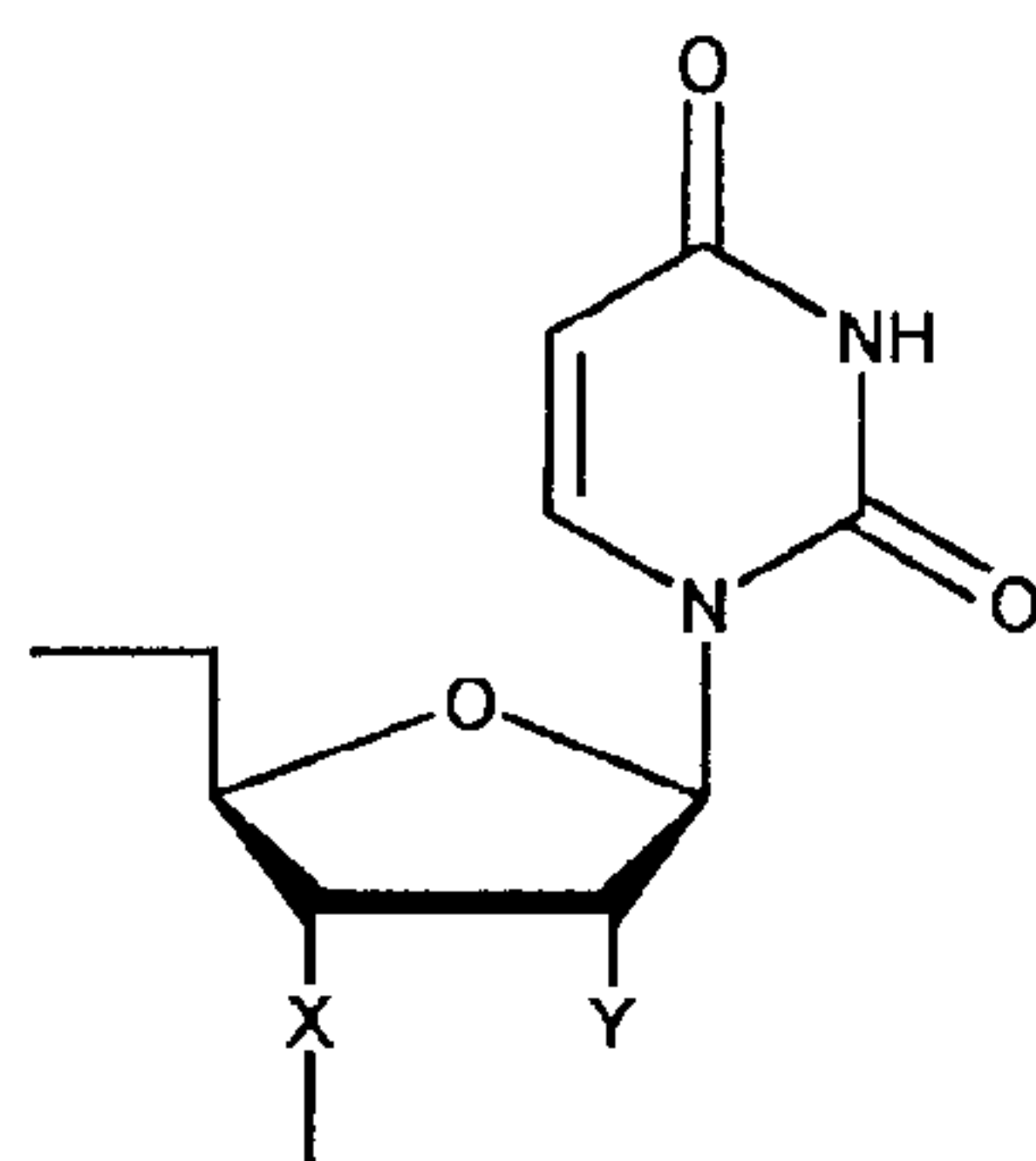


(C 1)

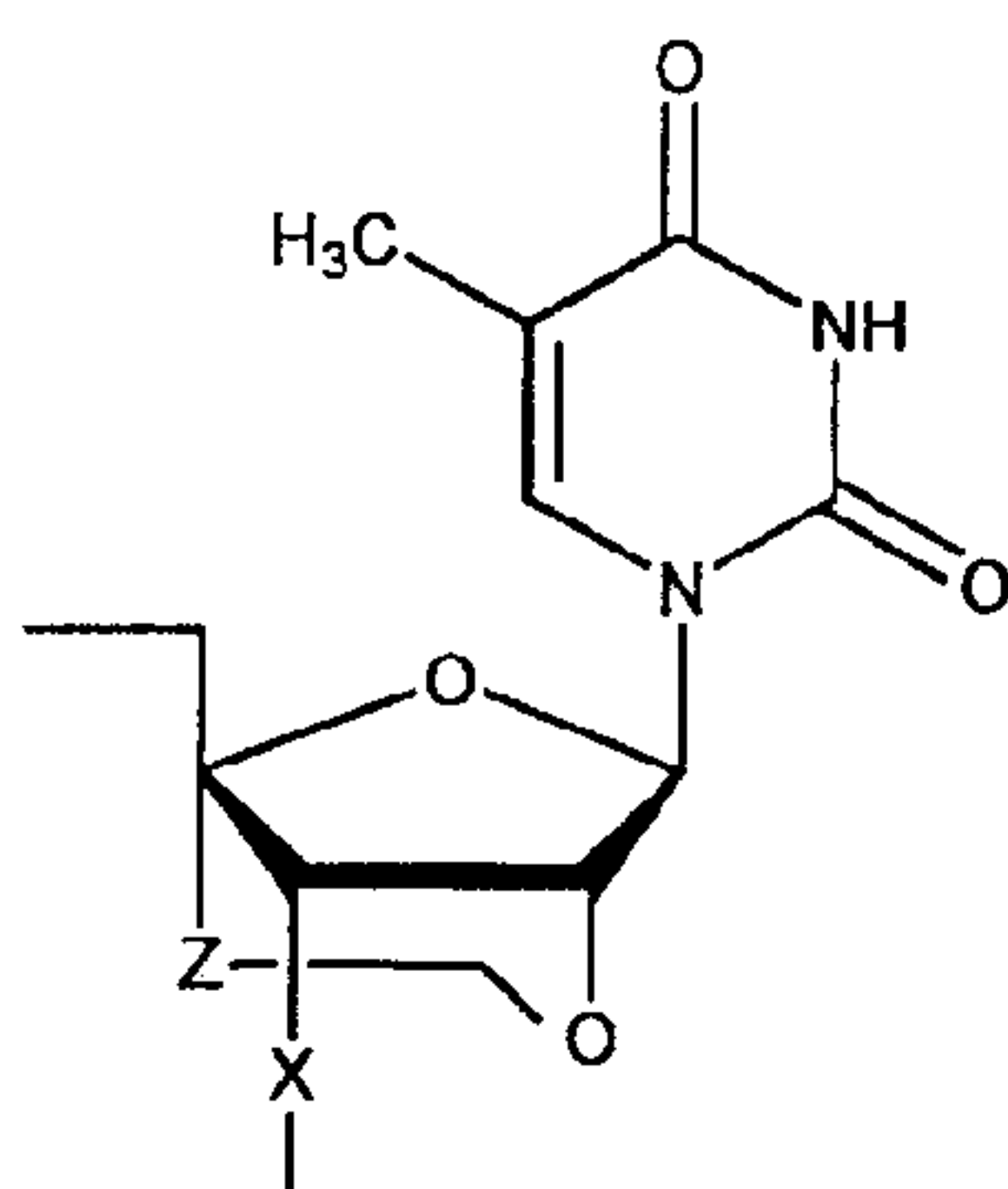


(C 2)

79861-7D

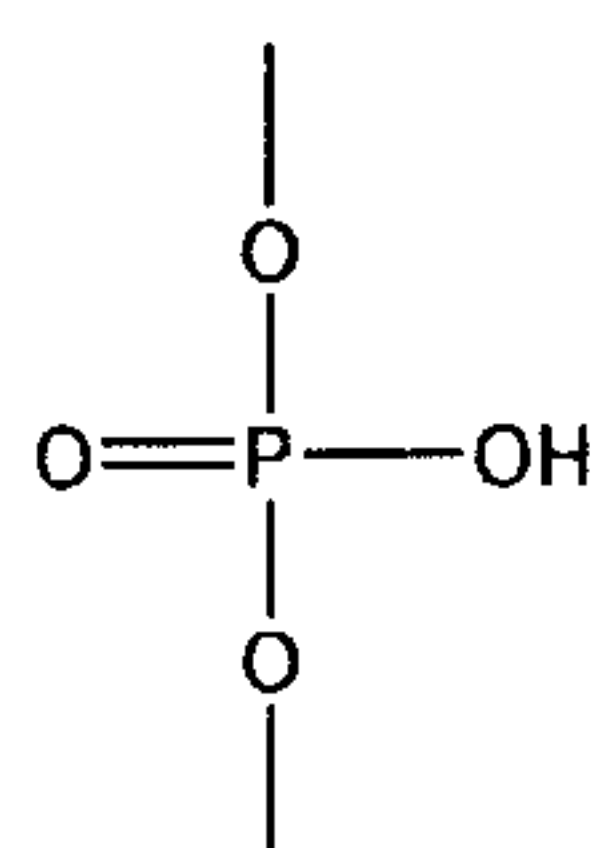


(U 1)

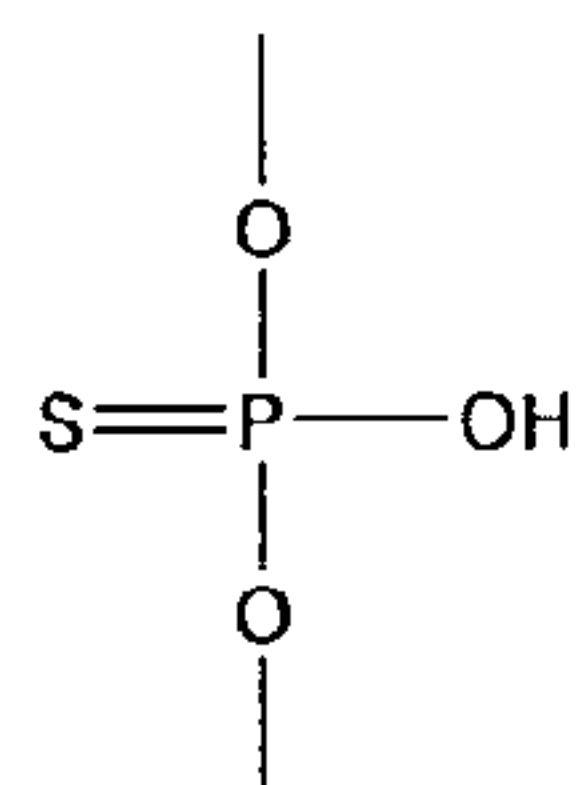


(T 2)

where X is individually and independently a group represented by the following formula (X1) or (X2):



(X 1)



(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

10 B_M'₉ is a group represented by the following formula (9''):

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-Bt-Ba-Ba-Bc-Ba-Bg-Bt- (9'')

where Bg, Ba, Bt and Bc are as defined above;

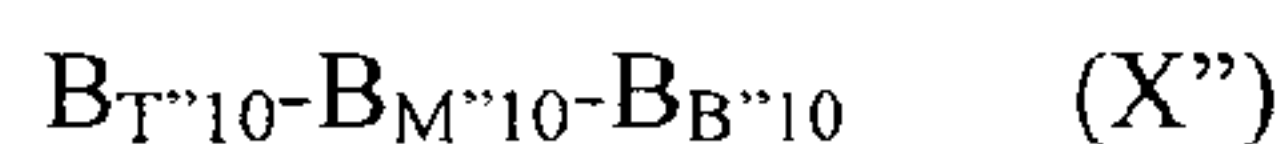
B_{B''9} is a group represented by any one of the following (109a'') to (109l''):

- (109a'')-CH₂CH₂OH,
- 5 (109b'')-Bc-CH₂CH₂OH,
- (109c'')-Bc-Bt-CH₂CH₂OH,
- (109d'')-Bc-Bt-Bg-CH₂CH₂OH,
- (109e'')-Bc-Bt-Bg-Ba-CH₂CH₂OH,
- (109f'')-Bc-Bt-Bg-Ba-Bg-CH₂CH₂OH,
- 10 (109g'')-Bc-Bt-Bg-Ba-Bg-Bt-CH₂CH₂OH,
- (109h'')-Bc-Bt-Bg-Ba-Bg-Bt-Ba-CH₂CH₂OH,
- (109i'')-Bc-Bt-Bg-Ba-Bg-Bt-Ba-Bg-CH₂CH₂OH,
- (109j'')-Bc-Bt-Bg-Ba-Bg-Bt-Ba-Bg-Bg-CH₂CH₂OH,
- (109k'')-Bc-Bt-Bg-Ba-Bg-Bt-Ba-Bg-Bg-Ba-CH₂CH₂OH, or
- 15 (109l'')-Bc-Bt-Bg-Ba-Bg-Bt-Ba-Bg-Bg-Ba-Bg-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (IX'') has 2''-O,4''-C-alkylene group.

- [35] A compound represented by the following general formula (X'') or a
- 20 pharmacologically acceptable salt thereof:

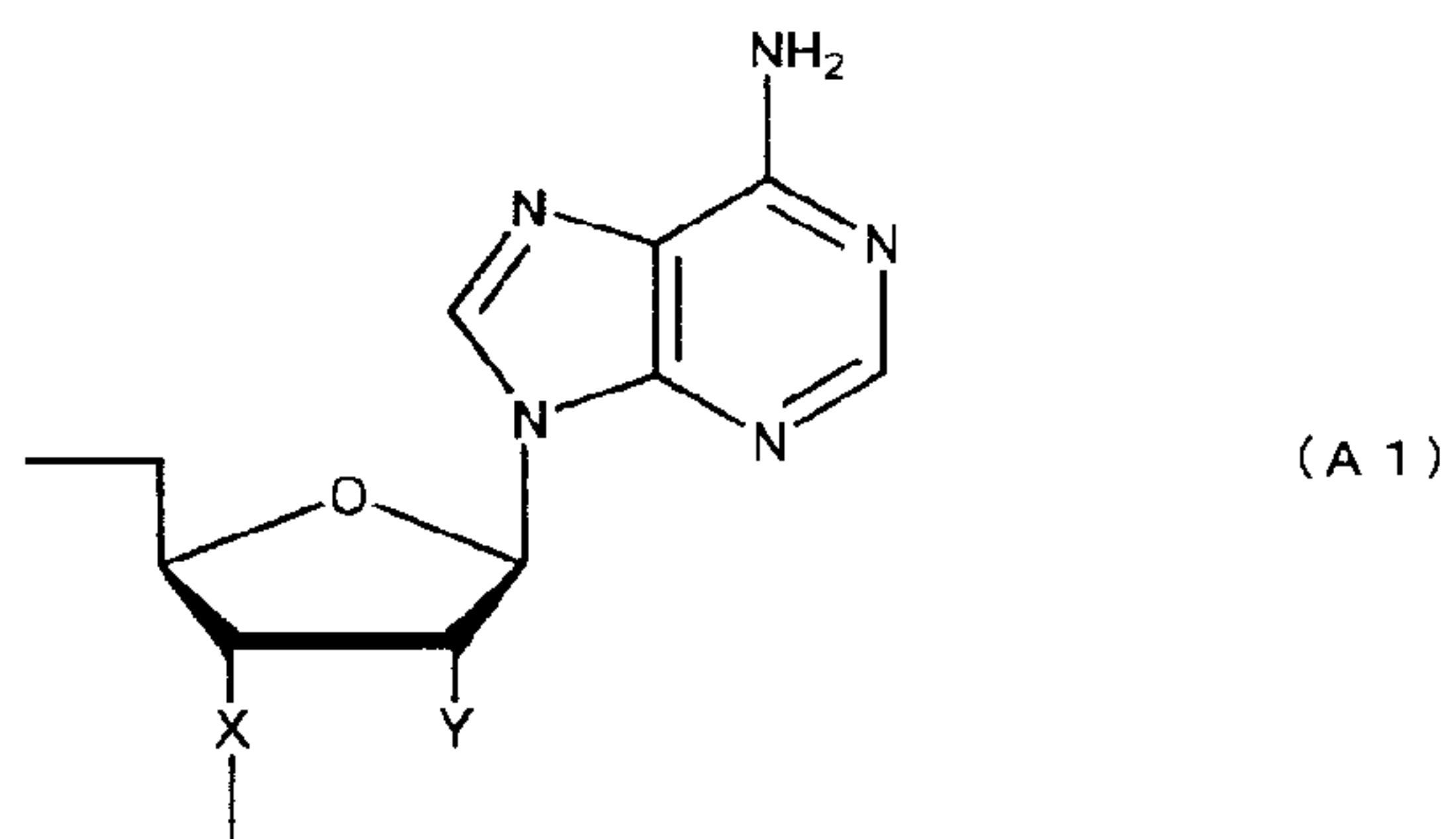
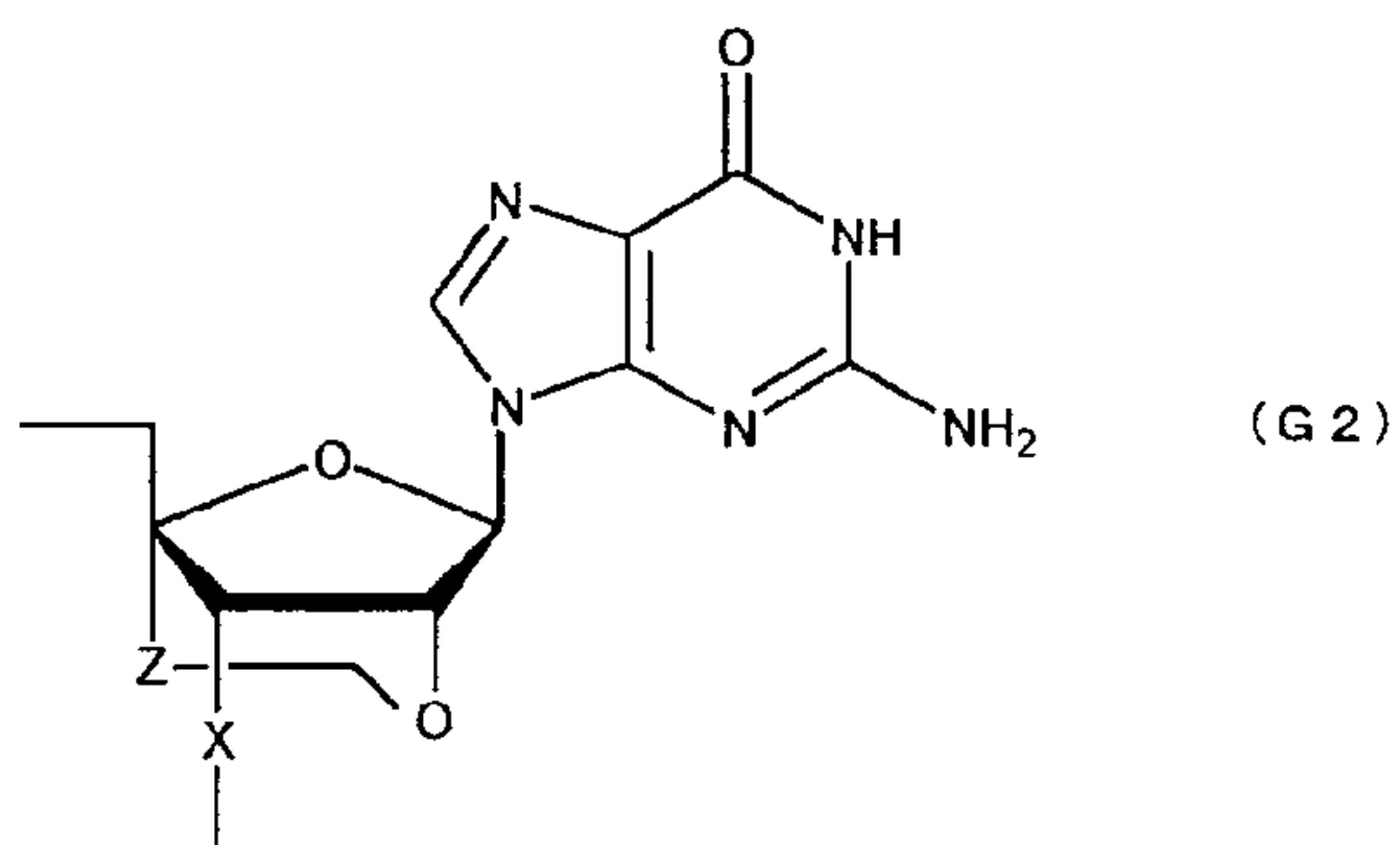
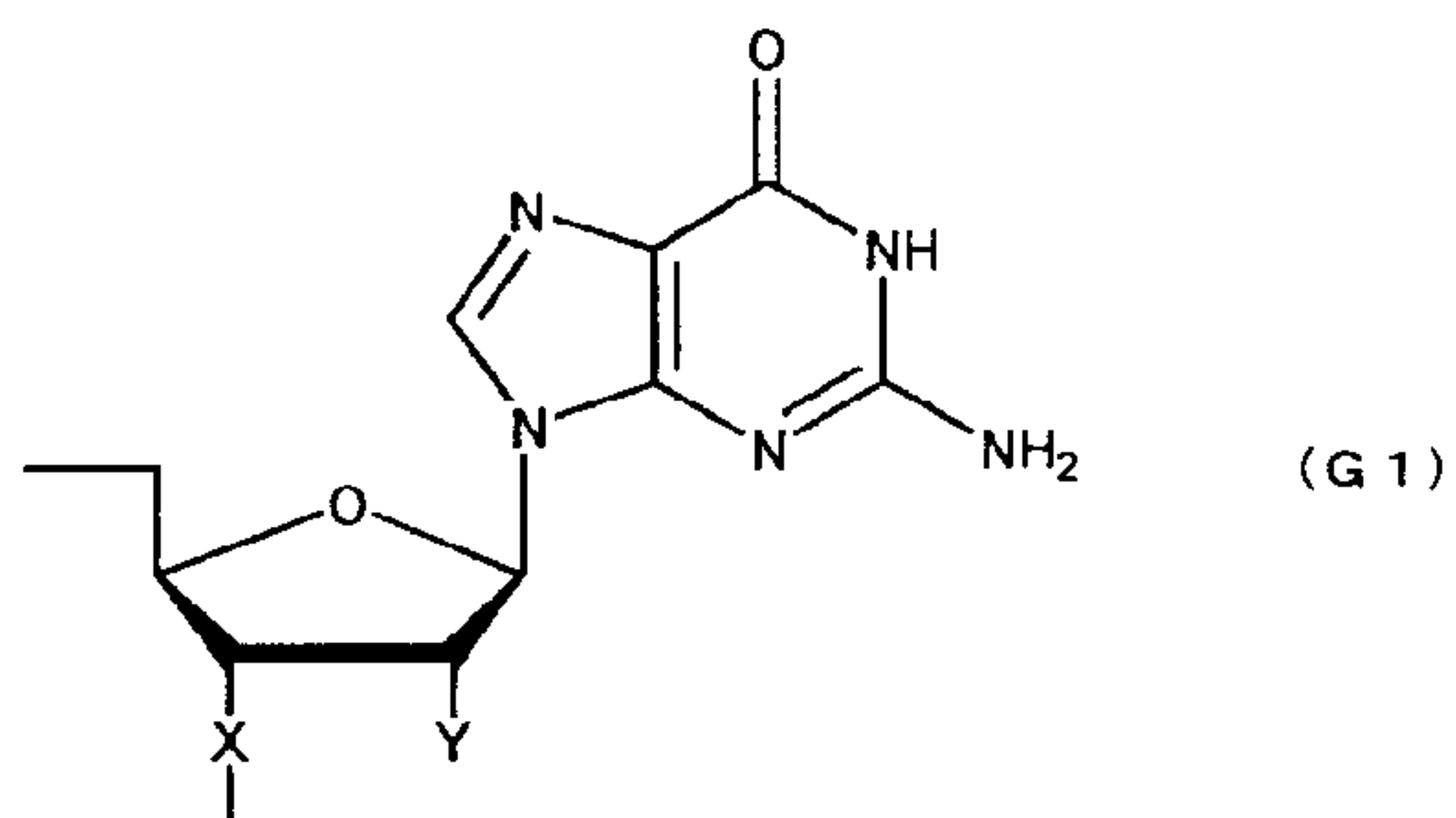
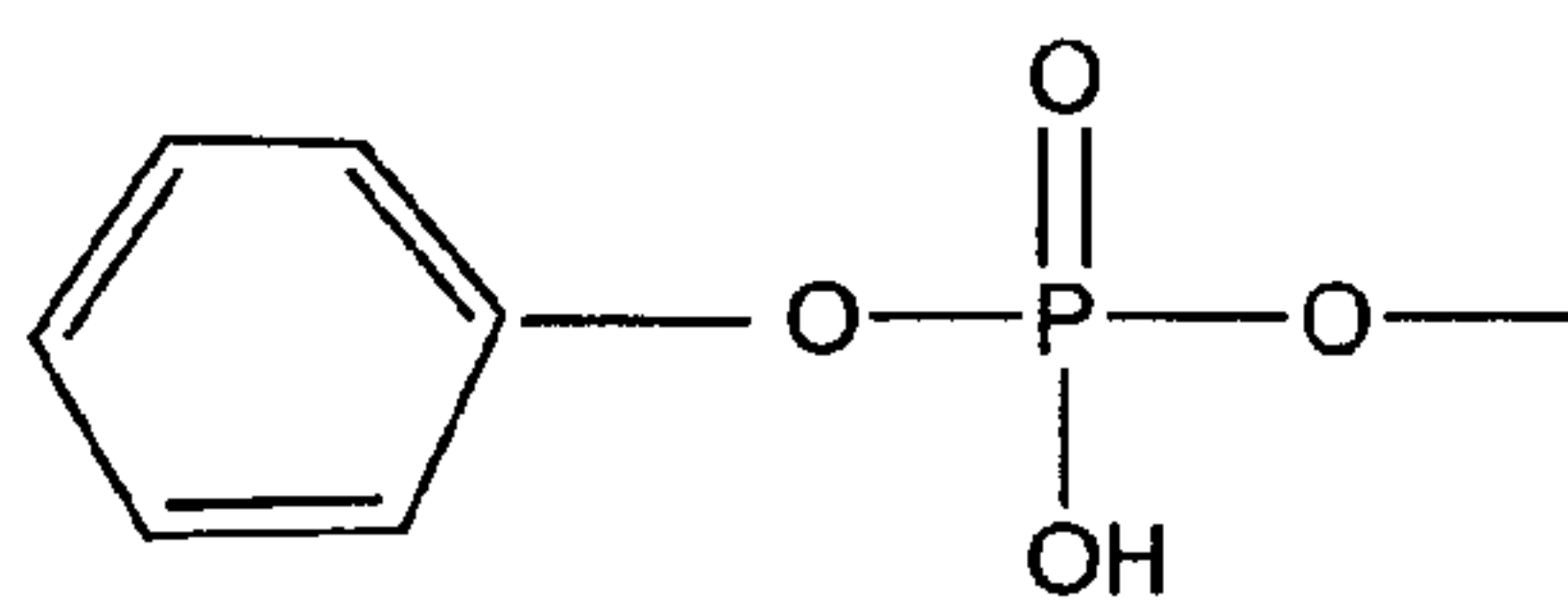


where B_{T''10} is a group represented by any one of the following (10a'') to (10e''):

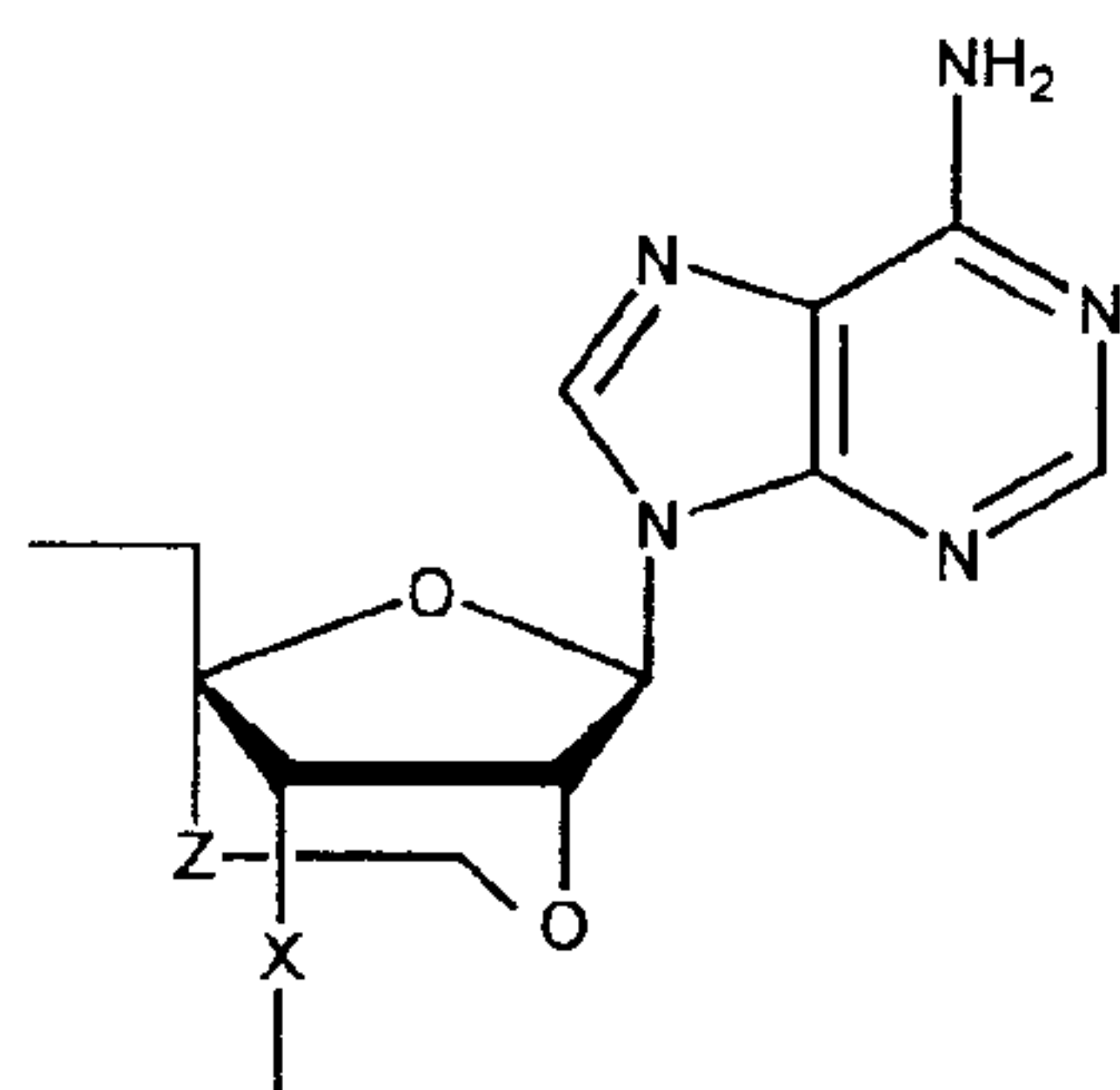
- (10a'')D-,
- (10b'')D-Bt-,
- 25 (10c'')D-Bg-Bt-,
- (10d'')D-Bg-Bg-Bt-, or
- (10e'')D-Ba-Bg-Bg-Bt-

- where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the
- 30 following formula (C1) or (C2); Bt is a group represented by the following formula (U1) or (T2); and D is HO- or Ph- wherein Ph- is a group represented by the following first formula:

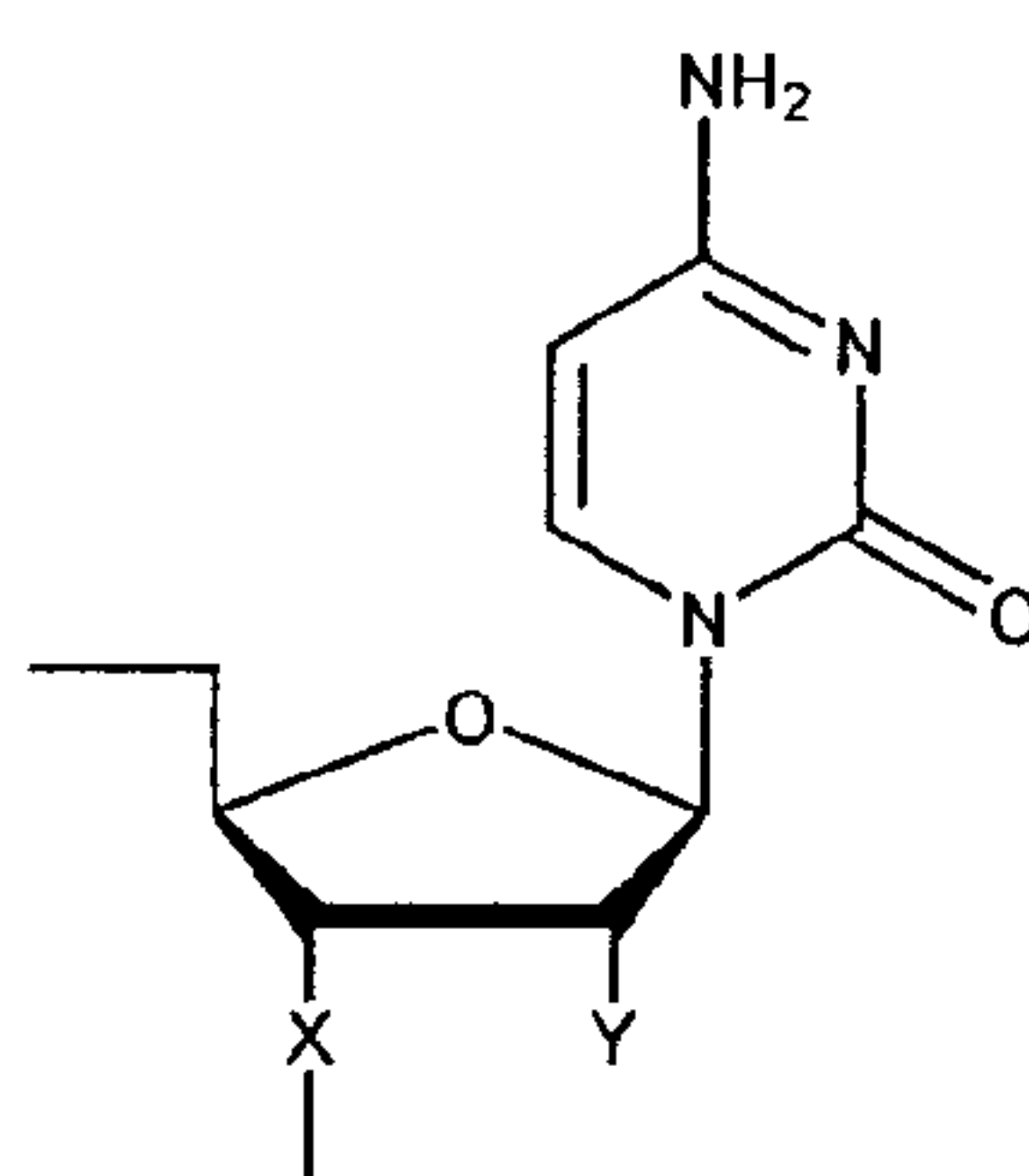
79861-7D



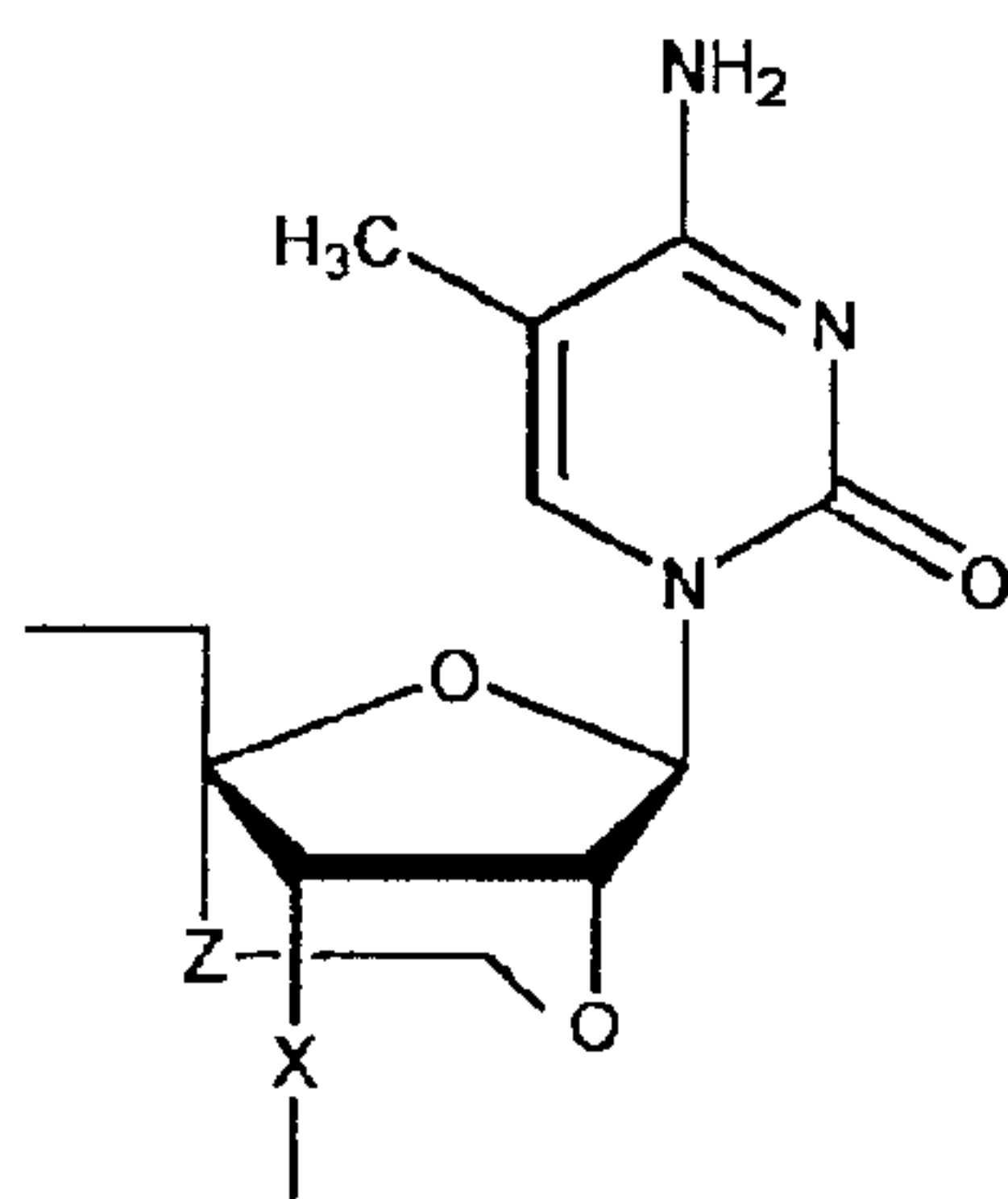
79861-7D



(A 2)

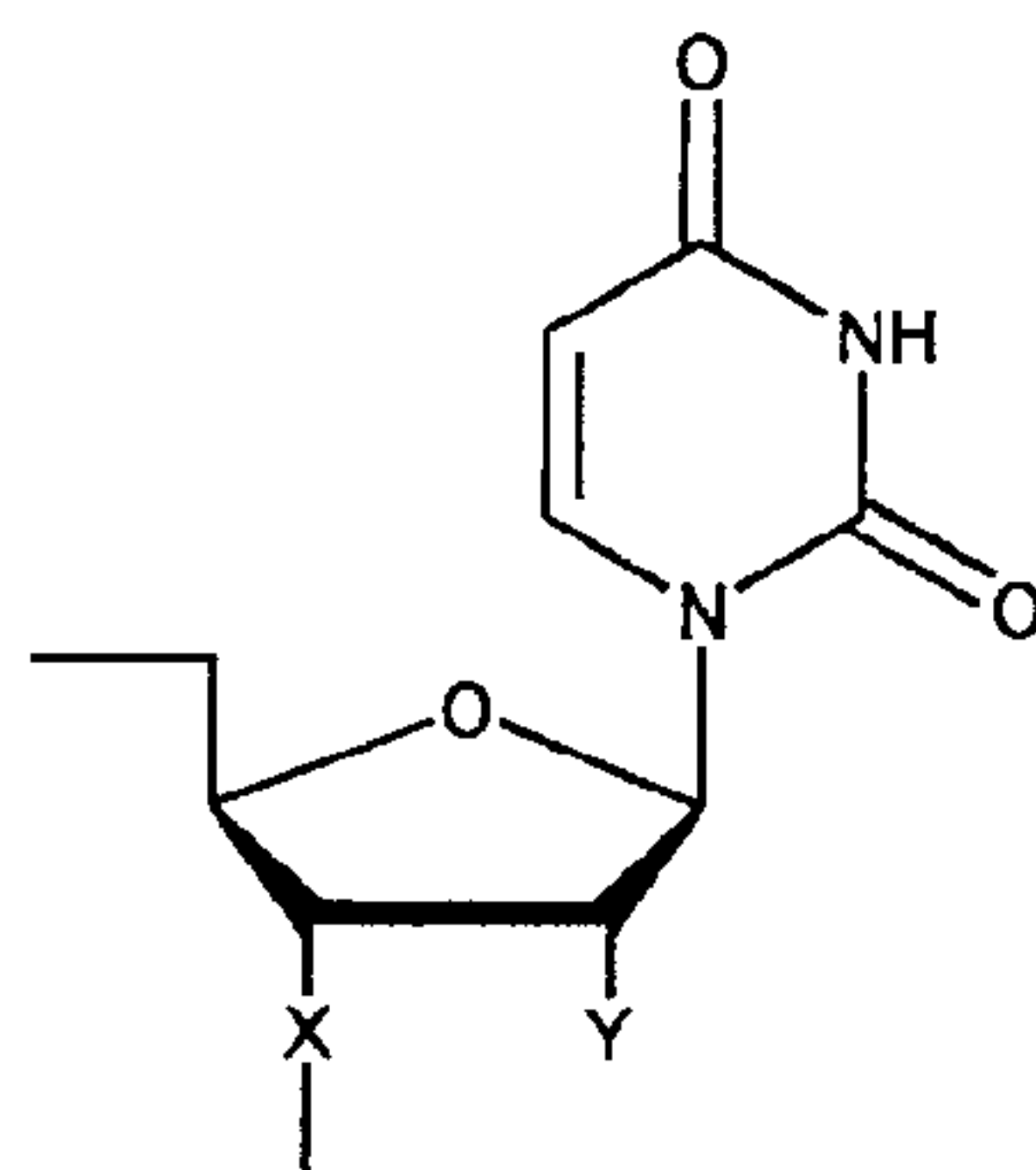


(C 1)

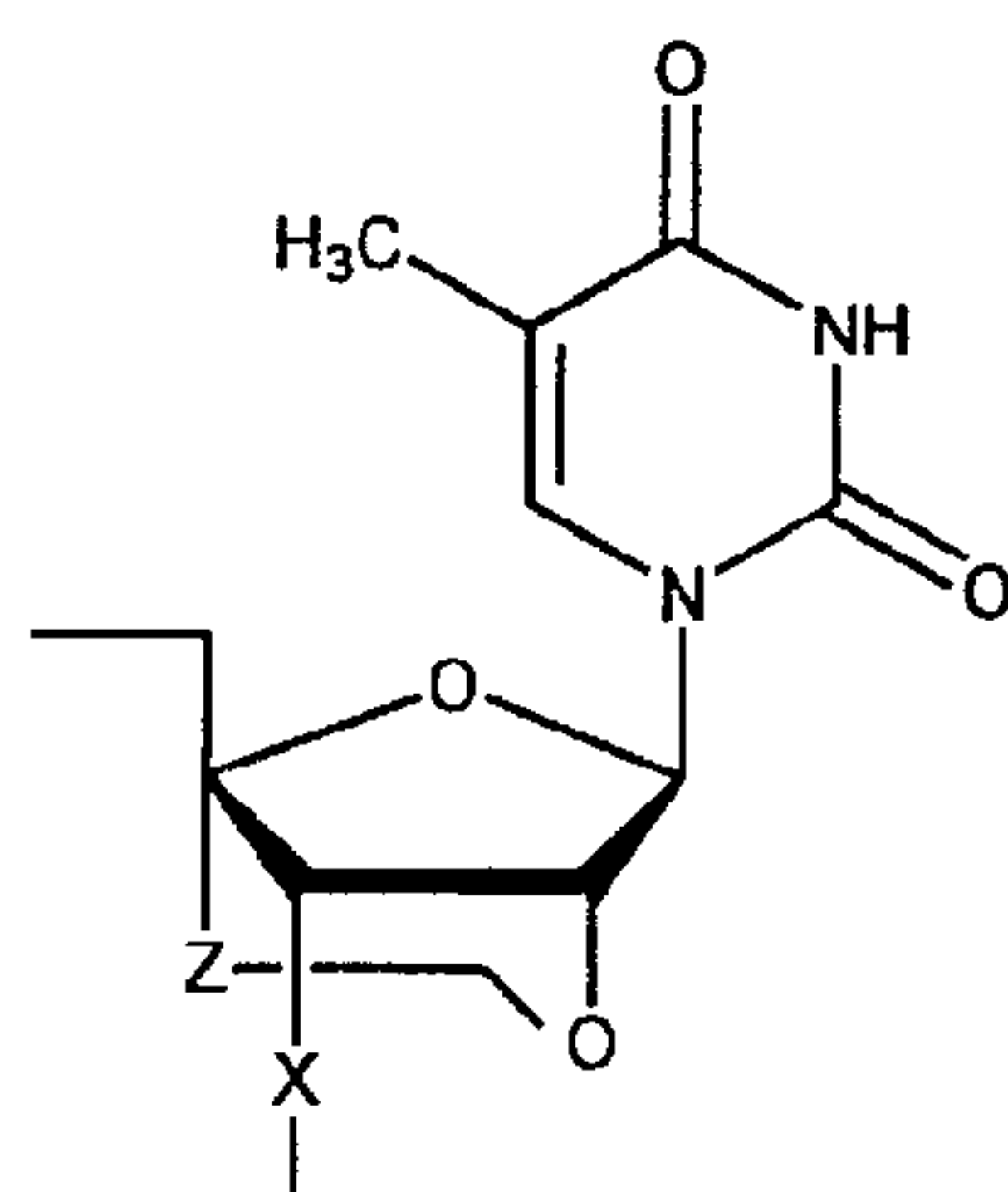


(C 2)

79861-7D

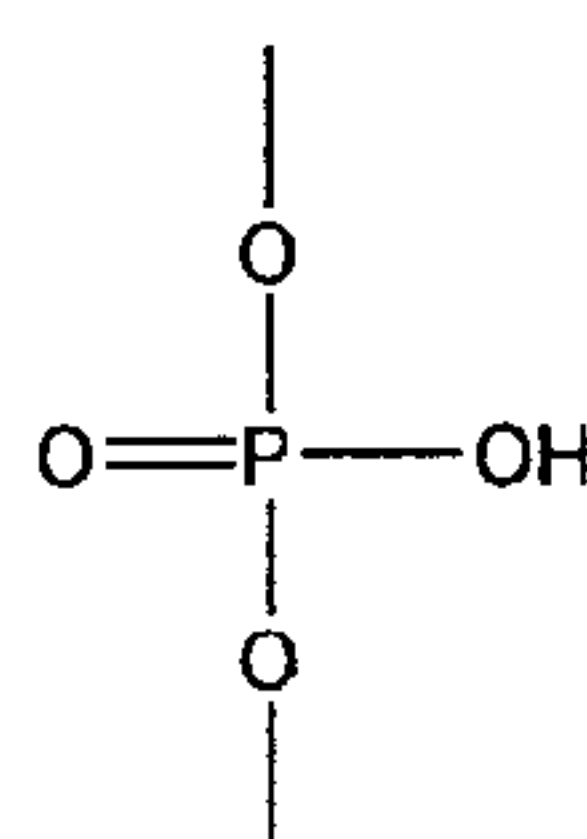


(U 1)

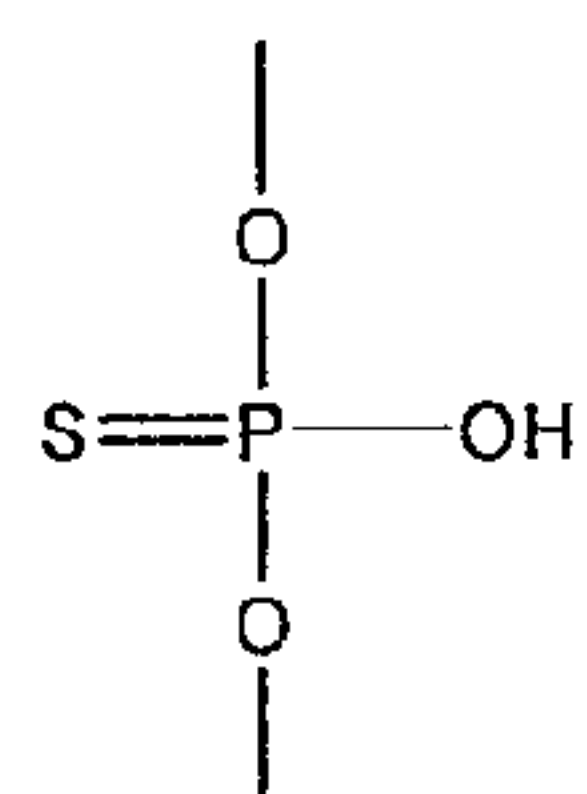


(T 2)

where X is individually and independently a group represented by the following formula (X1) or (X2):



(X 1)



(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

10 B_{M''10} is a group represented by the following formula (10''):

79861-7D

-Bt-Bg-Bt-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-Bt-Ba-Ba- (10'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''10} is a group represented by any one of the following (110a'') to (110e''):

(110a'')-CH₂CH₂OH,

5 (110b'')-Bc-CH₂CH₂OH,

(110c'')-Bc-Ba-CH₂CH₂OH,

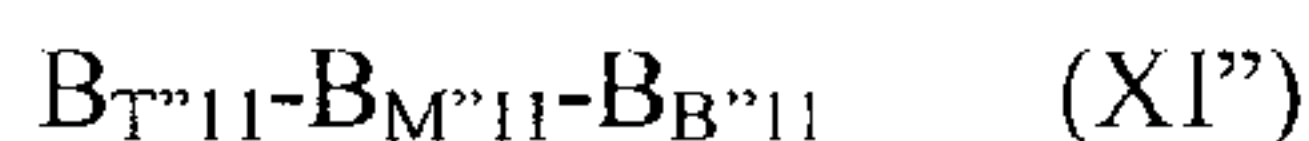
(110d'')-Bc-Ba-Bg-CH₂CH₂OH, or

(110e'')-Bc-Ba-Bg-Bt-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

10 provided that at least one of the nucleosides constituting the compound represented by formula (X'') has 2''-O,4''-C-alkylene group.

[36] A compound represented by the following general formula (XI'') or a pharmacologically acceptable salt thereof:



15 where B_{T''11} is a group represented by any one of the following (11a'') to (11j''):

(11a'')D-,

(11b'')D-Bc-,

(11c'')D-Ba-Bc-,

(11d'')D-Bc-Ba-Bc-,

20 (11e'')D-Bc-Bc-Ba-Bc-,

(11f'')D-Ba-Bc-Bc-Ba-Bc-,

(11g'')D-Ba-Ba-Bc-Bc-Ba-Bc-,

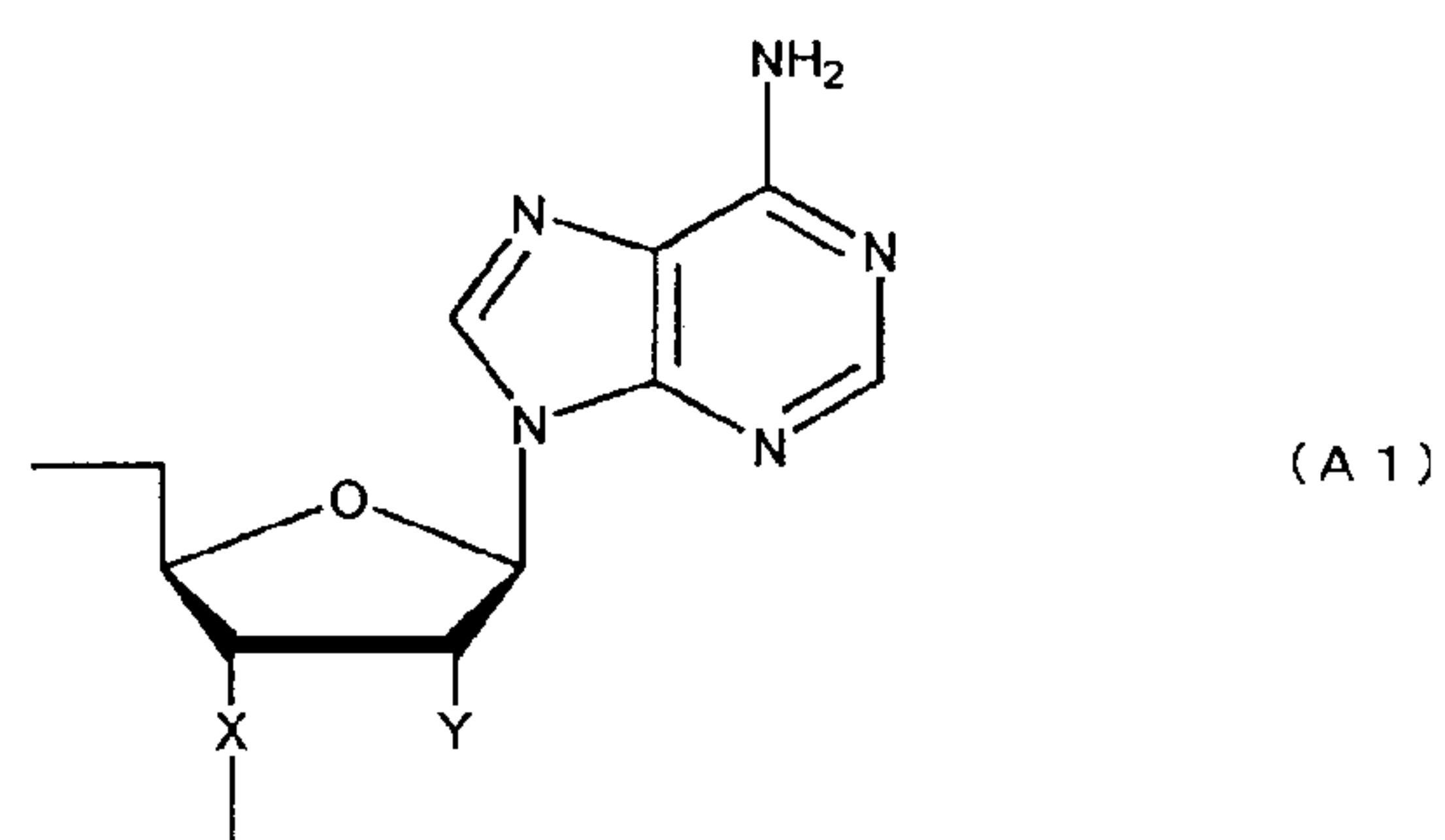
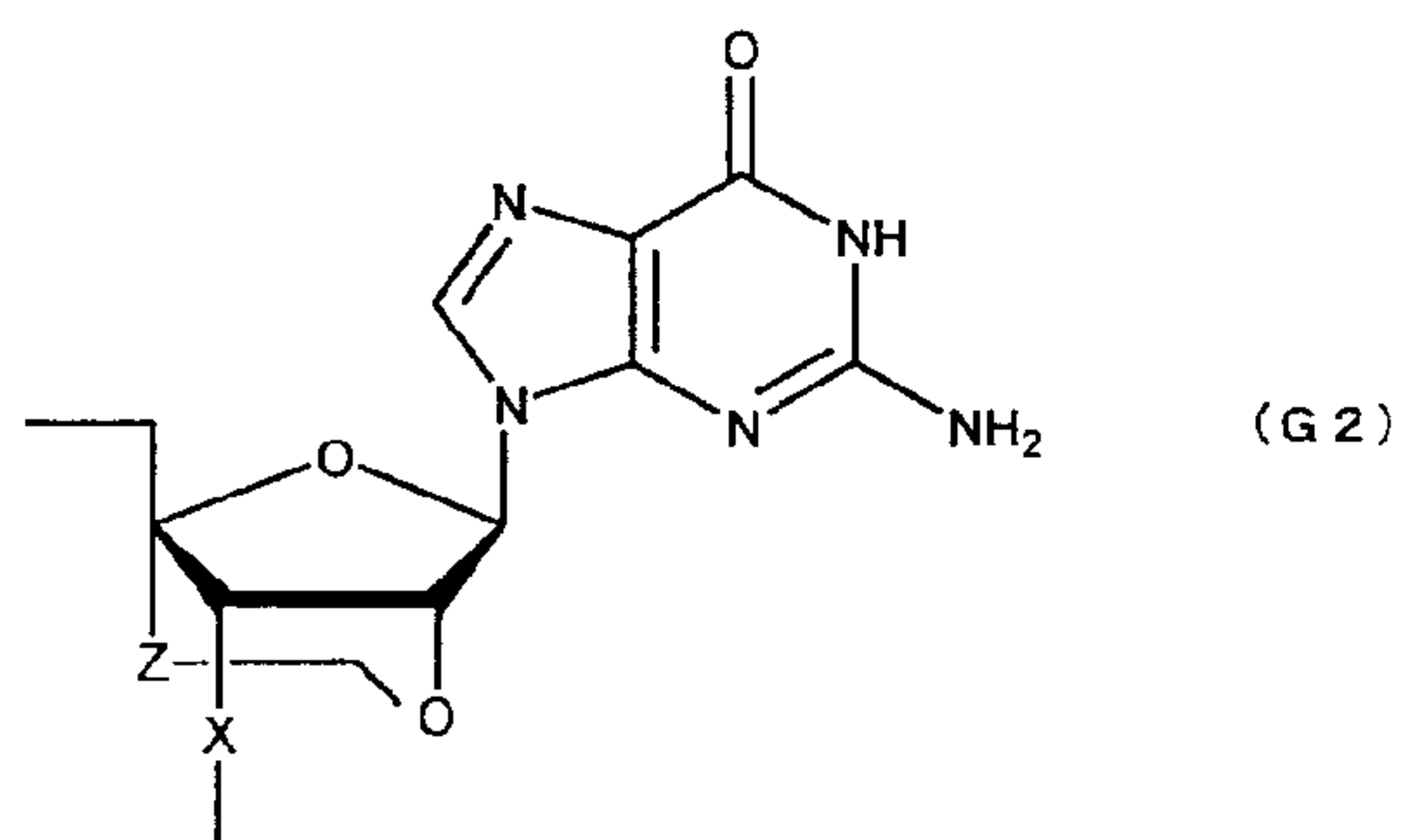
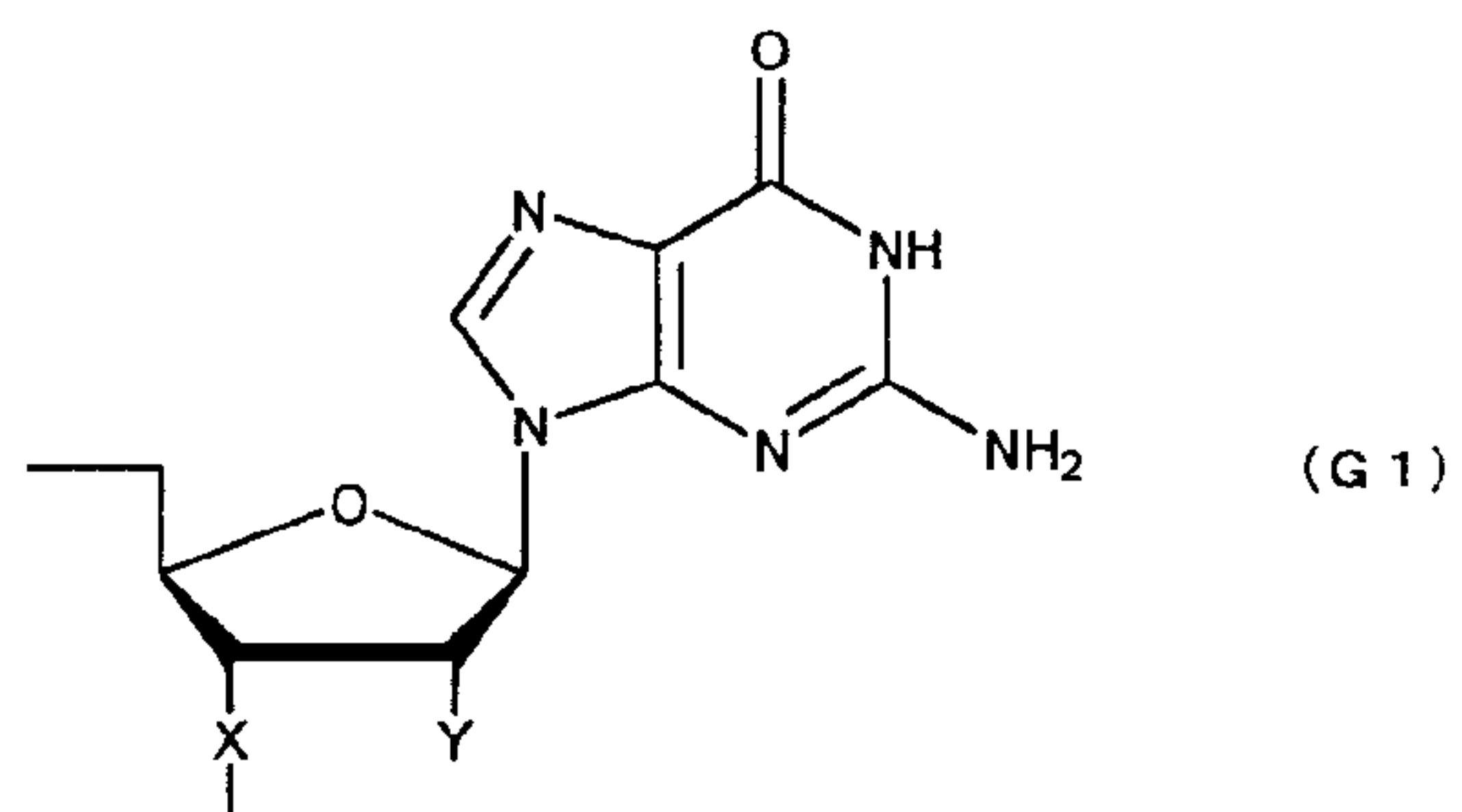
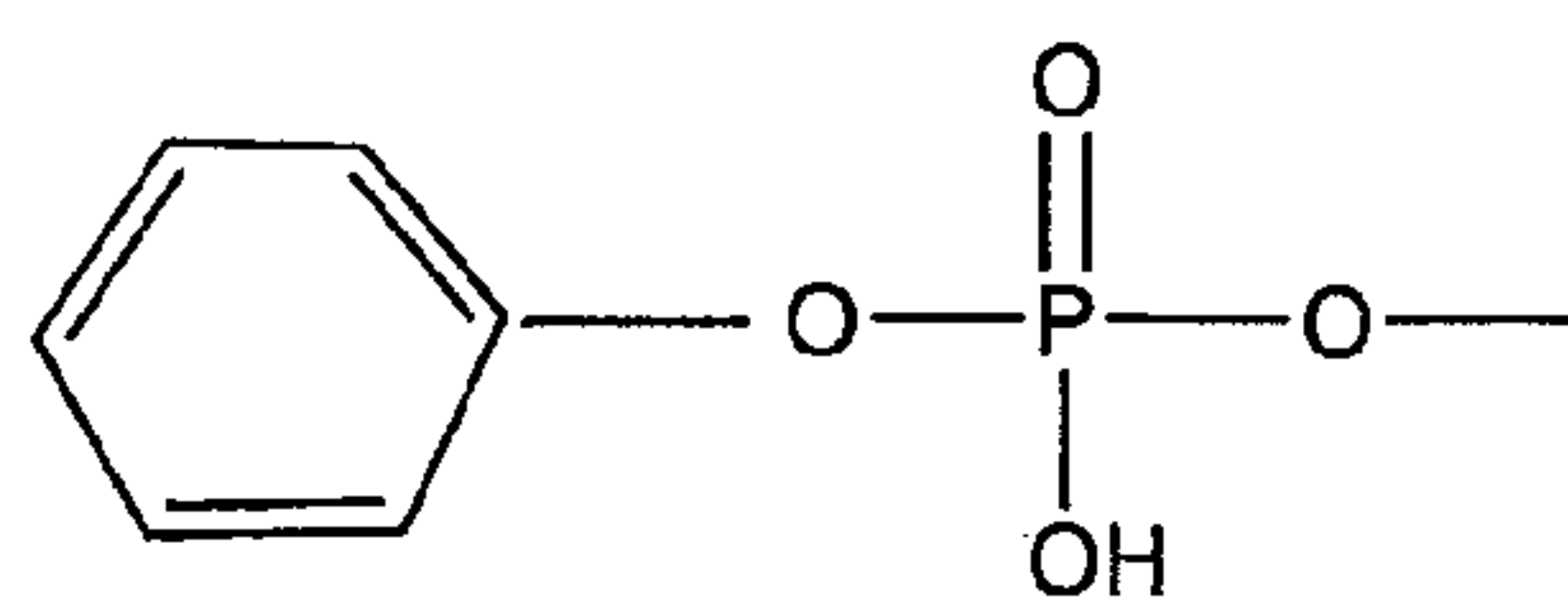
(11h'')D-Bt-Ba-Ba-Bc-Bc-Ba-Bc-,

(11i'')D-Bg-Bt-Ba-Ba-Bc-Bc-Ba-Bc-, or

25 (11j'')D-Ba-Bg-Bt-Ba-Ba-Bc-Bc-Ba-Bc-

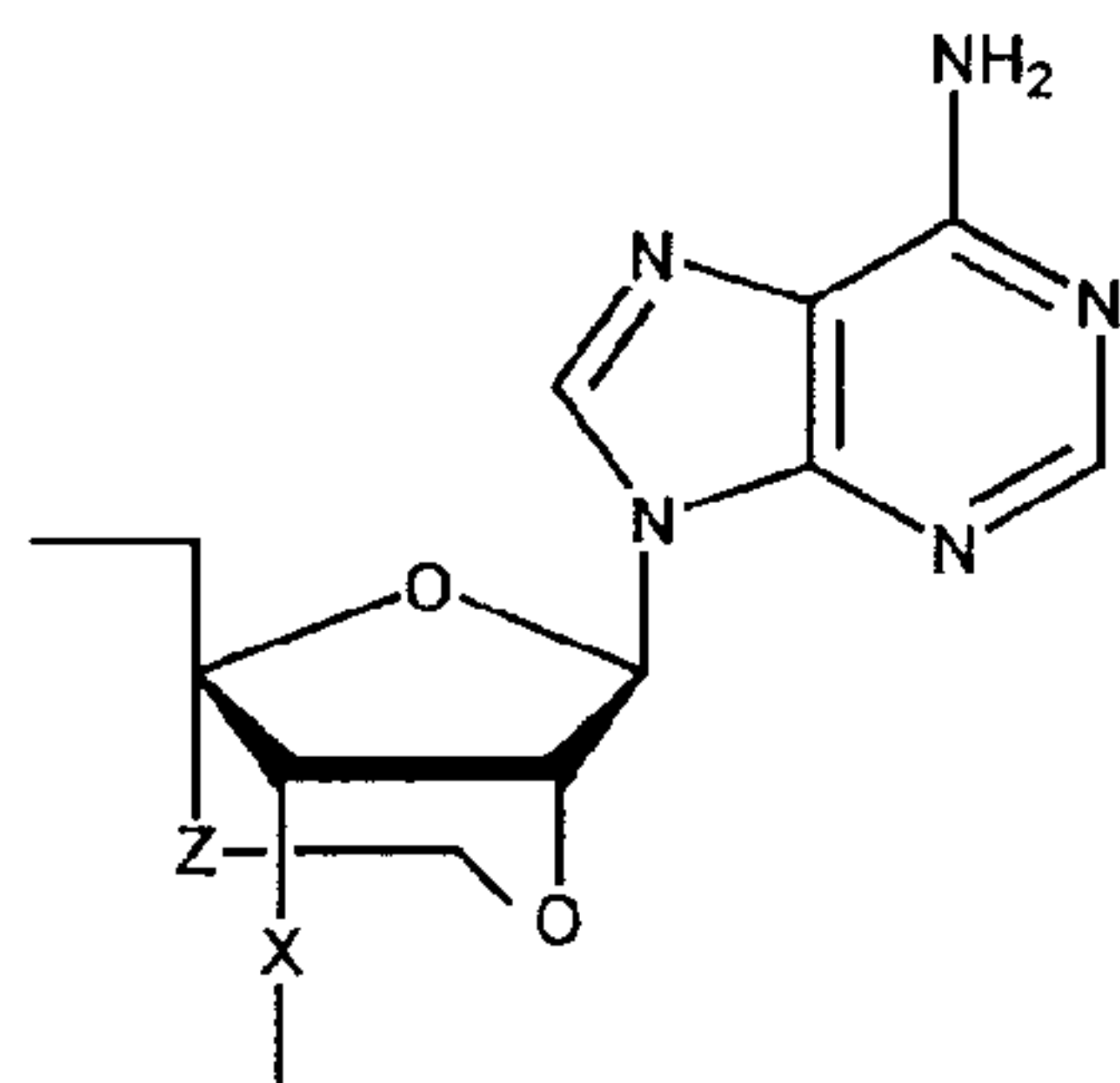
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); Bt is a group represented by the following formula (U1) or (T2); and D is HO- or Ph- wherein Ph- is a group represented by the following first formula:

79861-7D

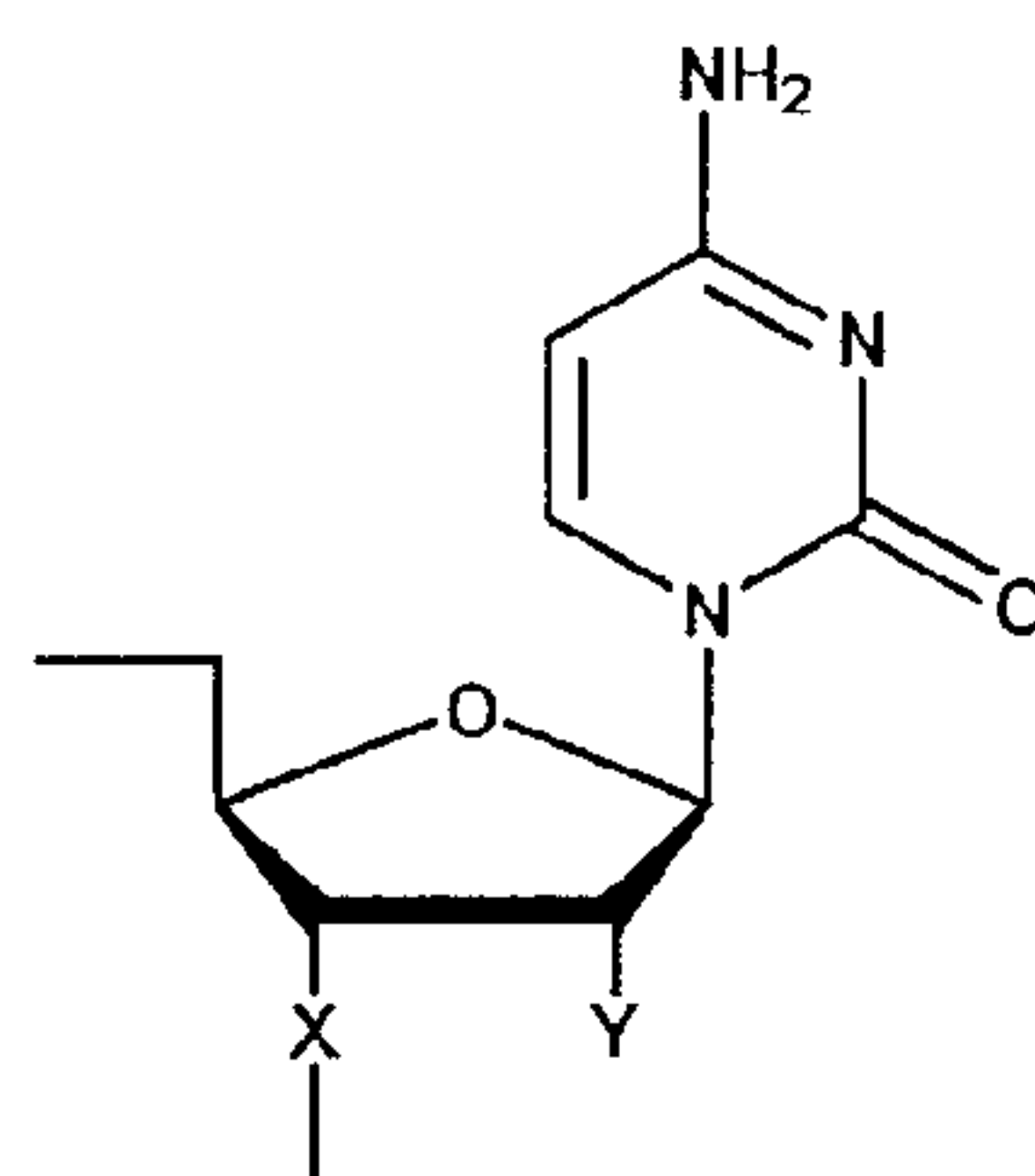


5

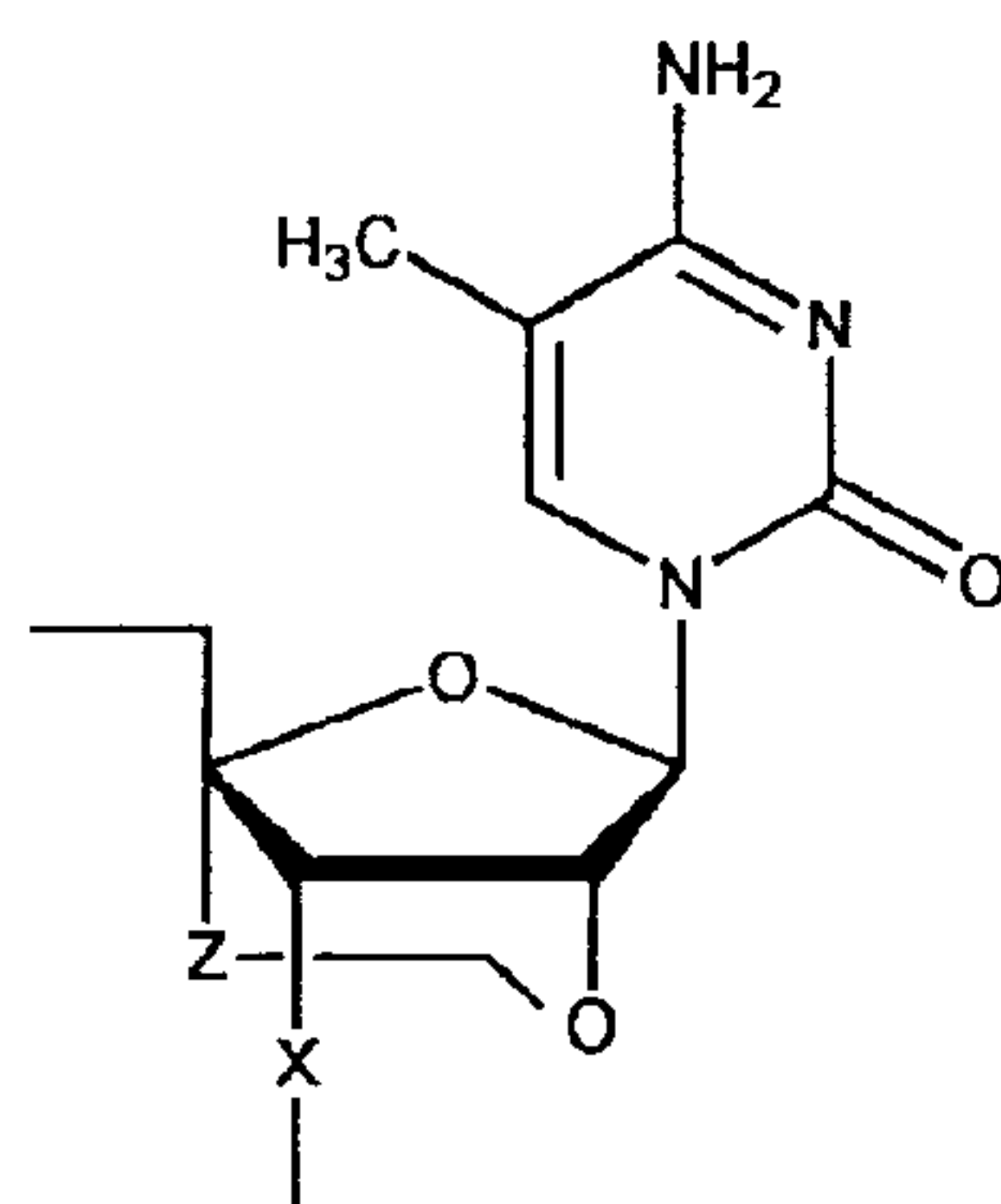
79861-7D



(A 2)

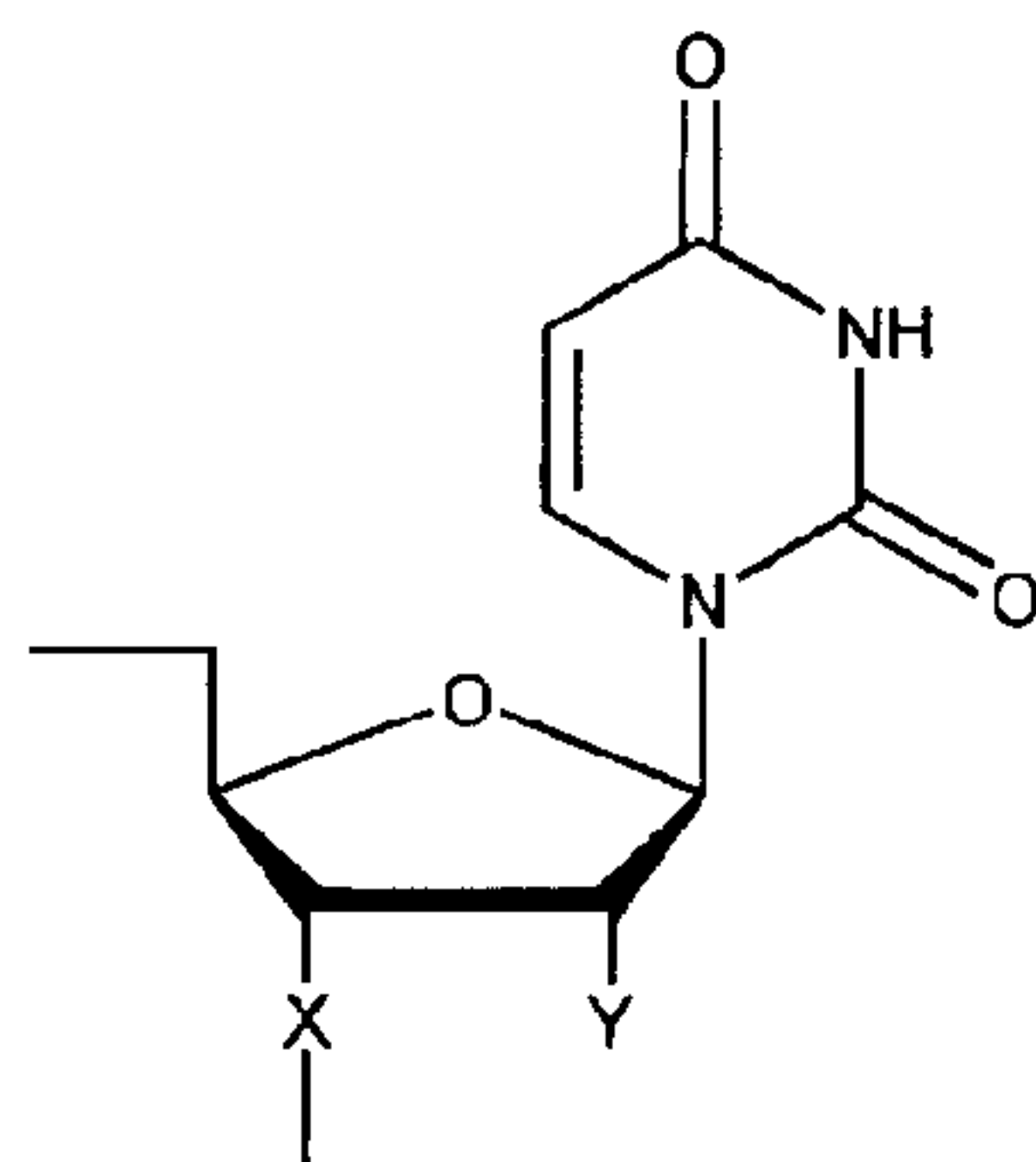


(C 1)

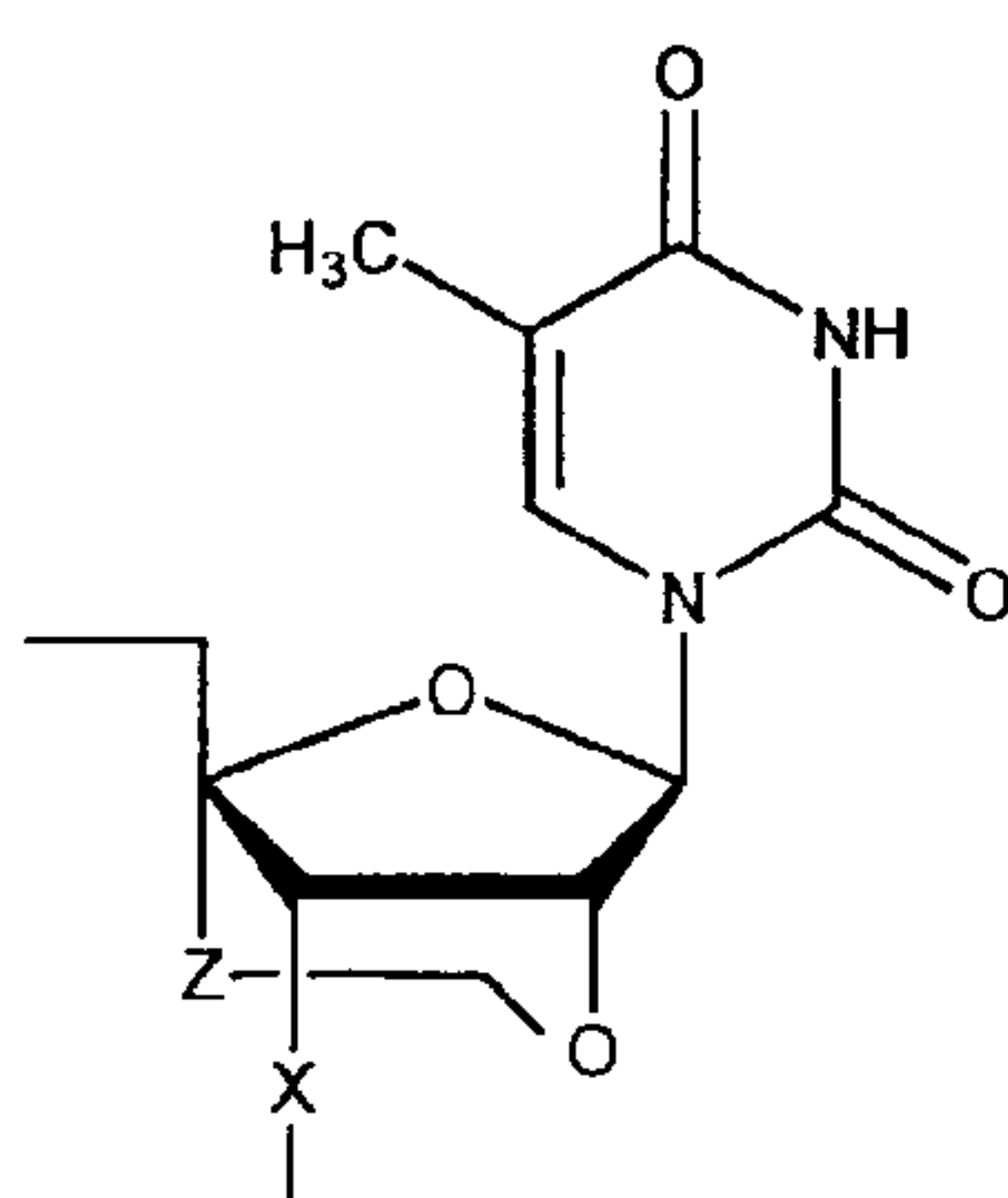


(C 2)

79861-7D



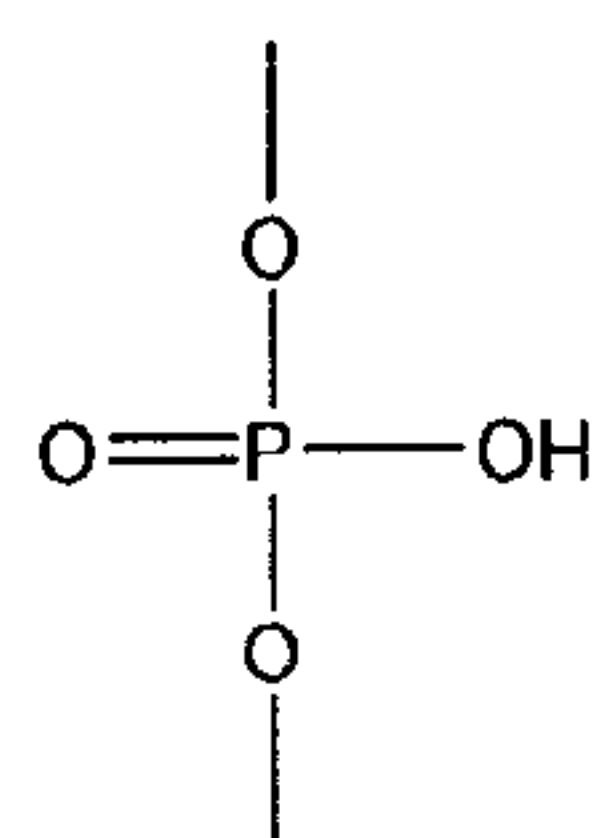
(U 1)



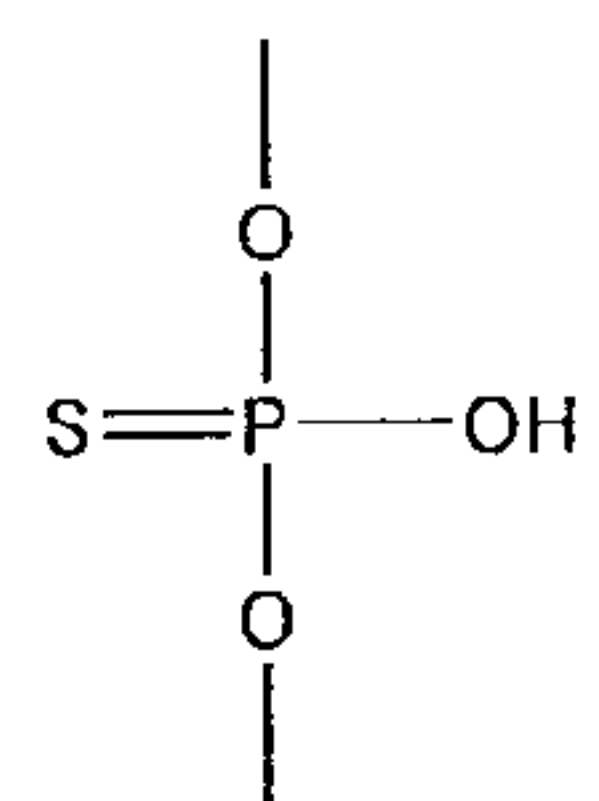
(T 2)

where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)



(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

10

79861-7D

B_{M''11} is a group represented by the following formula (11''):



where Bg, Ba, Bt and Bc are as defined above;

B_{B''11} is a group represented by any one of the following (111a'') to (111j''):

- 5 (111a'')-CH₂CH₂OH,
 (111b'')-Bc-CH₂CH₂OH,
 (111c'')-Bc-Bc-CH₂CH₂OH,
 (111d'')-Bc-Bc-Ba-CH₂CH₂OH,
 (111e'')-Bc-Bc-Ba-Bg-CH₂CH₂OH,
 10 (111f'')-Bc-Bc-Ba-Bg-Ba-CH₂CH₂OH,
 (111g'')-Bc-Bc-Ba-Bg-Ba-Bg-CH₂CH₂OH,
 (111h'')-Bc-Bc-Ba-Bg-Ba-Bg-Bt-CH₂CH₂OH,
 (111i'')-Bc-Bc-Ba-Bg-Ba-Bg-Bt-Ba-CH₂CH₂OH, or
 (111j'')-Bc-Bc-Ba-Bg-Ba-Bg-Bt-Ba-Ba-CH₂CH₂OH

- 15 where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XI'') has 2''-O,4''-C-alkylene group.

[37] A compound represented by the following general formula (XII'') or a pharmacologically acceptable salt thereof:



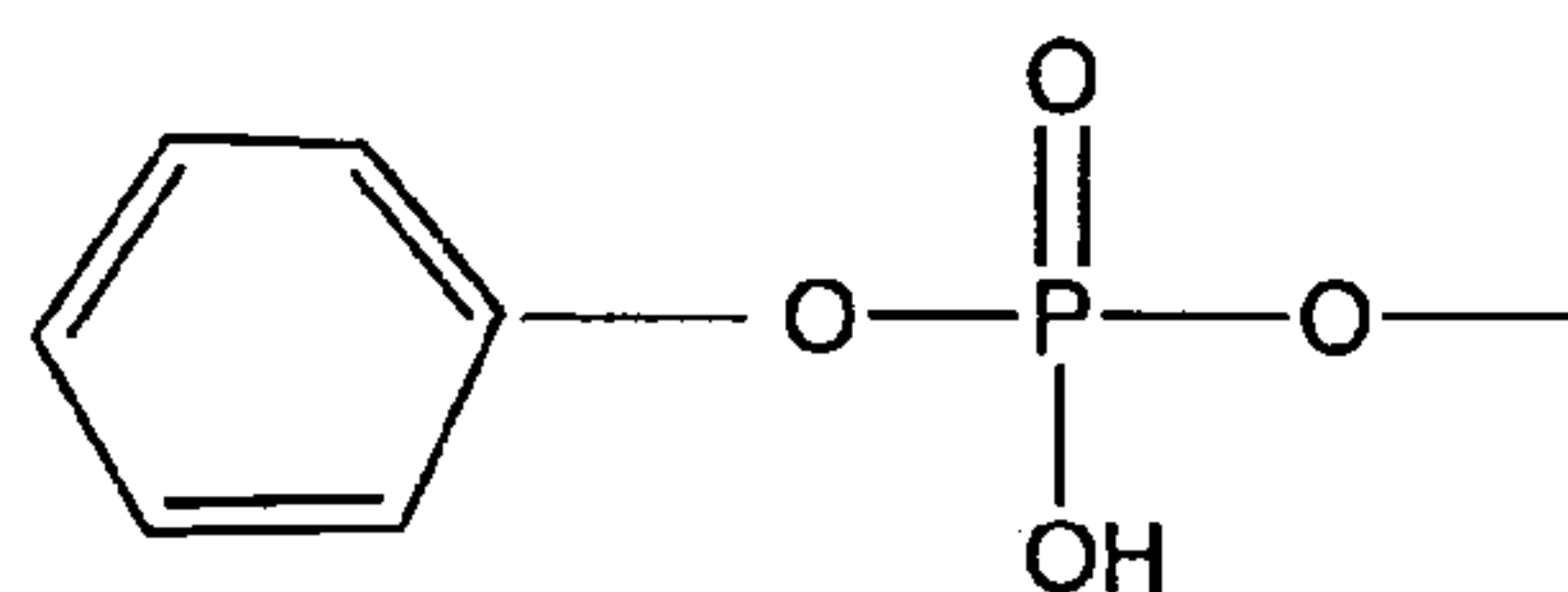
where B_{T''12} is a group represented by any one of the following (12a'') to (12j''):

- (12a'')D-,
 (12b'')D-Bt-,
 (12c'')D-Ba-Bt-,
 25 (12d'')D-Bc-Ba-Bt-,
 (12e'')D-Bc-Bc-Ba-Bt-,
 (12f'')D-Ba-Bc-Bc-Ba-Bt-,
 (12g'')D-Bc-Ba-Bc-Bc-Ba-Bt-,
 (12h'')D-Bc-Bc-Ba-Bc-Bc-Ba-Bt-,
 30 (12i'')D-Bc-Bc-Bc-Ba-Bc-Bc-Ba-Bt-, or
 (12j'')D-Ba-Bc-Bc-Bc-Ba-Bc-Bc-Ba-Bt-

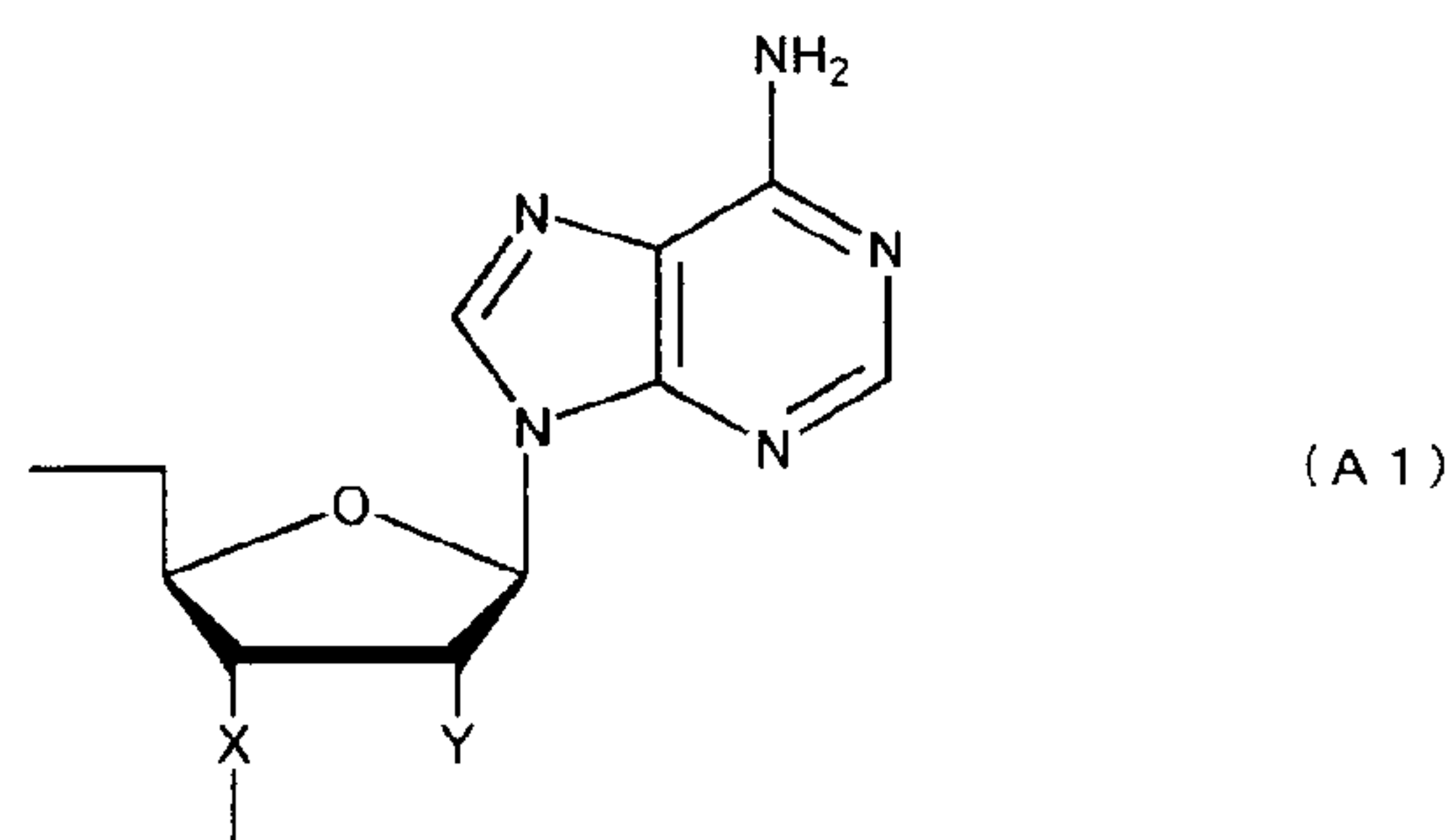
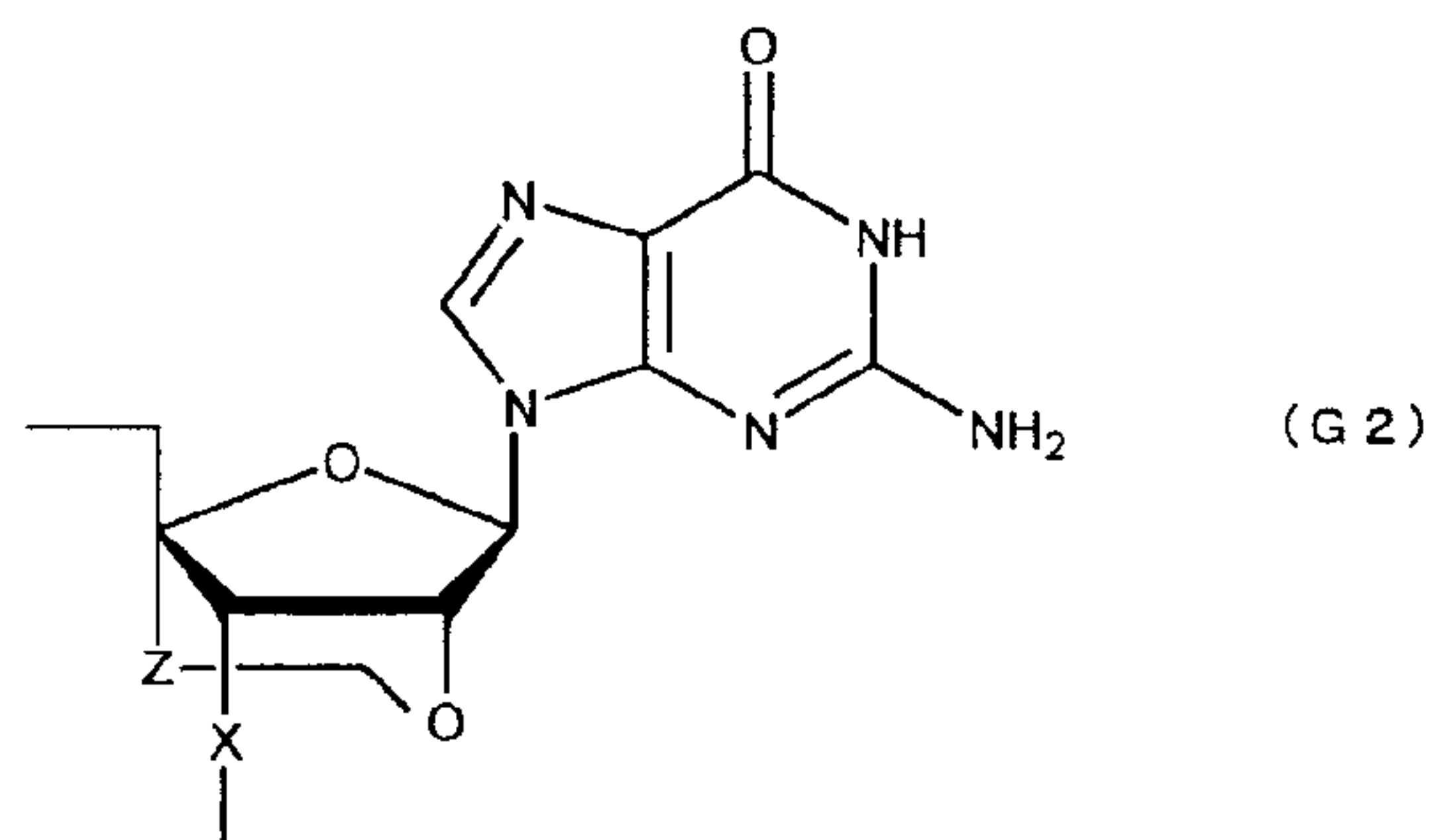
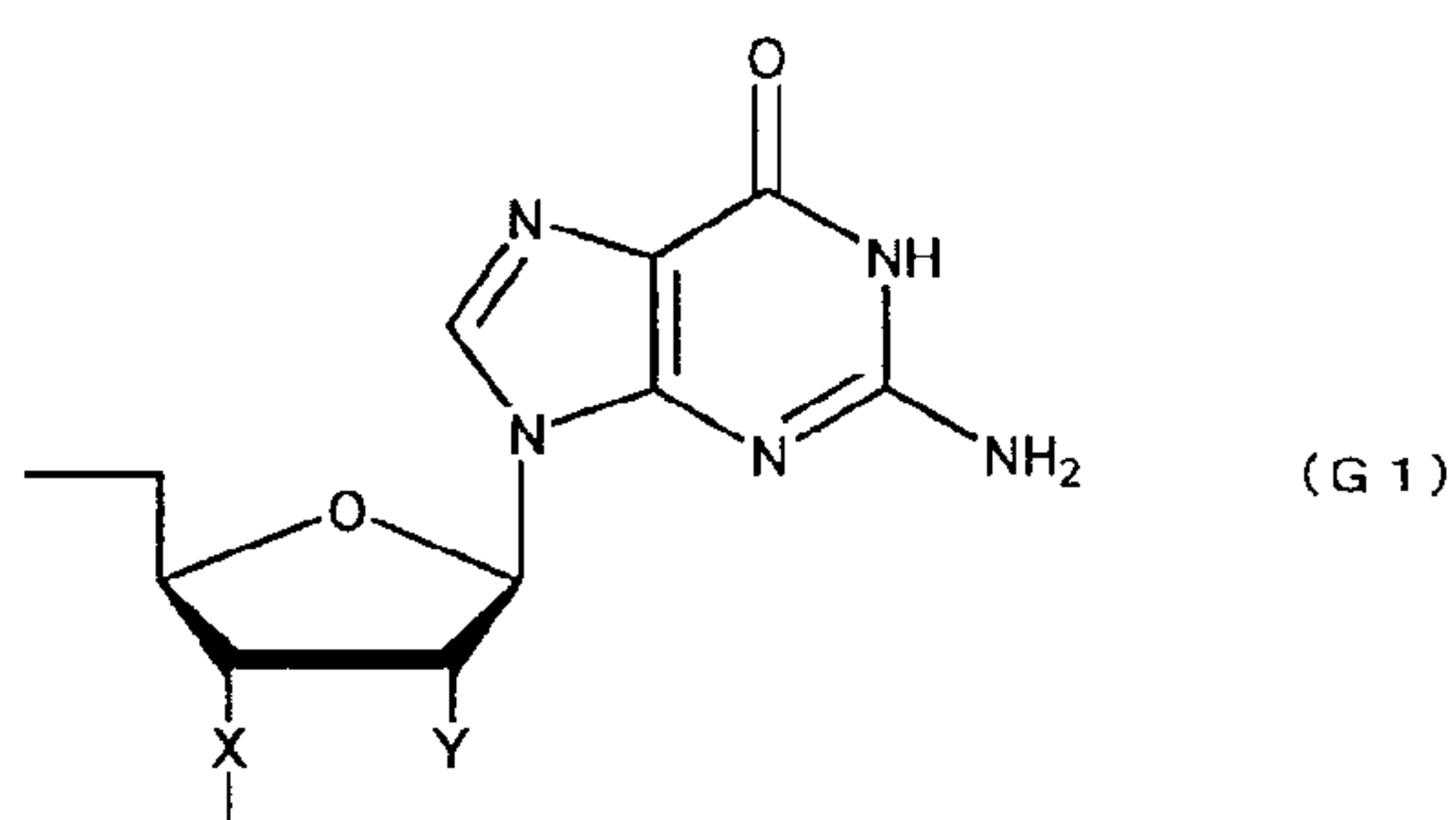
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group

79861-7D

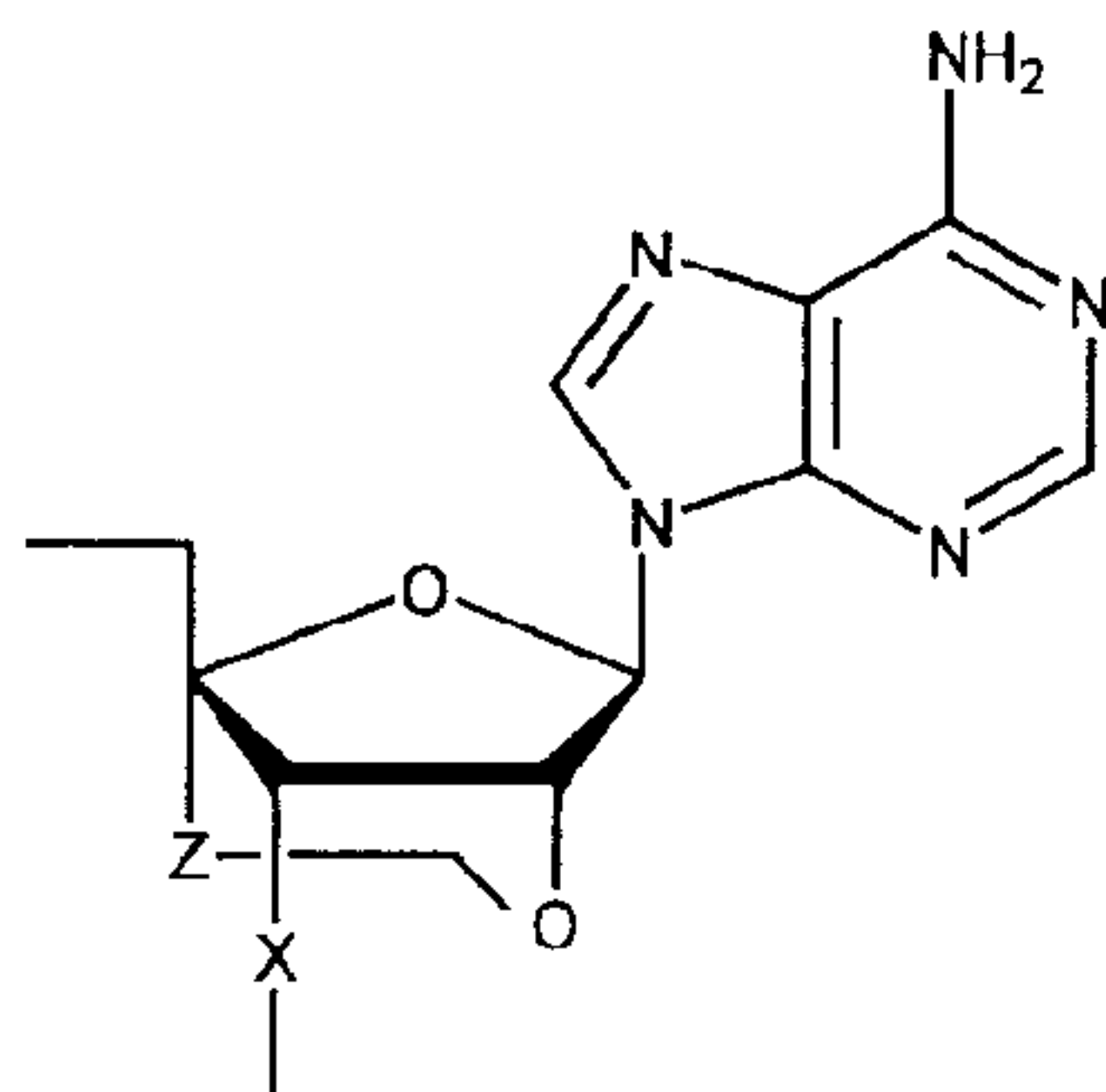
represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); Bt is a group represented by the following formula (U1) or (T2); and D is HO- or Ph- wherein Ph- is a group represented by the following first formula:



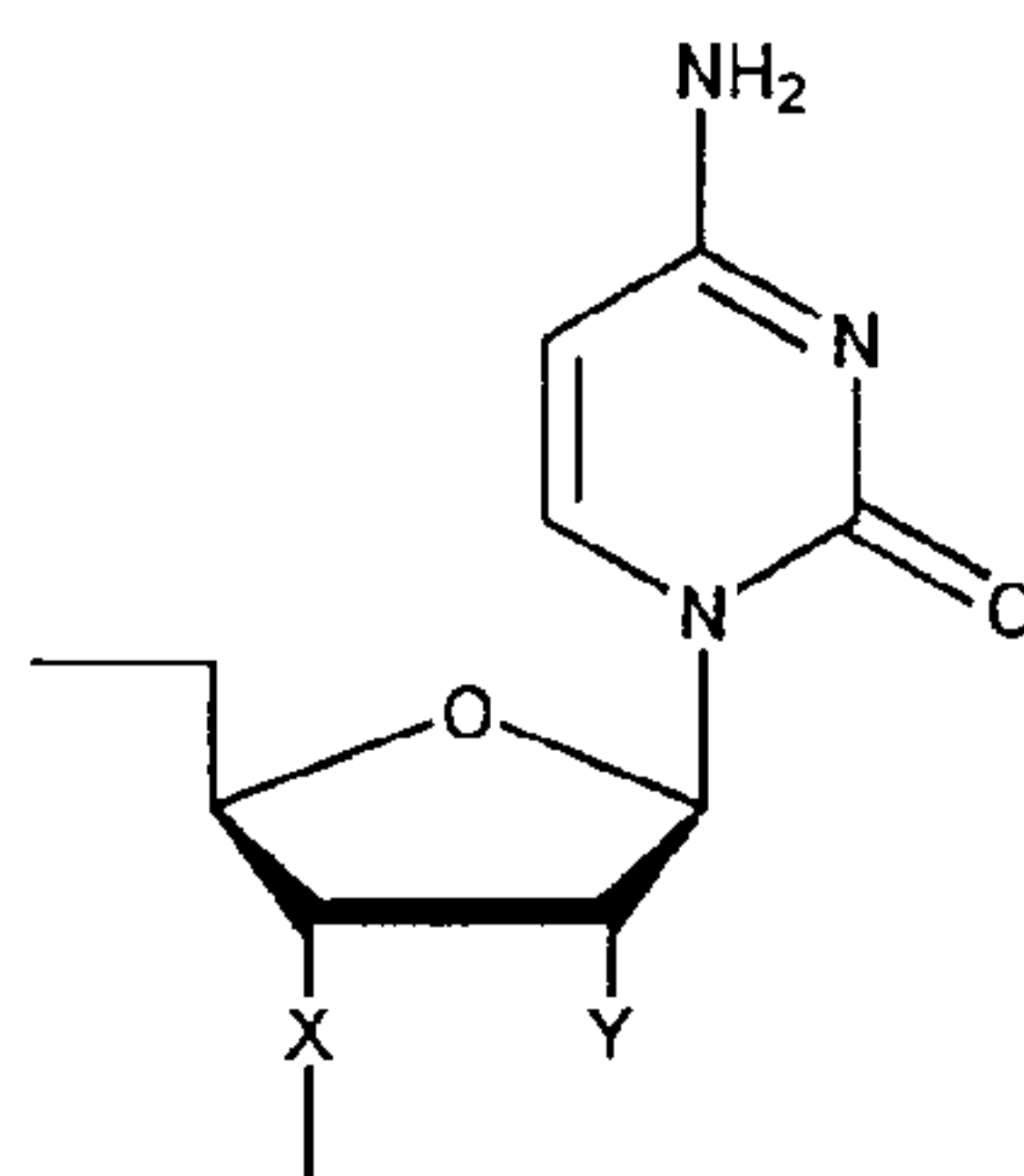
5



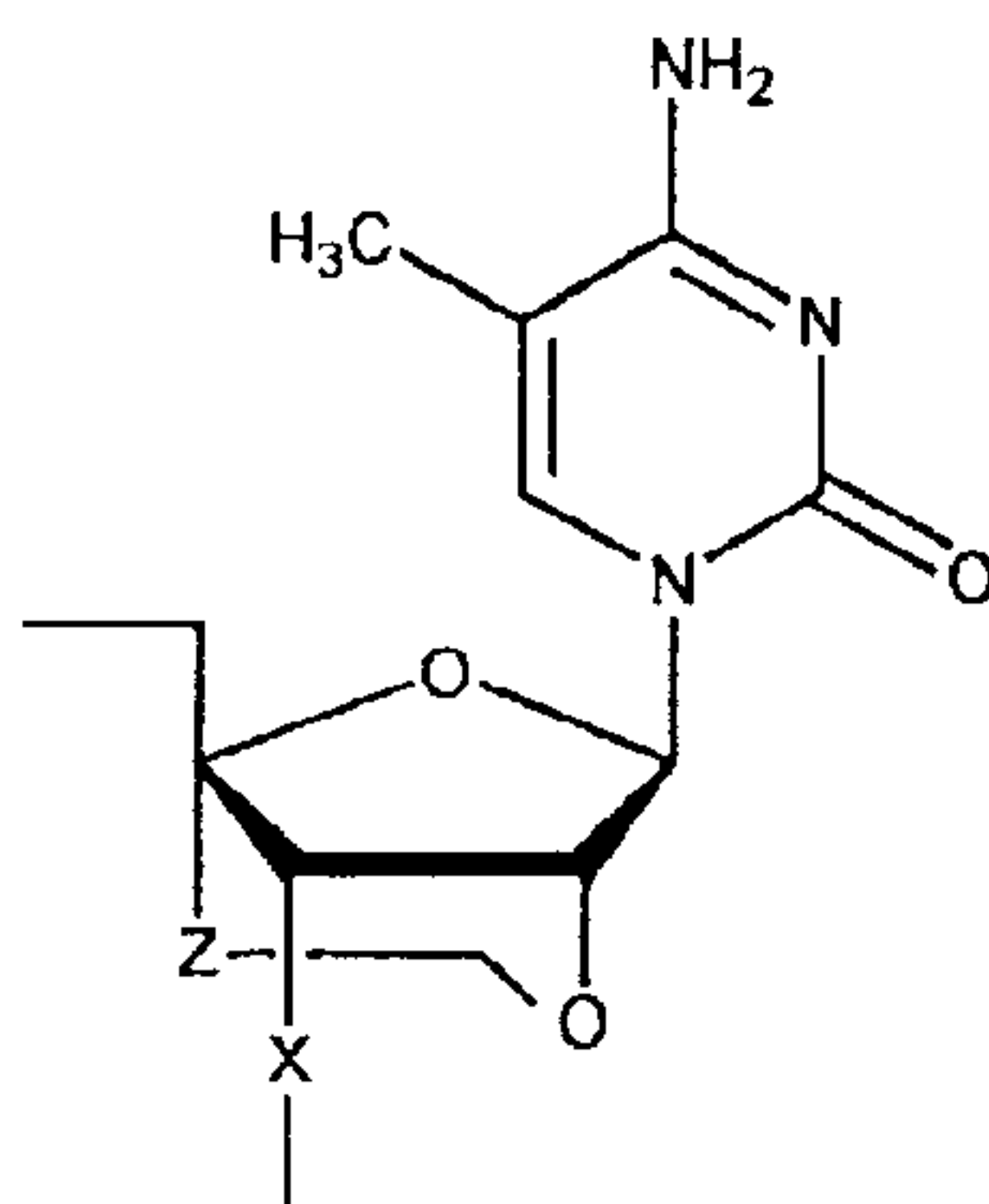
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(A 2)

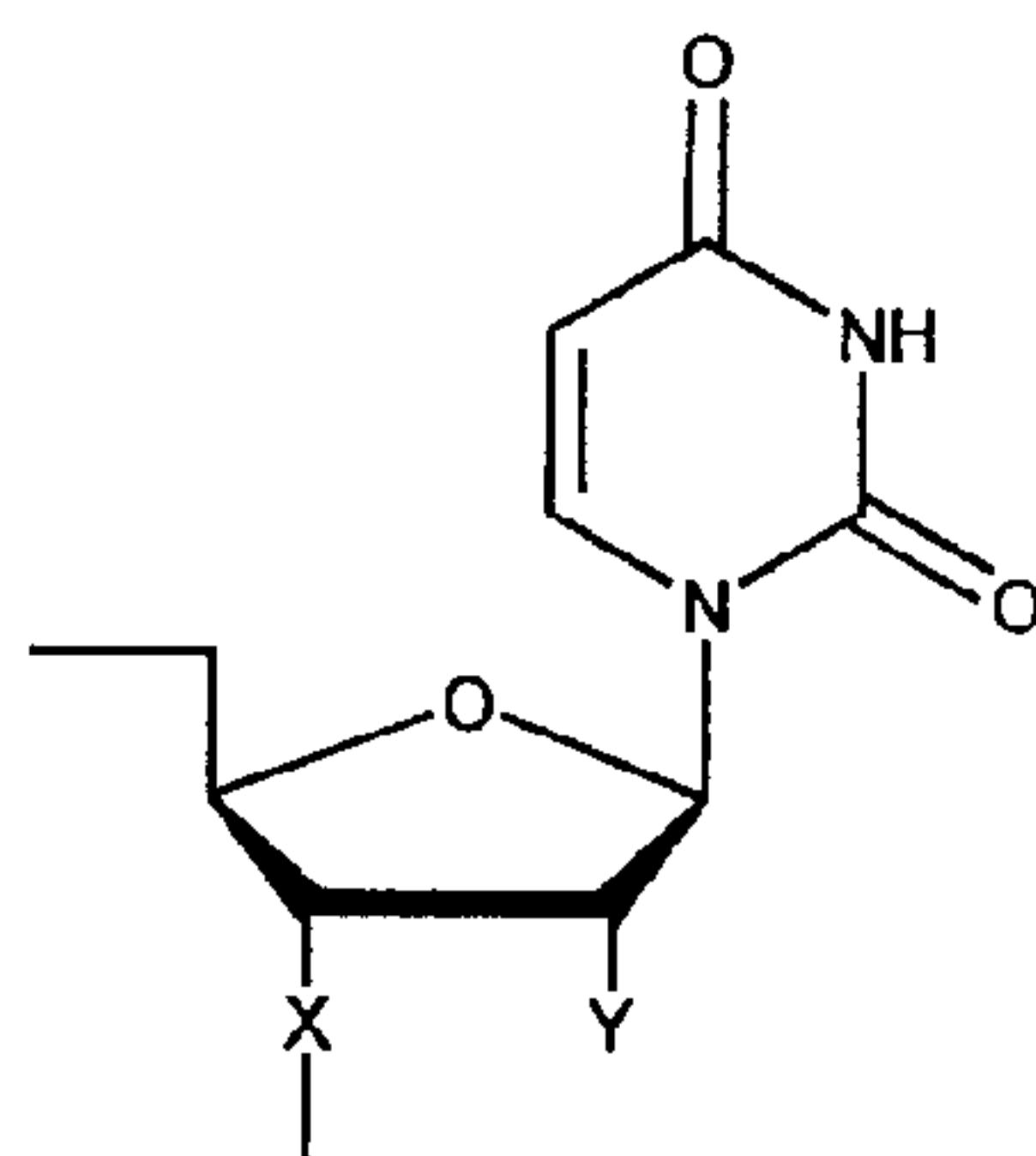


(C 1)

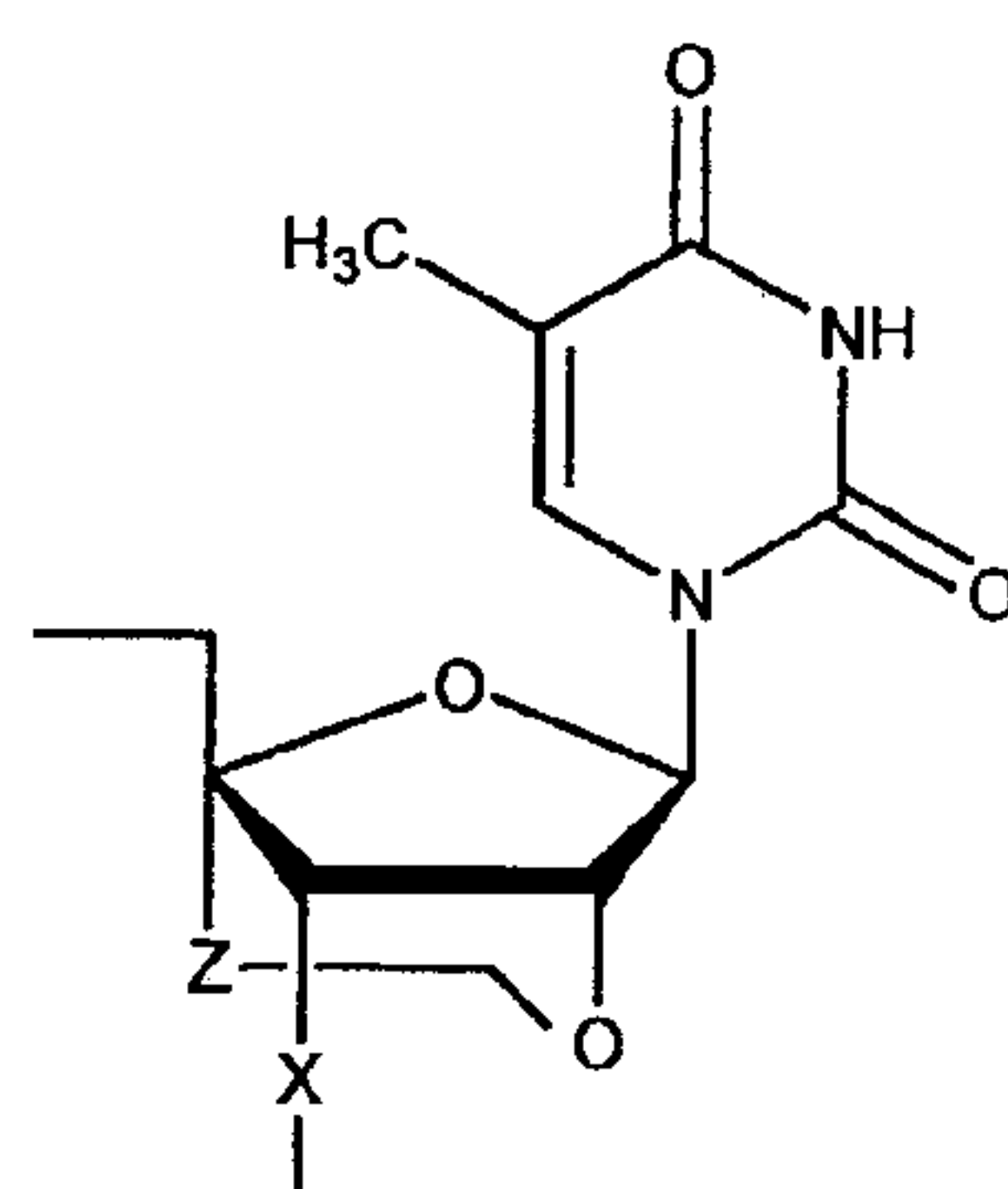


(C 2)

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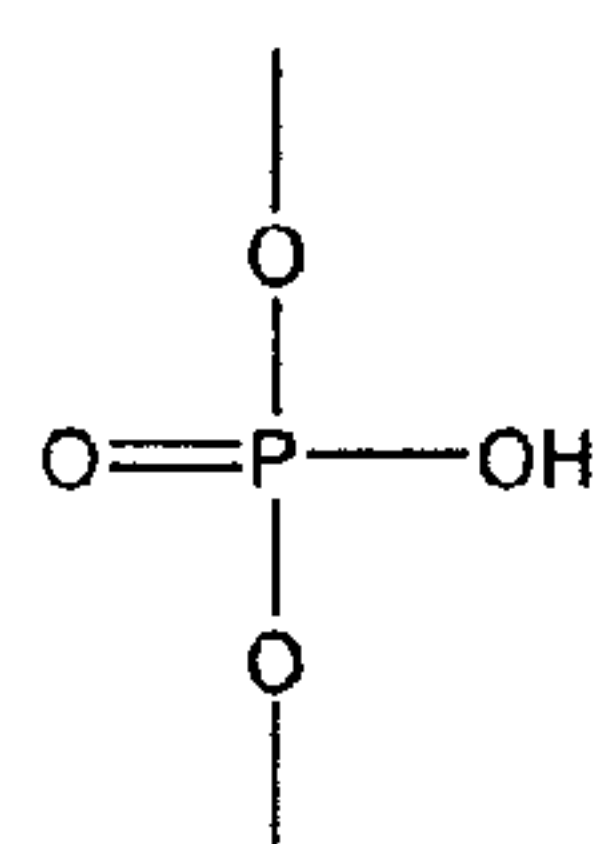


(U 1)

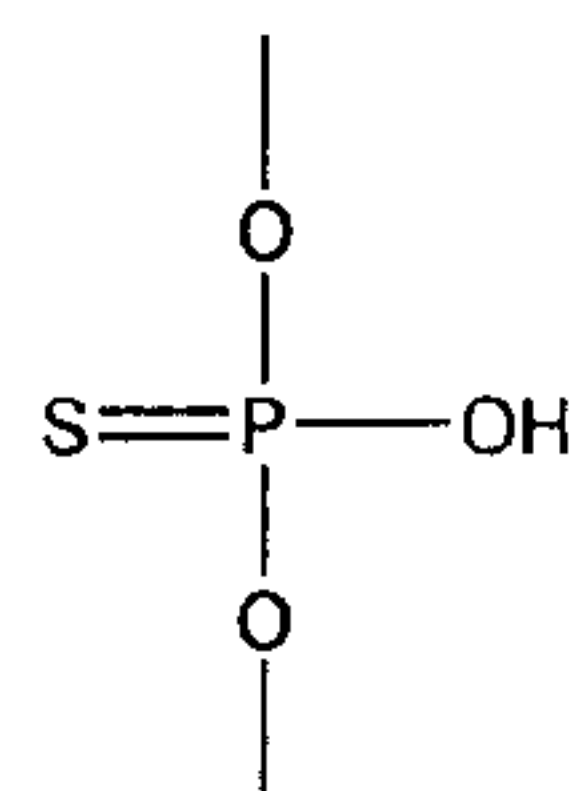


(T 2)

where X is individually and independently a group represented by the following formula (X1) or (X2):



(X 1)



(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

10 $B_{M''12}$ is a group represented by the following formula (12''):

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-Bc-Ba-Bc-Bc-Bc-Bt-Bc-Bt-Bg-Bt-Bg- (12'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''12} is a group represented by any one of the following (112a'')~(112j''):

(112a'')-CH₂CH₂OH,

5 (112b'')-Ba-CH₂CH₂OH,

(112c'')-Ba-Bt-CH₂CH₂OH,

(112d'')-Ba-Bt-Bt-CH₂CH₂OH,

(112e'')-Ba-Bt-Bt-Bt-CH₂CH₂OH,

(112f'')-Ba-Bt-Bt-Bt-Bt-CH₂CH₂OH,

10 (112g'')-Ba-Bt-Bt-Bt-Bt-Ba-CH₂CH₂OH,

(112h'')-Ba-Bt-Bt-Bt-Bt-Ba-Bt-CH₂CH₂OH,

(112i'')-Ba-Bt-Bt-Bt-Bt-Ba-Bt-Ba-CH₂CH₂OH, or

(112j'')-Ba-Bt-Bt-Bt-Bt-Ba-Bt-Ba-Ba-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

15 provided that at least one of the nucleosides constituting the compound represented by formula (XII'') has 2''-O,4''-C-alkylene group.

[38] A compound represented by the following general formula (XIII'') or a pharmacologically acceptable salt thereof:



20 where B_{T''13} is a group represented by any one of the following (13a'') to (13k''):

(13a'')HO-,

(13b'')HO-Bc-,

(13c'')HO-Bt-Bc-,

(13d'')HO-Bg-Bt-Bc-,

25 (13e'')HO-Bg-Bg-Bt-Bc-,

(13f'')HO-Ba-Bg-Bg-Bt-Bc-,

(13g'')HO-Ba-Ba-Bg-Bg-Bt-Bc-,

(13h'')HO-Bc-Ba-Ba-Bg-Bg-Bt-Bc-,

(13i'')HO-Bt-Bc-Ba-Ba-Bg-Bg-Bt-Bc-,

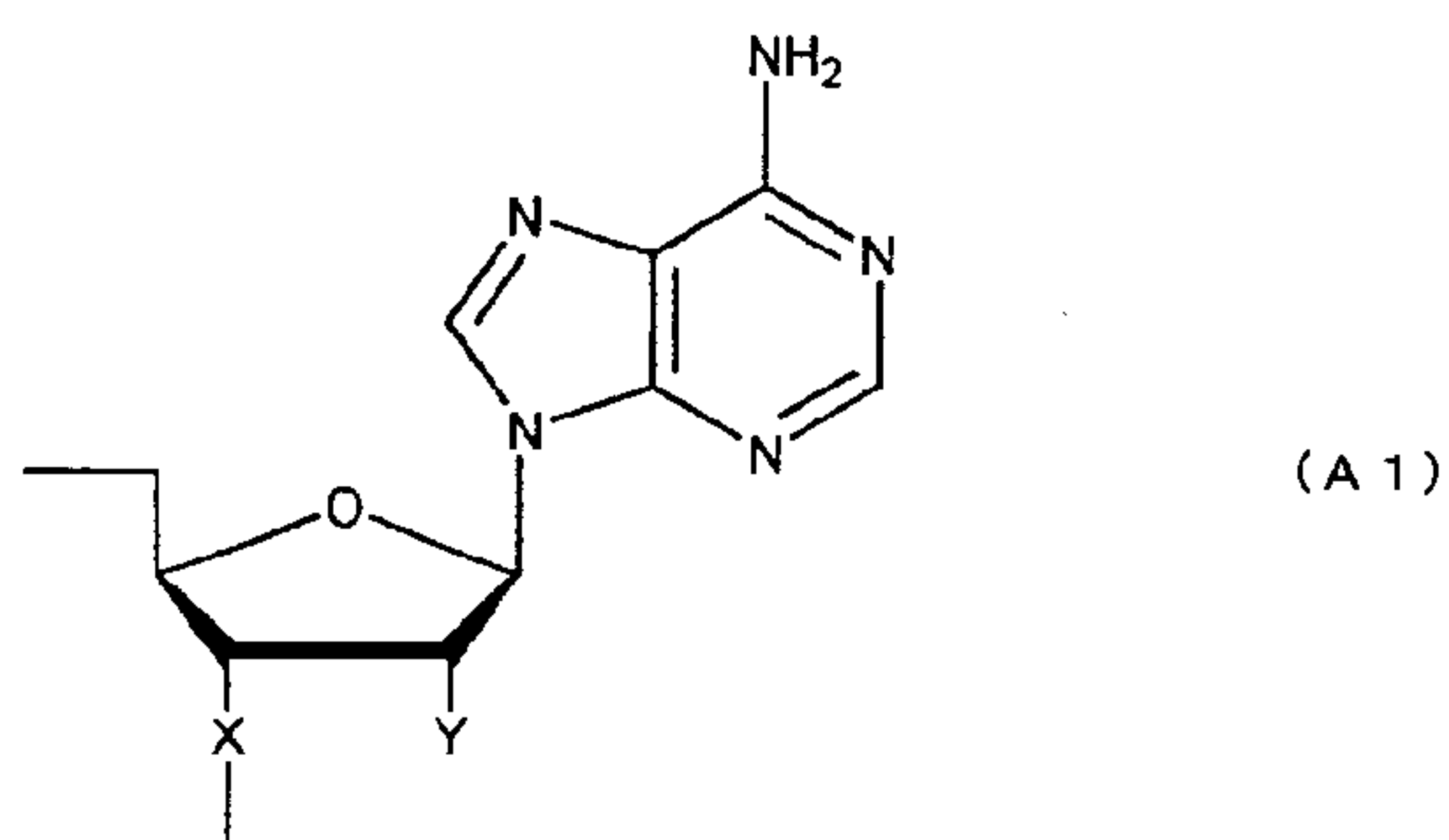
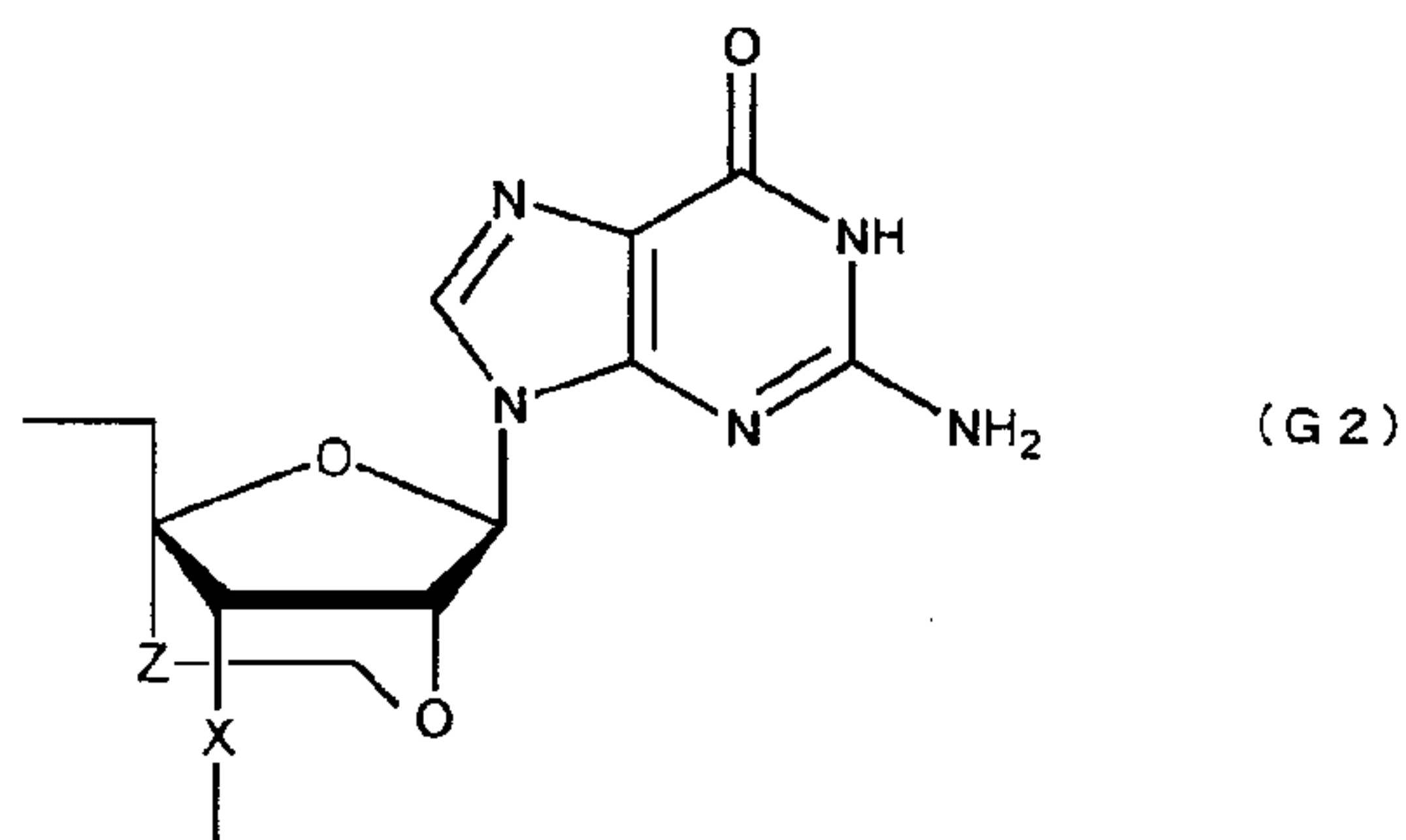
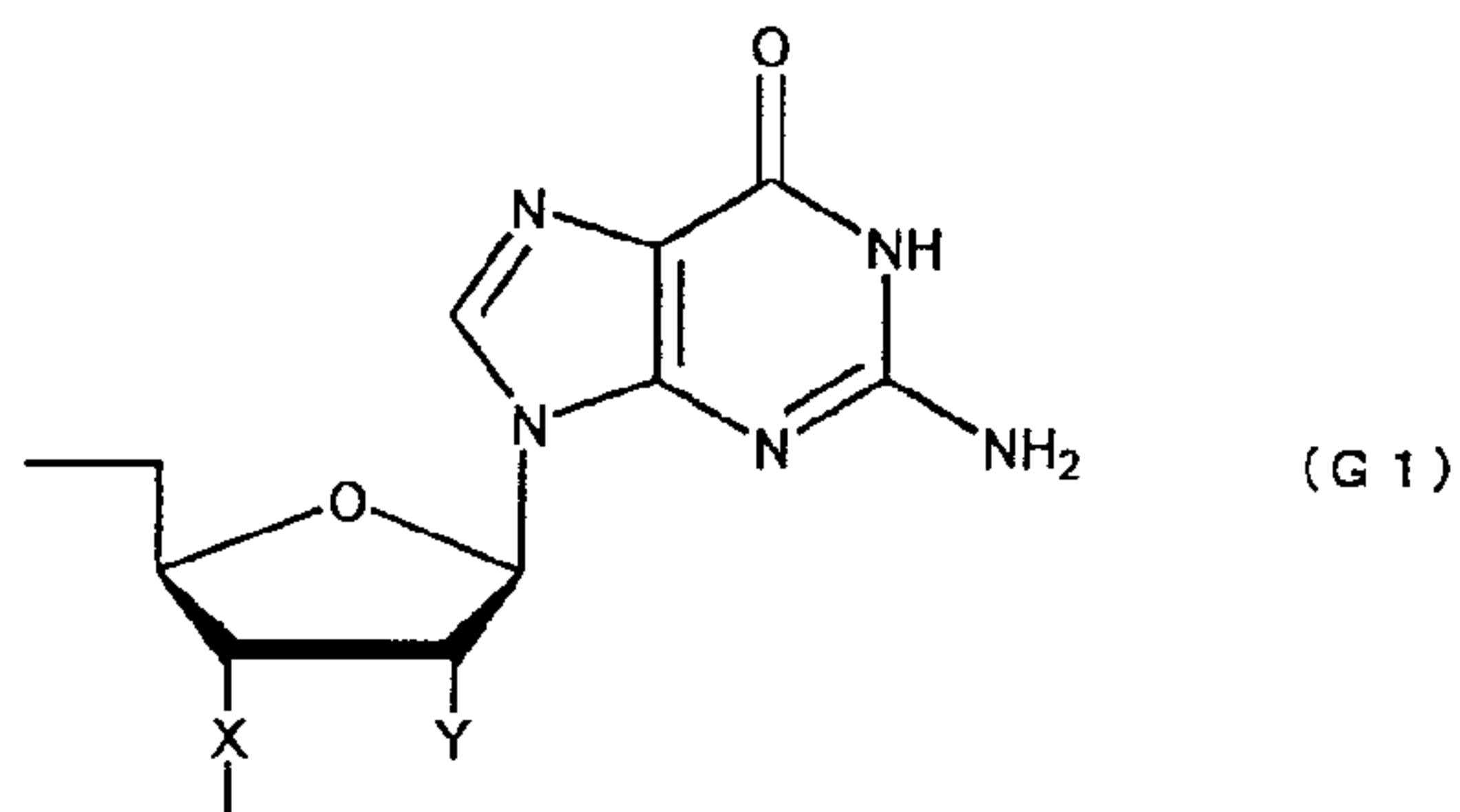
30 (13j'')HO-Bc-Bt-Bc-Ba-Ba-Bg-Bg-Bt-Bc-, or

(13k'')HO-Bc-Bc-Bt-Bc-Ba-Ba-Bg-Bg-Bt-Bc-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group

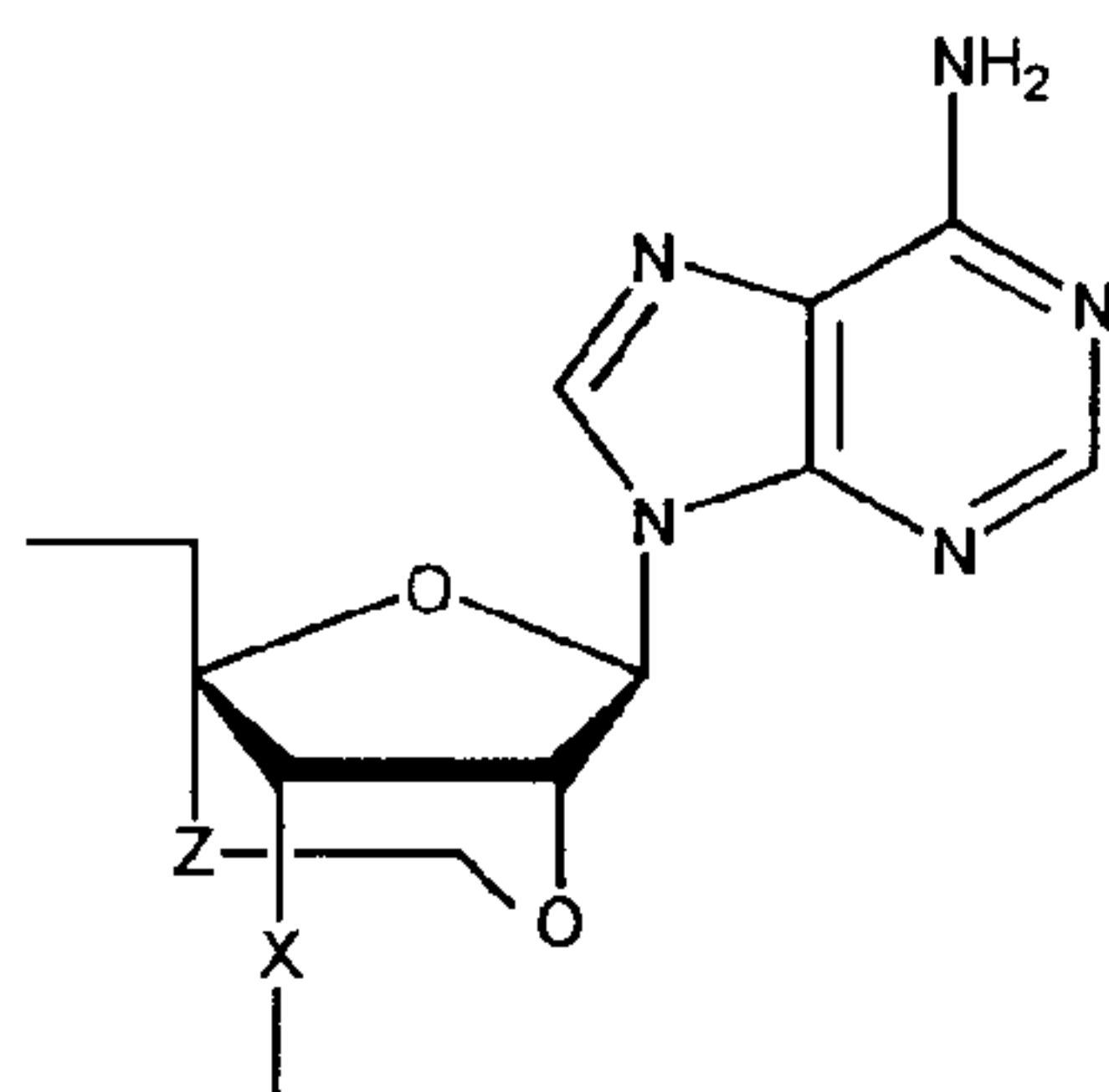
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represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

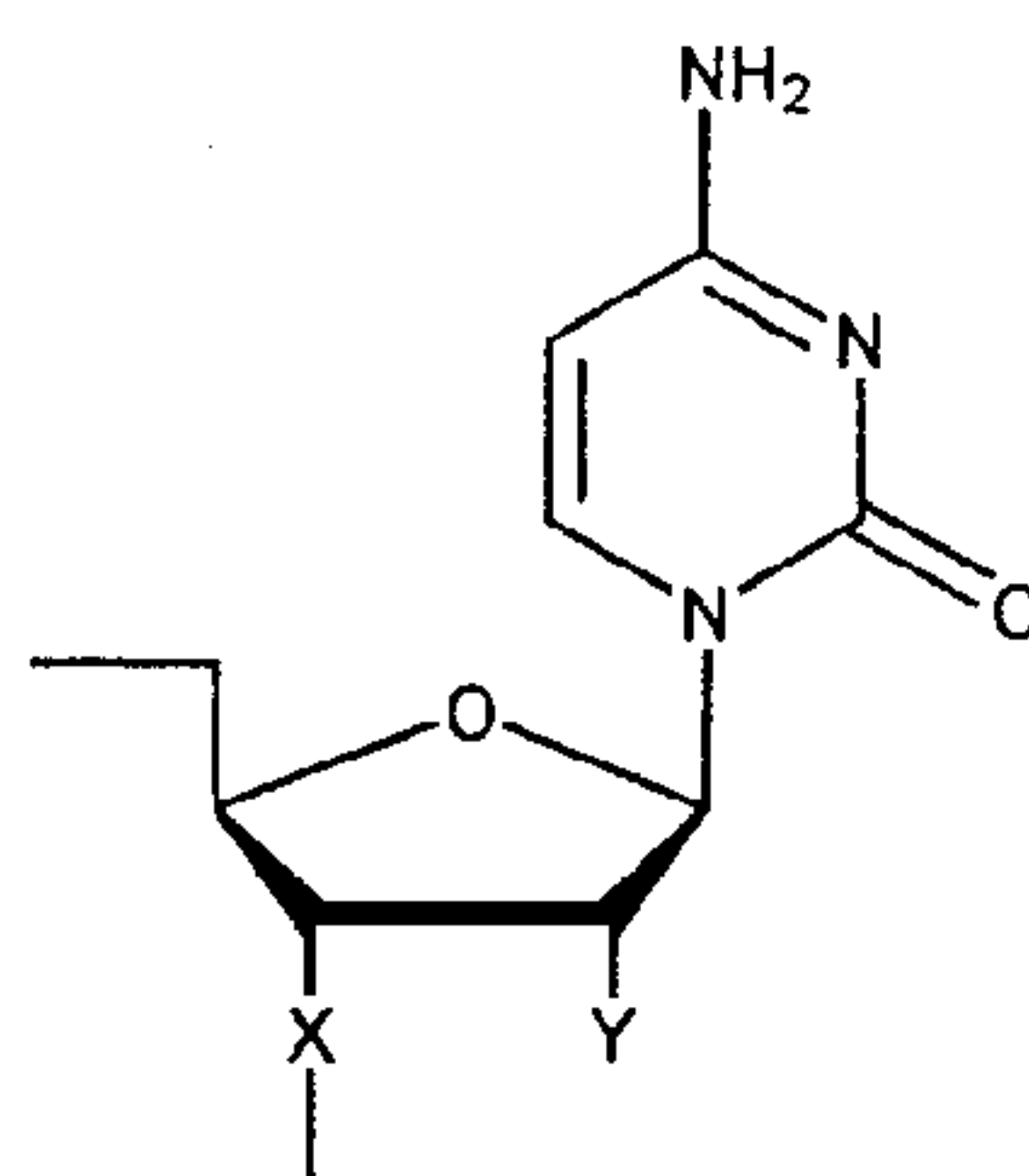


5

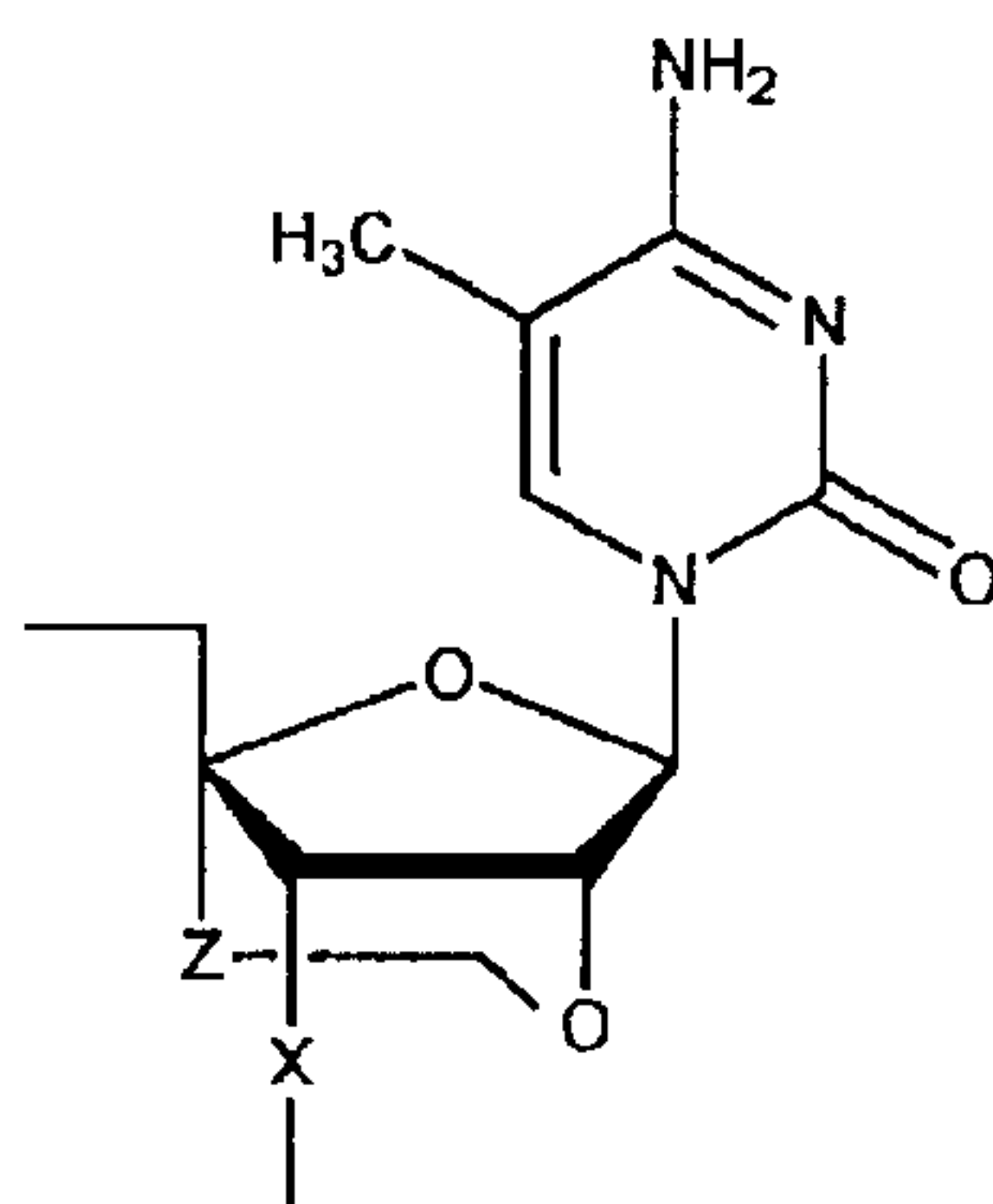
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(A 2)

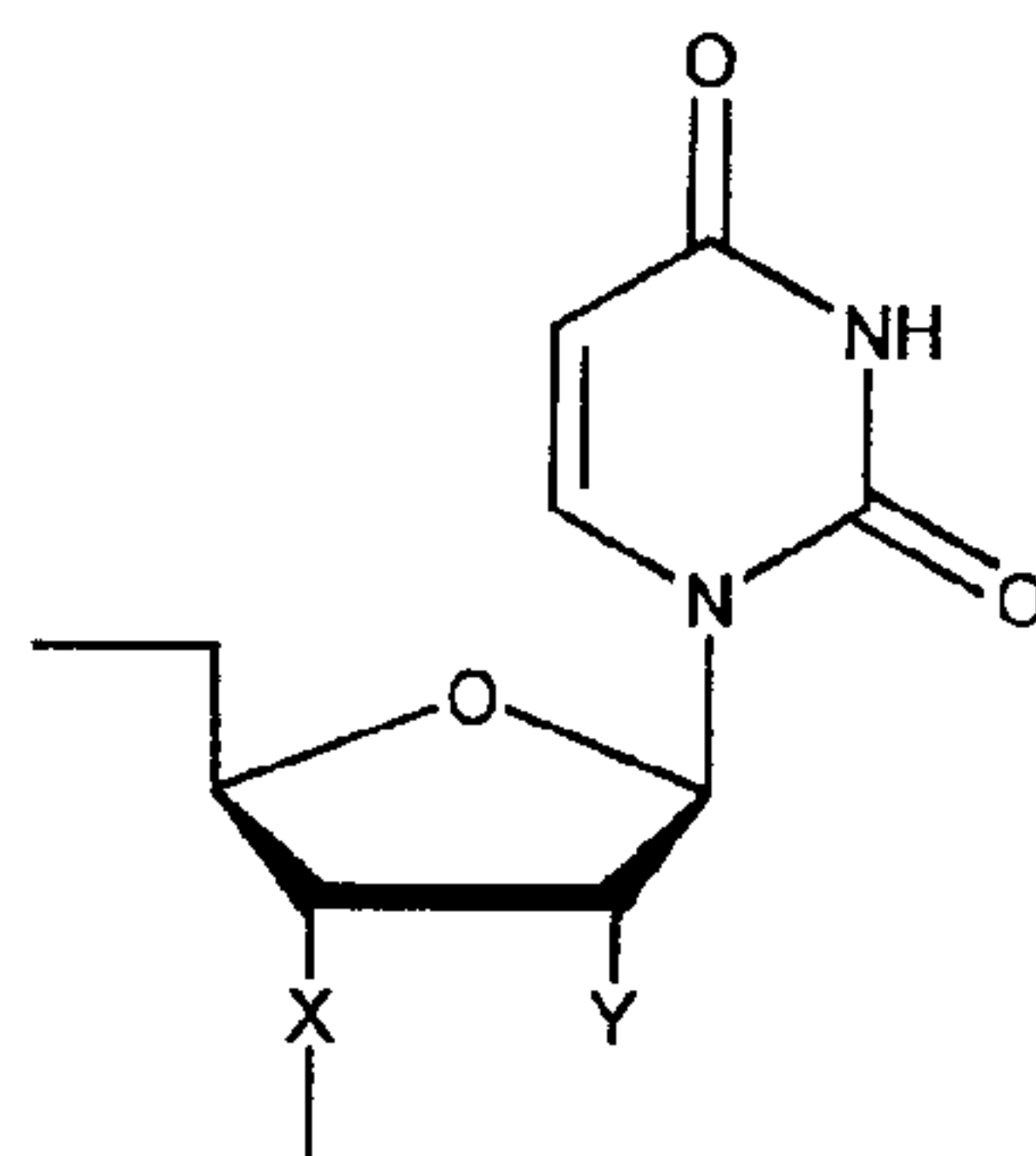


(C 1)

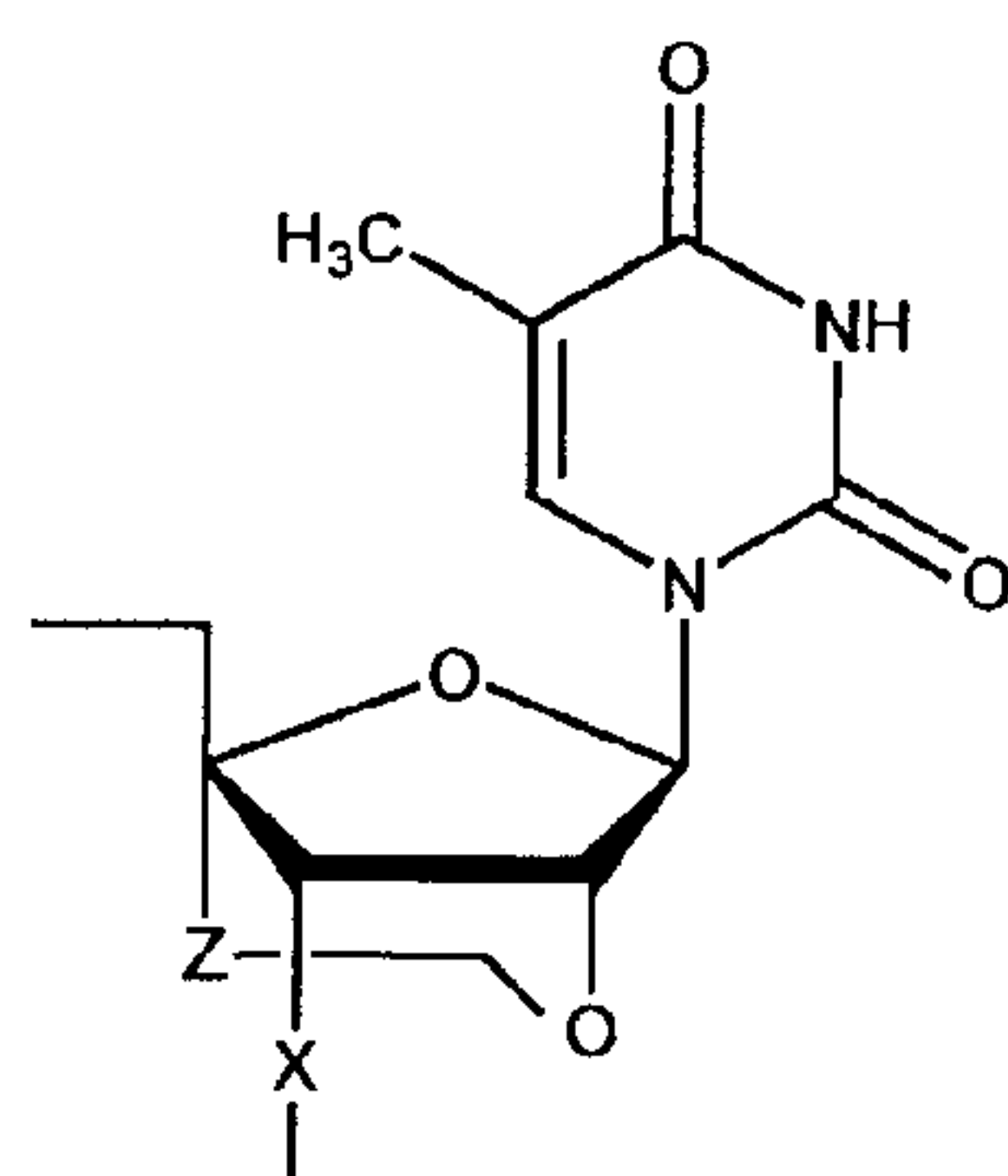


(C 2)

79861-7D

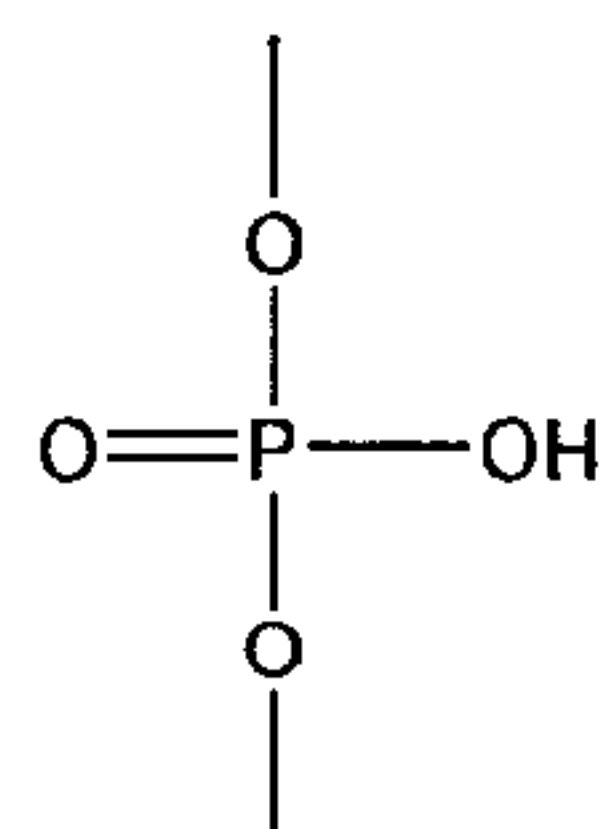


(U 1)

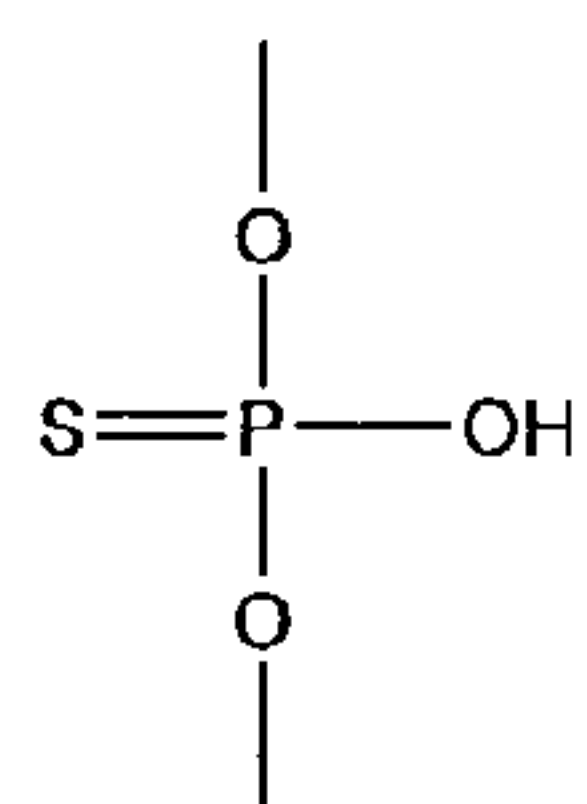


(T 2)

where X is individually and independently a group represented by the following formula
 5 (X1) or (X2):



(X 1)

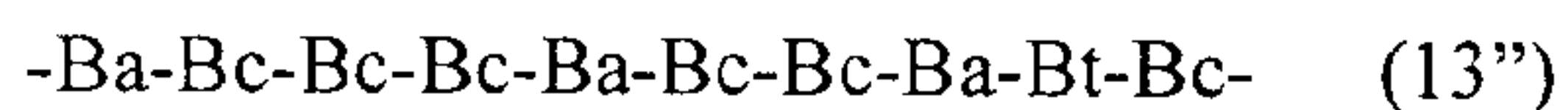


(X 2)

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group
 with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene
 10 group with 1-5 carbon atoms;

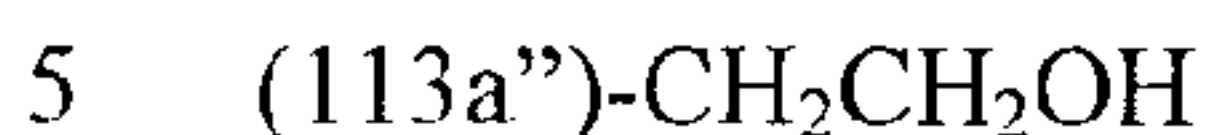
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B_{M''13} is a group represented by the following formula (13''):



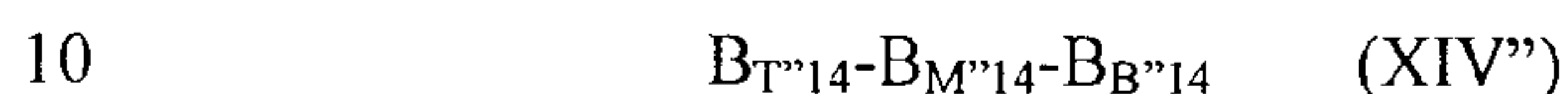
where Bg, Ba, Bt and Bc are as defined above;

B_{B''13} is a group represented by the following (113a''):

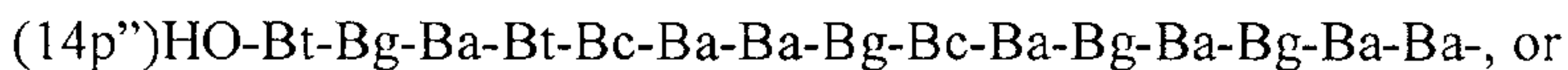
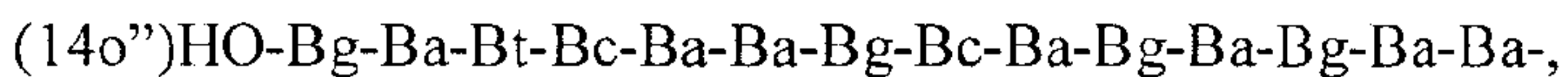
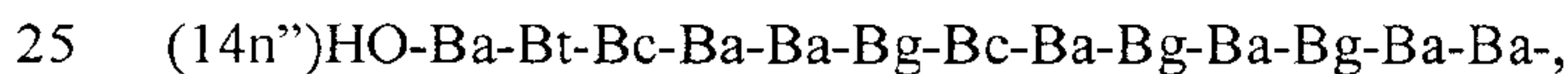
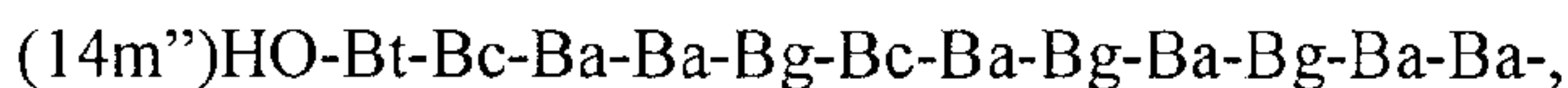
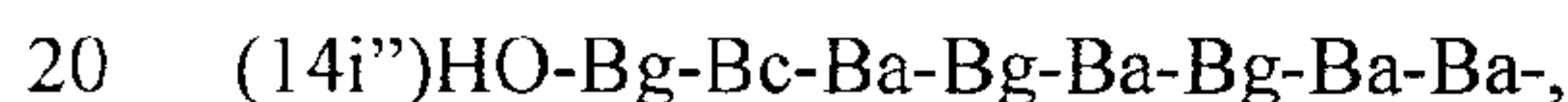
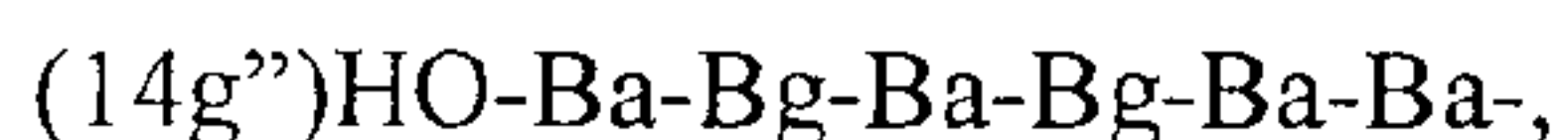
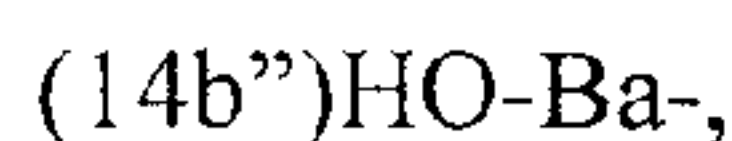
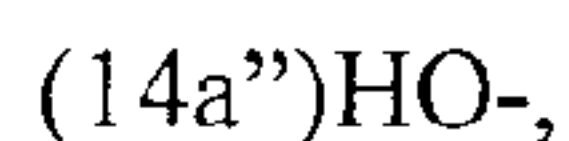


provided that at least one of the nucleosides constituting the compound represented by formula (XIII'') has 2''-O,4''-C-alkylene group.

[39] A compound represented by the following general formula (XIV'') or a pharmacologically acceptable salt thereof:



where B_{T''14} is a group represented by any one of the following (14a'') to (14q''):

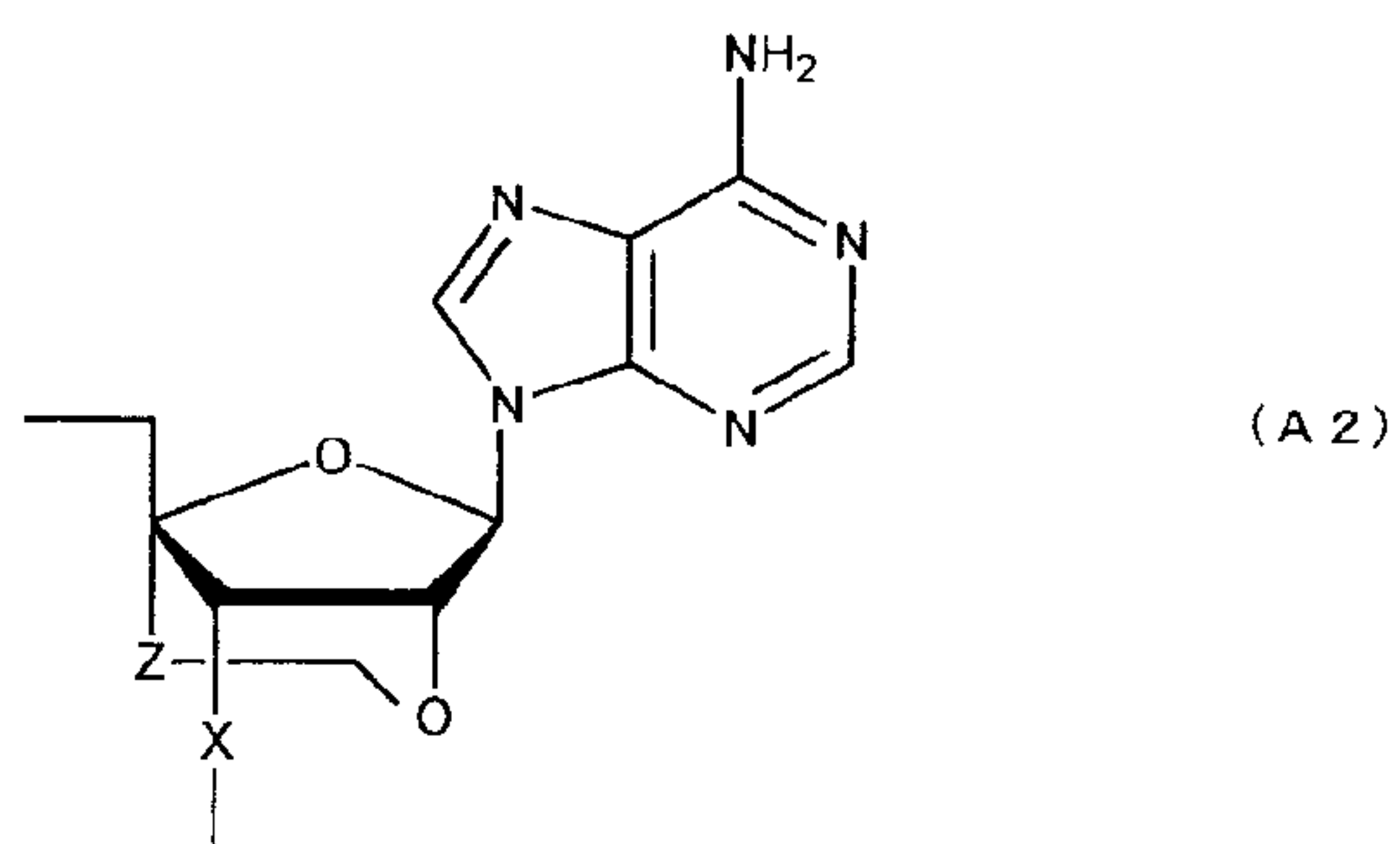
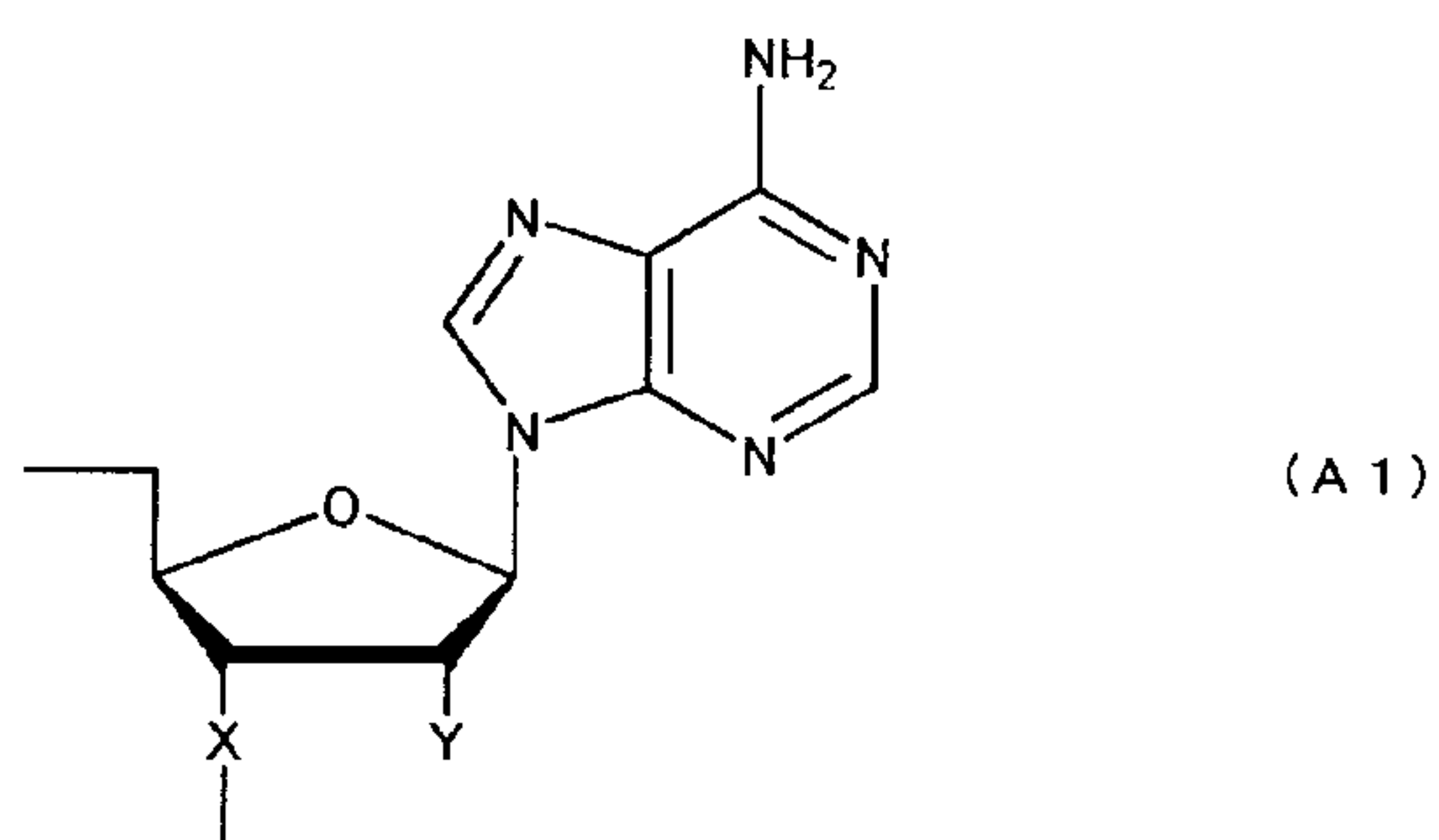
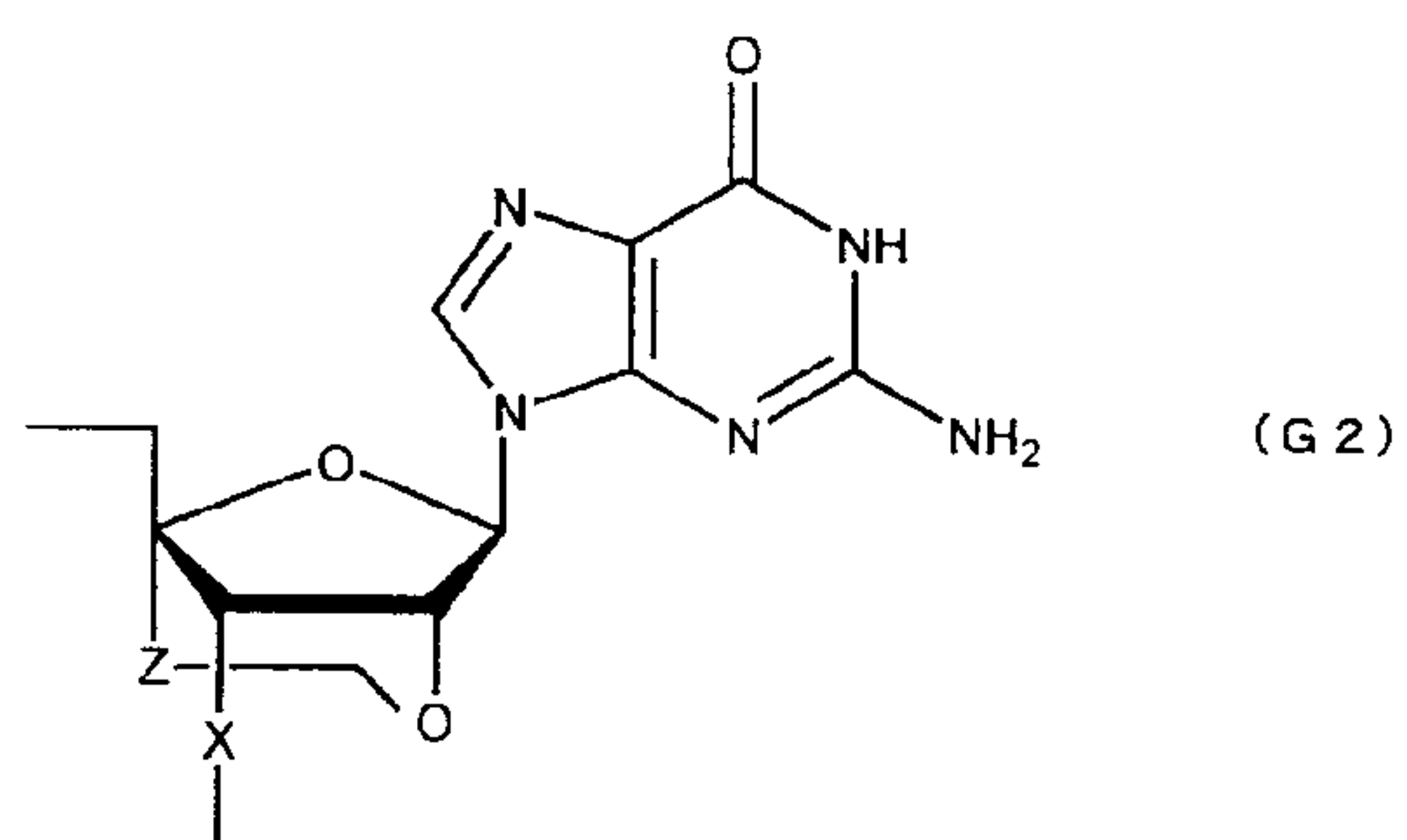
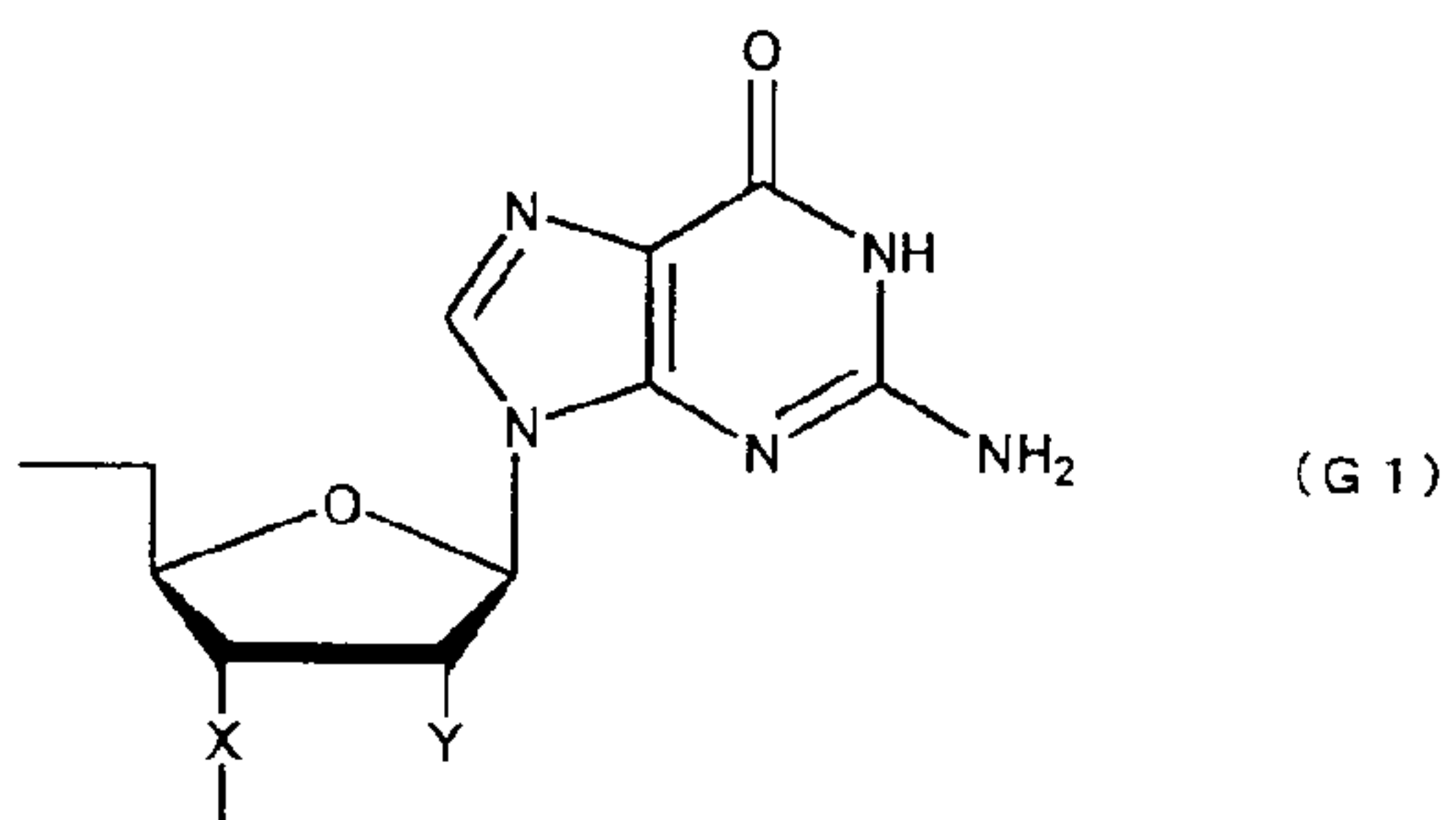


where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

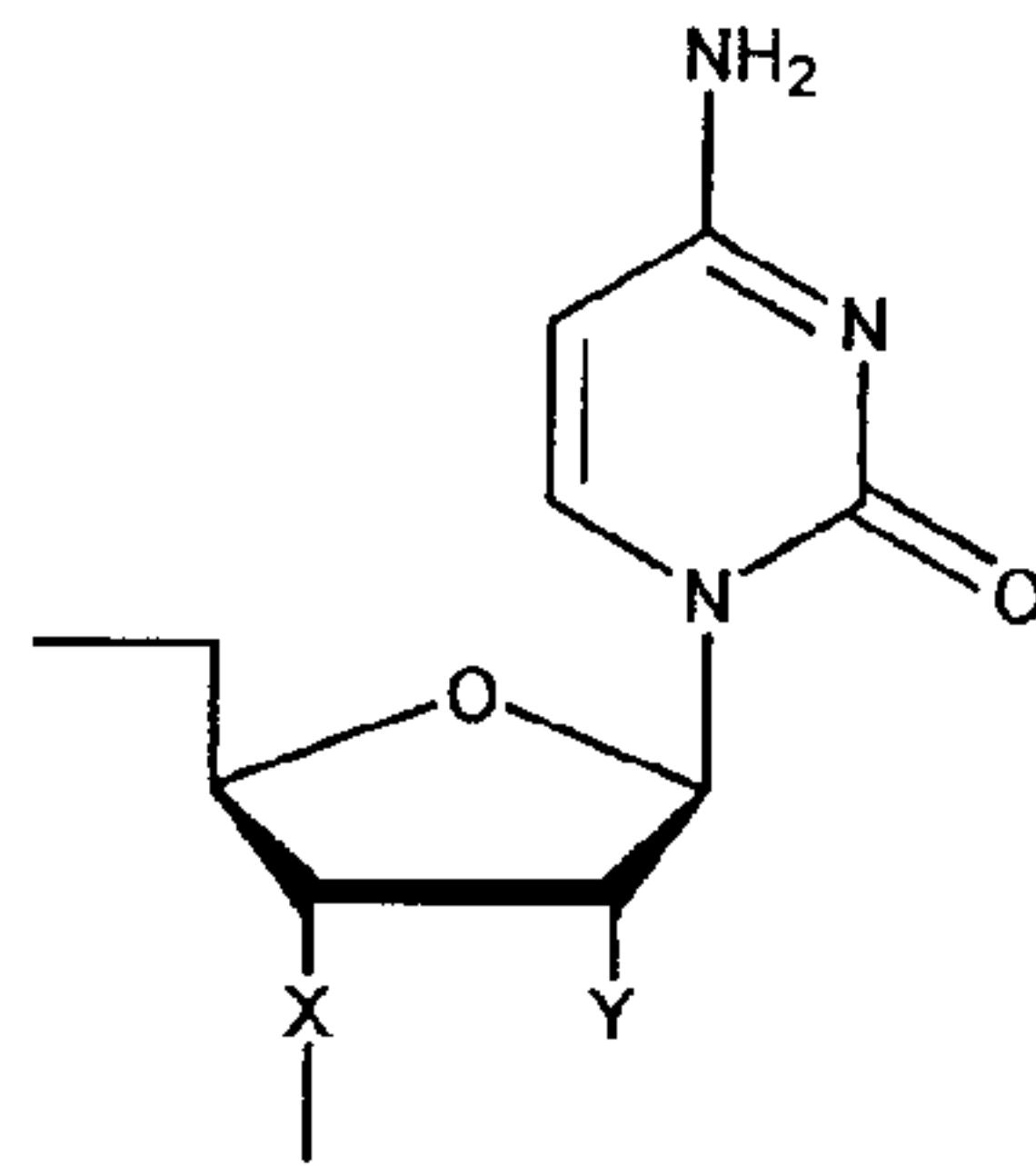
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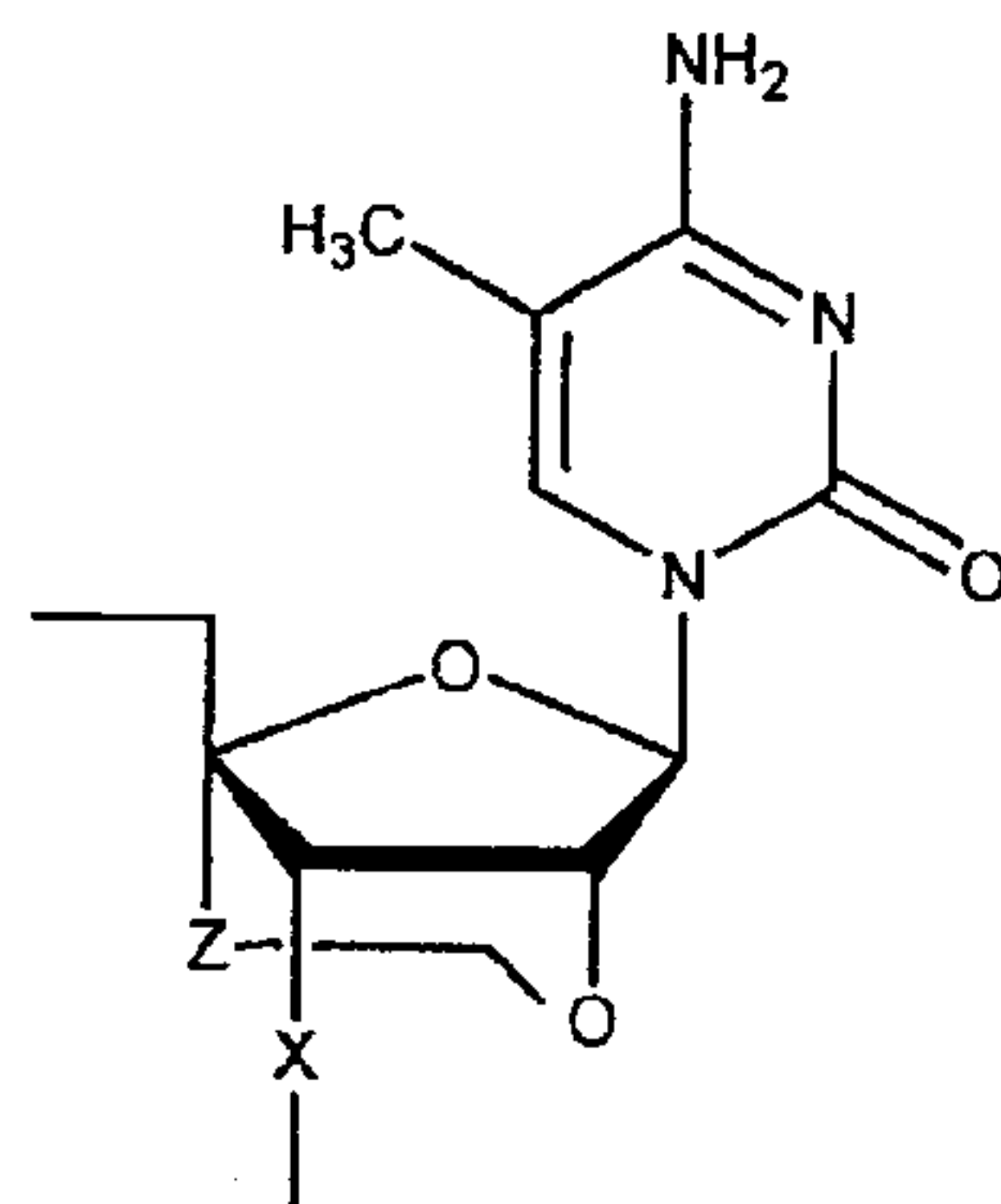
(



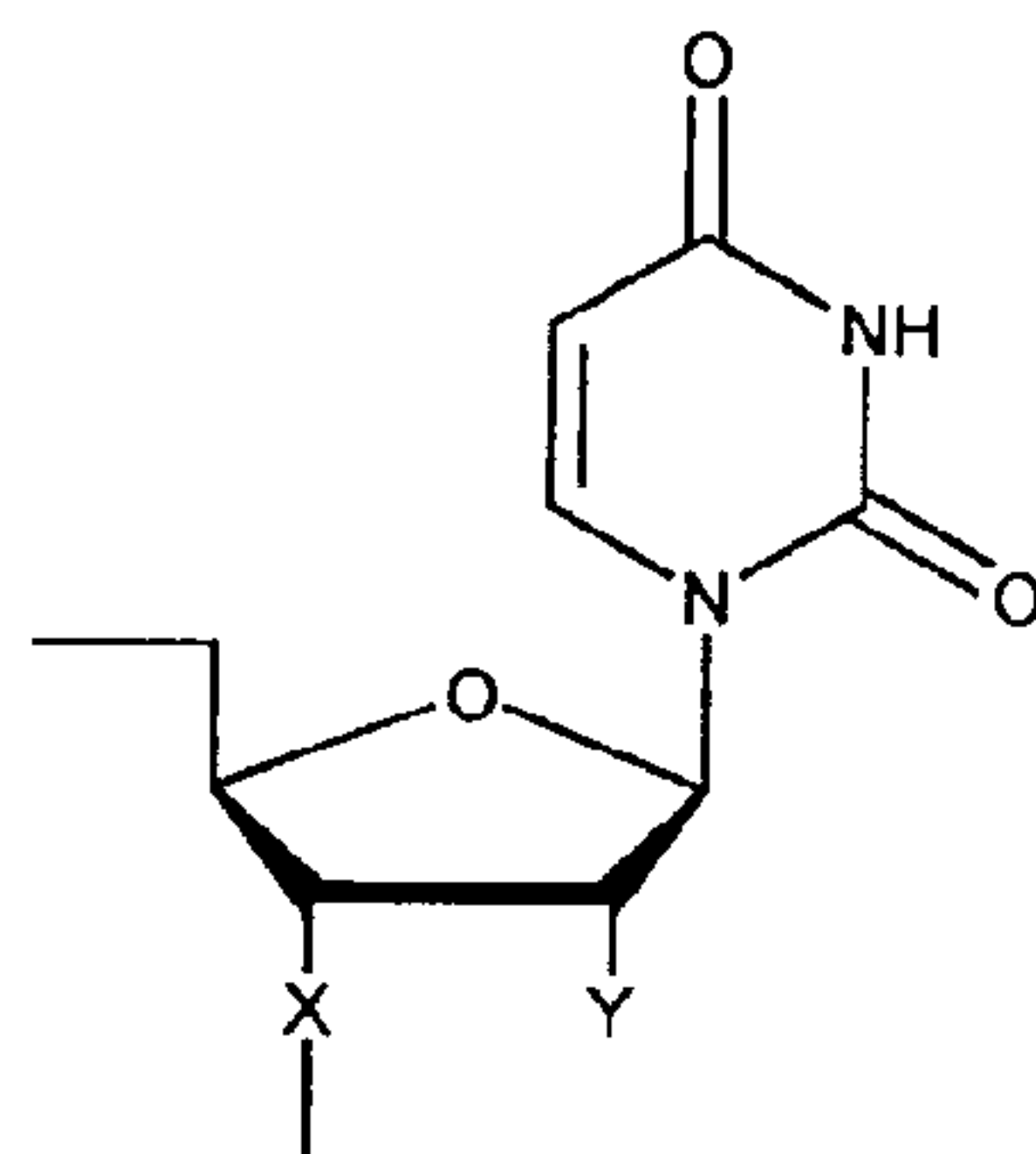
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(C 1)

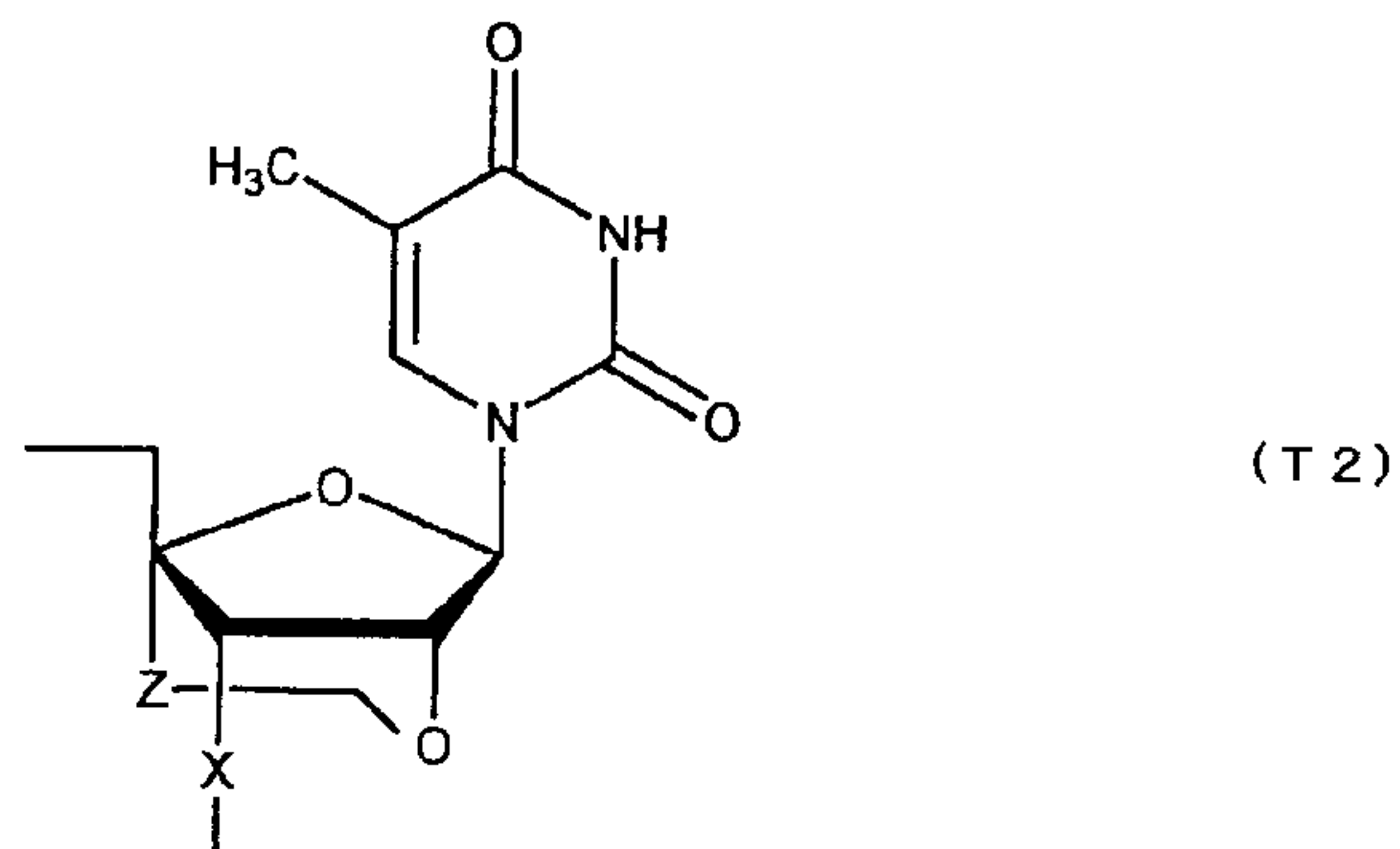


(C 2)

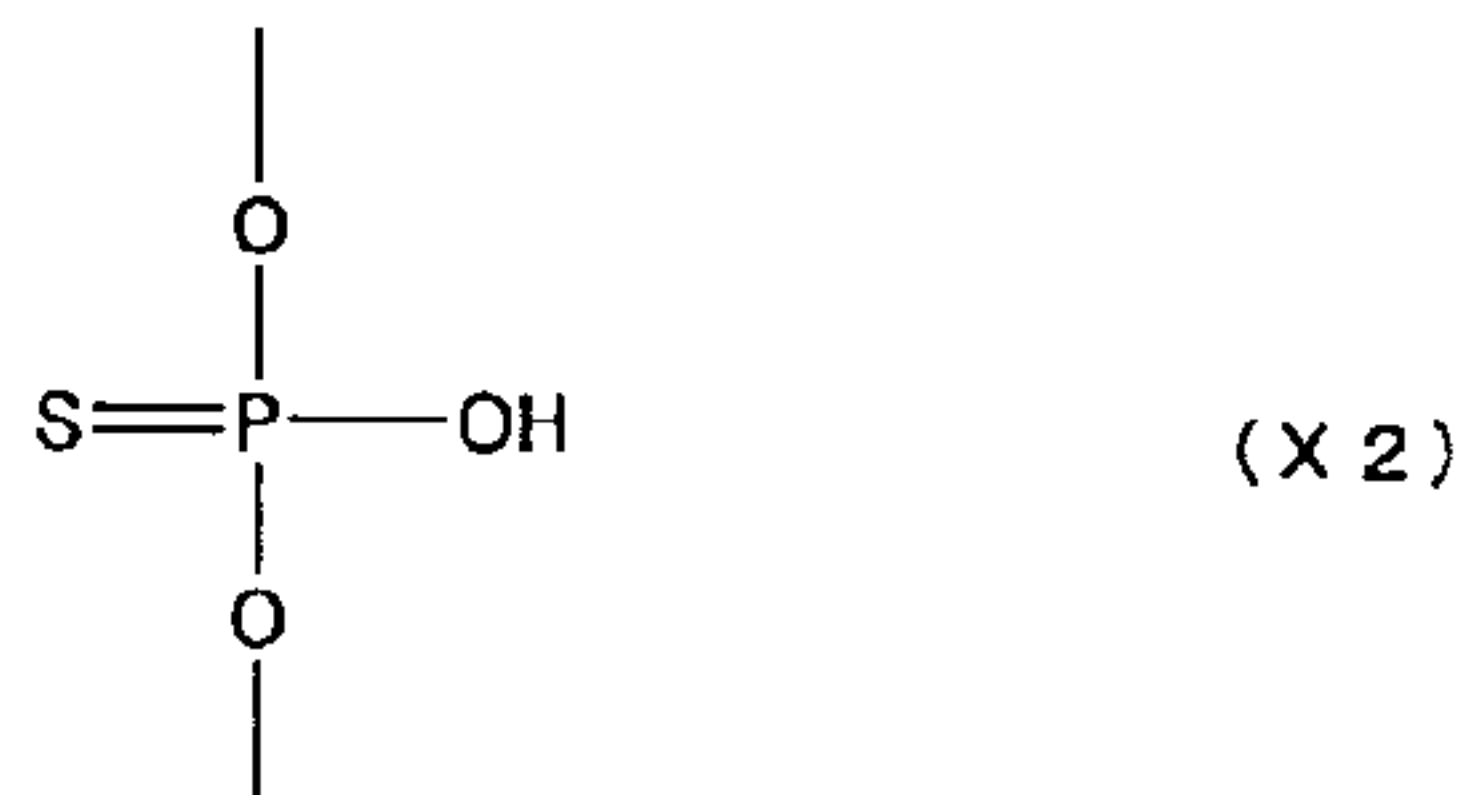
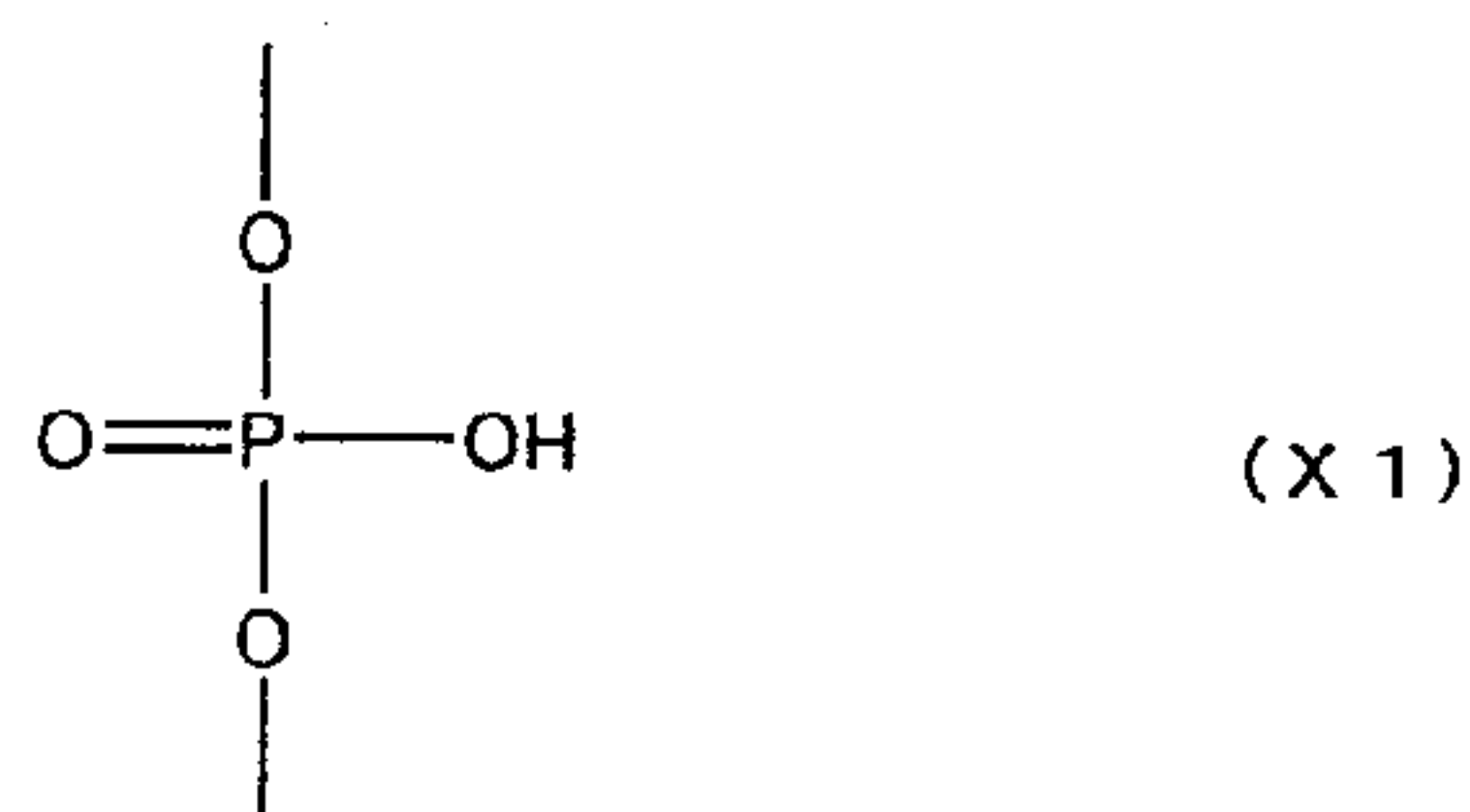


(U 1)

79861-7D



where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

$B_{M''14}$ is a group represented by the following formula (14''):

10 -Ba-Bg-Bc-Bc- (14'')

where Bg, Ba, Bt and Bc are as defined above;

$B_{B''14}$ is a group represented by any one of the following (114a'') to (114o''):

(114a'')-CH₂CH₂OH,

(114b'')-Ba-CH₂CH₂OH,

15 (114c'')-Ba-Bg-CH₂CH₂OH,

(114d'')-Ba-Bg-Bt-CH₂CH₂OH,

(114e'')-Ba-Bg-Bt-Bc-CH₂CH₂OH,

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- (114f'')-Ba-Bg-Bt-Bc-Bg-CH₂CH₂OH,
 (114g'')-Ba-Bg-Bt-Bc-Bg-Bg-CH₂CH₂OH,
 (114h'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-CH₂CH₂OH,
 (114i'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-CH₂CH₂OH,
 5 (114j'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-Ba-CH₂CH₂OH,
 (114k'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-Ba-Bg-CH₂CH₂OH,
 (114l'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-Ba-Bg-Bt-CH₂CH₂OH,
 (114m'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-Ba-Bg-Bt-Bt-CH₂CH₂OH,
 (114n'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-Ba-Bg-Bt-Bt-Bc-CH₂CH₂OH, or
 10 (114o'')-Ba-Bg-Bt-Bc-Bg-Bg-Bt-Ba-Ba-Bg-Bt-Bt-Bc-Bt-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XIV'') has 2''-O,4''-C-alkylene group.

- [40] A compound represented by the following general formula (XV'') or a
 15 pharmacologically acceptable salt thereof:

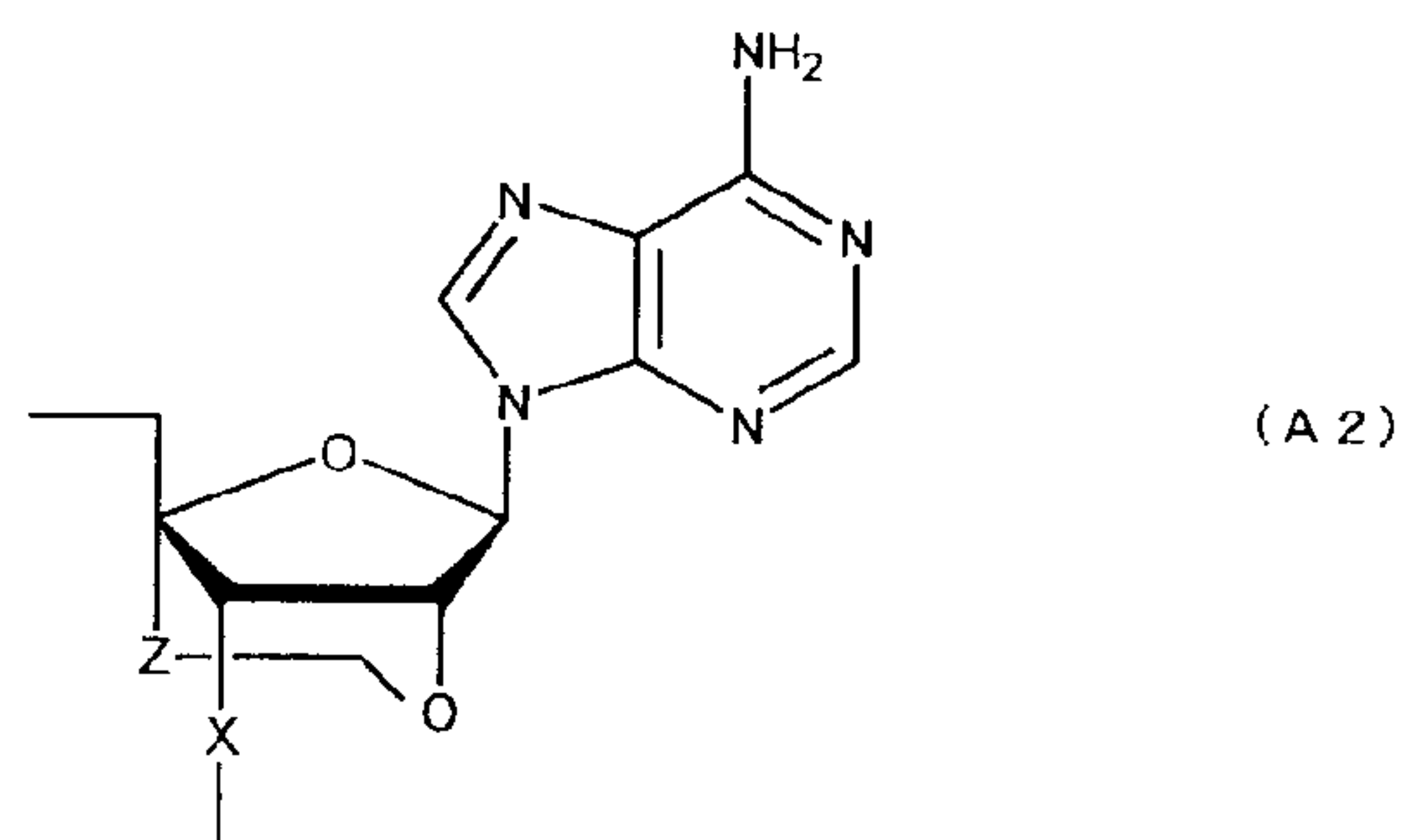
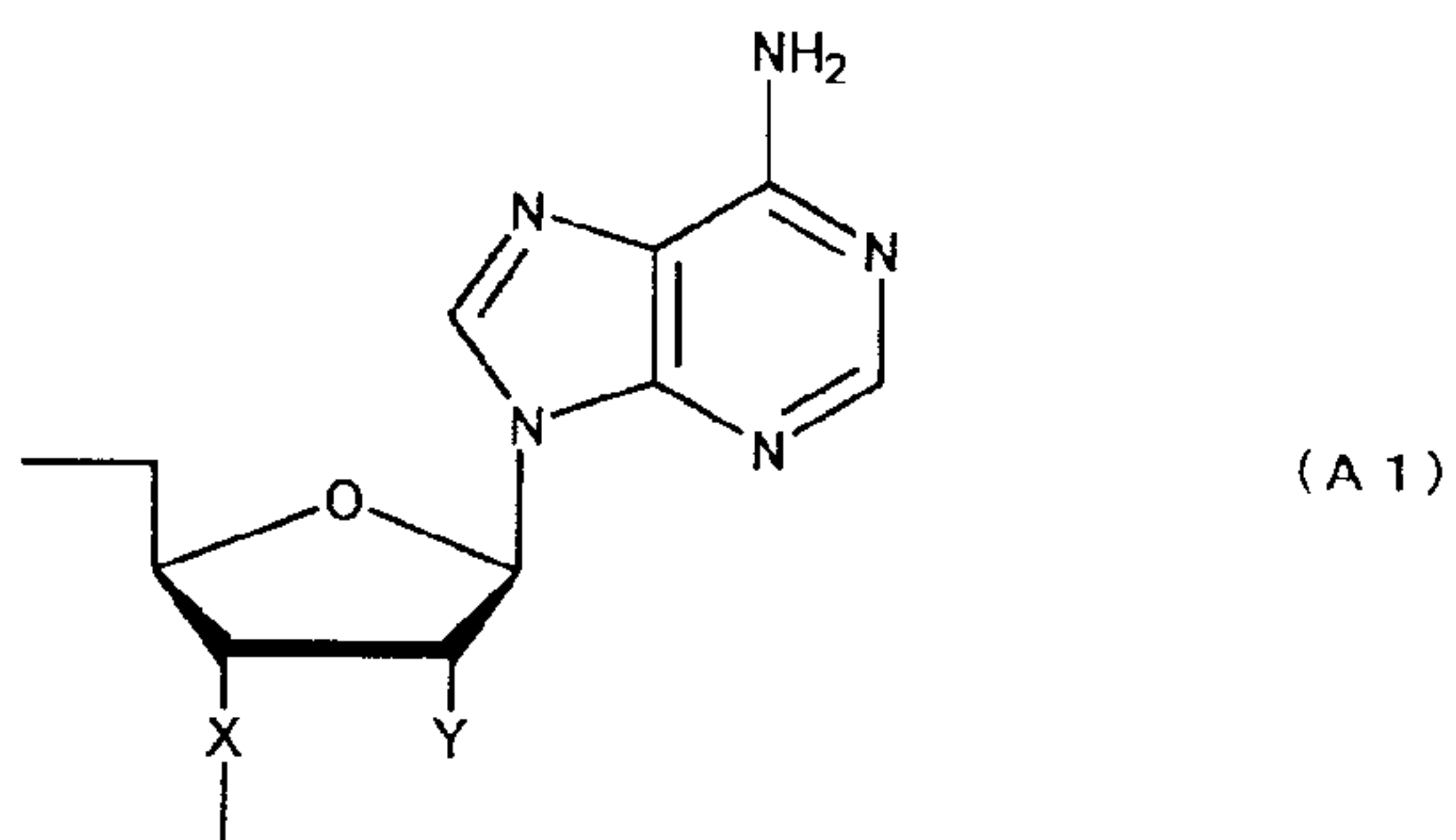
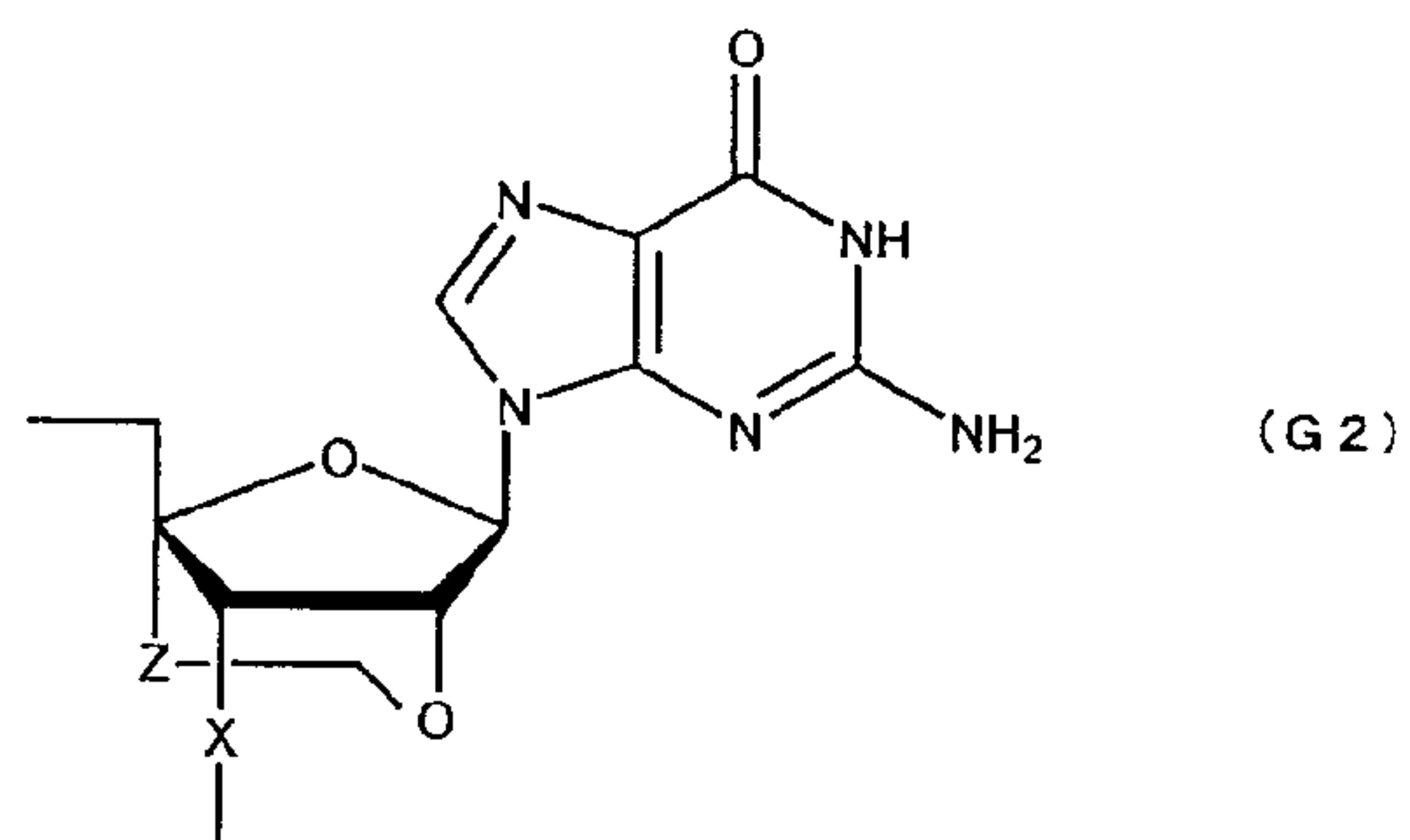
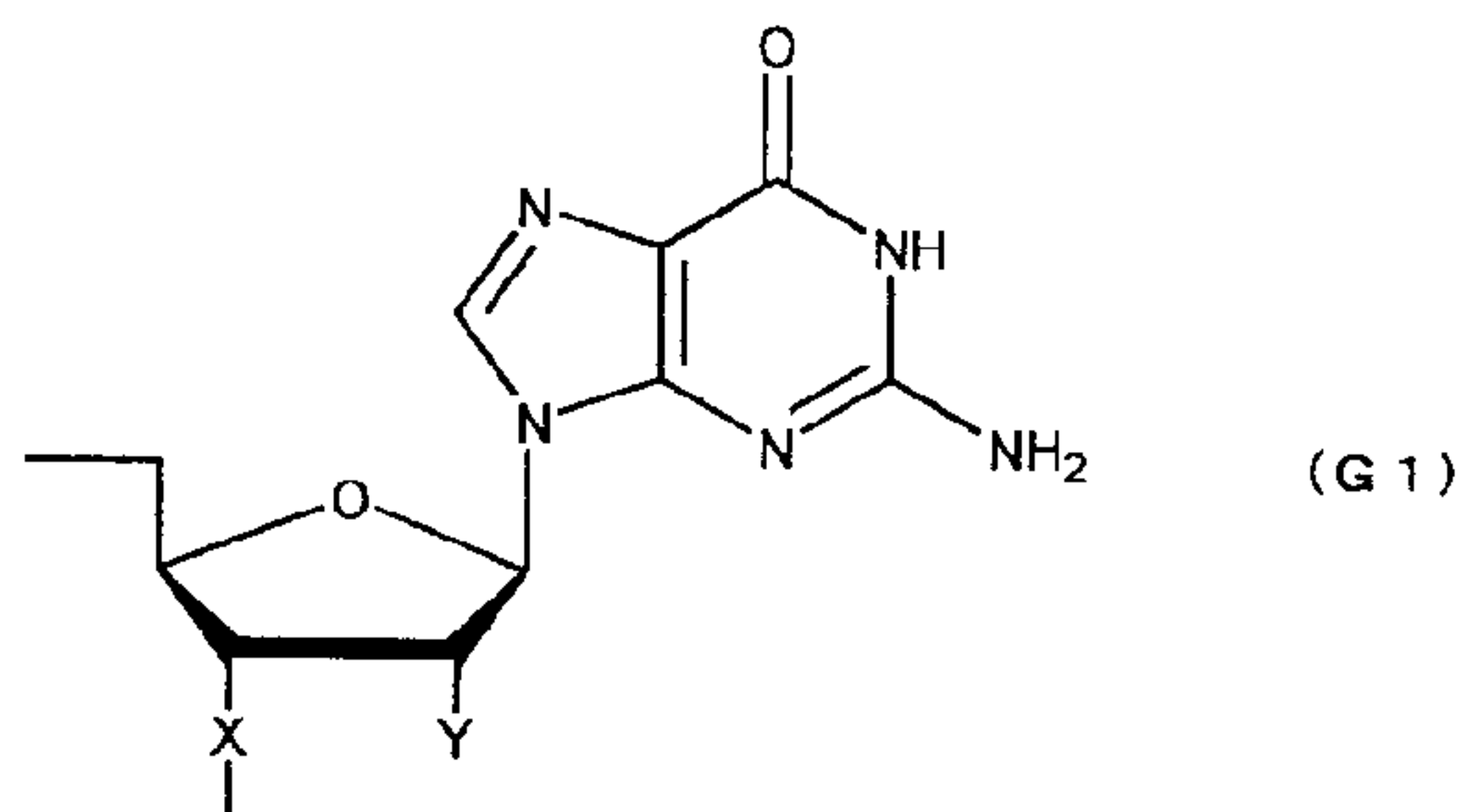


where B_{T''15} is a group represented by any one of the following (15a'') to (15j''):

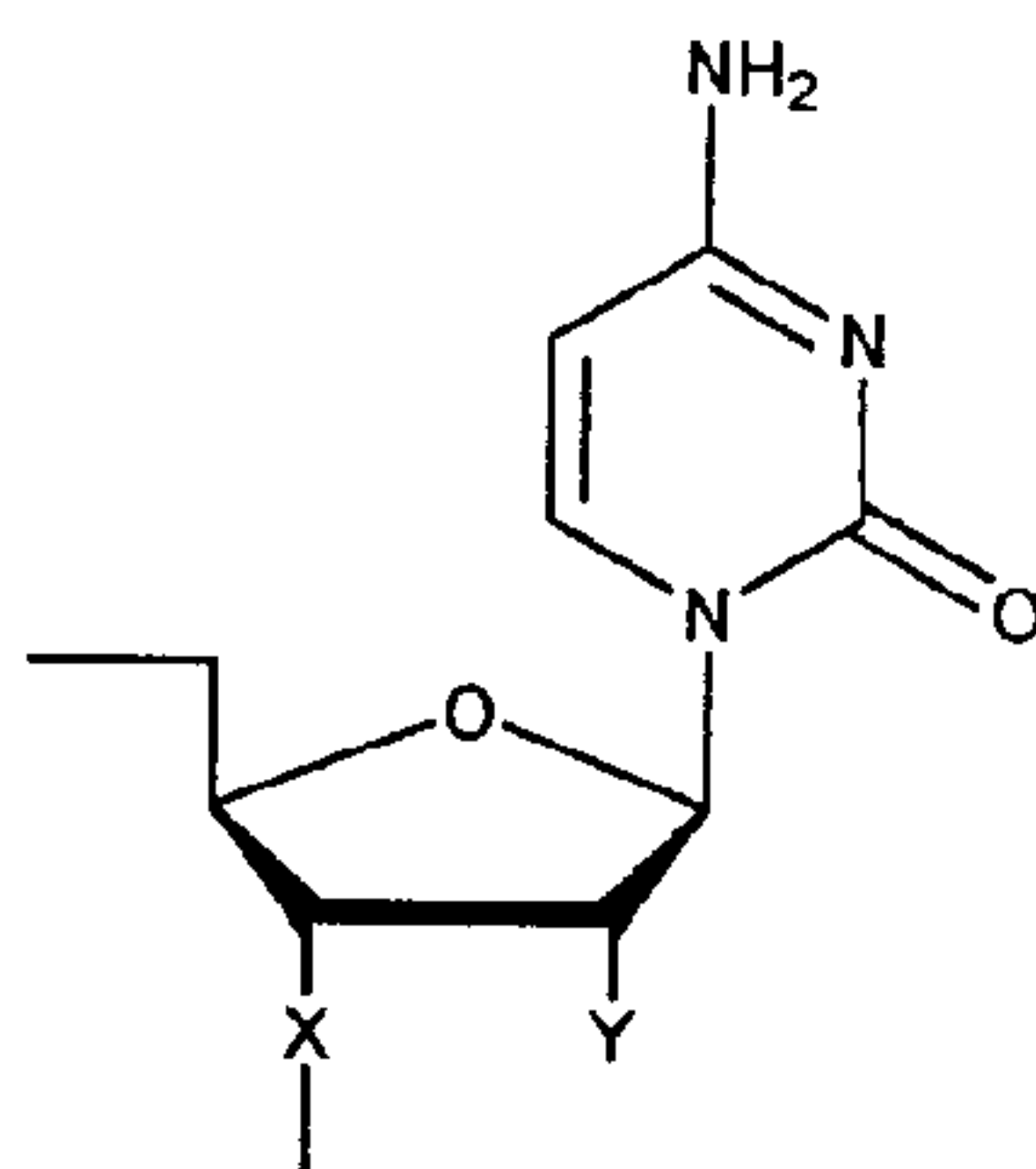
- (15a'')HO-,
 (15b'')HO-Bt-,
 20 (15c'')HO-Bc-Bt-,
 (15d'')HO-Bt-Bc-Bt-,
 (15e'')HO-Bt-Bt-Bc-Bt-,
 (15f'')HO-Bt-Bt-Bt-Bc-Bt-,
 (15g'')HO-Ba-Bt-Bt-Bt-Bc-Bt-,
 25 (15h'')HO-Bc-Ba-Bt-Bt-Bt-Bc-Bt-,
 (15i'')HO-Bg-Bc-Ba-Bt-Bt-Bt-Bc-Bt-, or
 (15j'')HO-Bg-Bg-Bc-Ba-Bt-Bt-Bt-Bc-Bt-

- where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the
 30 following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

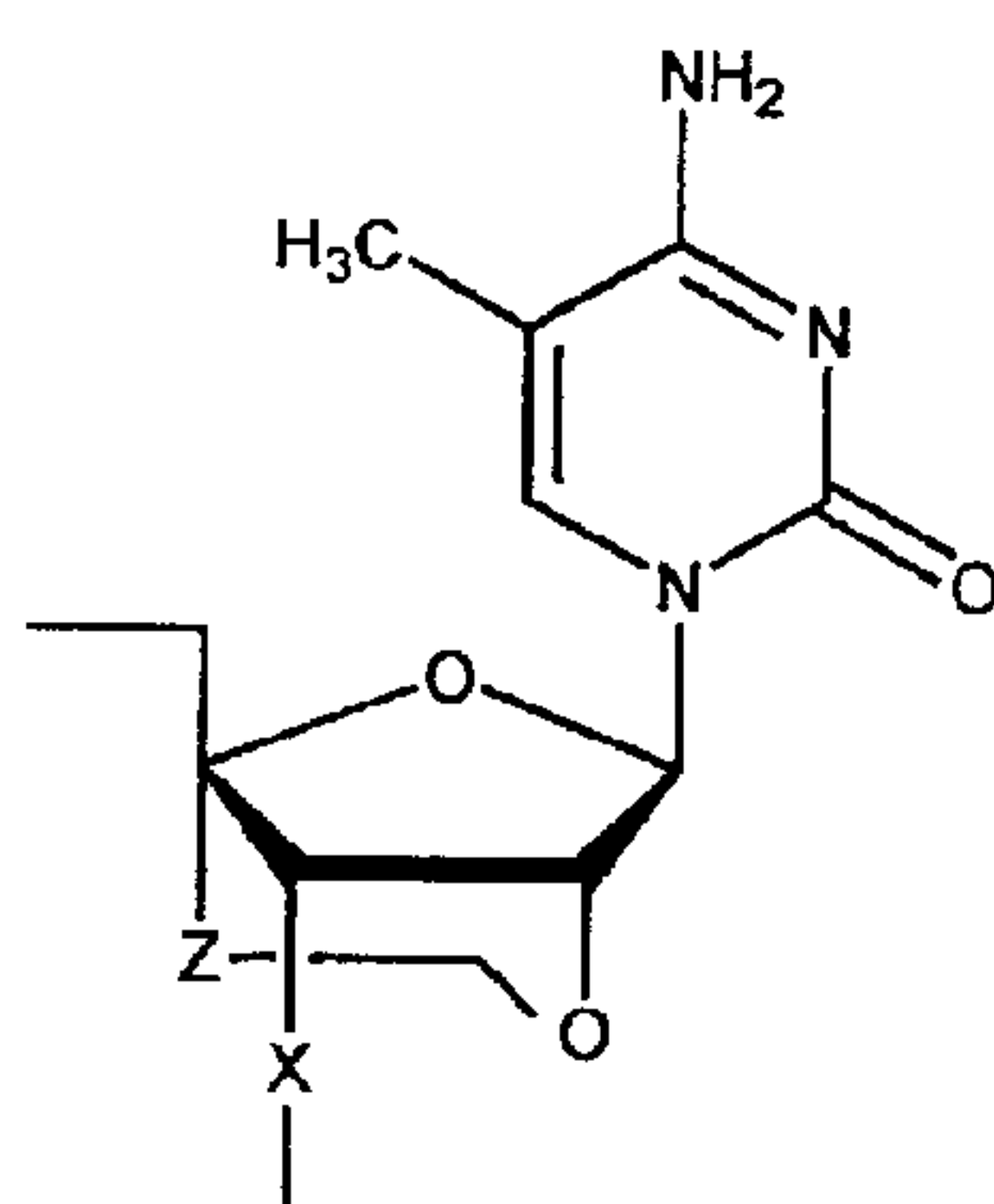
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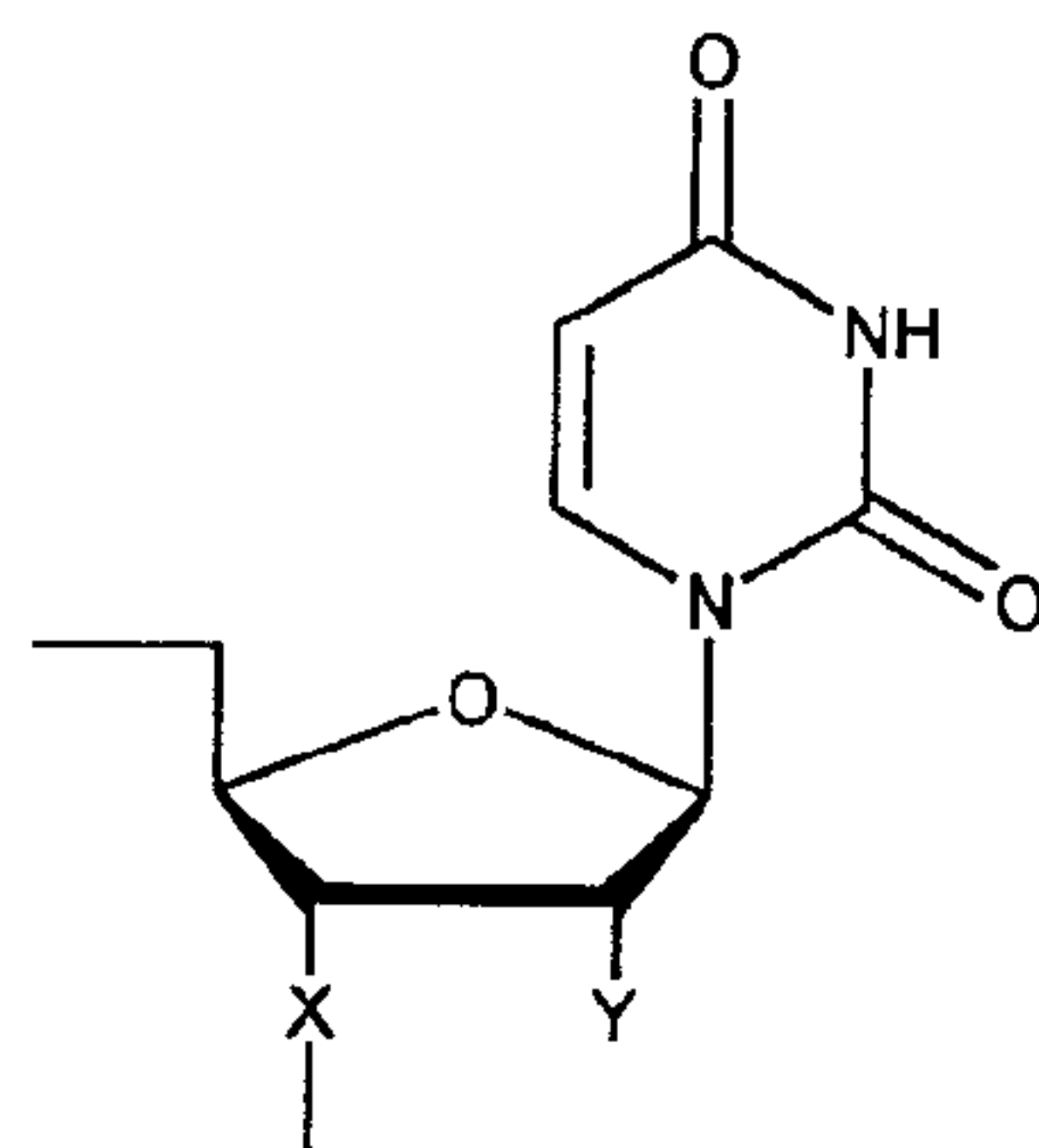
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(C 1)

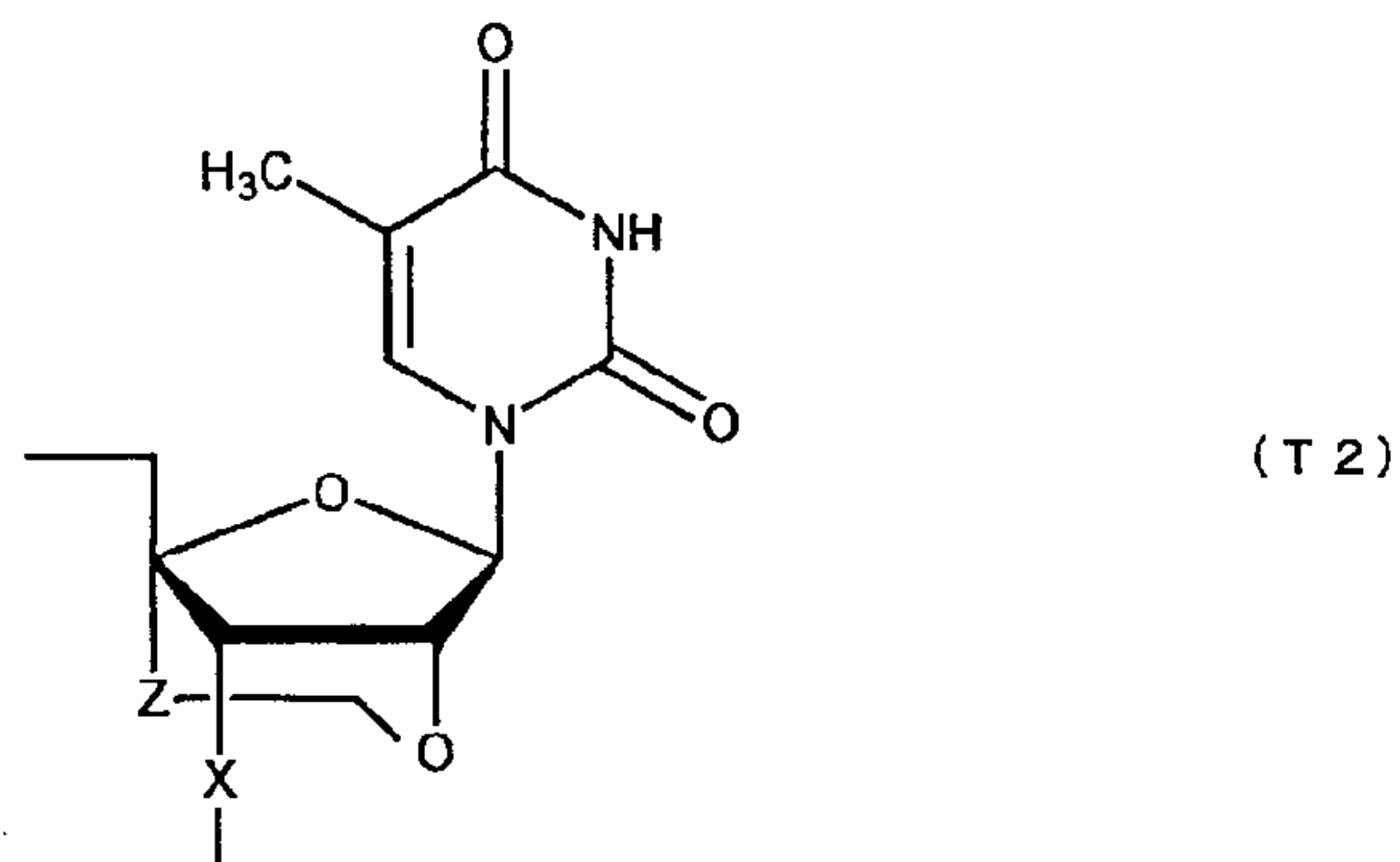


(C 2)

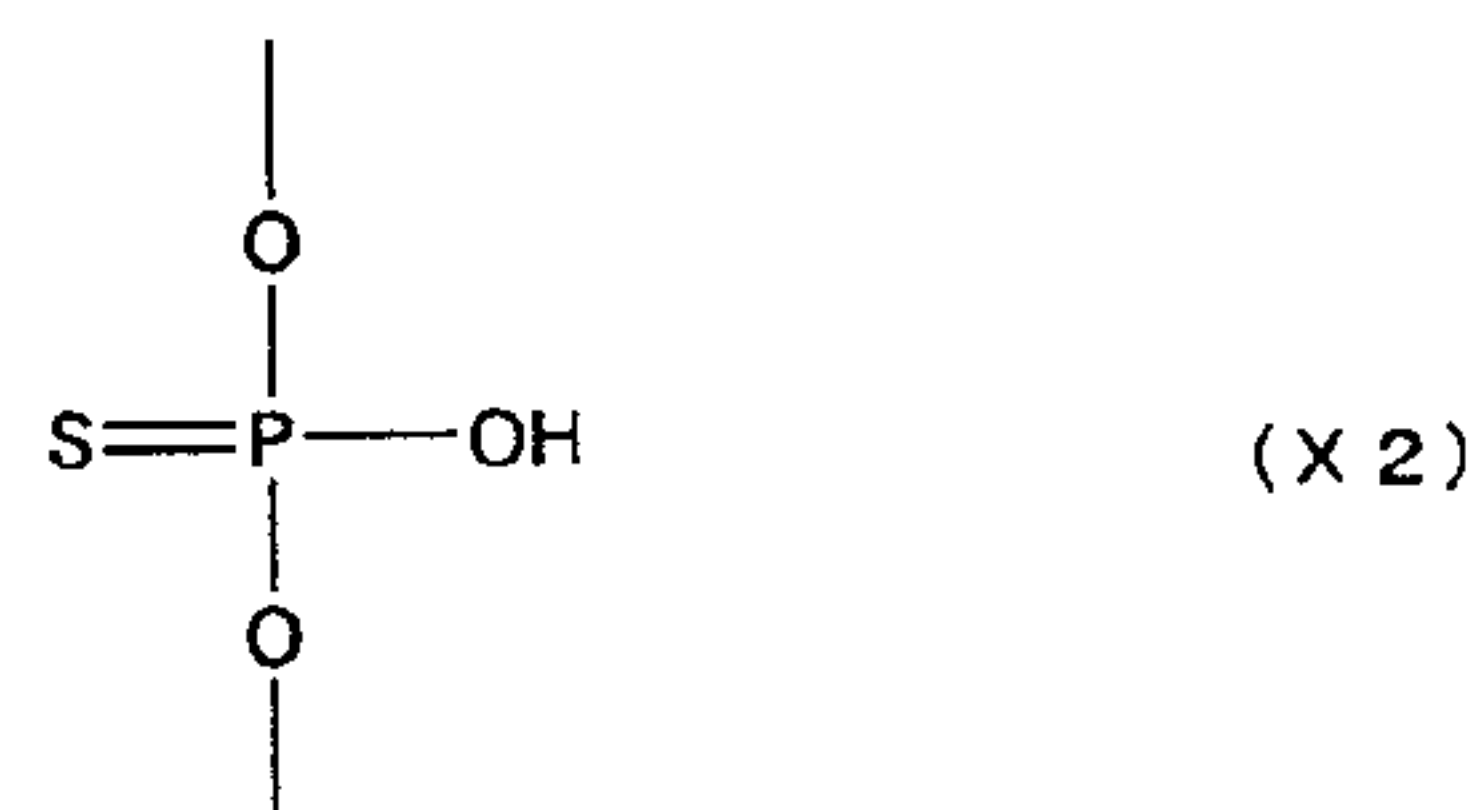
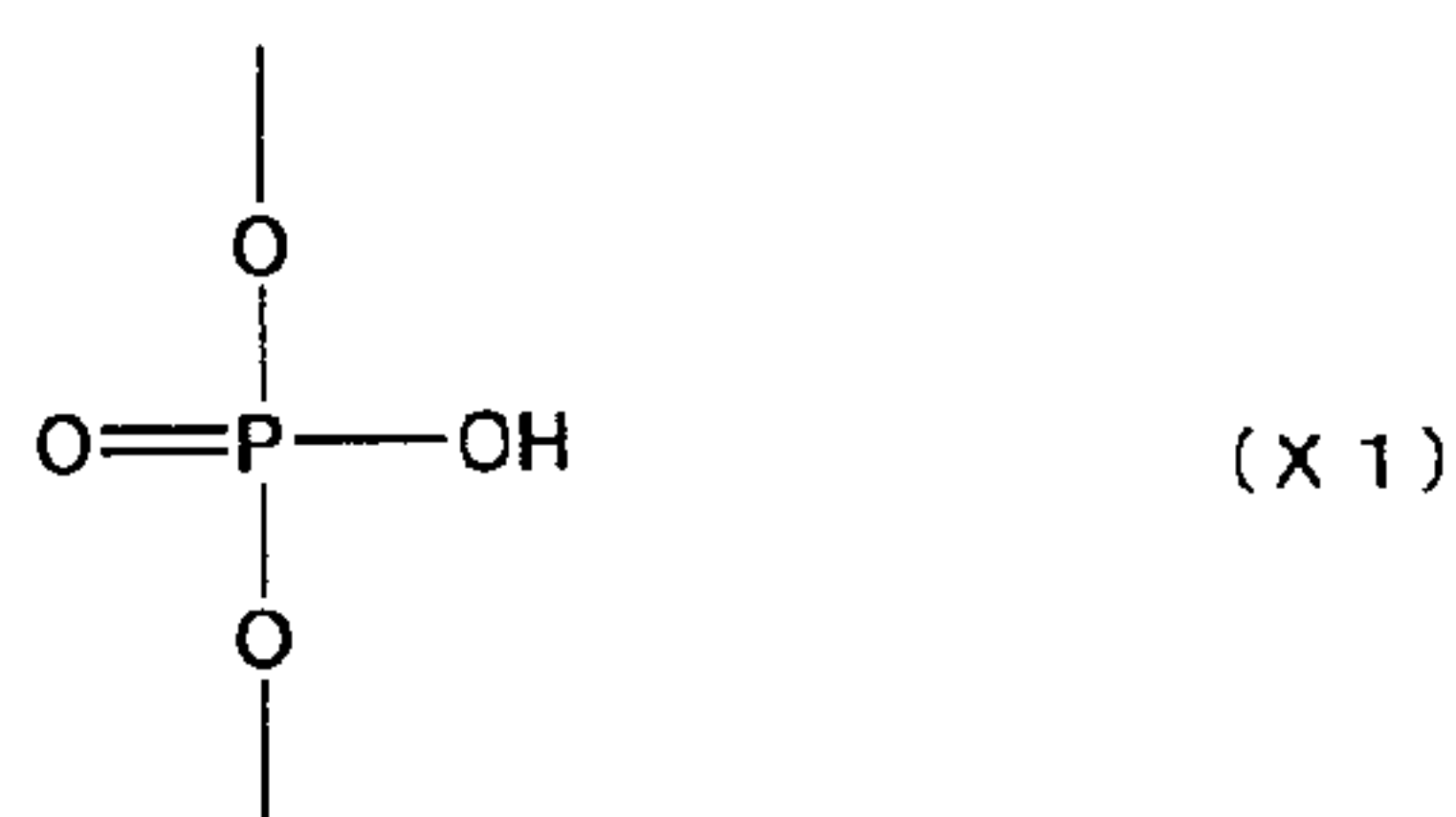


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''15} is a group represented by the following formula (15''):

10 -Ba-Bg-Bt-Bt-Bt-Bg-Bg-Ba-Bg- (15'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''15} is a group represented by any one of the following (115a'') to (115j''):

(115a'')-CH₂CH₂OH,

(115b'')-Ba-CH₂CH₂OH,

15 (115c'')-Ba-Bt-CH₂CH₂OH,

(115d'')-Ba-Bt-Bg-CH₂CH₂OH,

(115e'')-Ba-Bt-Bg-Bg-CH₂CH₂OH,

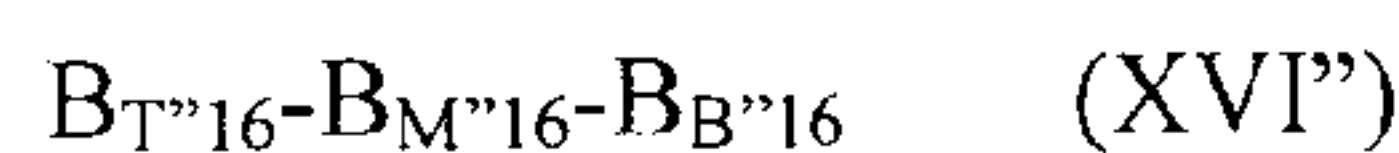
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(115f'')-Ba-Bt-Bg-Bg-Bc-CH₂CH₂OH,(115g'')-Ba-Bt-Bg-Bg-Bc-Ba-CH₂CH₂OH,(115h'')-Ba-Bt-Bg-Bg-Bc-Ba-Bg-CH₂CH₂OH,(115i'')-Ba-Bt-Bg-Bg-Bc-Ba-Bg-Bt-CH₂CH₂OH, or5 (115j'')-Ba-Bt-Bg-Bg-Bc-Ba-Bg-Bt-Bt-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XV'') has 2''-O,4''-C-alkylene group.

[41] A compound represented by the following general formula (XVI'') or a
10 pharmacologically acceptable salt thereof:

where B_{T''16} is a group represented by any one of the following (16a'') to (16j''):

(16a'')HO-,

(16b'')HO-Bg-,

15 (16c'')HO-Bt-Bg-,

(16d'')HO-Bg-Bt-Bg-,

(16e'')HO-Bg-Bg-Bt-Bg-,

(16f'')HO-Ba-Bg-Bg-Bt-Bg-,

(16g'')HO-Ba-Ba-Bg-Bg-Bt-Bg-,

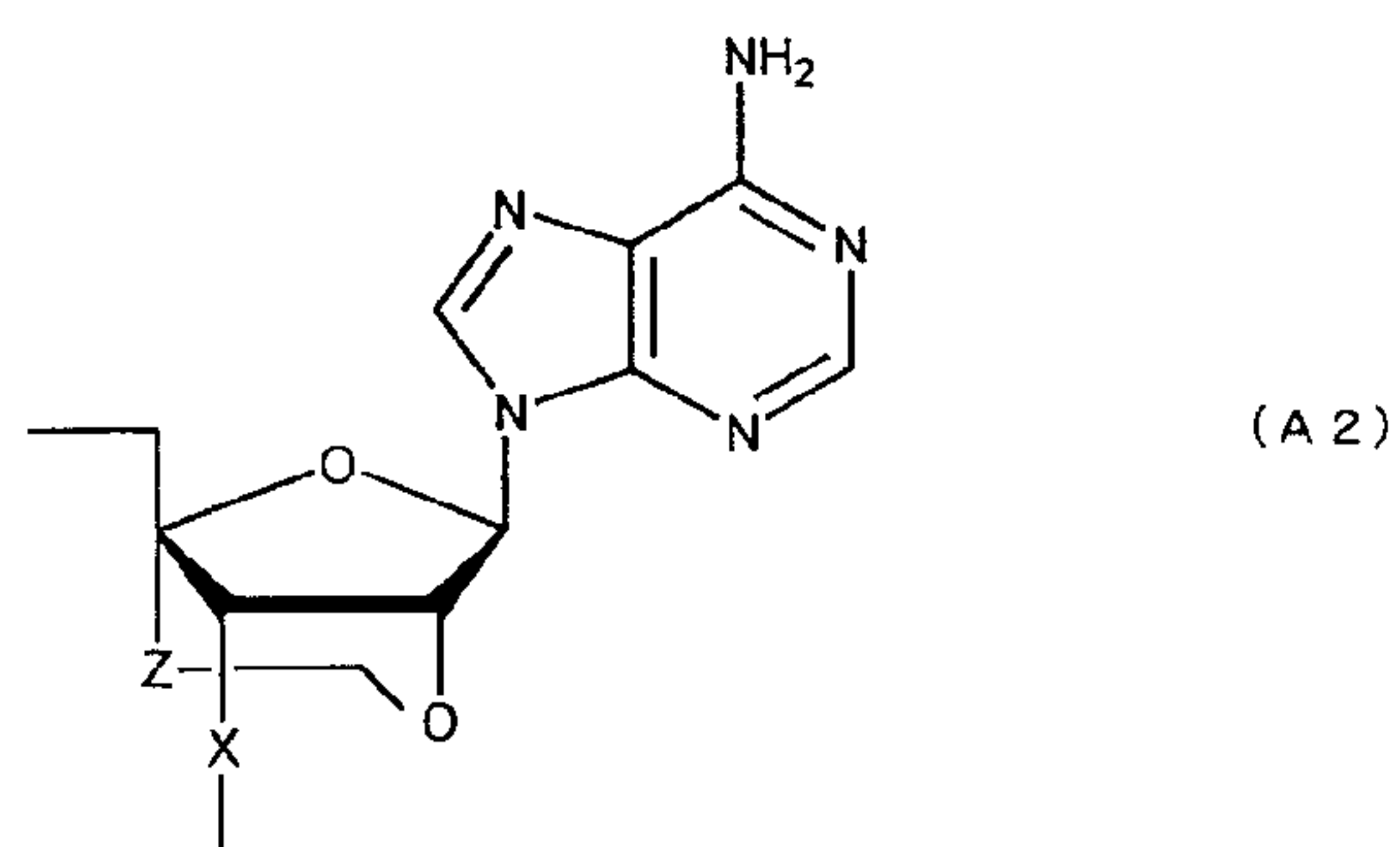
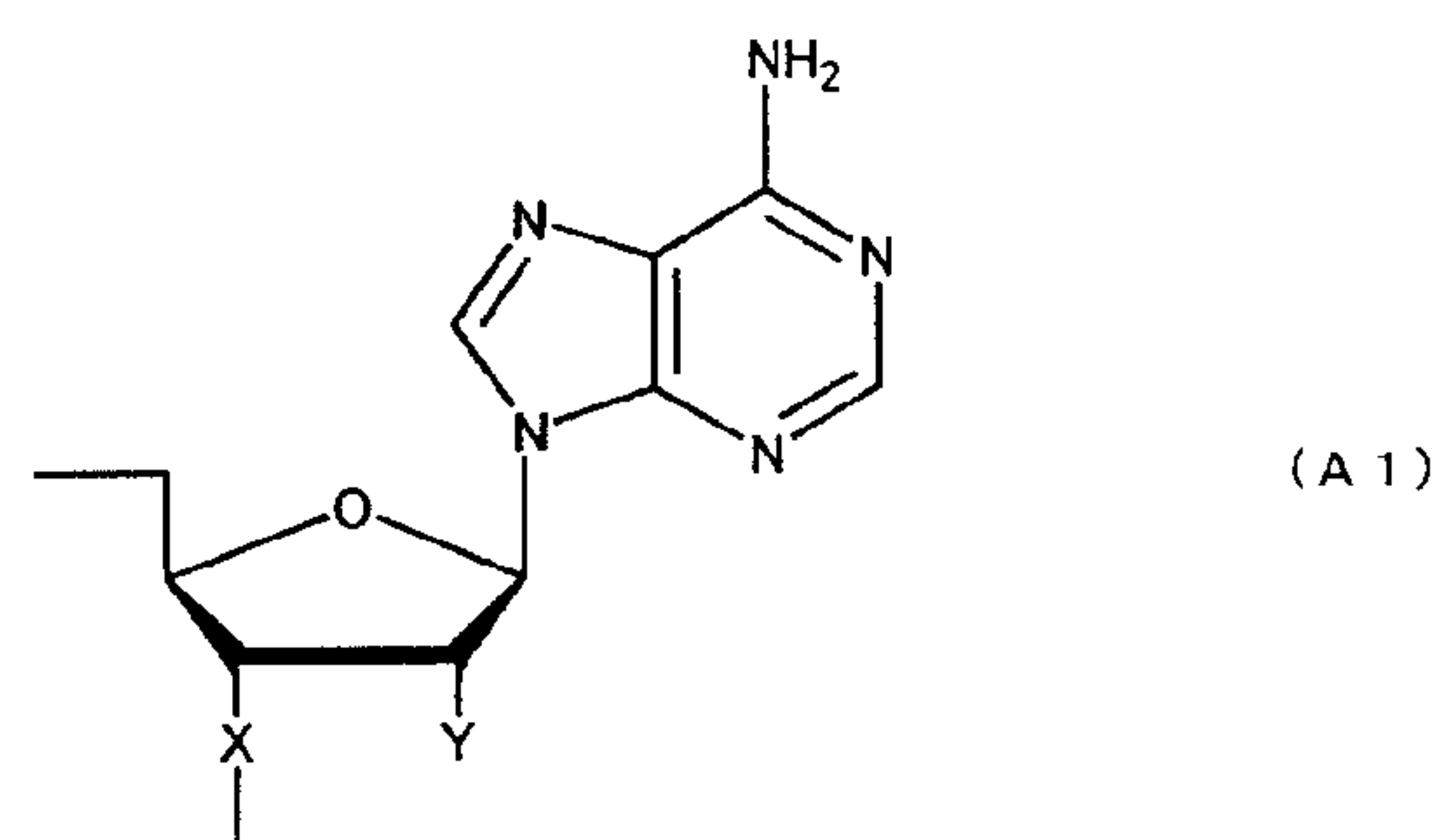
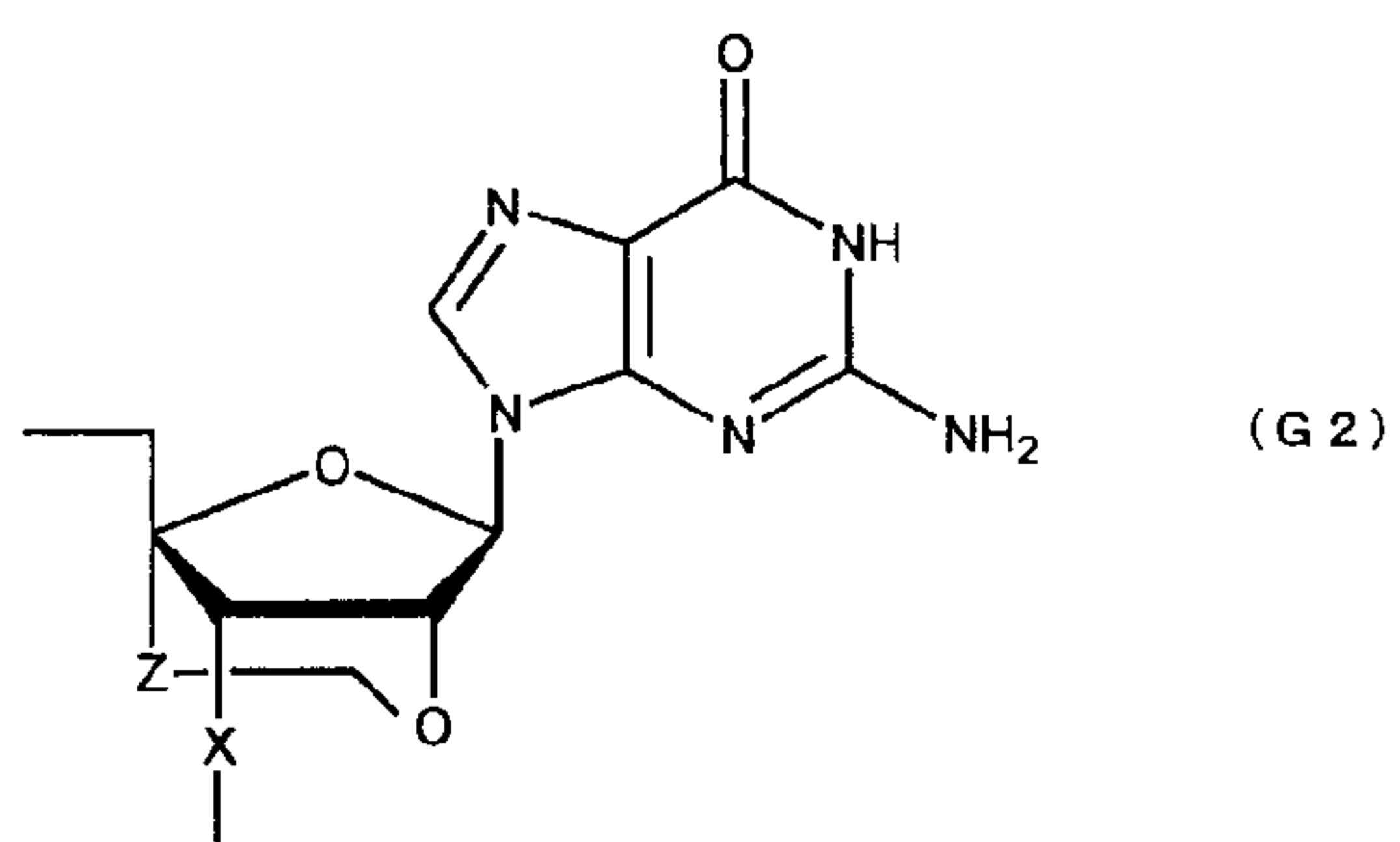
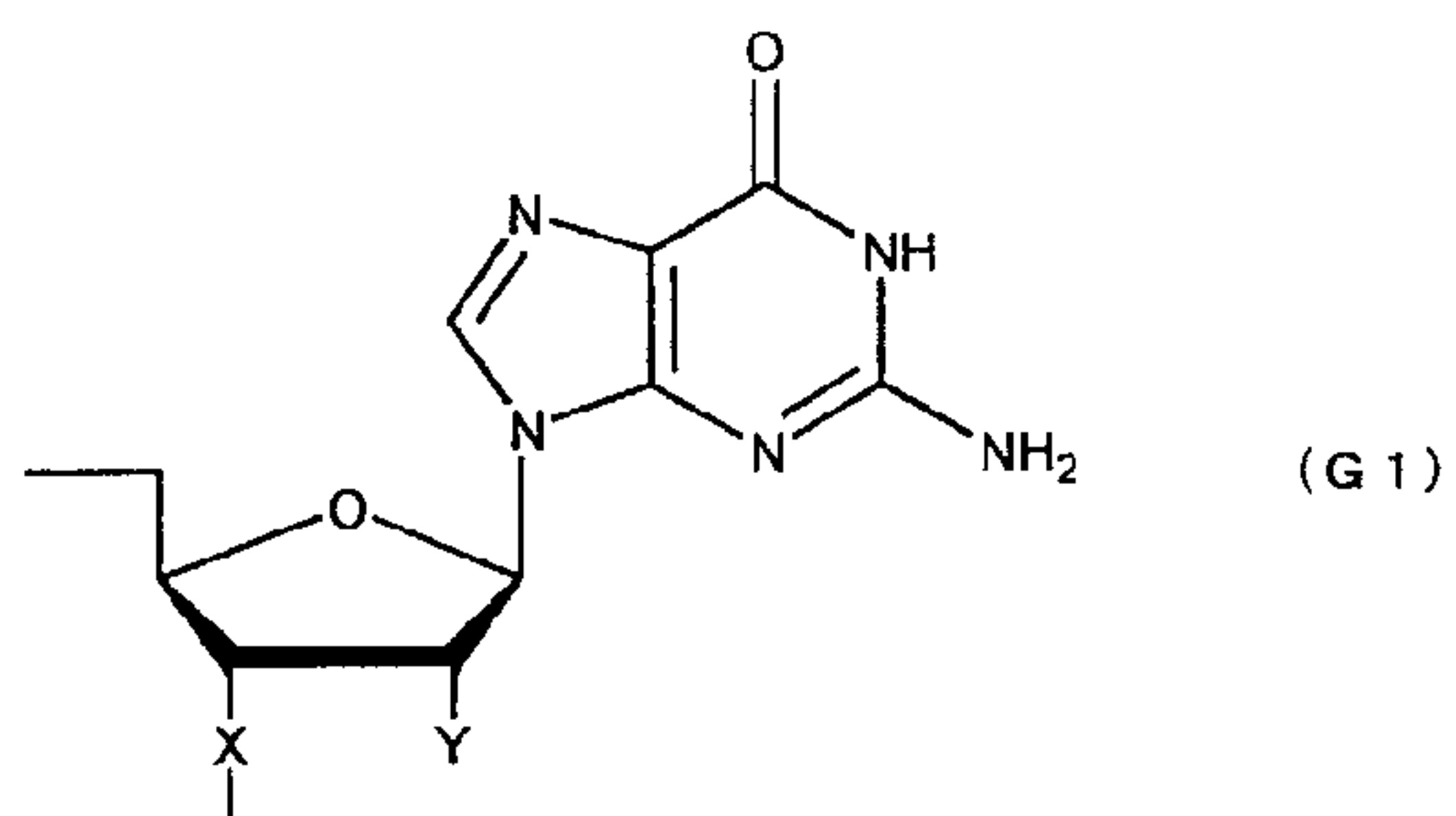
20 (16h'')HO-Bg-Ba-Ba-Bg-Bg-Bt-Bg-,

(16i'')HO-Bt-Bg-Ba-Ba-Bg-Bg-Bt-Bg-, or

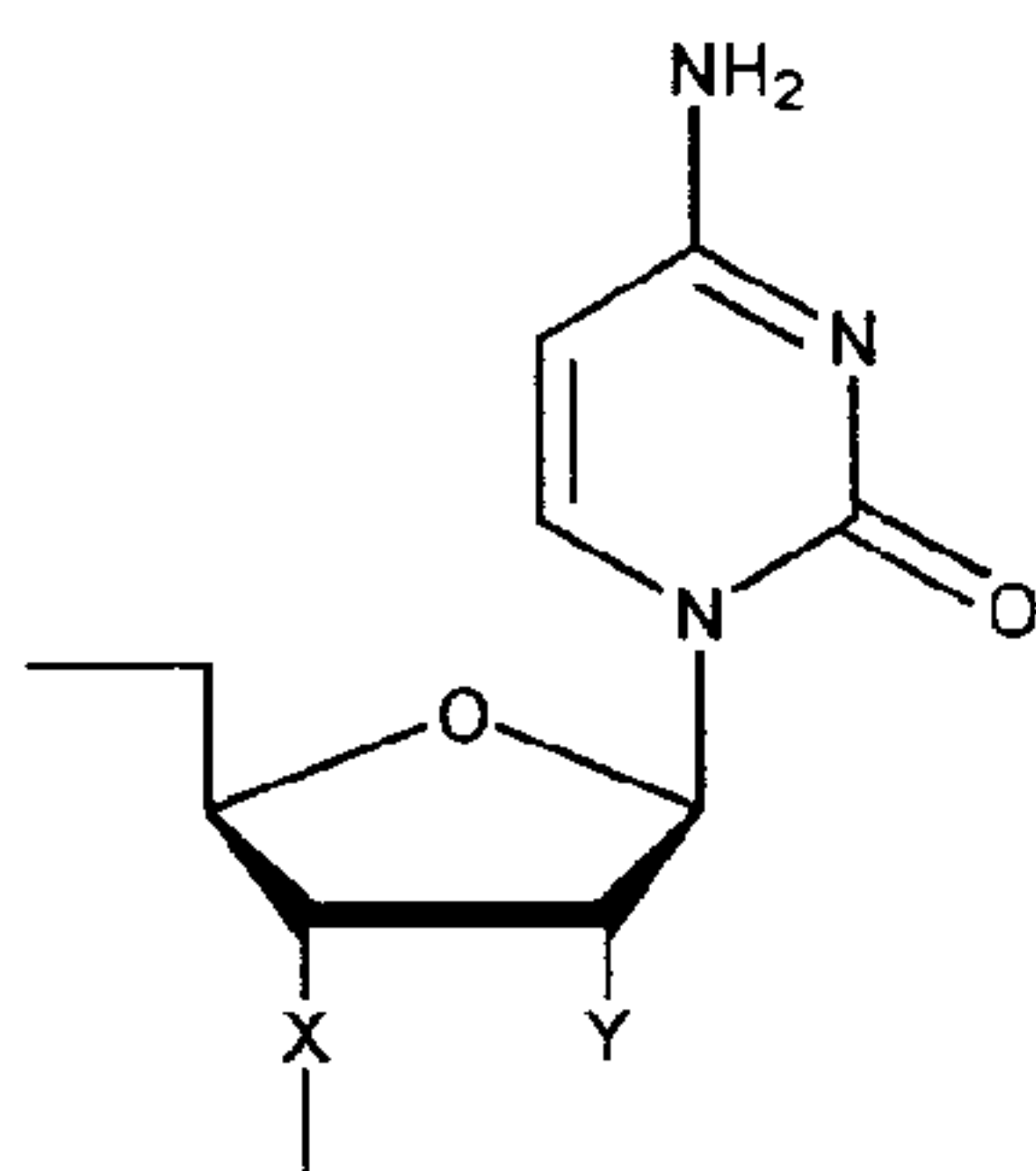
(16j'')HO-Bc-Bt-Bg-Ba-Ba-Bg-Bg-Bt-Bg-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group
represented by the following formula (A1) or (A2); Bc is a group represented by the
25 following formula (C1) or (C2); and Bt is a group represented by the following formula
(U1) or (T2):

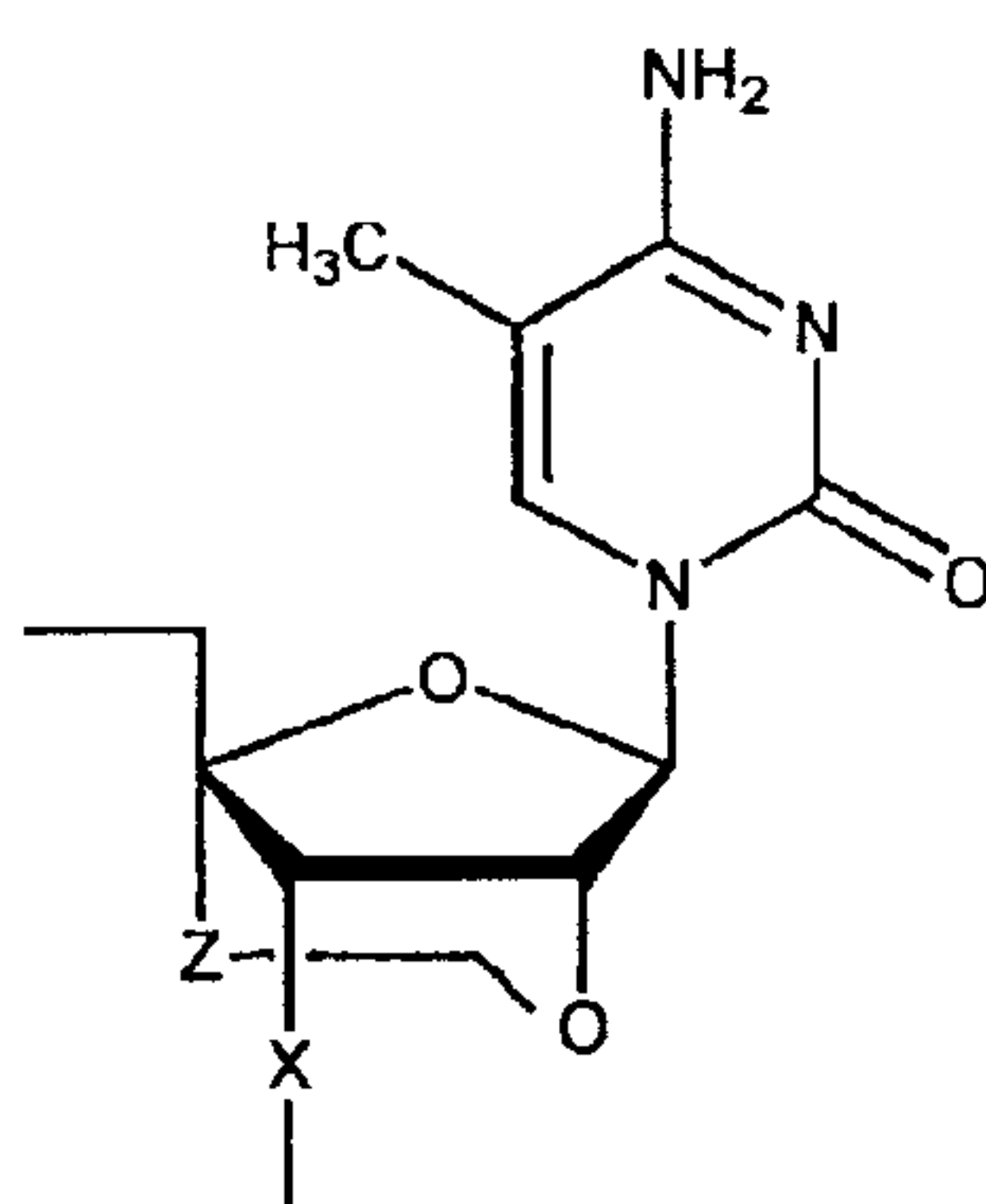
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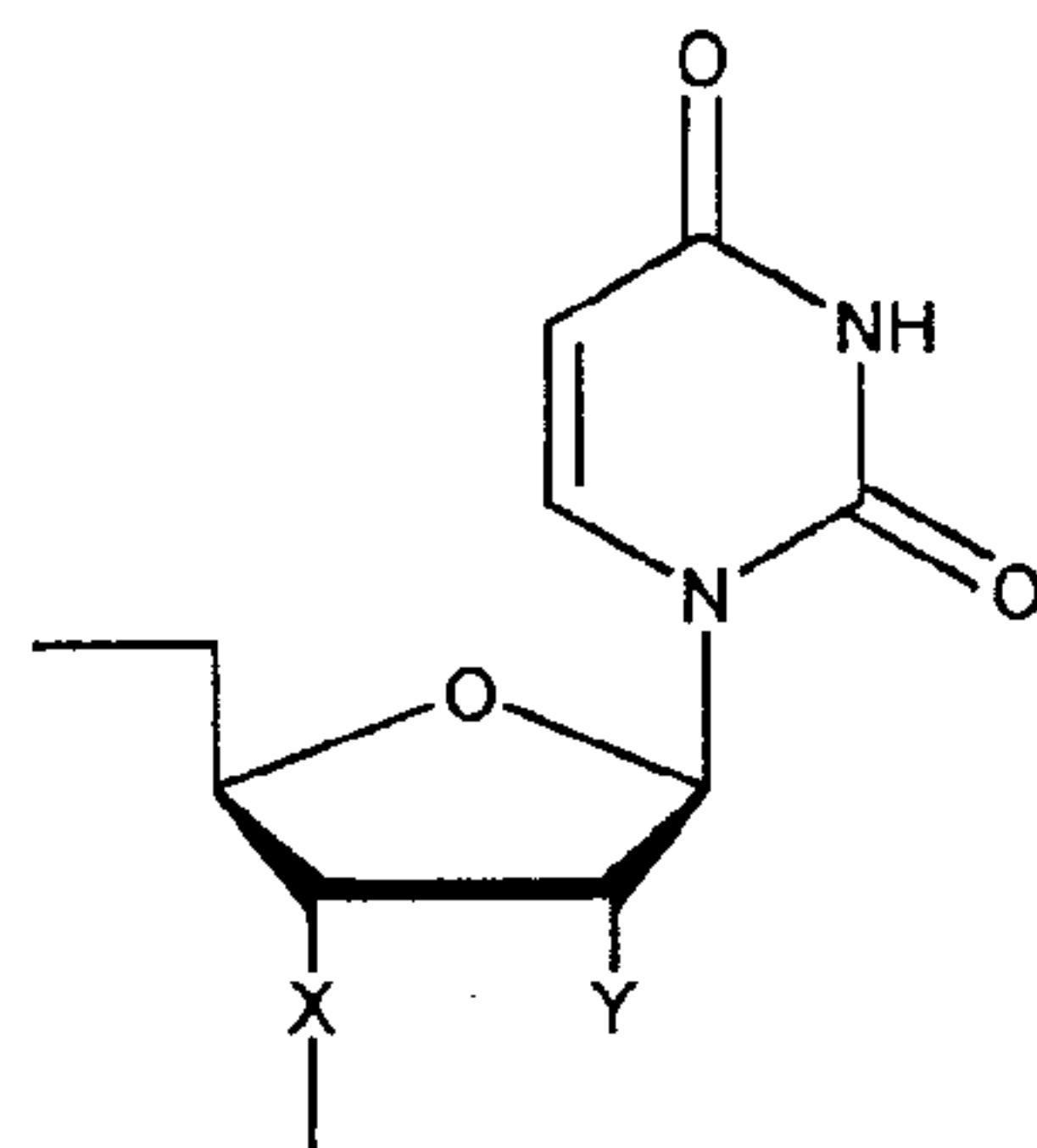
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(C 1)

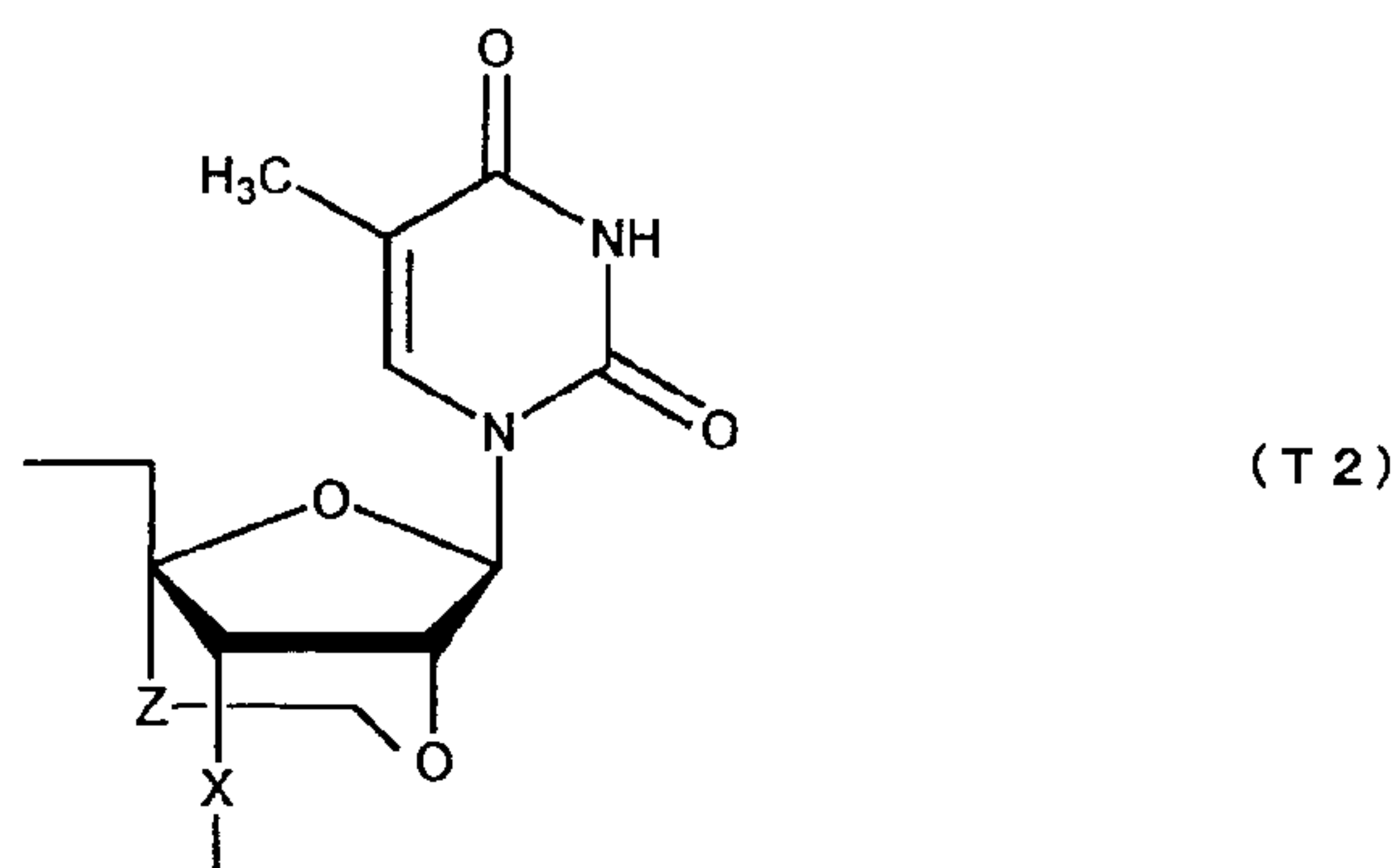


(C 2)

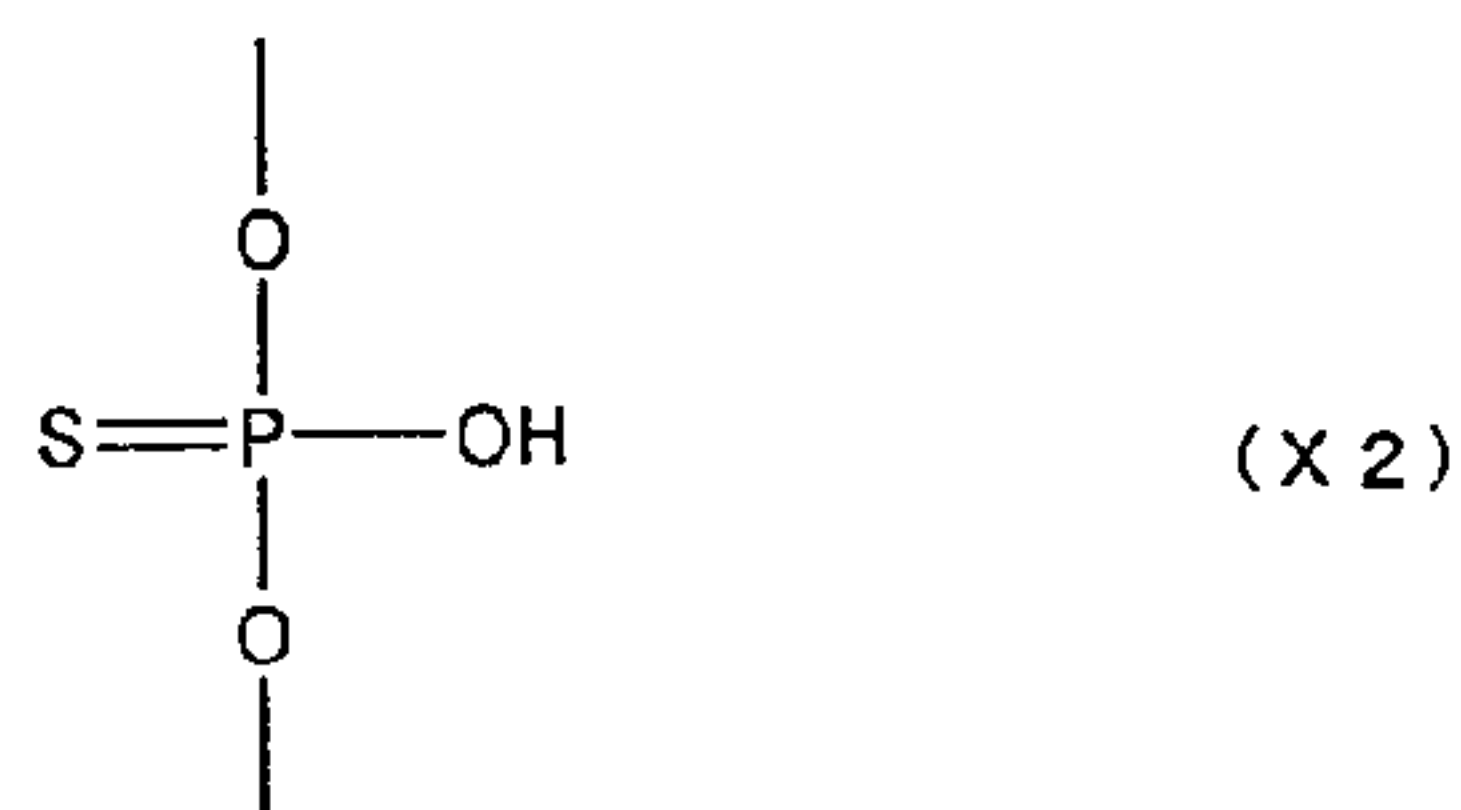
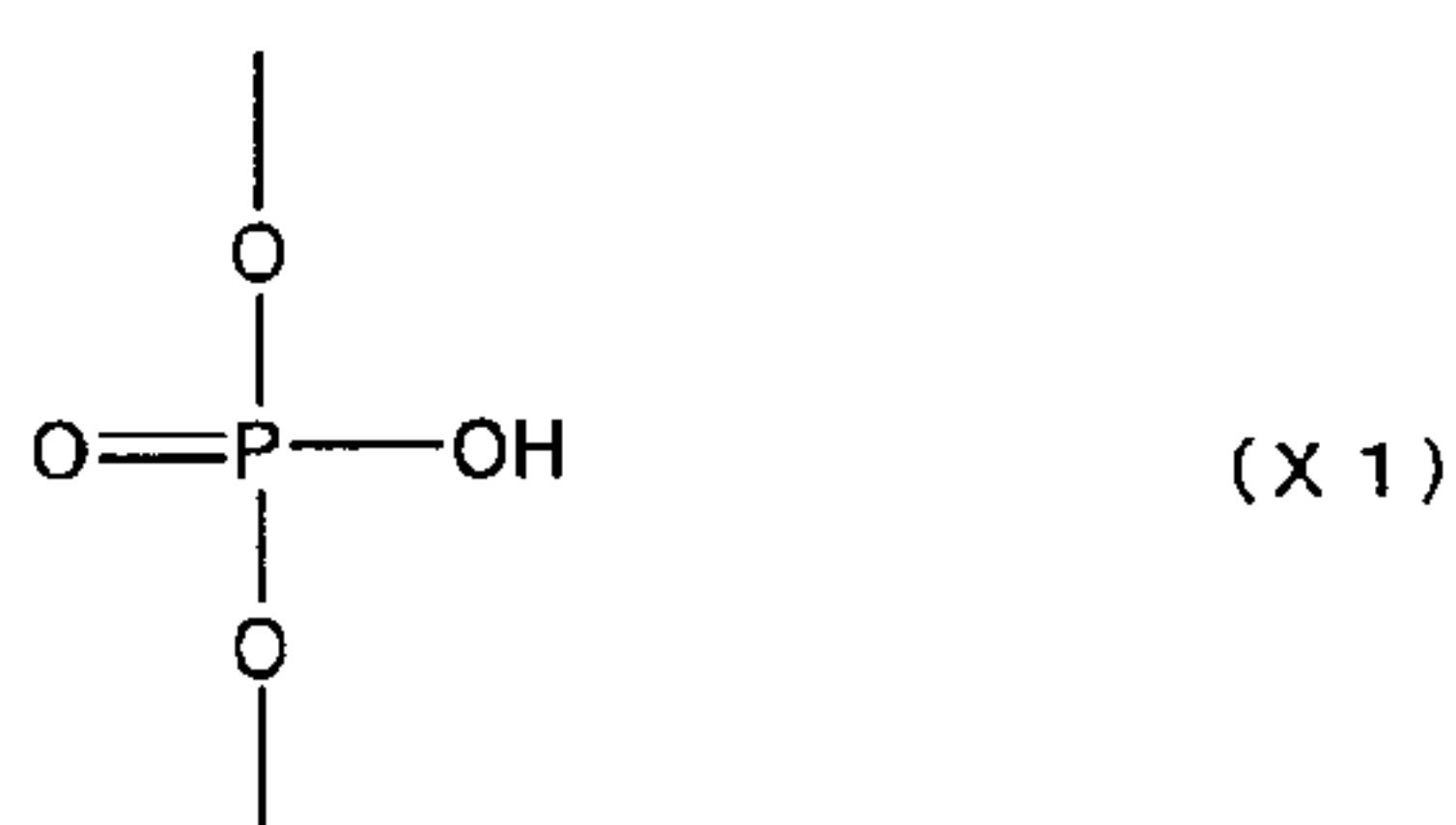


(U 1)

79861-7D



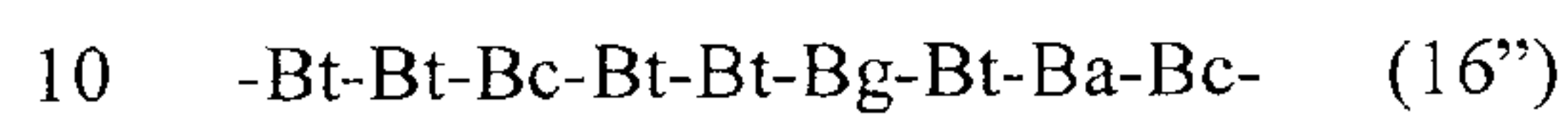
where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''16} is a group represented by the following formula (16''):



where Bg, Ba, Bt and Bc are as defined above;

B_{B''16} is a group represented by any one of the following (116a'') to (116j''):

(116a'')-CH₂CH₂OH,

(116b'')-Bt-CH₂CH₂OH,

15 (116c'')-Bt-Bt-CH₂CH₂OH,

(116d'')-Bt-Bt-Bc-CH₂CH₂OH,

(116e'')-Bt-Bt-Bc-Ba-CH₂CH₂OH,

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(116f'')-Bt-Bt-Bc-Ba-Bt-CH₂CH₂OH,(116g'')-Bt-Bt-Bc-Ba-Bt-Bc-CH₂CH₂OH,(116h'')-Bt-Bt-Bc-Ba-Bt-Bc-Bc-CH₂CH₂OH,(116i'')-Bt-Bt-Bc-Ba-Bt-Bc-Bc-Bc-CH₂CH₂OH, or5 (116j'')-Bt-Bt-Bc-Ba-Bt-Bc-Bc-Bc-Ba-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XVI'') has 2''-O,4''-C-alkylene group.

[42] A compound represented by the following general formula (XVII'') or a
10 pharmacologically acceptable salt thereof:

where B_{T''17} is a group represented by any one of the following (17a'') to (17j''):

(17a'')HO-,

(17b'')HO-Bt-,

15 (17c'')HO-Bt-Bt-,

(17d'')HO-Bg-Bt-Bt-,

(17e'')HO-Bg-Bg-Bt-Bt-,

(17f'')HO-Bc-Bg-Bg-Bt-Bt-,

(17g'')HO-Bc-Bc-Bg-Bg-Bt-Bt-,

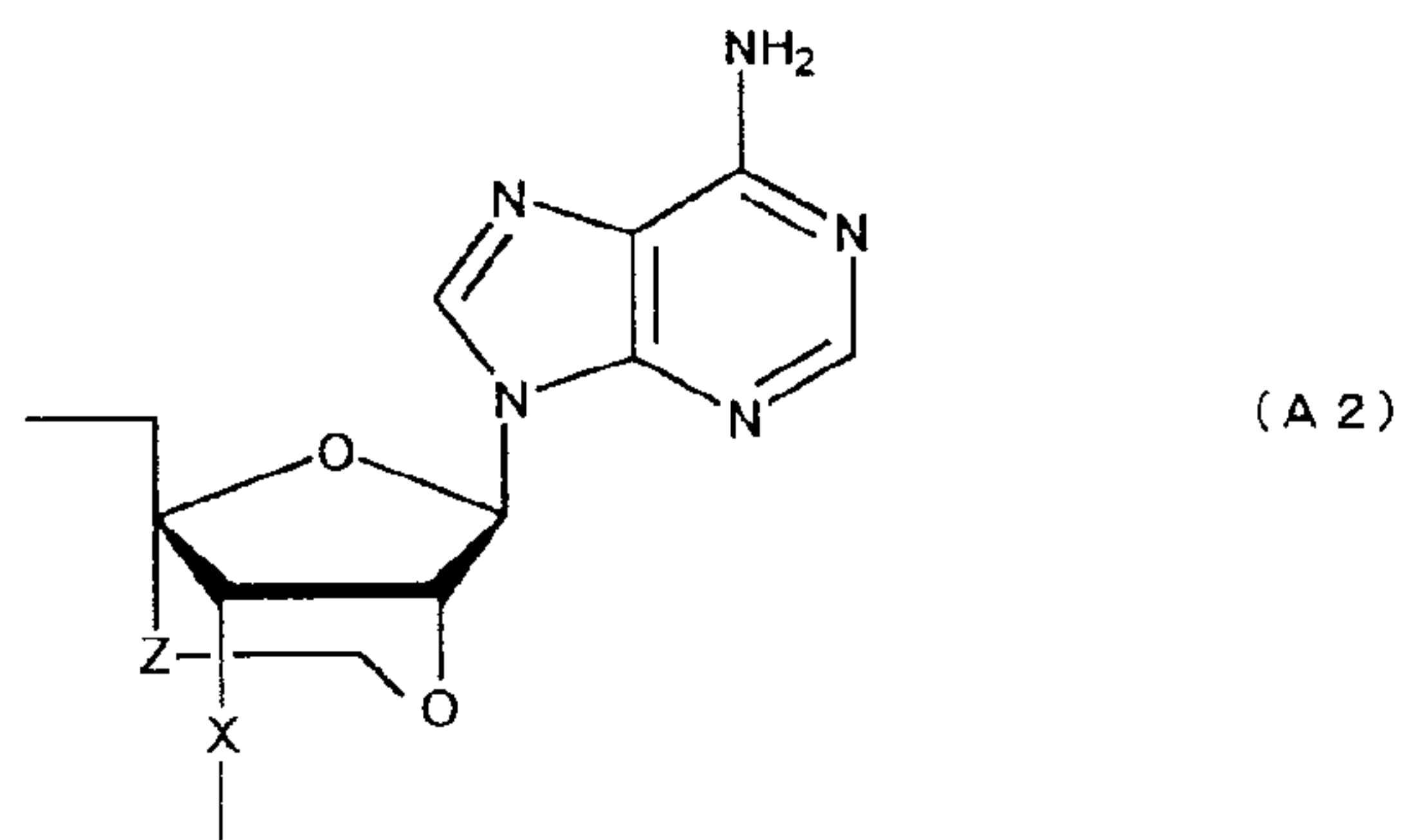
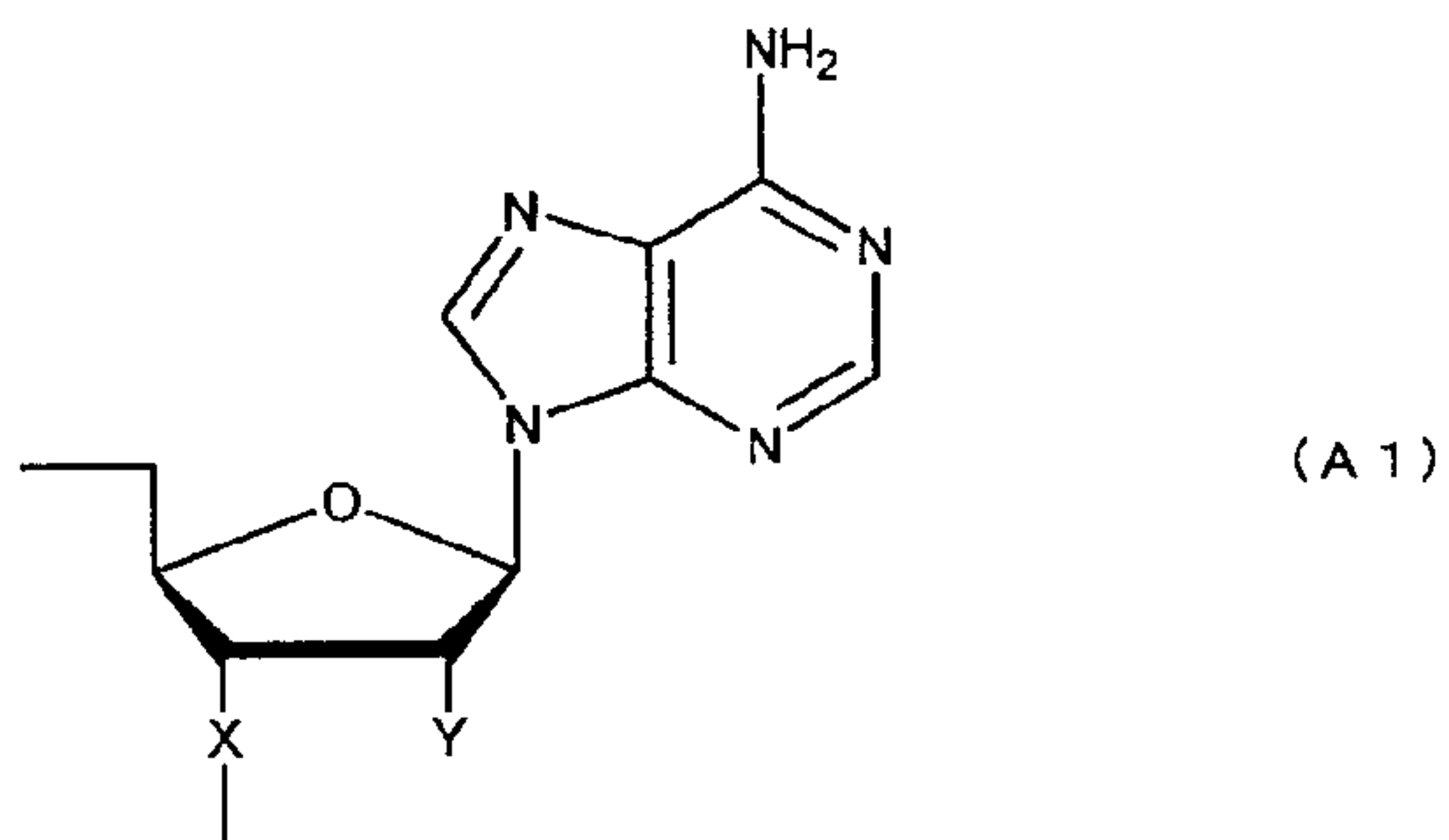
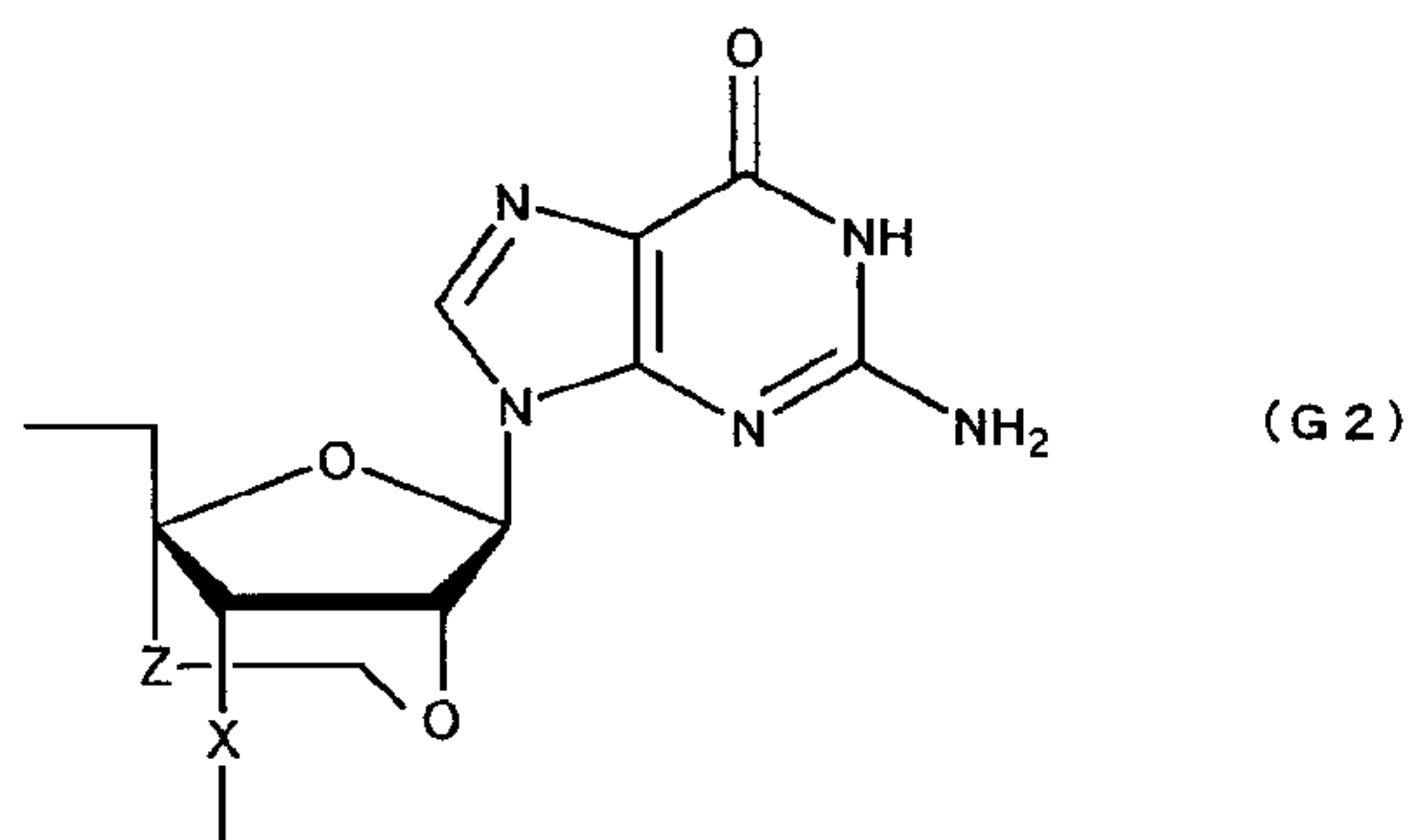
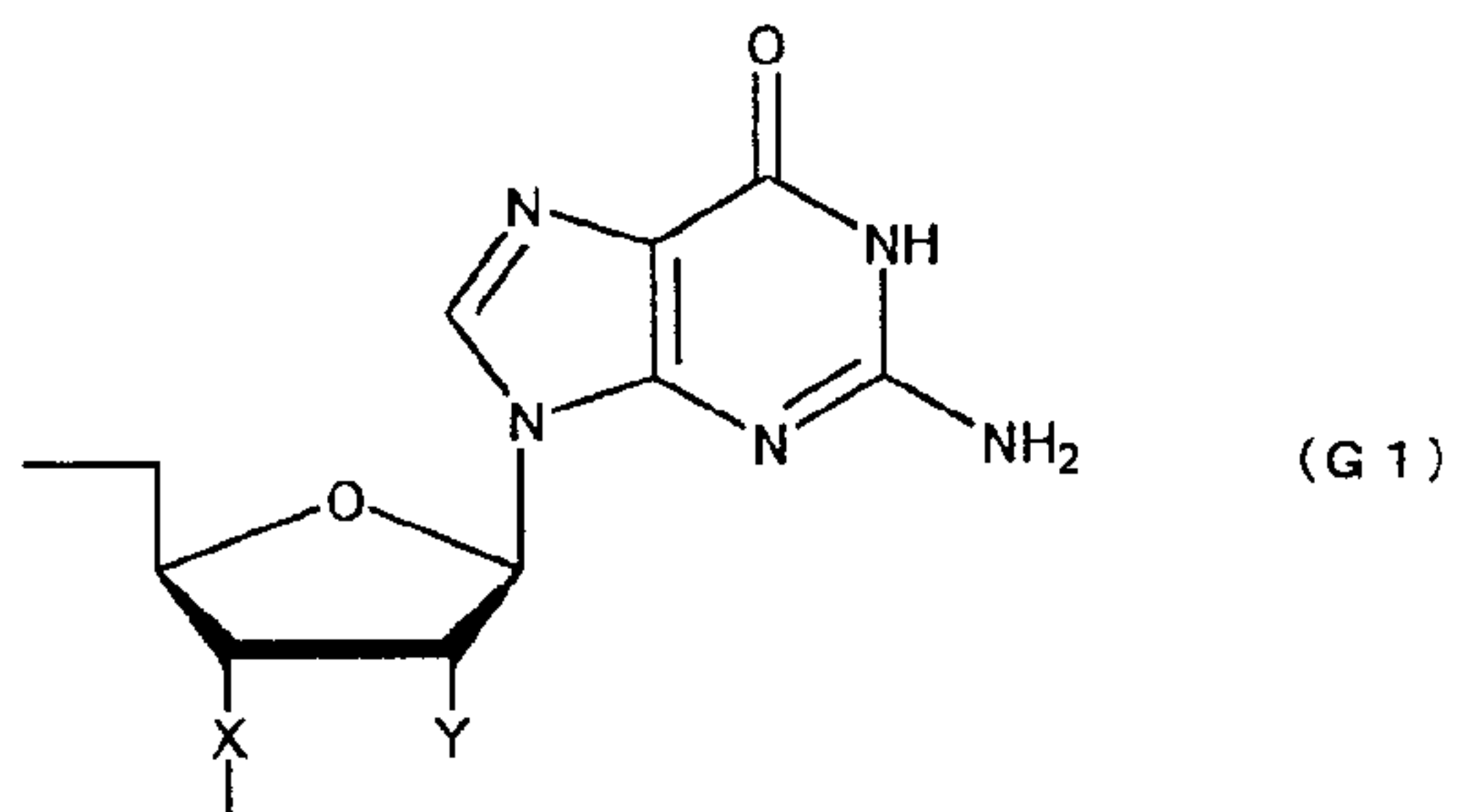
20 (17h'')HO-Bt-Bc-Bc-Bg-Bg-Bt-Bt-,

(17i'')HO-Bc-Bt-Bc-Bc-Bg-Bg-Bt-Bt-, or

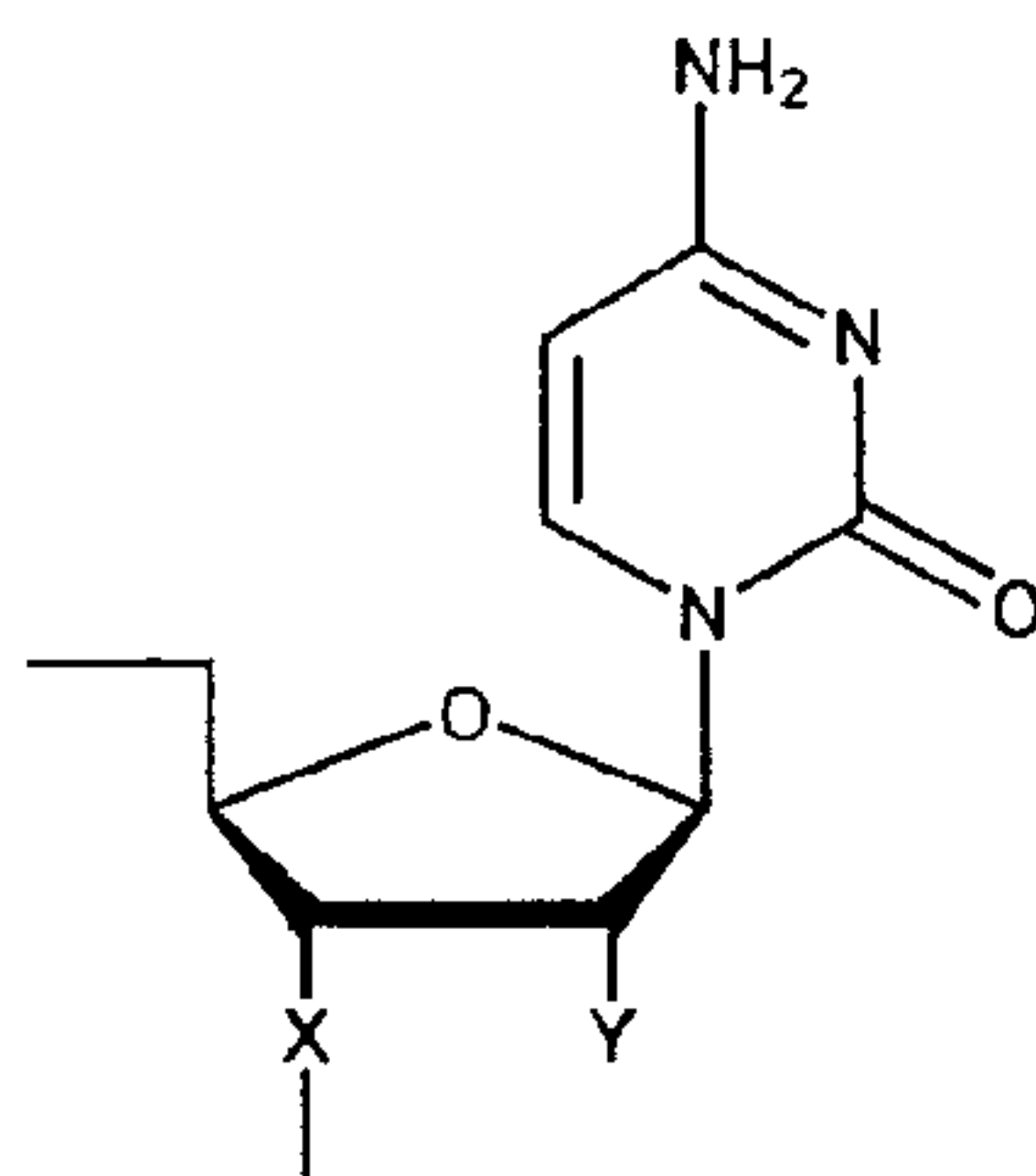
(17j'')HO-Bc-Bc-Bt-Bc-Bc-Bg-Bg-Bt-Bt-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group
represented by the following formula (A1) or (A2); Bc is a group represented by the
25 following formula (C1) or (C2); and Bt is a group represented by the following formula
(U1) or (T2):

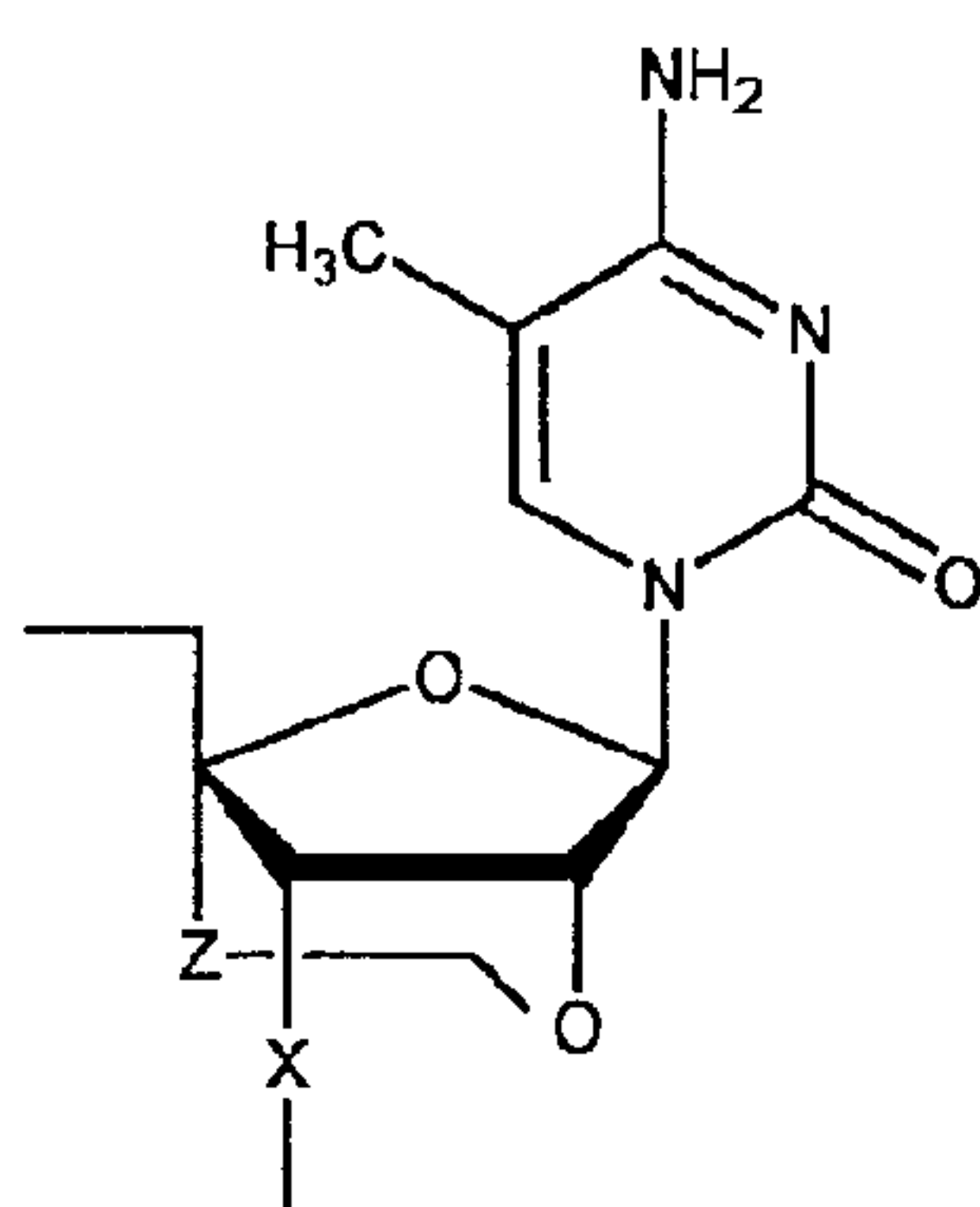
79861-7D



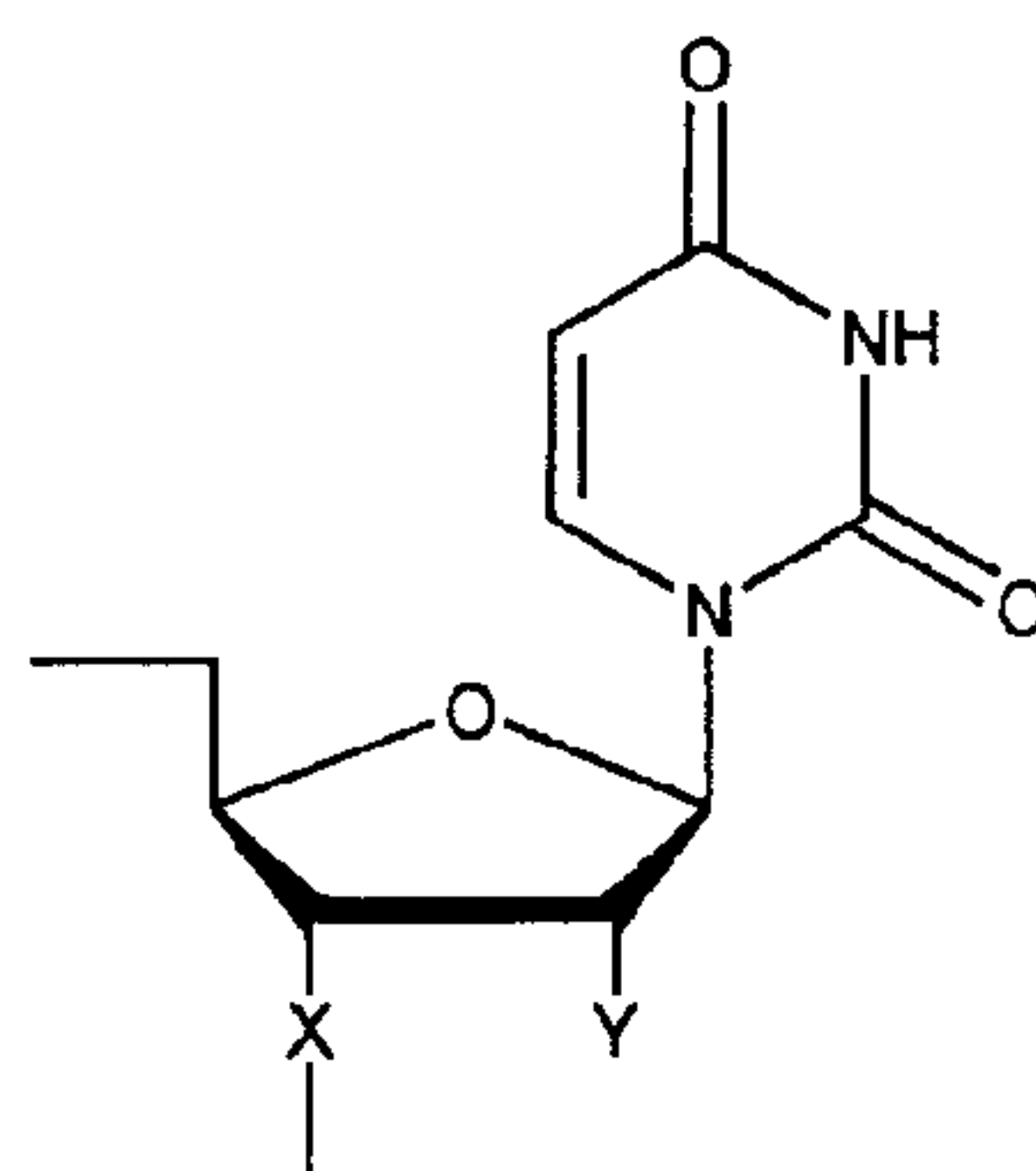
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(C 1)

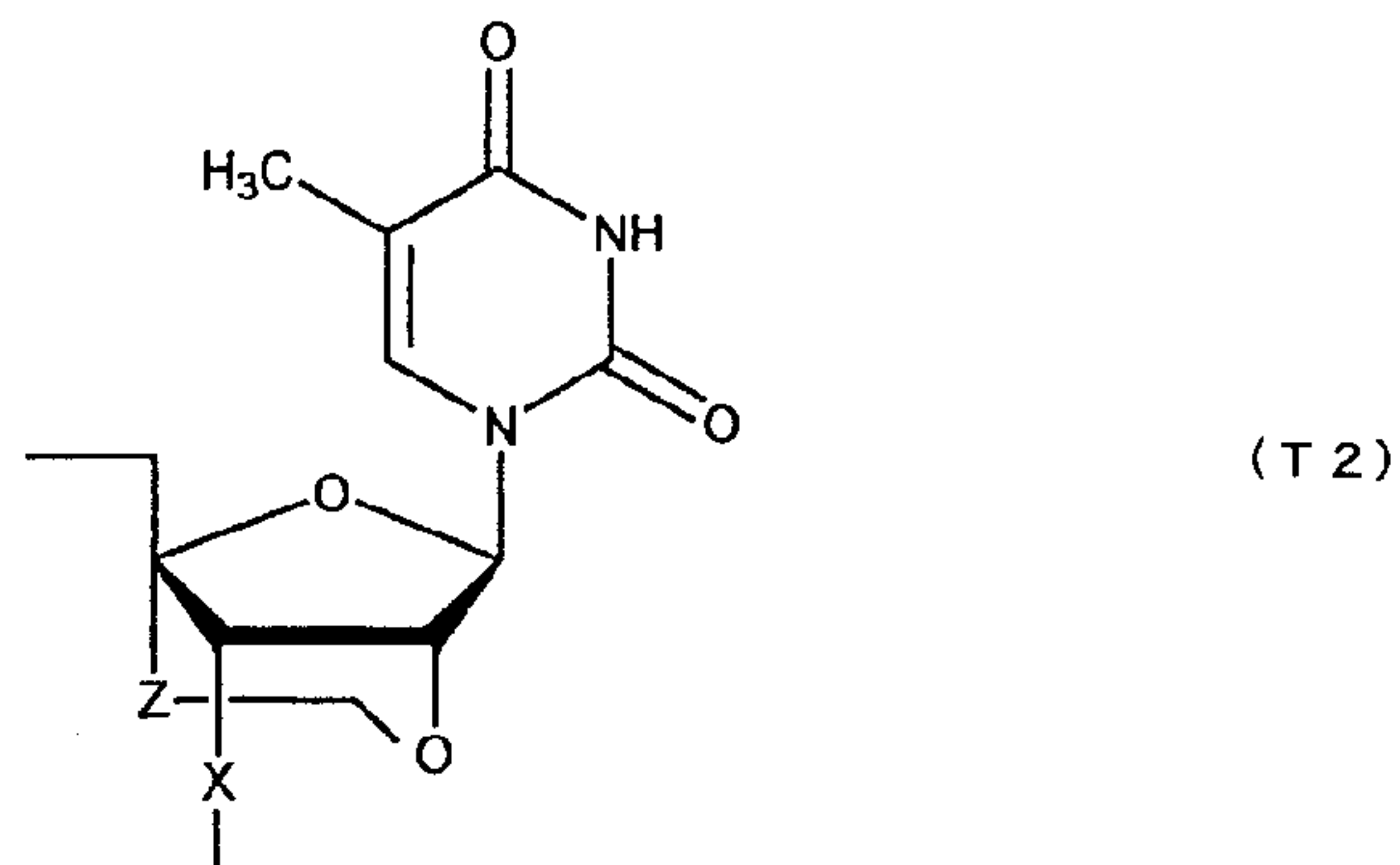


(C 2)

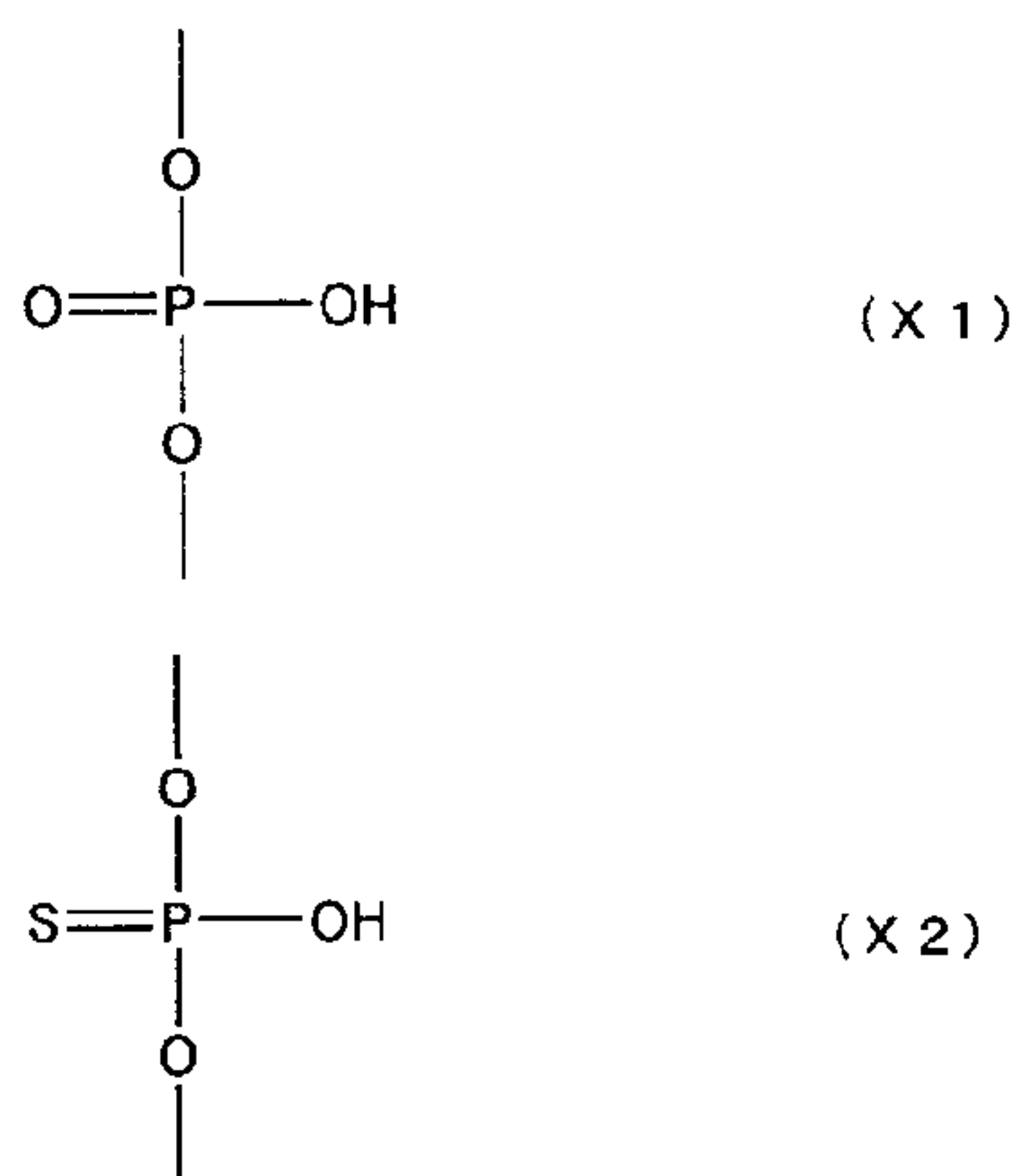


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''17} is a group represented by the following formula (17''):

10 -Bc-Bt-Bg-Ba-Ba-Bg-Bg-Bt-Bg- (17'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''17} is a group represented by any one of the following (117a'') to (117j''):

(117a'')-CH₂CH₂OH,

(117b'')-Bt-CH₂CH₂OH,

15 (117c'')-Bt-Bt-CH₂CH₂OH,

(117d'')-Bt-Bt-Bc-CH₂CH₂OH,

(117e'')-Bt-Bt-Bc-Bt-CH₂CH₂OH,

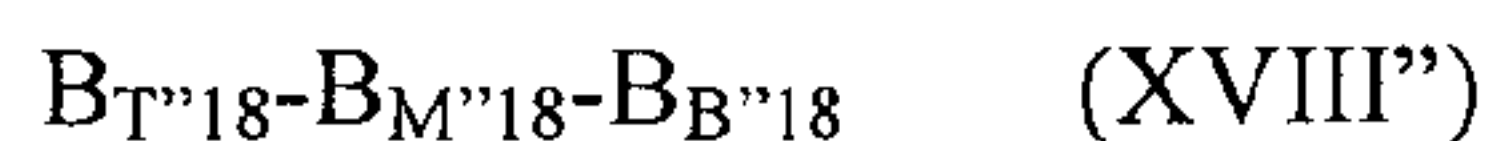
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(117f'')-Bt-Bt-Bc-Bt-Bt-CH₂CH₂OH,(117g'')-Bt-Bt-Bc-Bt-Bt-Bg-CH₂CH₂OH,(117h'')-Bt-Bt-Bc-Bt-Bt-Bg-Bt-CH₂CH₂OH,(117i'')-Bt-Bt-Bc-Bt-Bt-Bg-Bt-Ba-CH₂CH₂OH, or5 (117j'')-Bt-Bt-Bc-Bt-Bt-Bg-Bt-Ba-Bc-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XVII'') has 2''-O,4''-C-alkylene group.

[43] A compound represented by the following general formula (XVIII'') or a
10 pharmacologically acceptable salt thereof:



where B_{T''18} is a group represented by any one of the following (18a'') to (18j''):

(18a'')HO-,

(18b'')HO-Bg-,

15 (18c'')HO-Bt-Bg-,

(18d'')HO-Bc-Bt-Bg-,

(18e'')HO-Bc-Bc-Bt-Bg-,

(18f'')HO-Ba-Bc-Bc-Bt-Bg-,

(18g'')HO-Bg-Ba-Bc-Bc-Bt-Bg-,

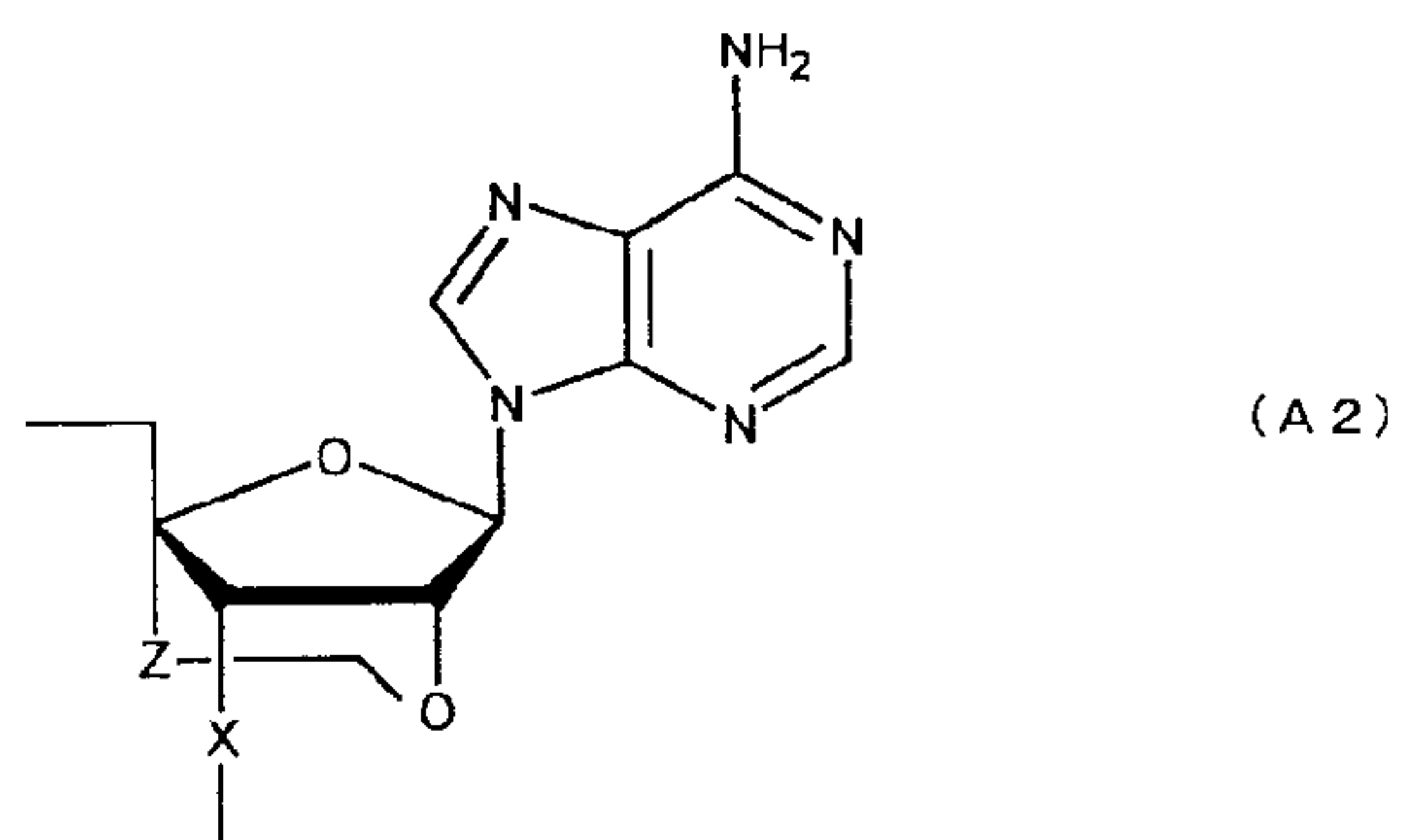
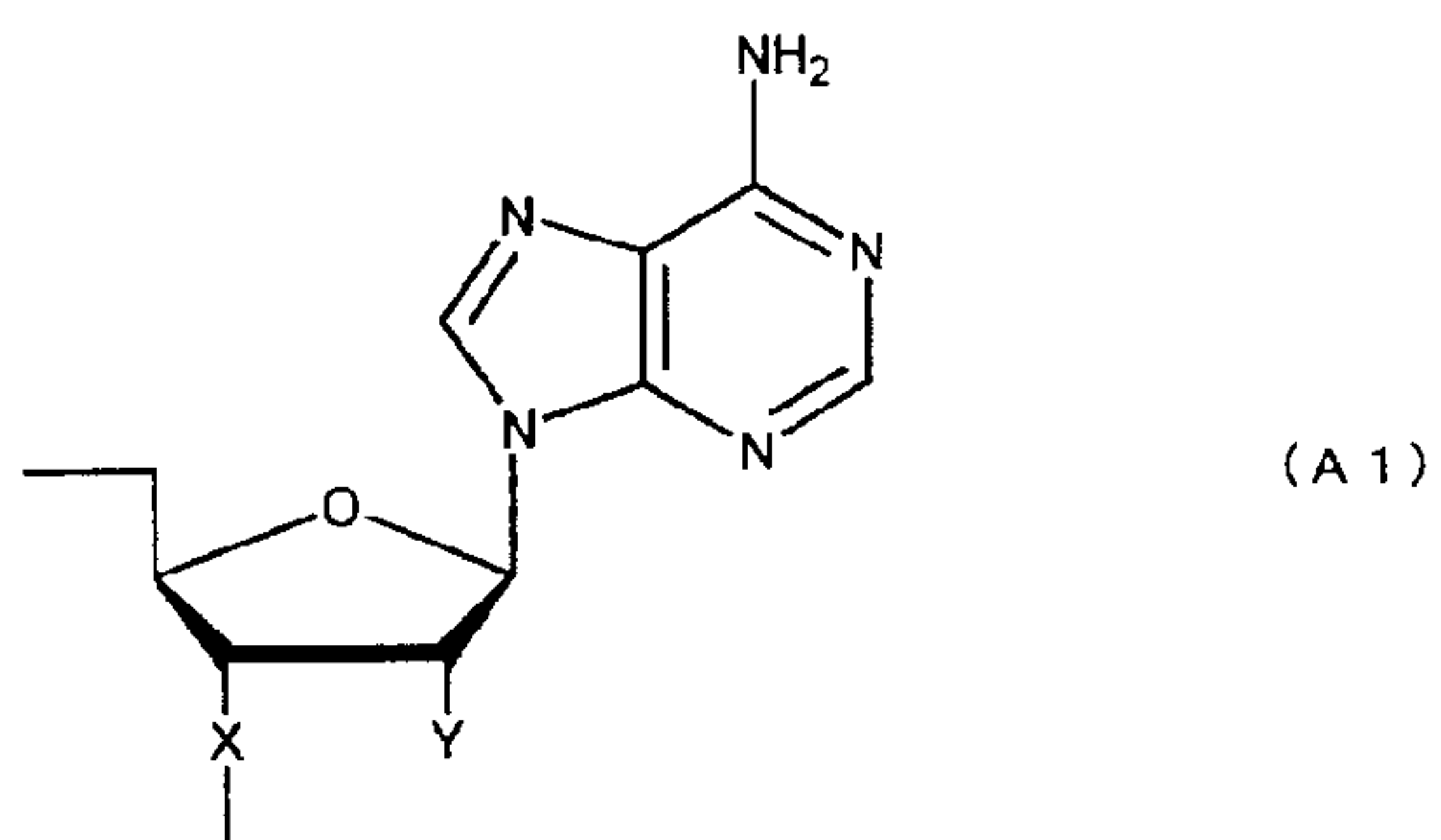
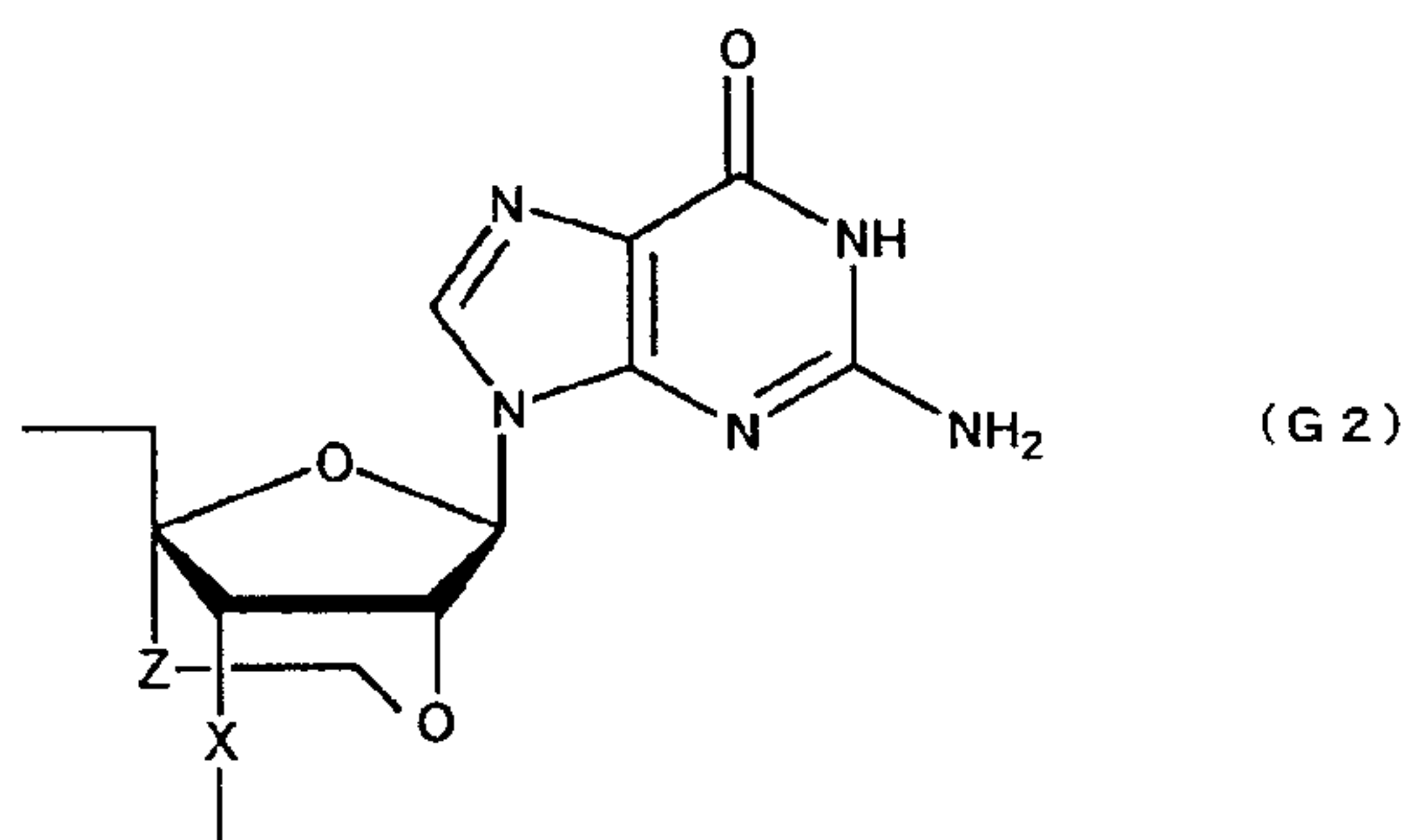
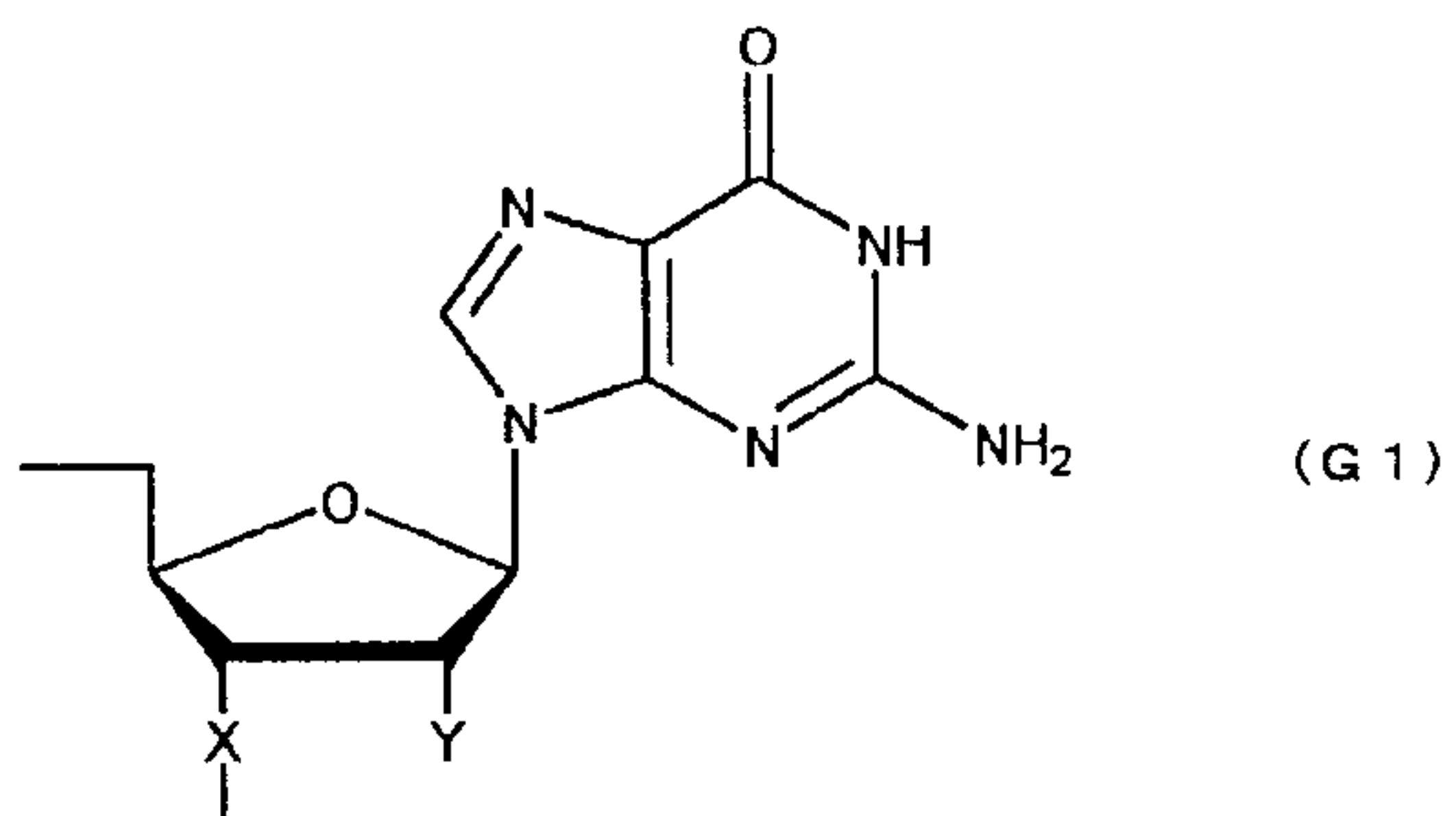
20 (18h'')HO-Ba-Bg-Ba-Bc-Bc-Bt-Bg-,

(18i'')HO-Ba-Ba-Bg-Ba-Bc-Bc-Bt-Bg-, or

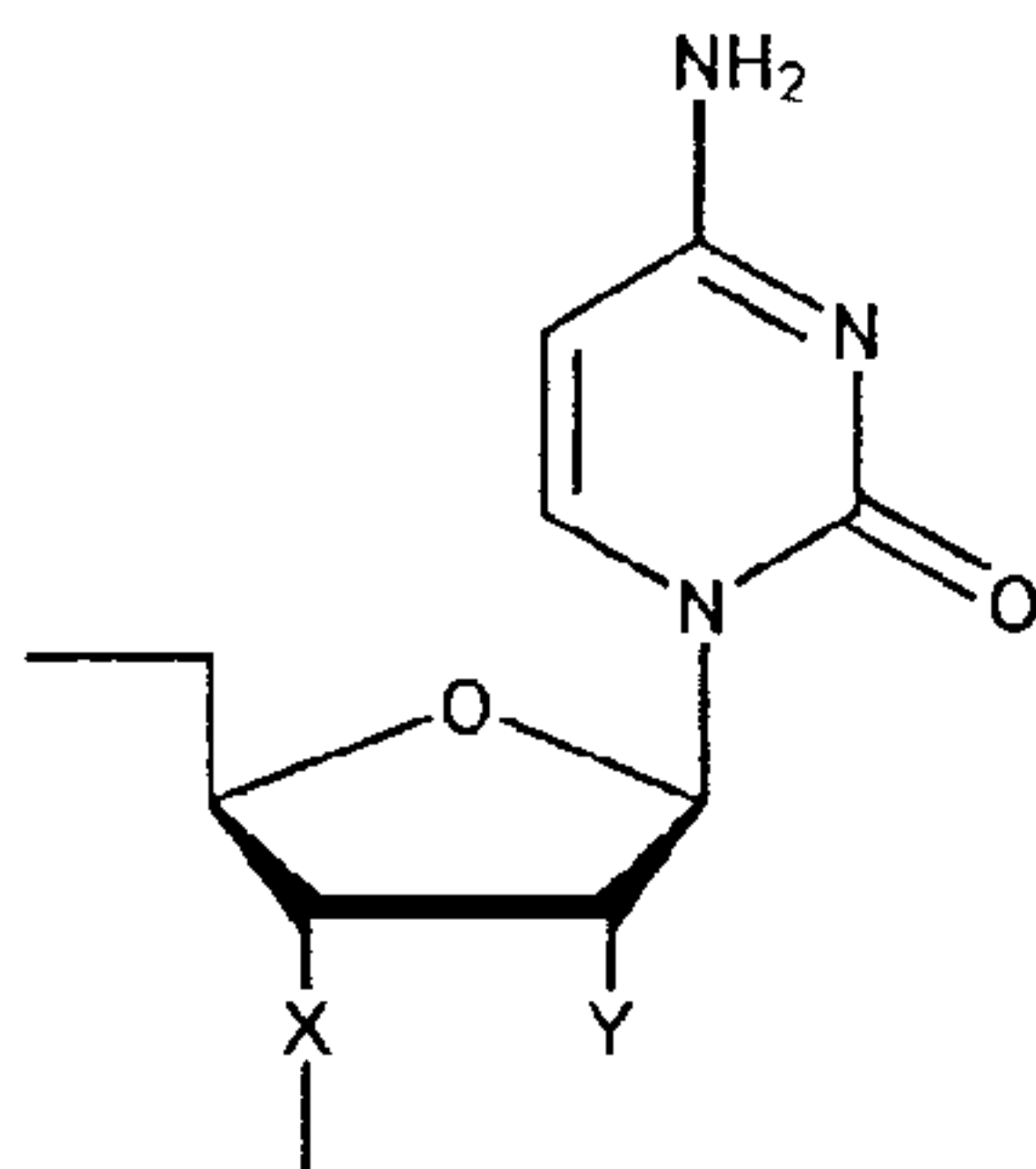
(18j'')HO-Bt-Ba-Ba-Bg-Ba-Bc-Bc-Bt-Bg-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the
25 following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

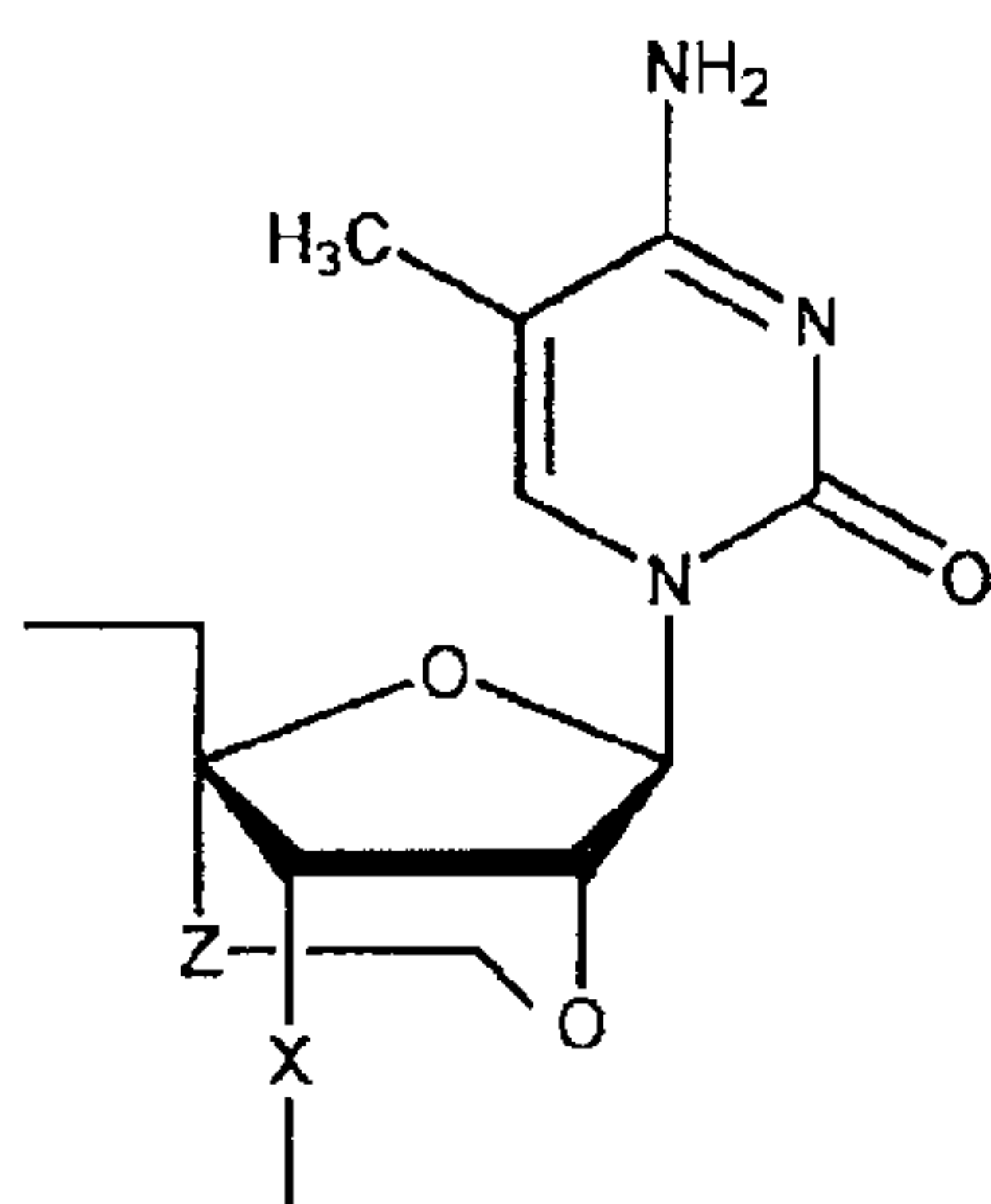
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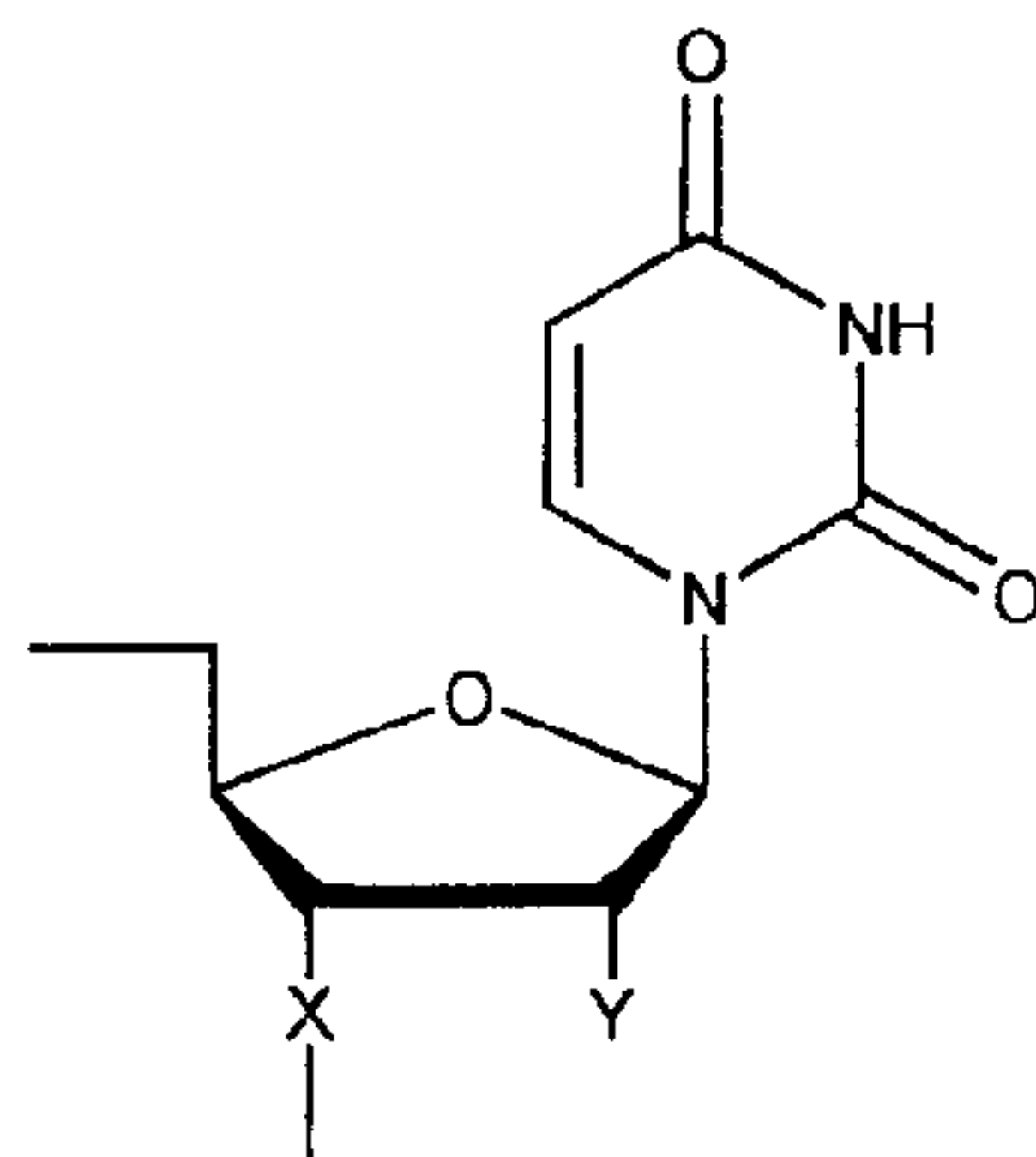
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(C 1)

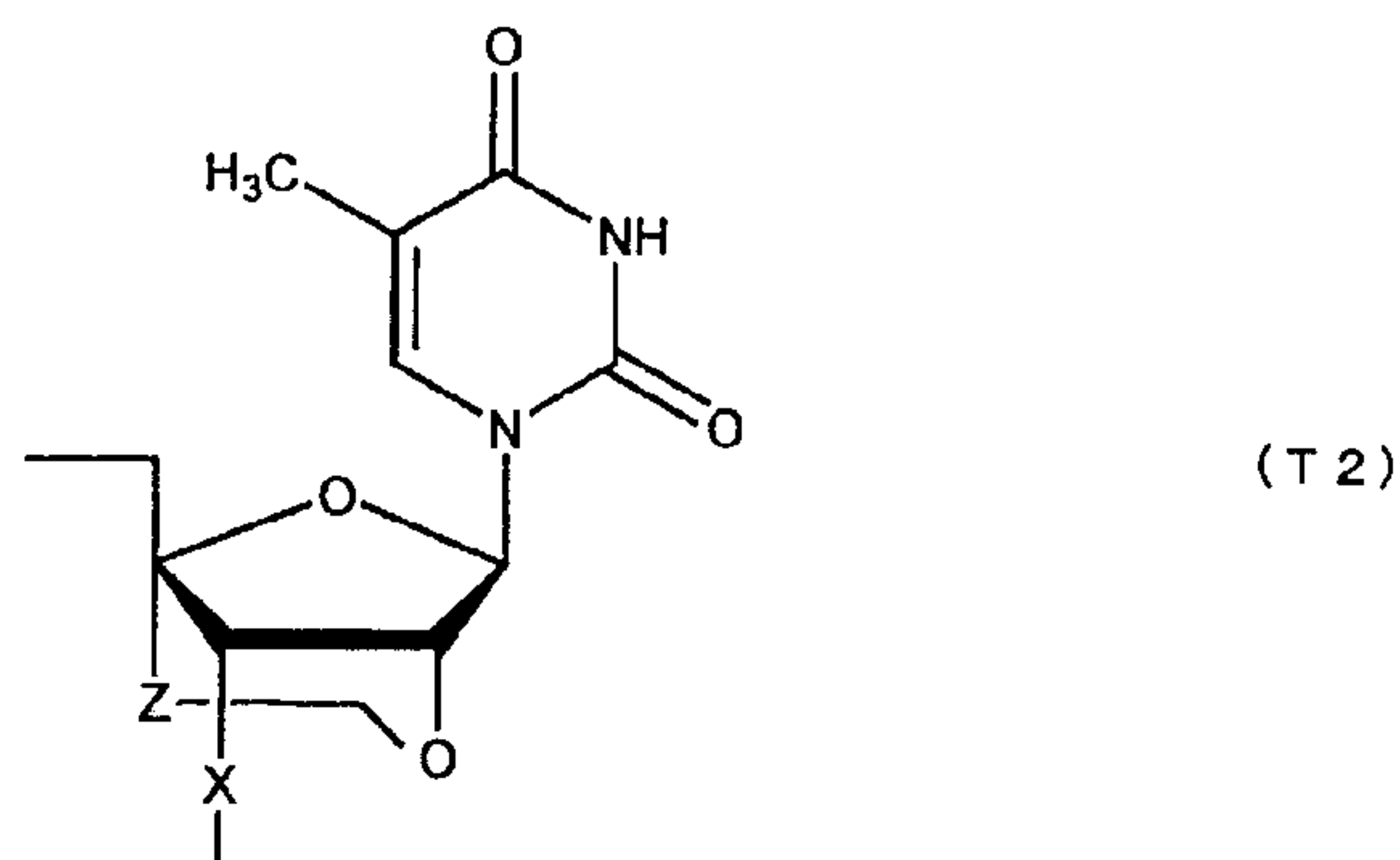


(C 2)

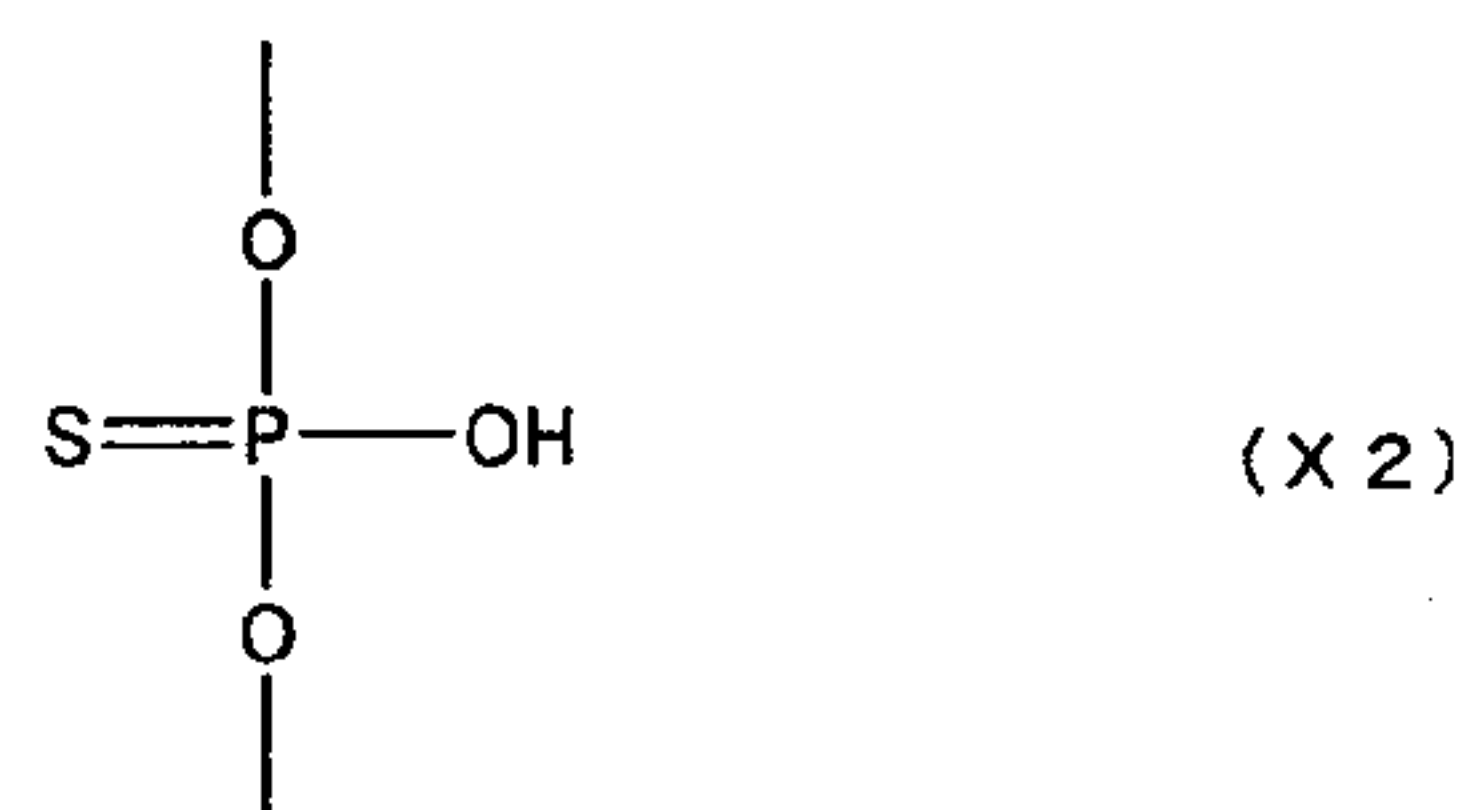
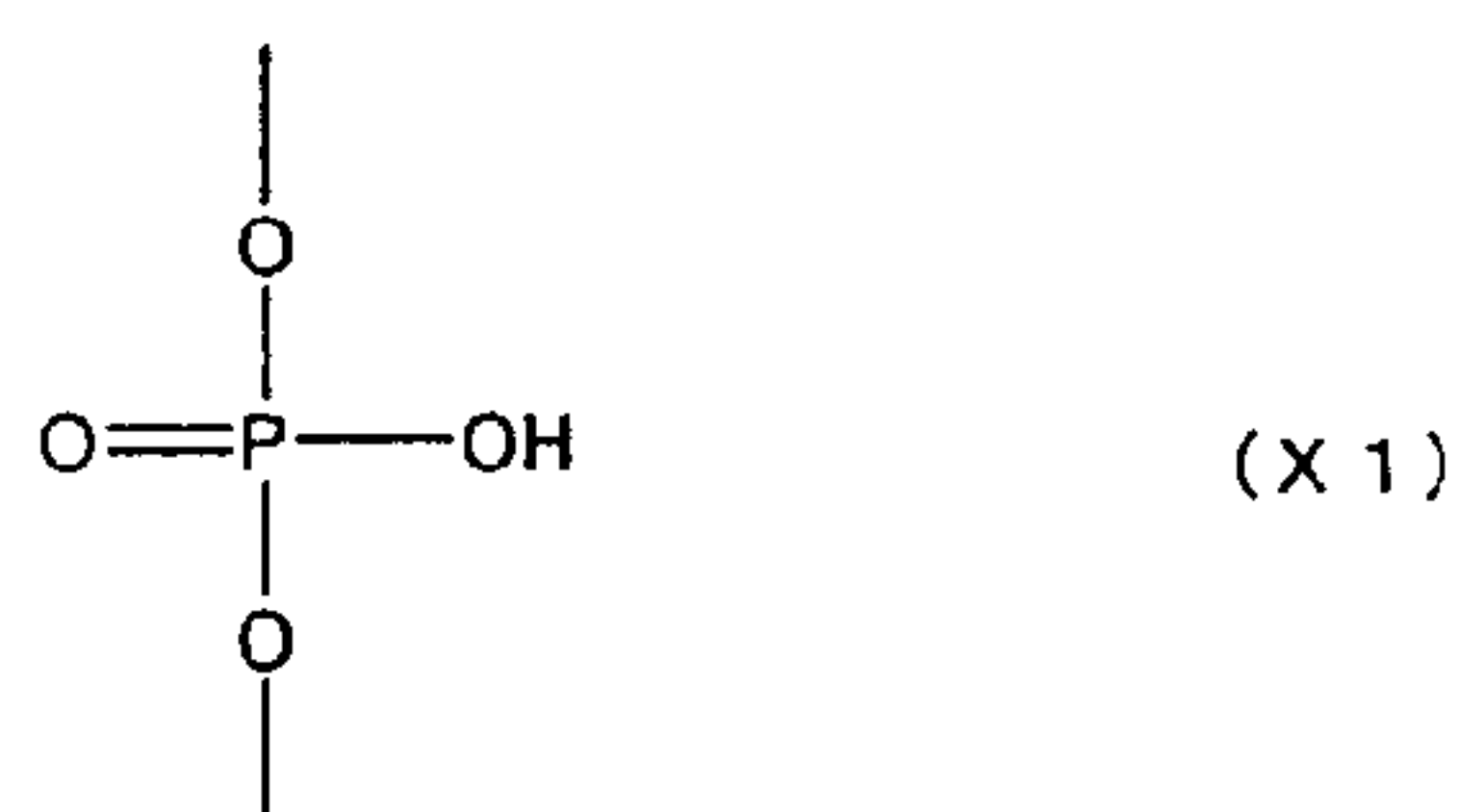


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''18} is a group represented by the following formula (18''):

10 -Bc-Bt-Bc-Ba-Bg-Bc-Bt-Bt-Bc- (18'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''18} is a group represented by any one of the following (118a'') to (118j''):

(118a'')-CH₂CH₂OH,

(118b'')-Bt-CH₂CH₂OH,

15 (118c'')-Bt-Bt-CH₂CH₂OH,

(118d'')-Bt-Bt-Bc-CH₂CH₂OH,

(118e'')-Bt-Bt-Bc-Bc-CH₂CH₂OH,

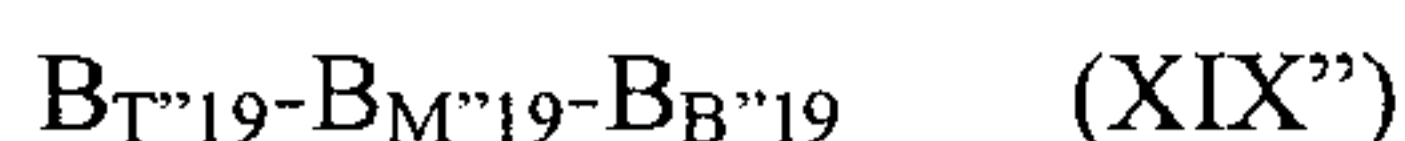
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(118f'')-Bt-Bt-Bc-Bc-Bt-CH₂CH₂OH,(118g'')-Bt-Bt-Bc-Bc-Bt-Bt-CH₂CH₂OH,(118h'')-Bt-Bt-Bc-Bc-Bt-Bt-Ba-CH₂CH₂OH,(118i'')-Bt-Bt-Bc-Bc-Bt-Bt-Ba-Bg-CH₂CH₂OH, or5 (118j'')-Bt-Bt-Bc-Bc-Bt-Bt-Ba-Bg-Bc-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XVIII'') has 2''-O,4''-C-alkylene group.

[44] A compound represented by the following general formula (XIX'') or a
10 pharmacologically acceptable salt thereof:

where B_{T''19} is a group represented by any one of the following (19a'') to (19j''):

(19a'')HO-,

(19b'')HO-Bc-,

15 (19c'')HO-Bg-Bc-,

(19d'')HO-Ba-Bg-Bc-,

(19e'')HO-Bt-Ba-Bg-Bc-,

(19f'')HO-Bt-Bt-Ba-Bg-Bc-,

(19g'')HO-Bc-Bt-Bt-Ba-Bg-Bc-,

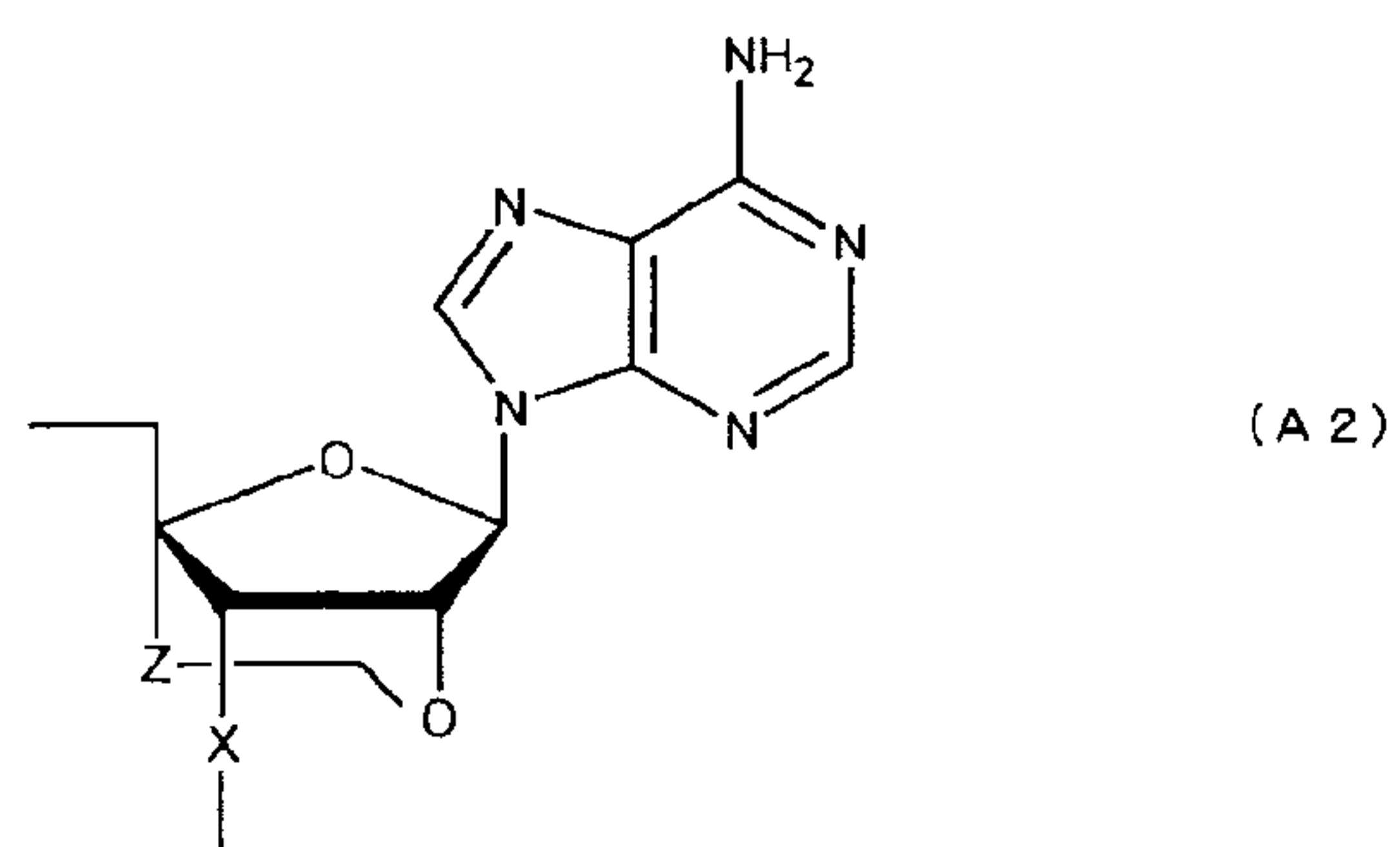
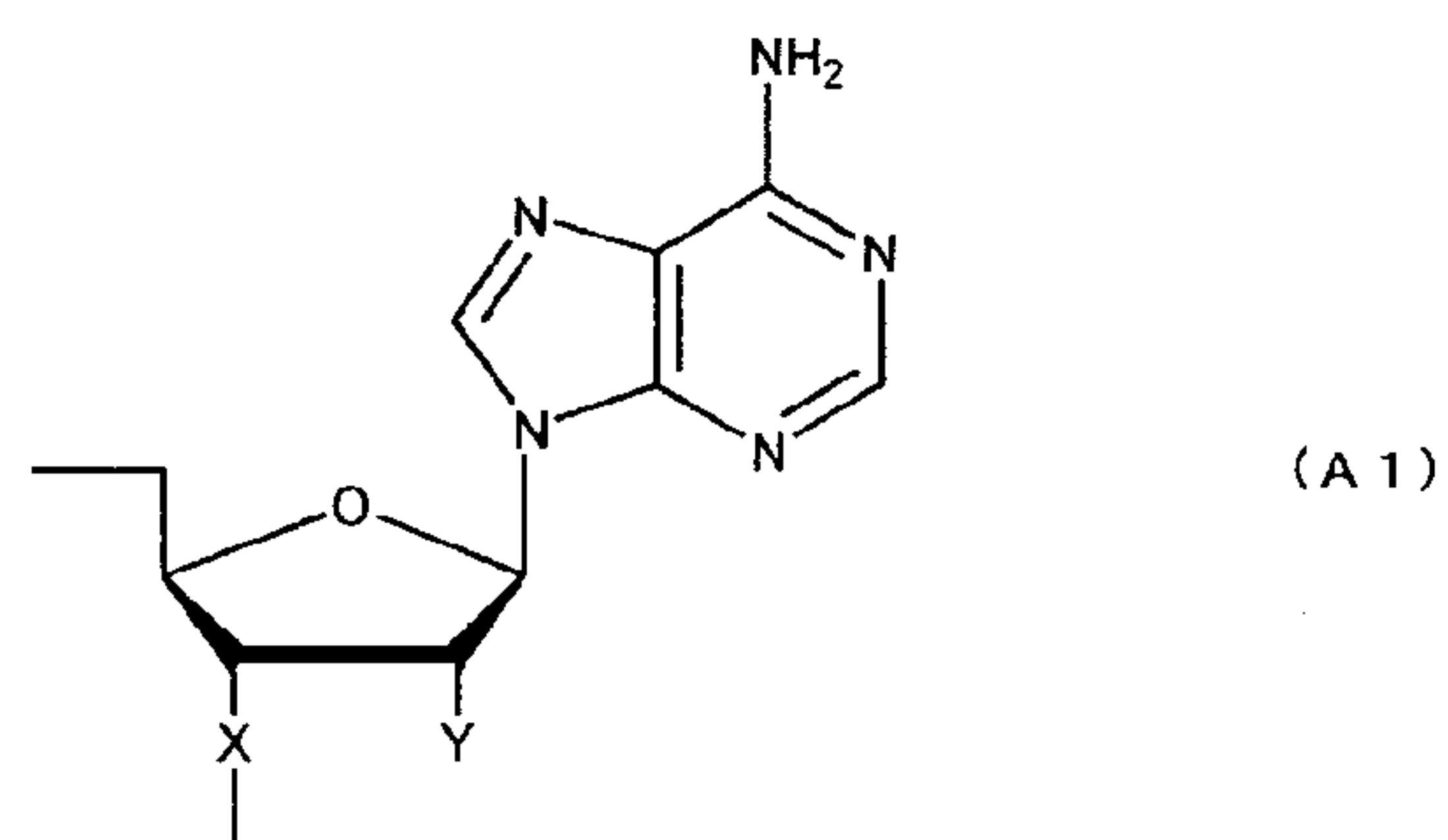
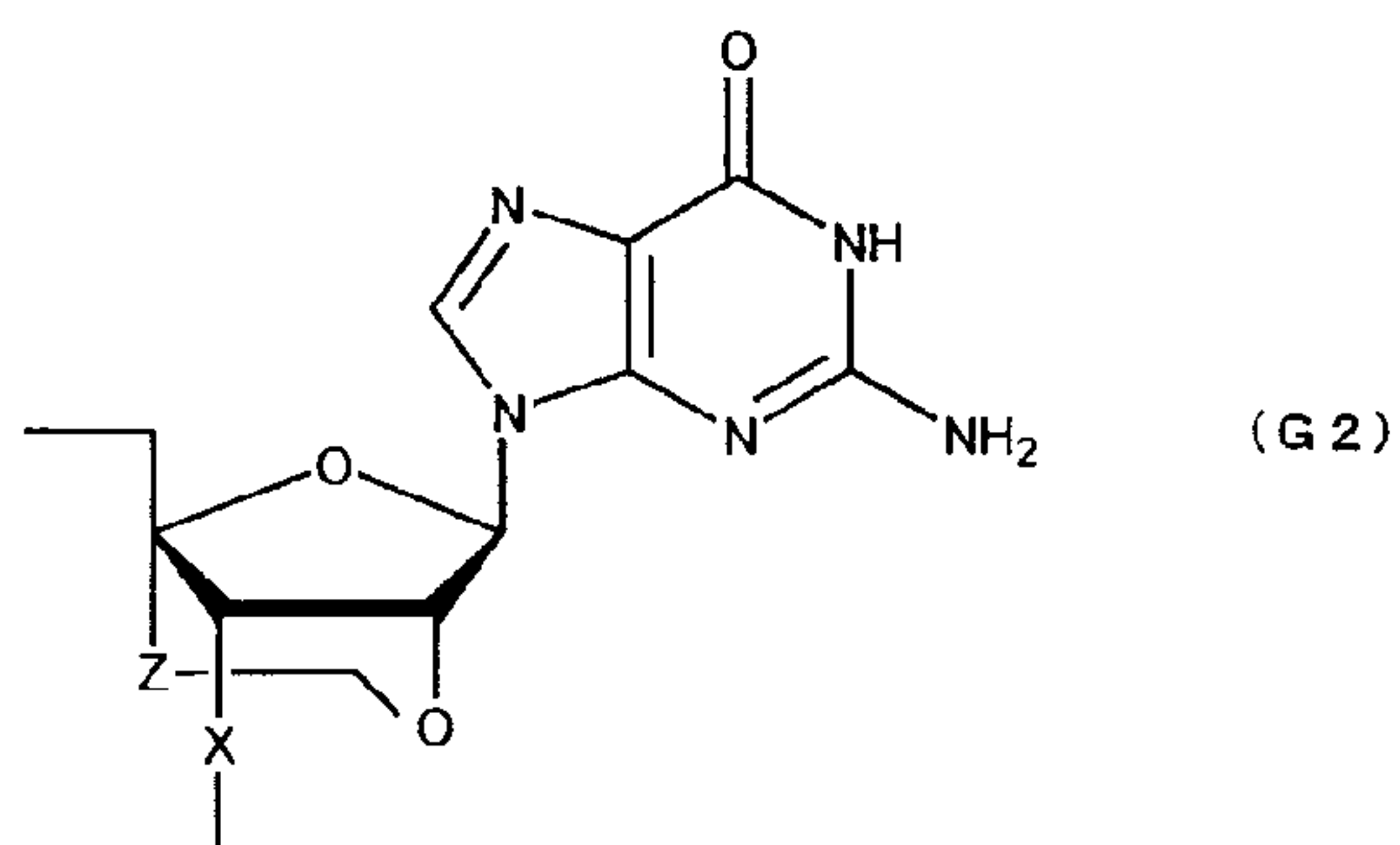
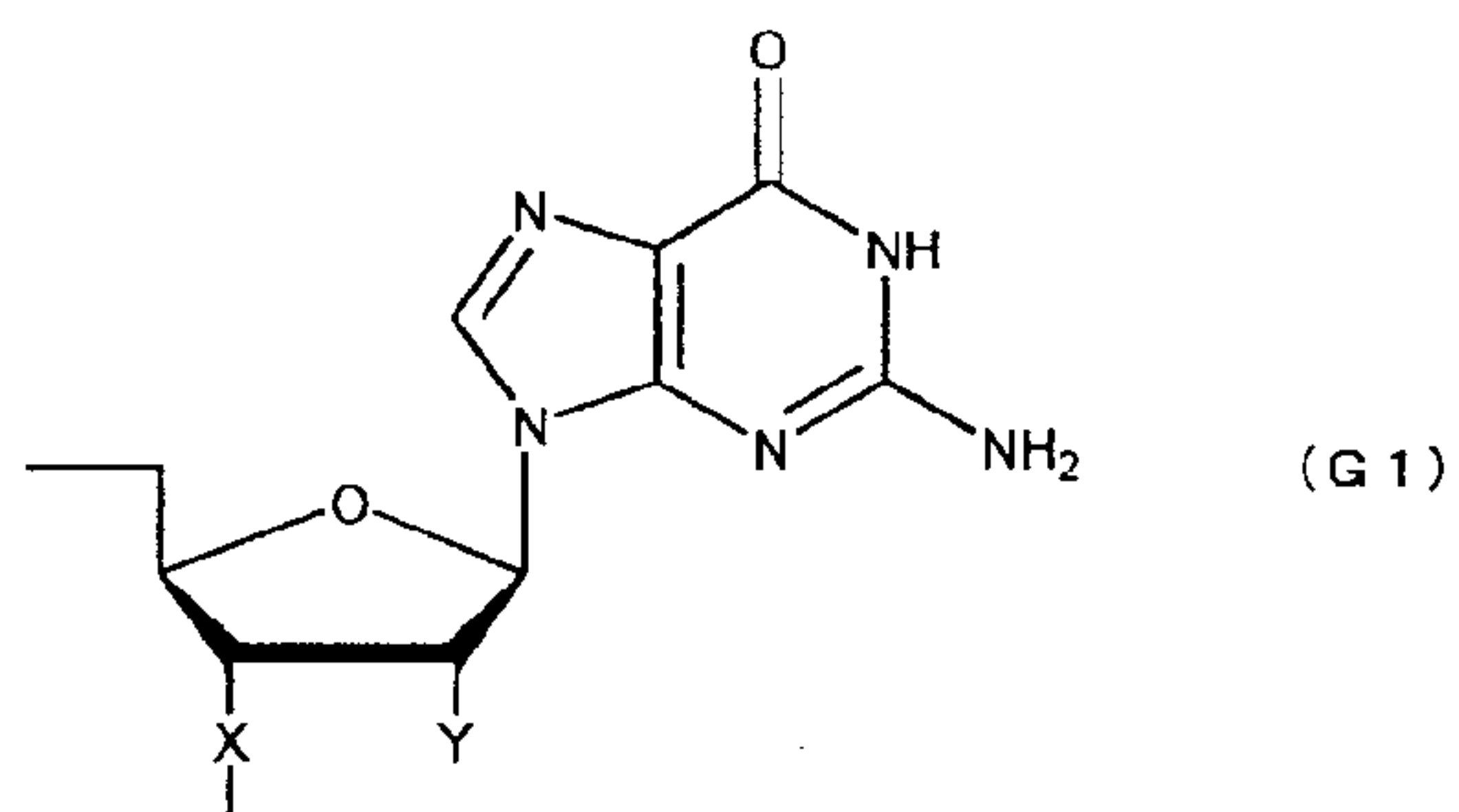
20 (19h'')HO-Bc-Bc-Bt-Bt-Ba-Bg-Bc-,

(19i'')HO-Bt-Bc-Bc-Bt-Bt-Ba-Bg-Bc-, or

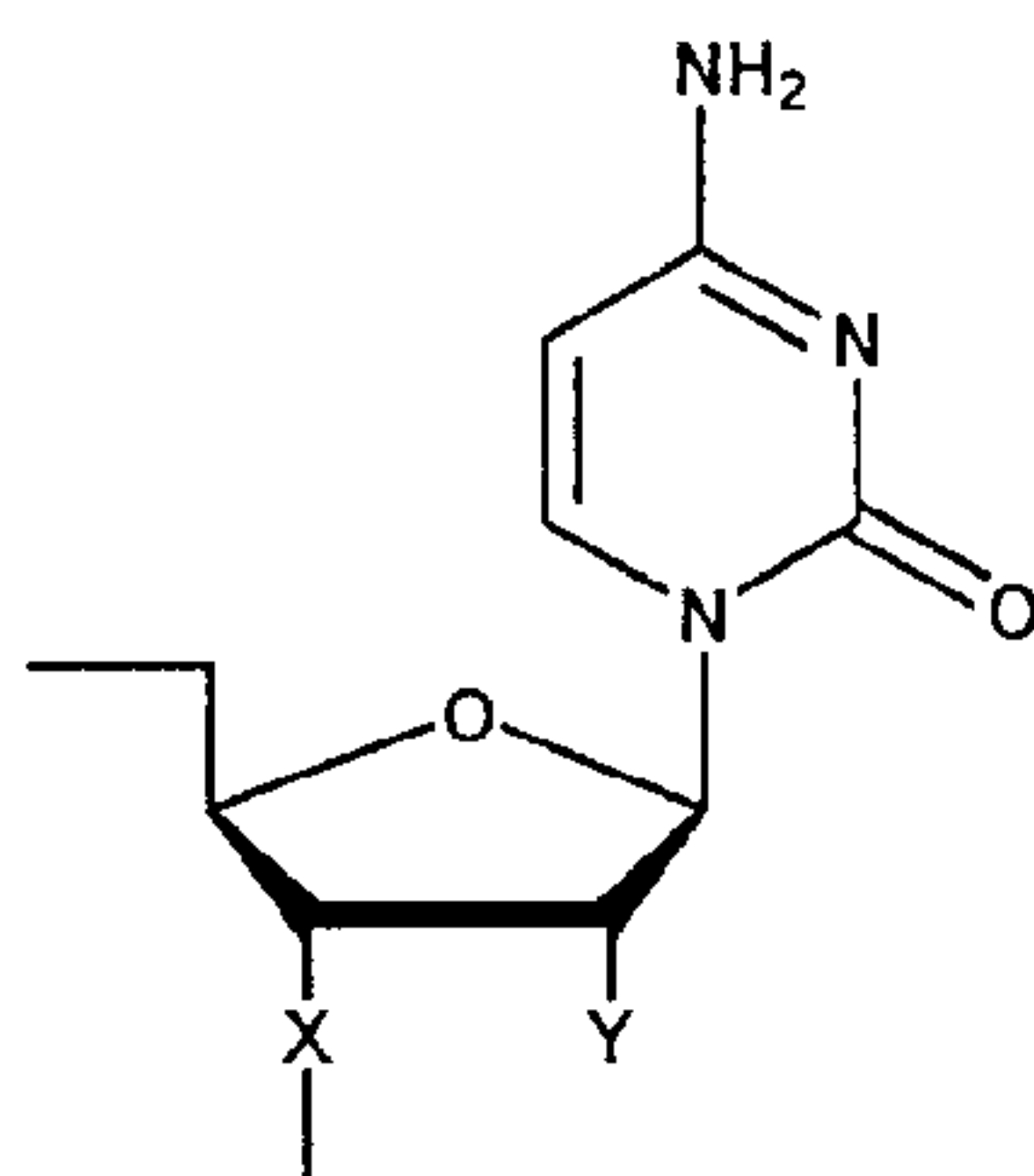
(19j'')HO-Bt-Bt-Bc-Bc-Bt-Bt-Ba-Bg-Bc-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group
represented by the following formula (A1) or (A2); Bc is a group represented by the
25 following formula (C1) or (C2); and Bt is a group represented by the following formula
(U1) or (T2):

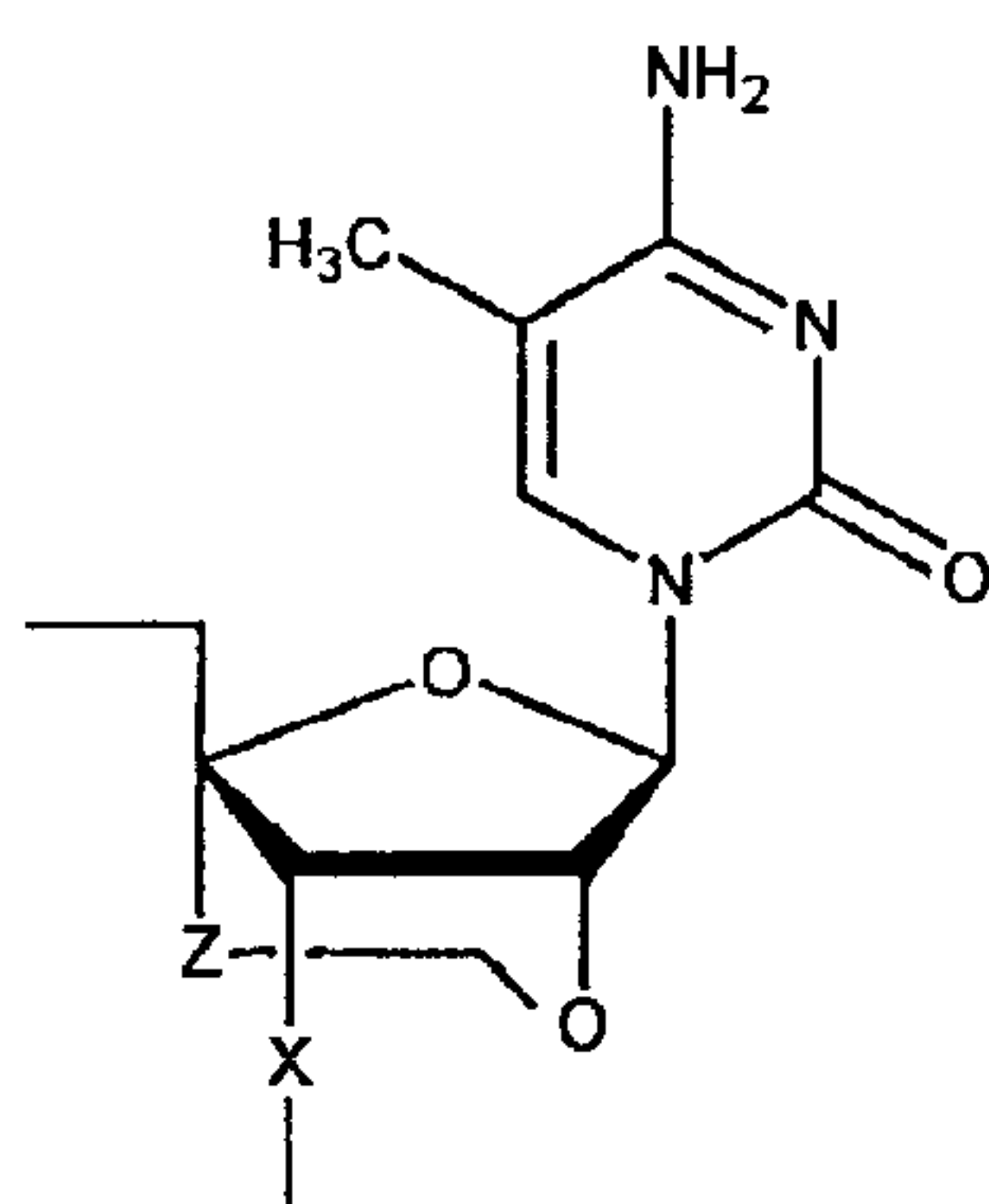
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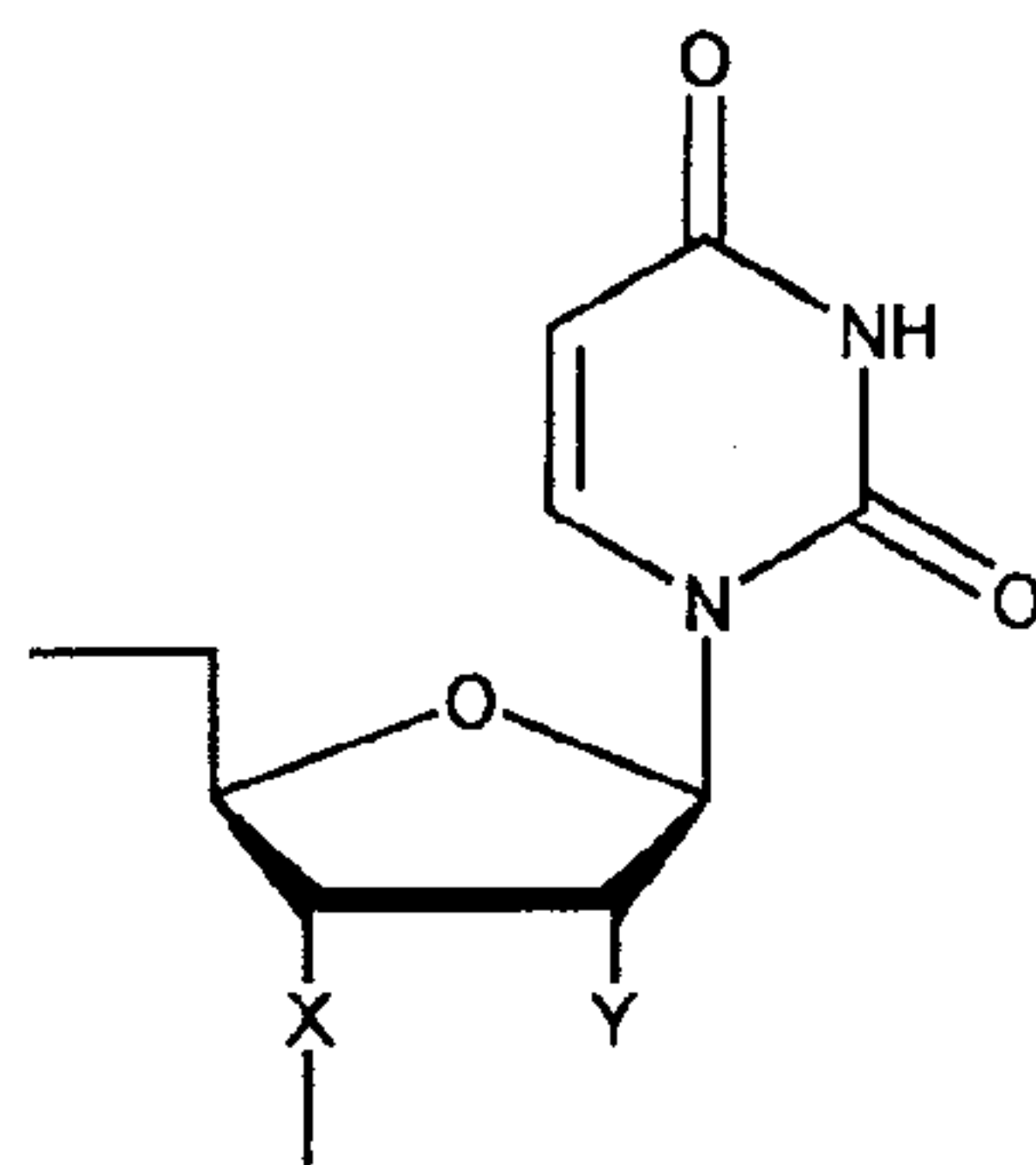
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(C 1)

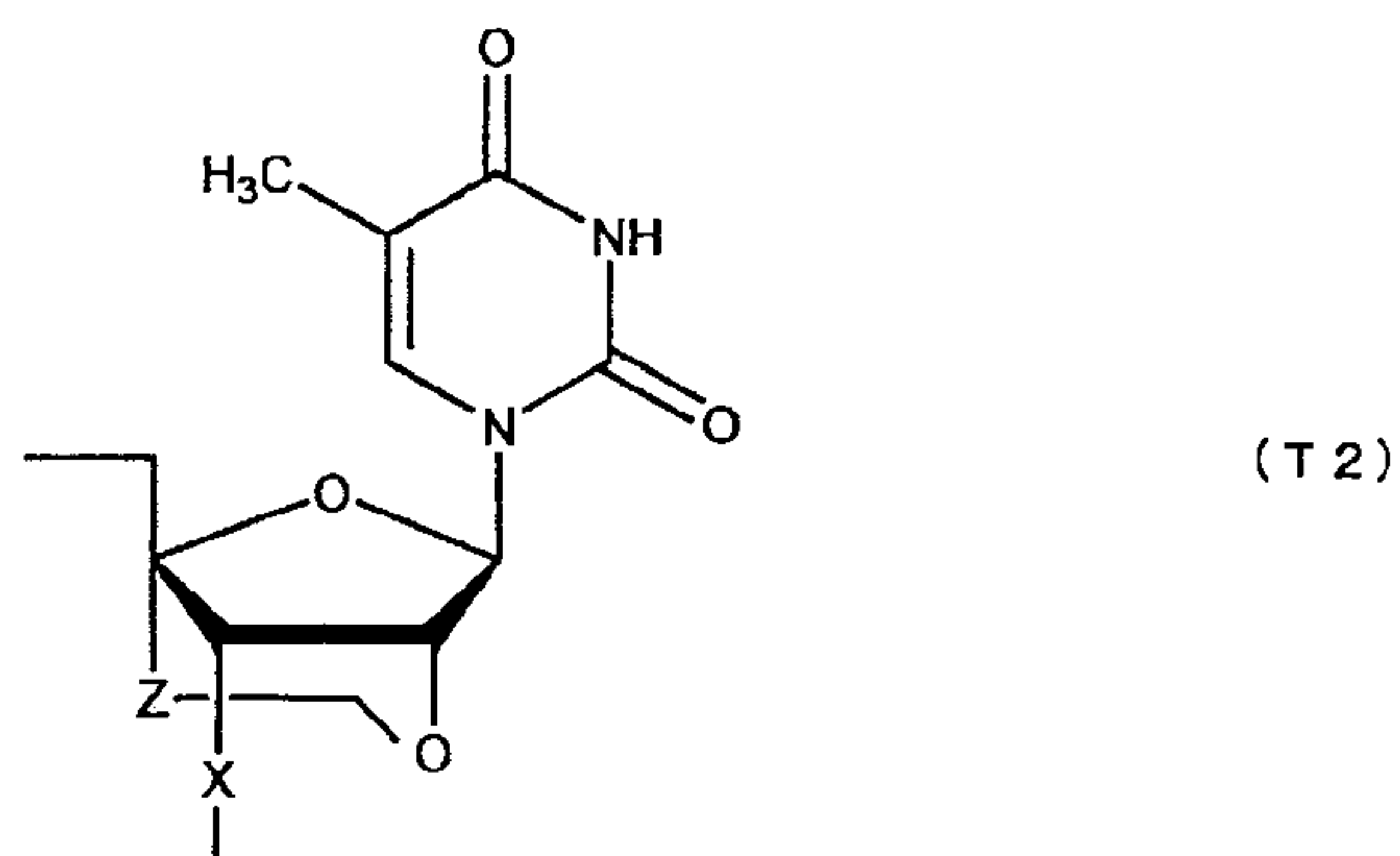


(C 2)

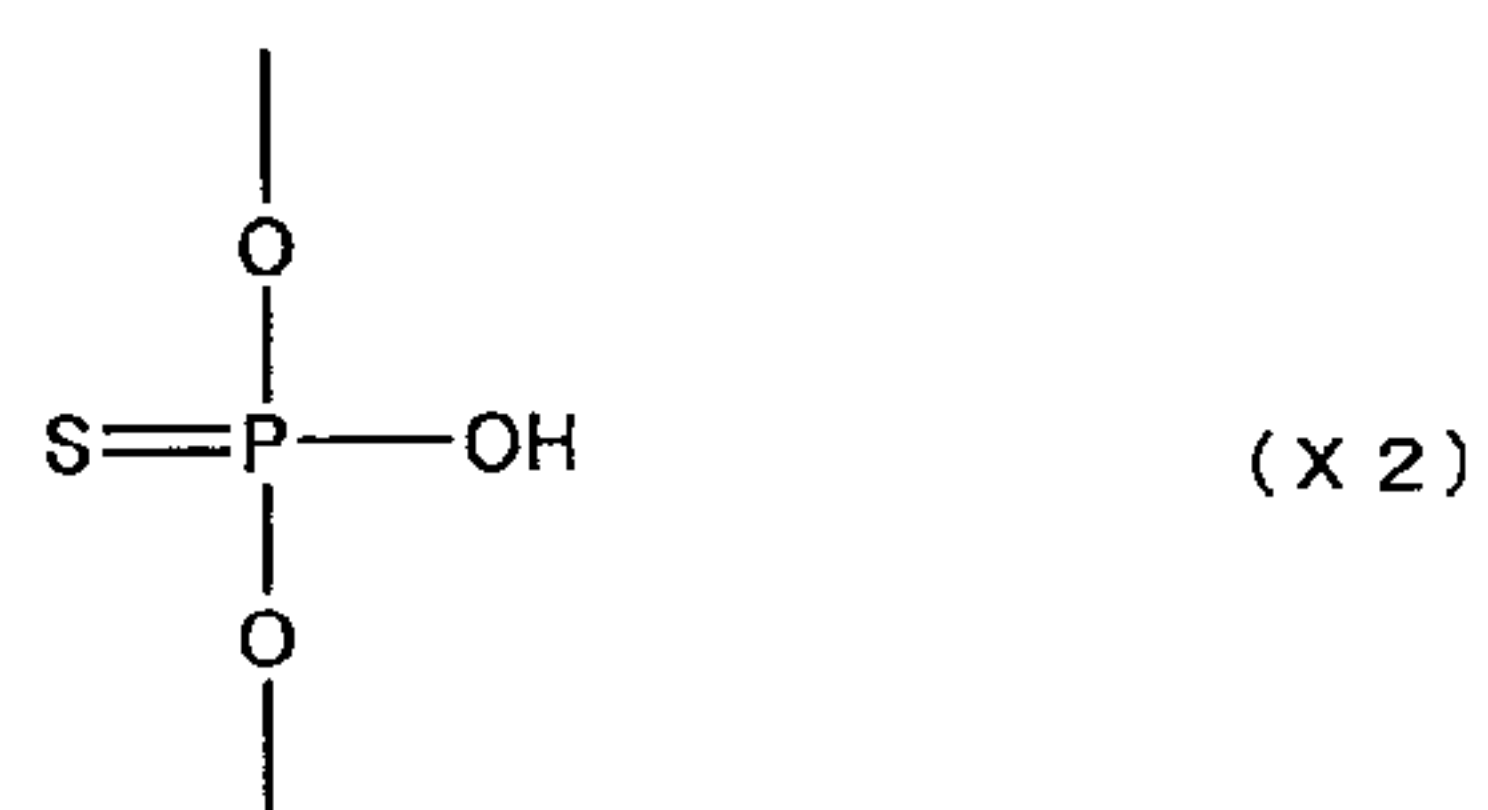
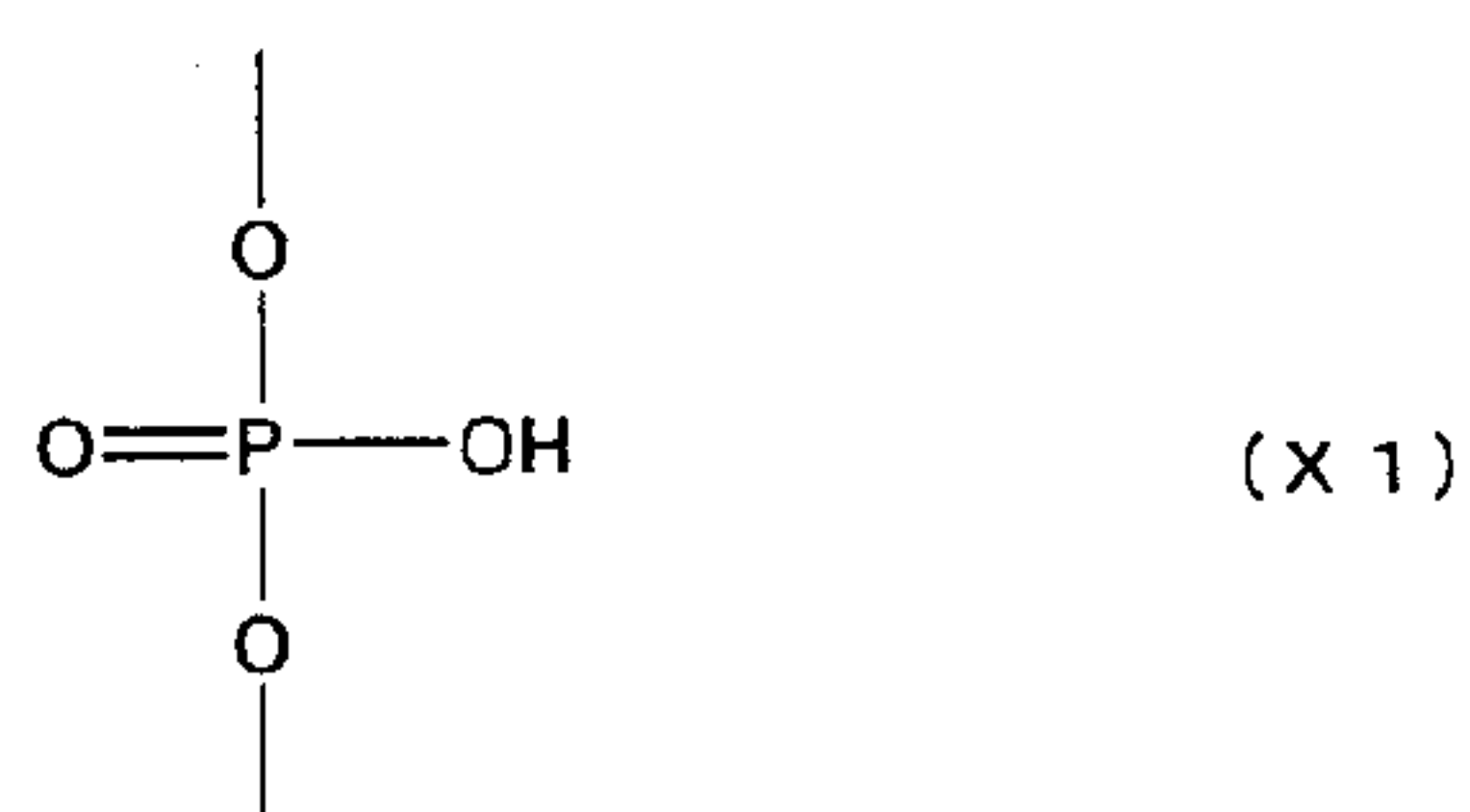


(U 1)

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where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''19} is a group represented by the following formula (19''):

10 -Bt-Bt-Bc-Bc-Ba-Bg-Bc-Bc-Ba- (19'')

where Bg, Ba, Bt and Bc are as defined above;

B_{B''19} is a group represented by any one of the following (119a'') to (119j''):

(119a'')-CH₂CH₂OH,

(119b'')-Bt-CH₂CH₂OH,

15 (119c'')-Bt-Bt-CH₂CH₂OH,

(119d'')-Bt-Bt-Bg-CH₂CH₂OH,

(119e'')-Bt-Bt-Bg-Bt-CH₂CH₂OH,

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(119f'')-Bt-Bt-Bg-Bt-Bg-CH₂CH₂OH,(119g'')-Bt-Bt-Bg-Bt-Bg-Bt-CH₂CH₂OH,(119h'')-Bt-Bt-Bg-Bt-Bg-Bt-Bt-CH₂CH₂OH,(119i'')-Bt-Bt-Bg-Bt-Bg-Bt-Bt-Bg-CH₂CH₂OH, or5 (119j'')-Bt-Bt-Bg-Bt-Bg-Bt-Bt-Bg-Ba-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XIX'') has 2''-O,4''-C-alkylene group.

[45] A compound represented by the following general formula (XX'') or a
 10 pharmacologically acceptable salt thereof:

where B_{T''20} is a group represented by any one of the following (20a'') to (20j''):

(20a'')HO-,

(20b'')HO-Bc-,

15 (20c'')HO-Bt-Bc-,

(20d'')HO-Bt-Bt-Bc-,

(20e'')HO-Bc-Bt-Bt-Bc-,

(20f'')HO-Bg-Bc-Bt-Bt-Bc-,

(20g'')HO-Ba-Bg-Bc-Bt-Bt-Bc-,

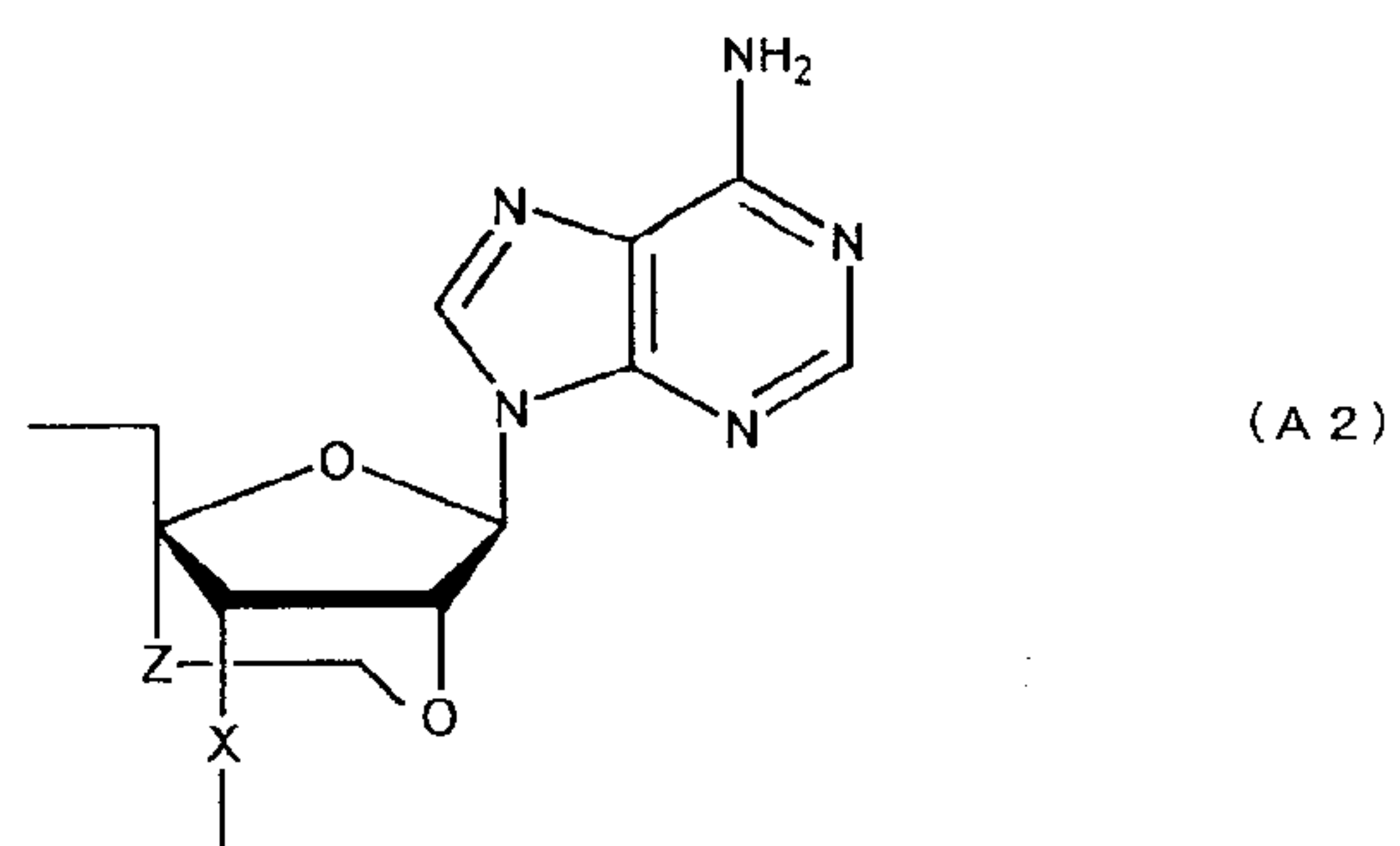
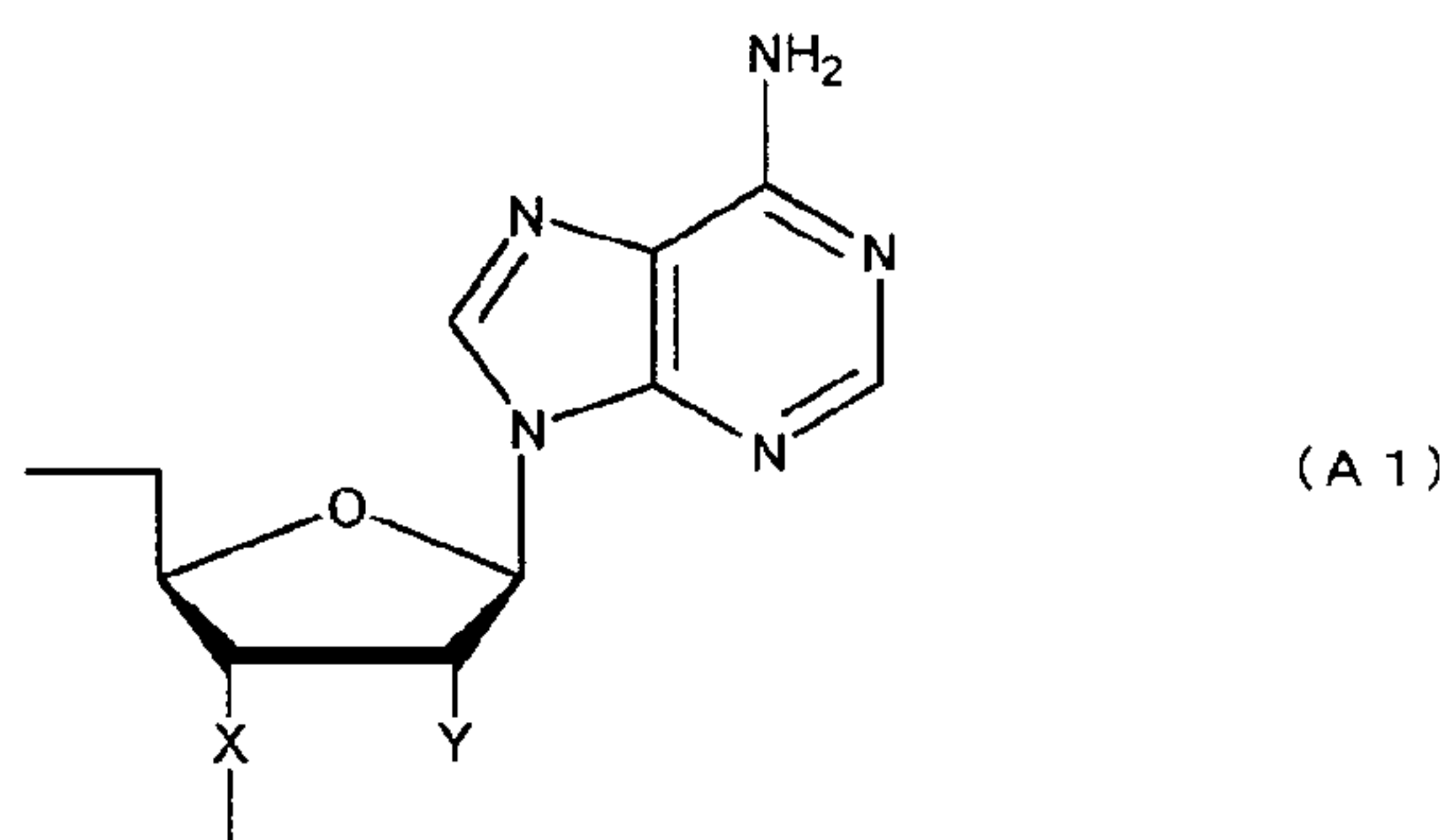
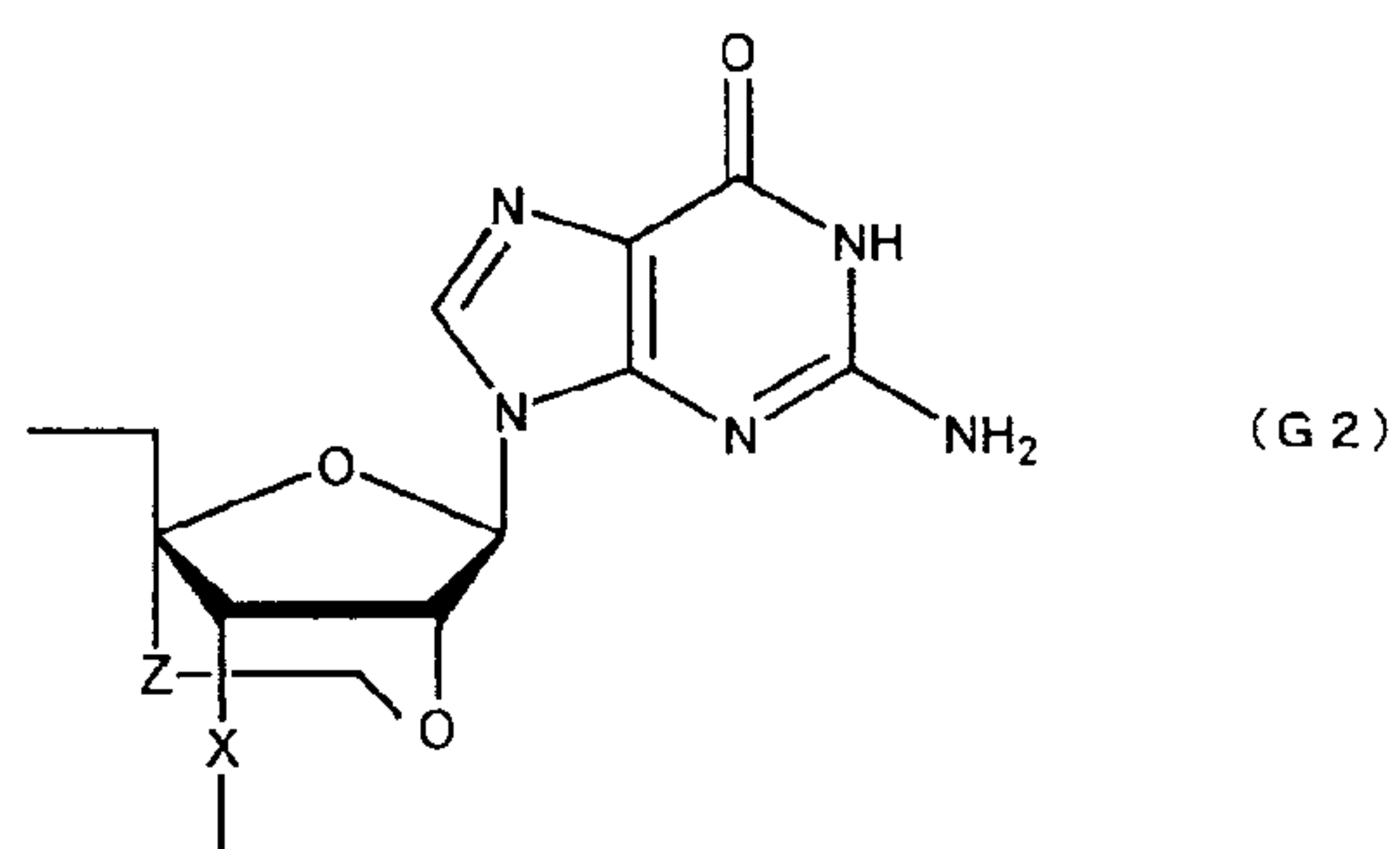
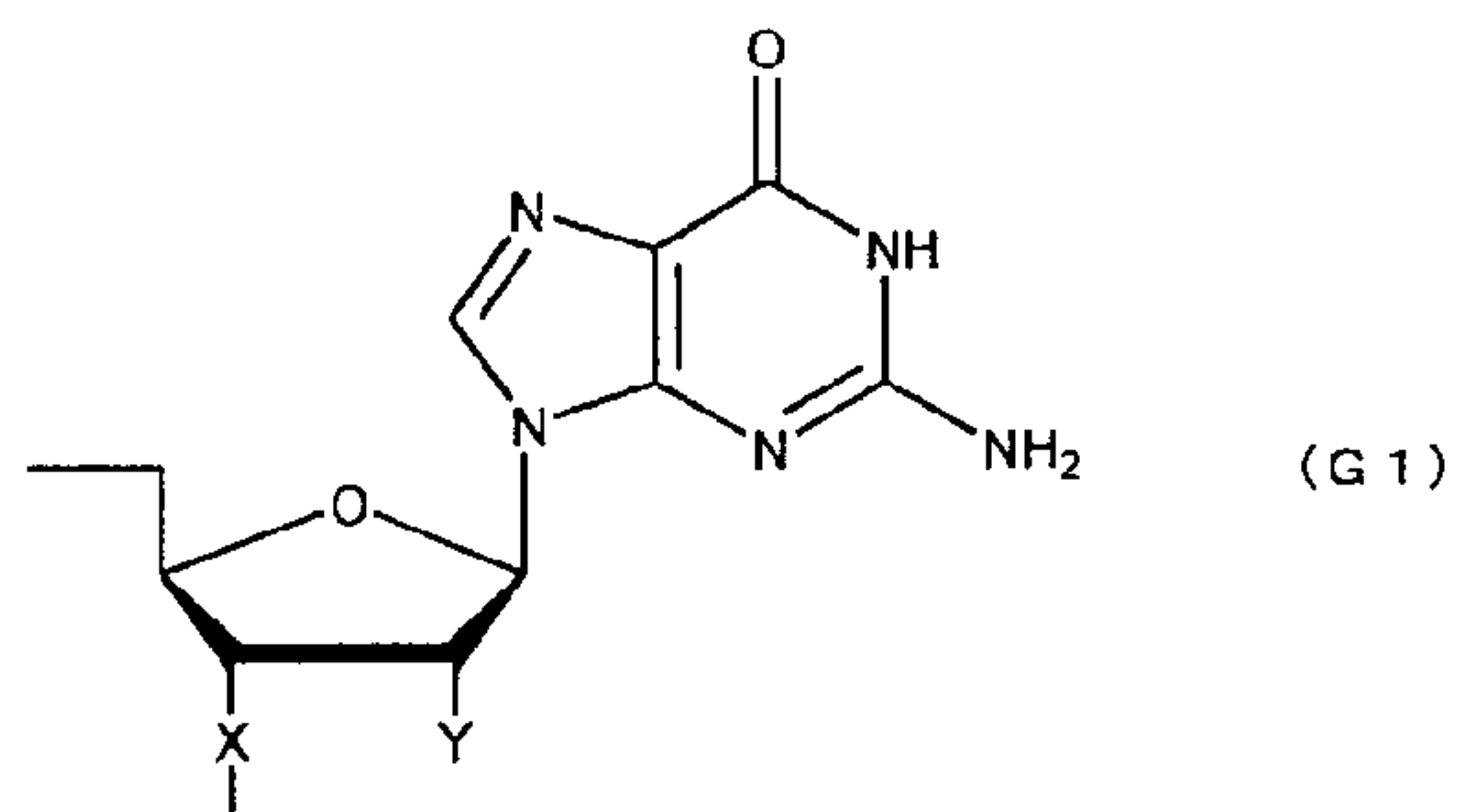
20 (20h'')HO-Bc-Ba-Bg-Bc-Bt-Bt-Bc-,

(20i'')HO-Bt-Bc-Ba-Bg-Bc-Bt-Bt-Bc-, or

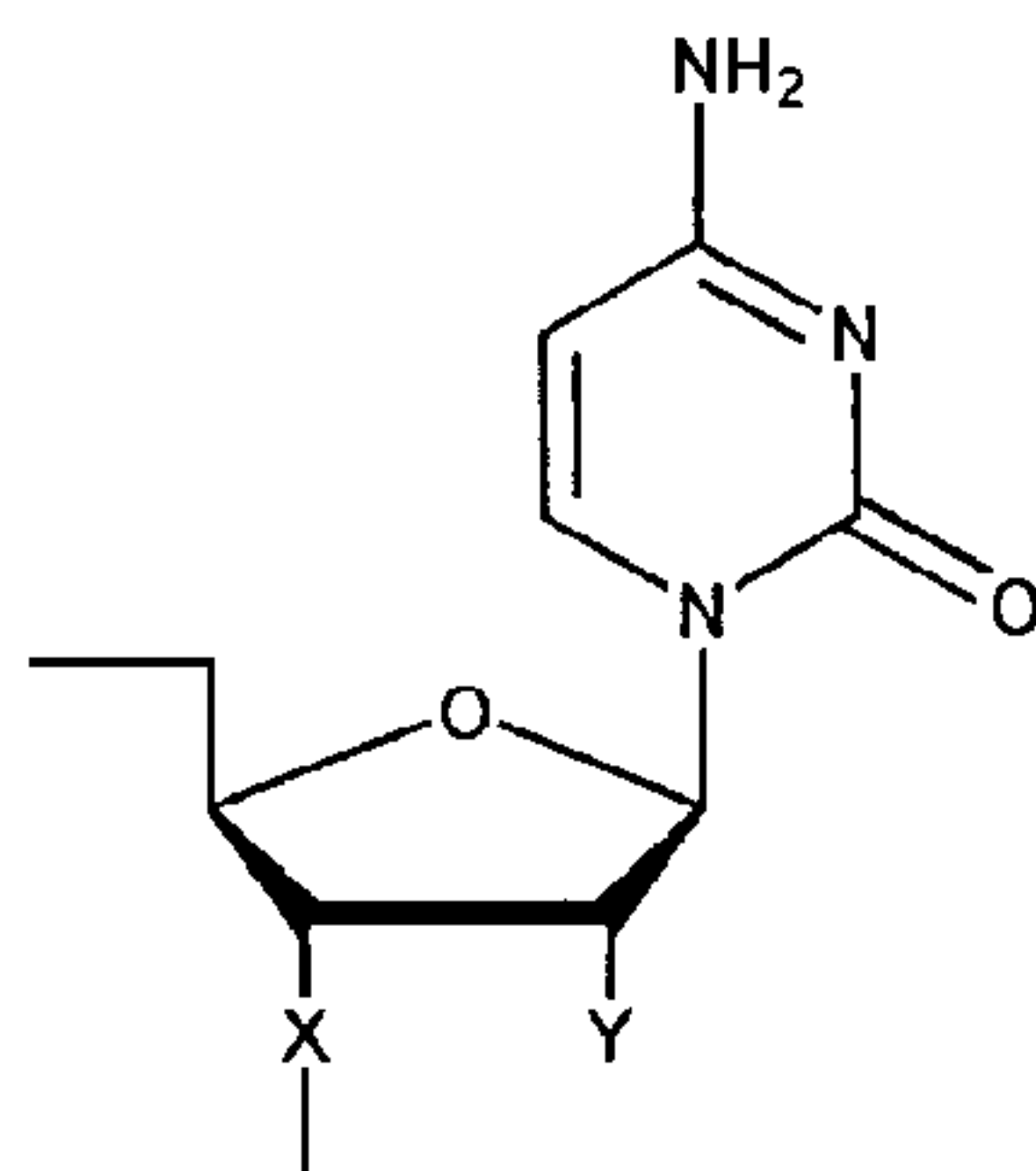
(20j'')HO-Bc-Bt-Bc-Ba-Bg-Bc-Bt-Bt-Bc-

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the
 25 following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

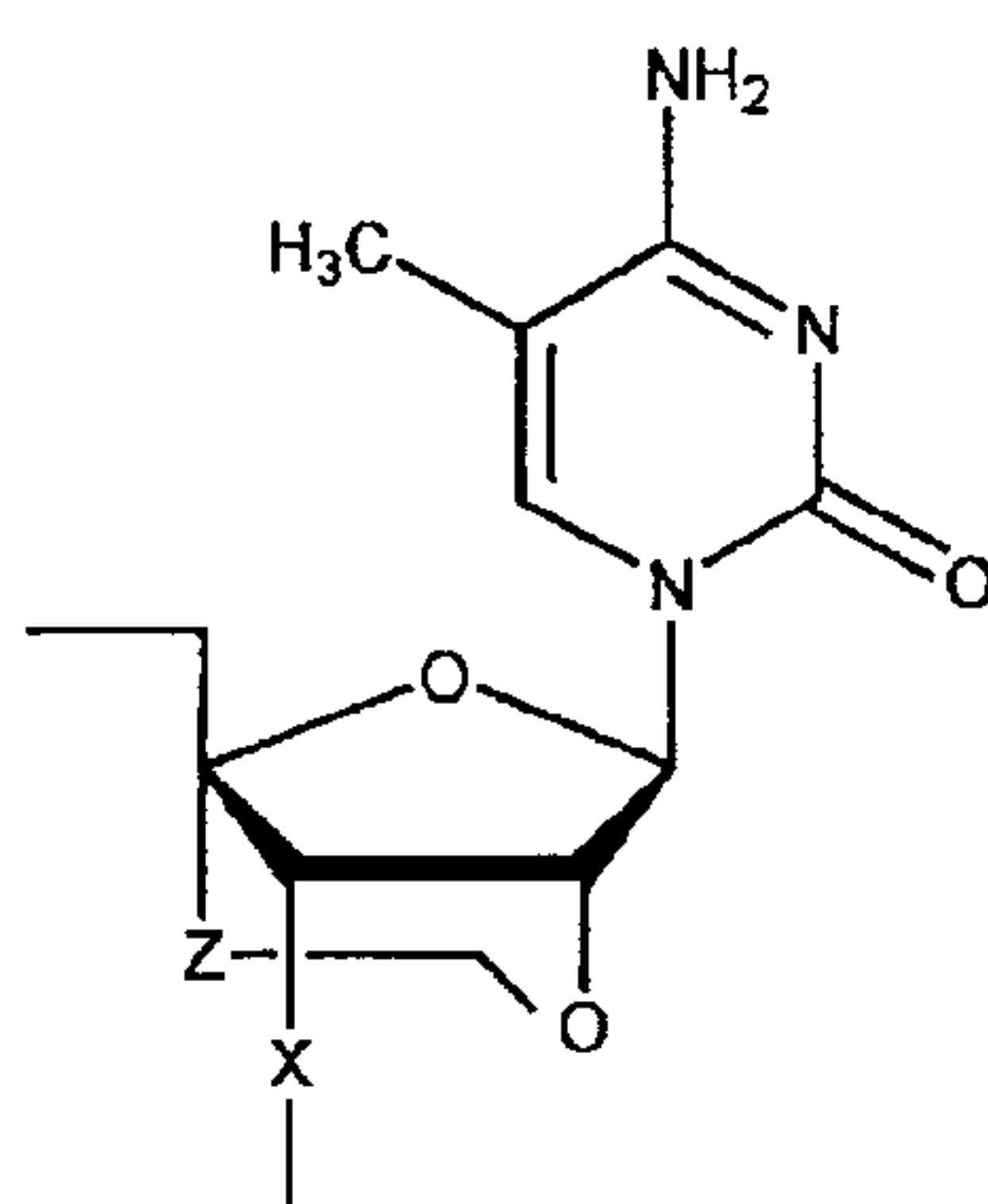
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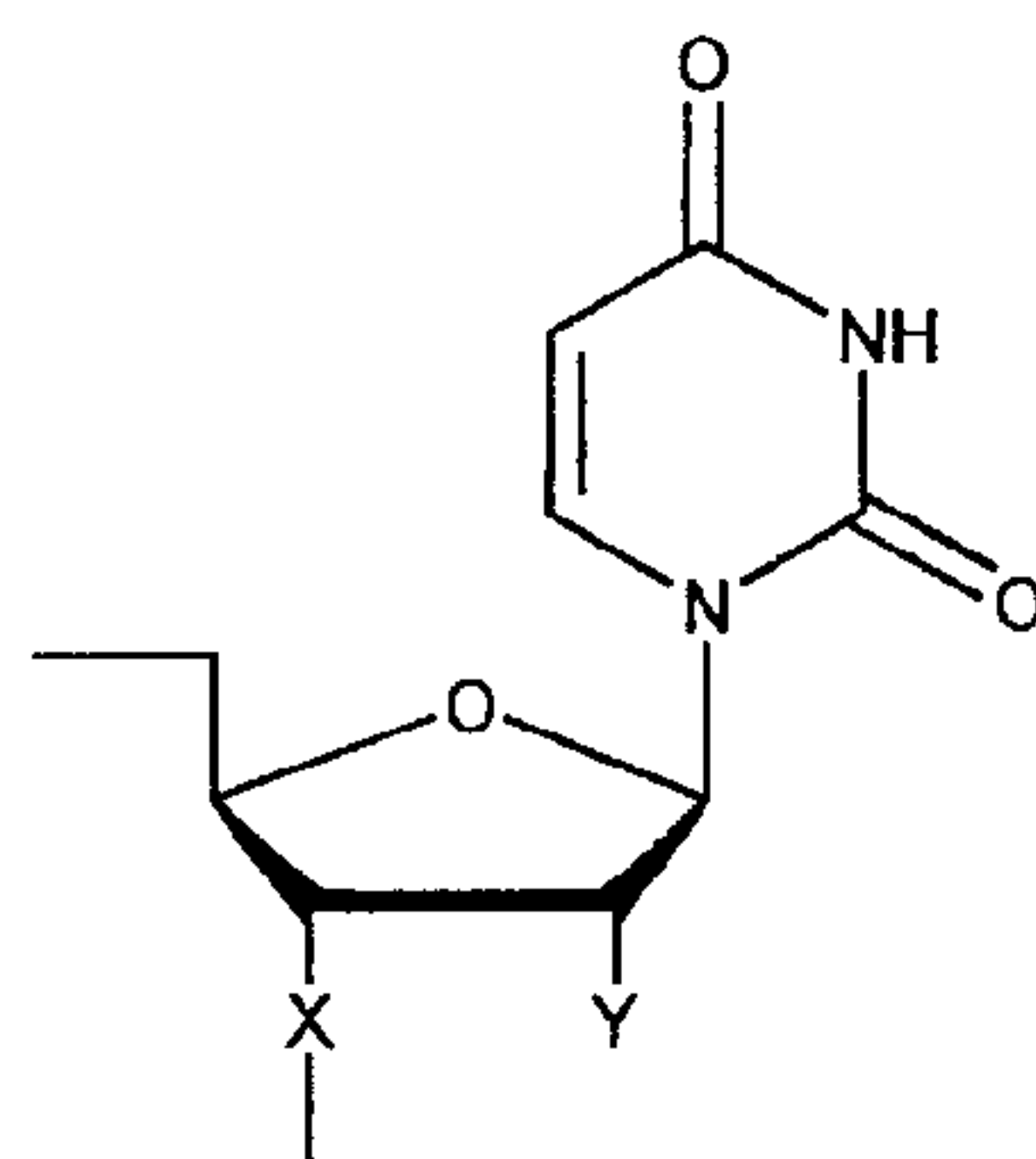
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(C 1)

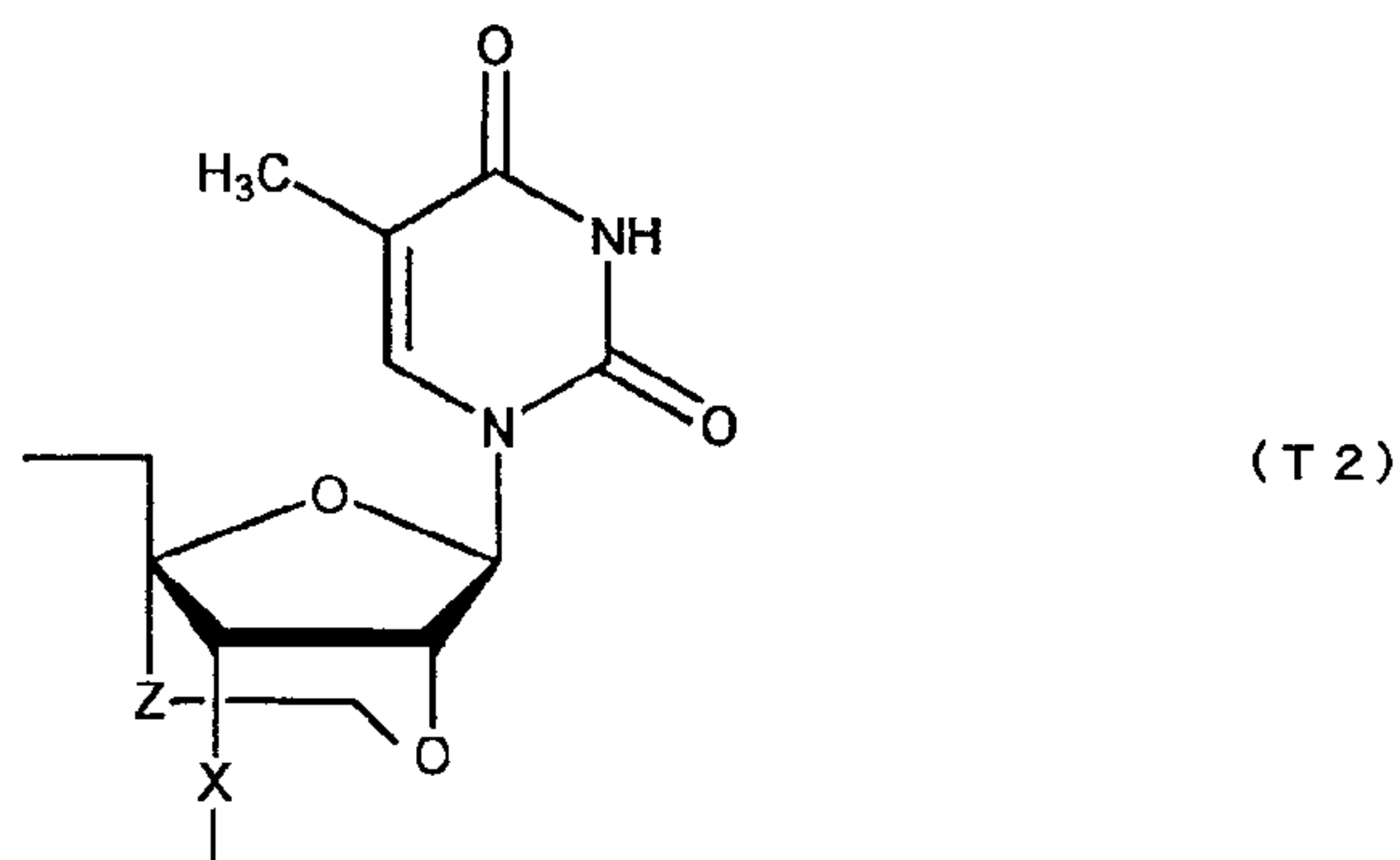


(C 2)

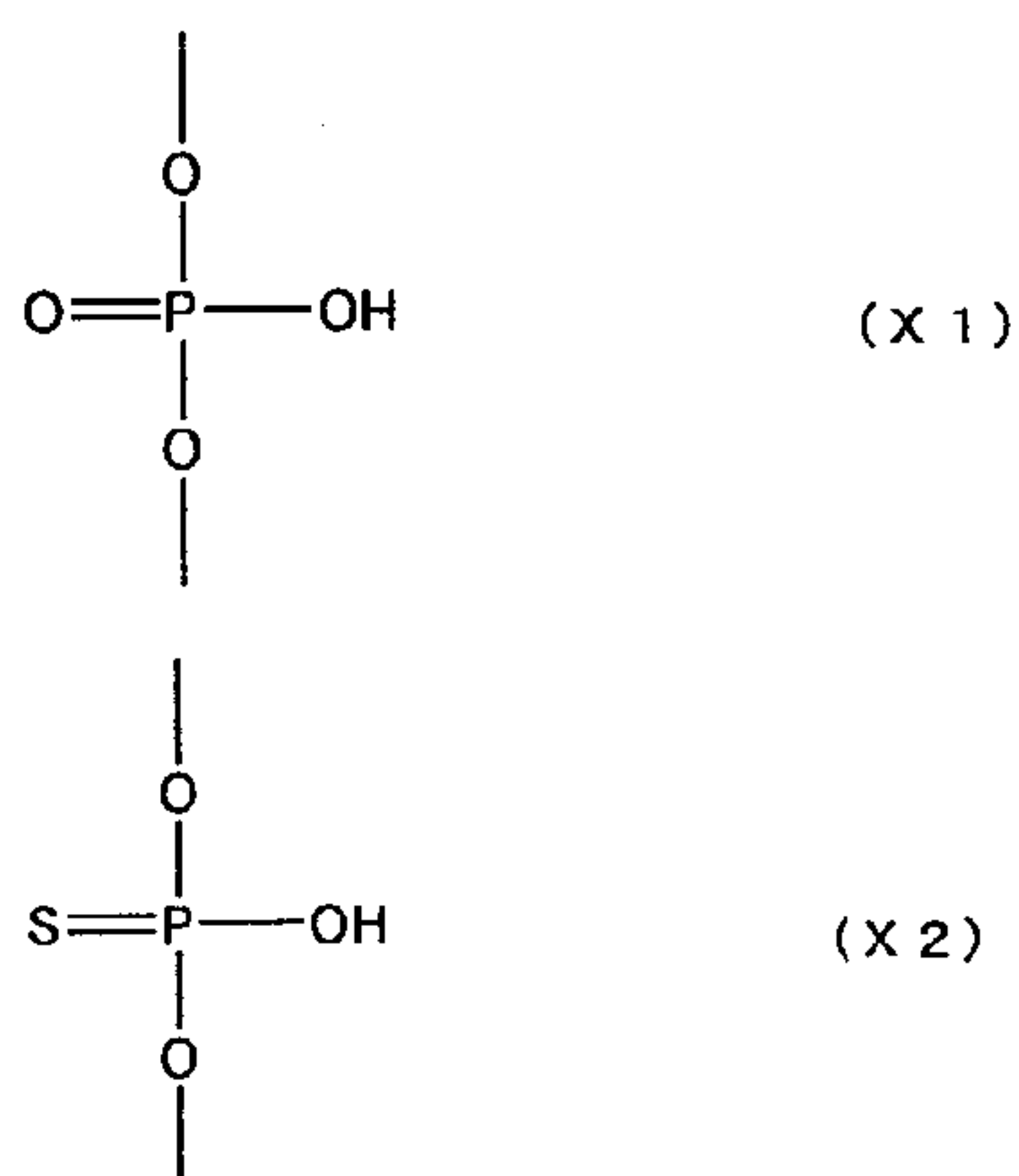


(U 1)

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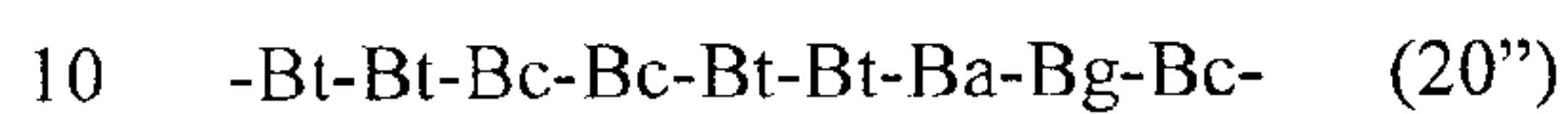
where X is individually and independently a group represented by the following formula (X1) or (X2):



5

Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

B_{M''20} is a group represented by the following formula (20''):



where Bg, Ba, Bt and Bc are as defined above;

B_{B''20} is a group represented by any one of the following (120a'') to (120j''):

(120a'')-CH₂CH₂OH,

(120b'')-Bt-CH₂CH₂OH,

15 (120c'')-Bt-Bt-CH₂CH₂OH,

(120d'')-Bt-Bt-Bc-CH₂CH₂OH,

(120e'')-Bt-Bt-Bc-Bc-CH₂CH₂OH,

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(120f'')-Bt-Bt-Bc-Bc-Ba-CH₂CH₂OH,(120g'')-Bt-Bt-Bc-Bc-Ba-Bg-CH₂CH₂OH,(120h'')-Bt-Bt-Bc-Bc-Ba-Bg-Bc-CH₂CH₂OH,(120i'')-Bt-Bt-Bc-Bc-Ba-Bg-Bc-Bc-CH₂CH₂OH, or5 (120j'')-Bt-Bt-Bc-Bc-Ba-Bg-Bc-Bc-Ba-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (XX'') has 2''-O,4''-C-alkylene group.

[46] A compound represented by the following general formula (XXI'') or a
 10 pharmacologically acceptable salt thereof:

where B_{T''21} is a group represented by any one of the following (21a'') to (21e''):

(21a'')HO-,

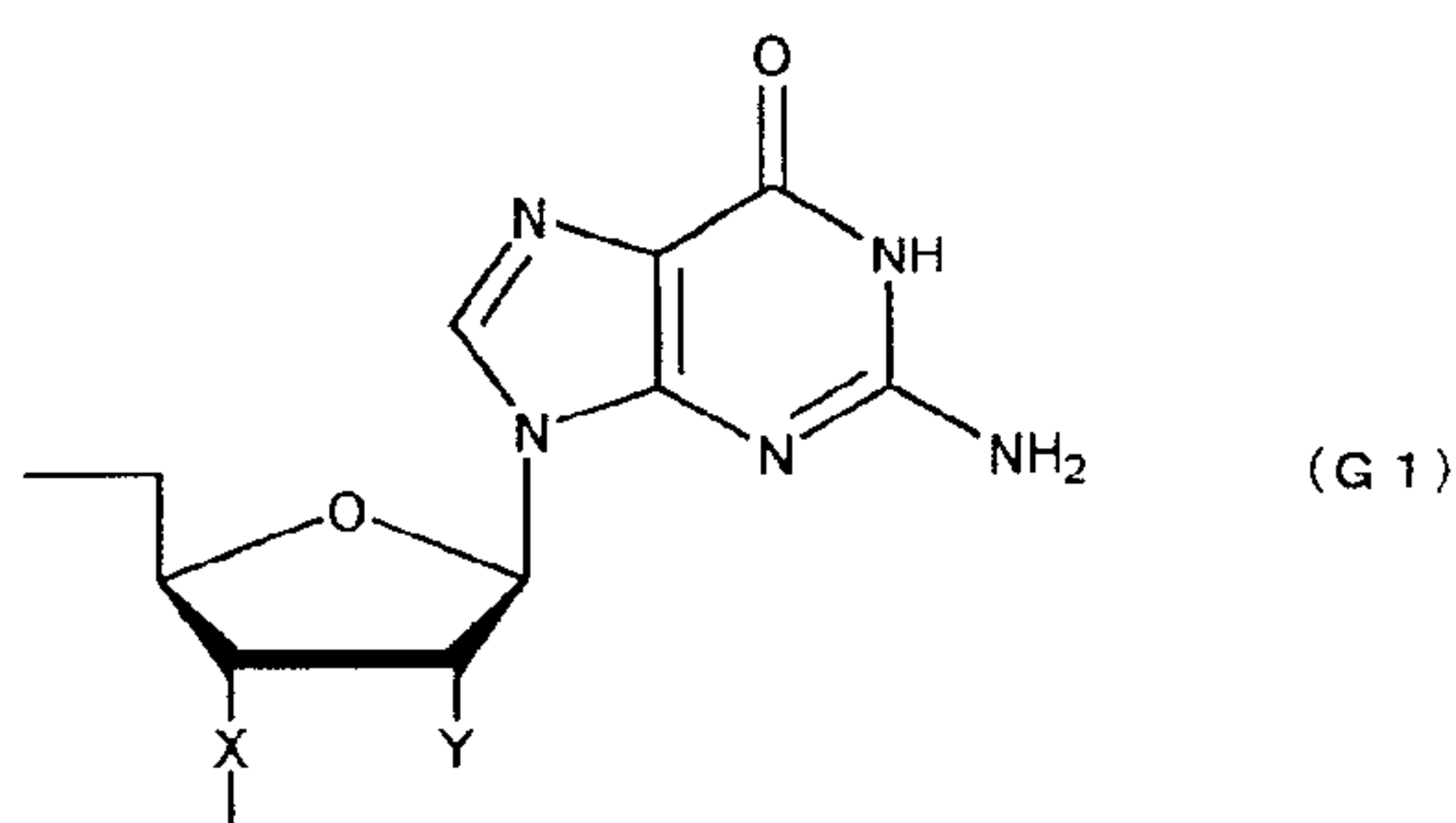
(21b'')HO-Ba-,

15 (21c'')HO-Bc-Ba-,

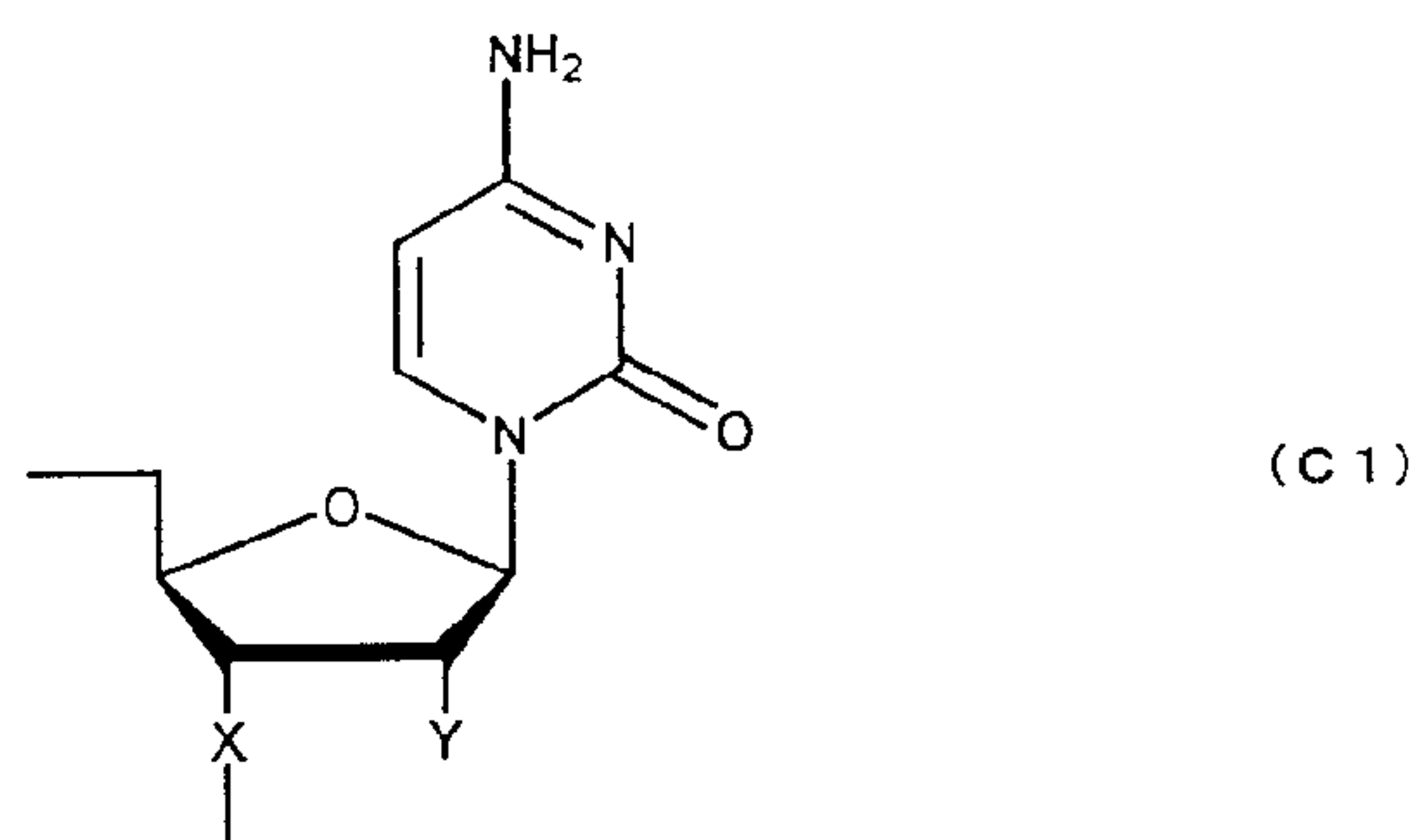
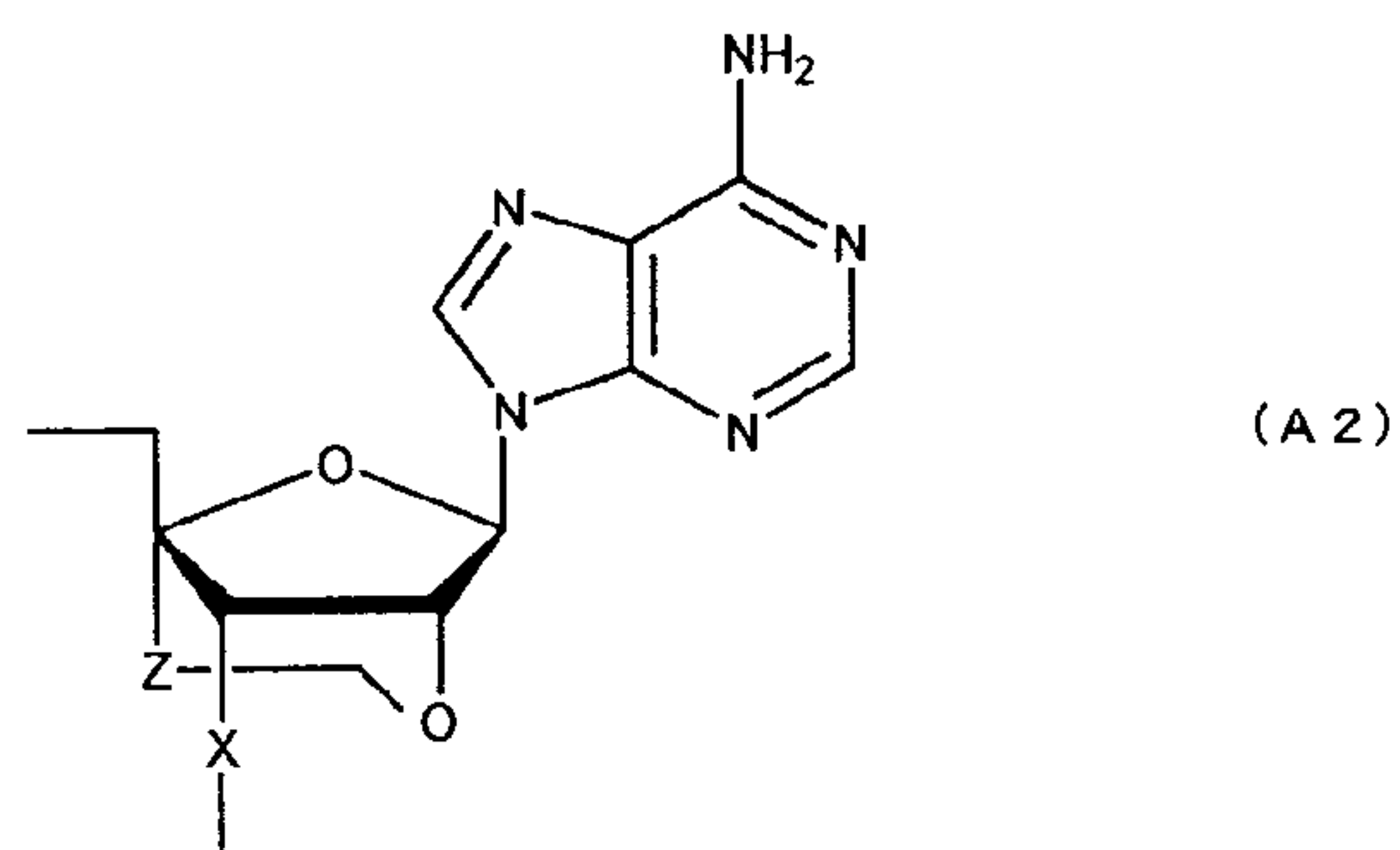
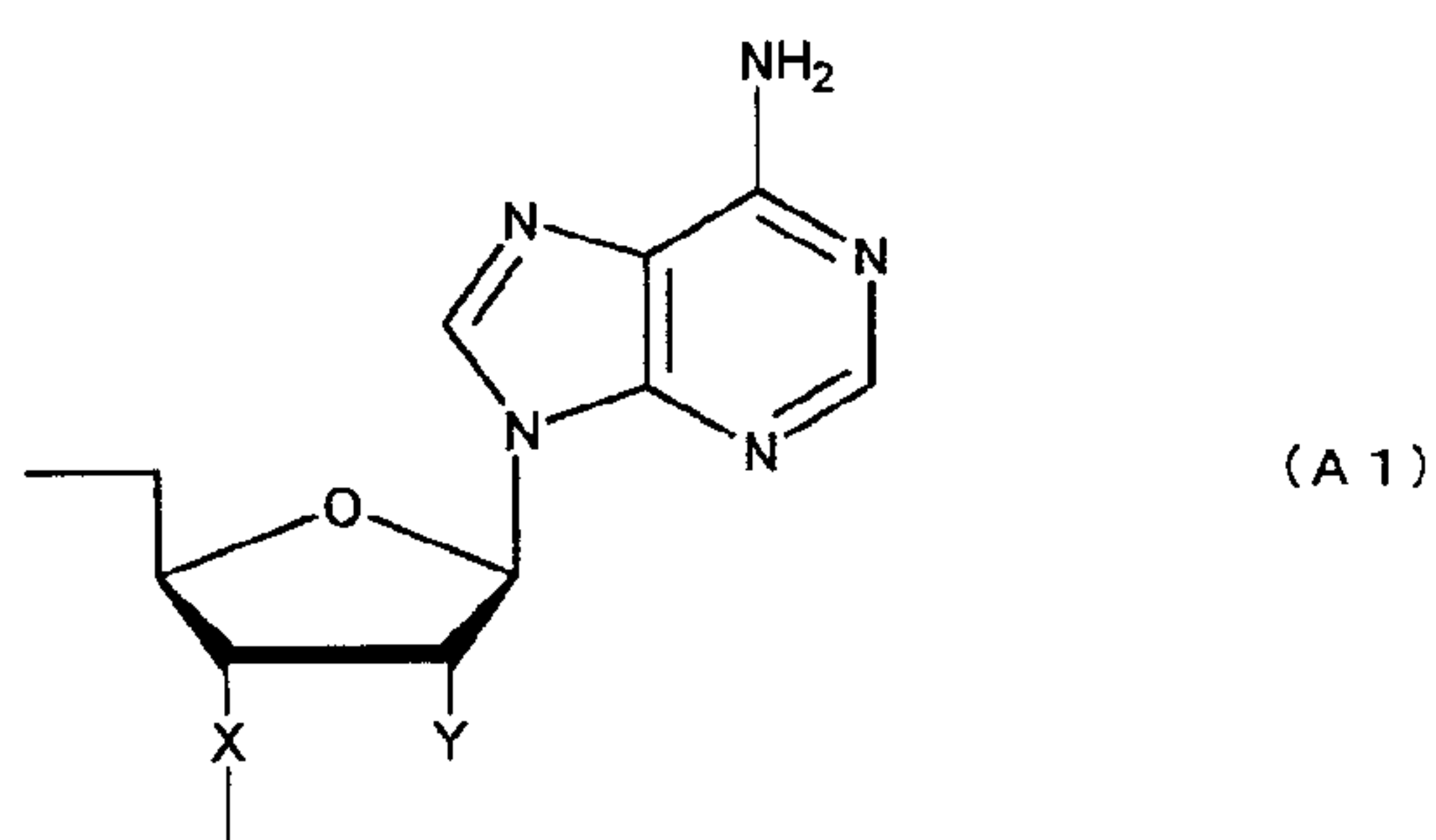
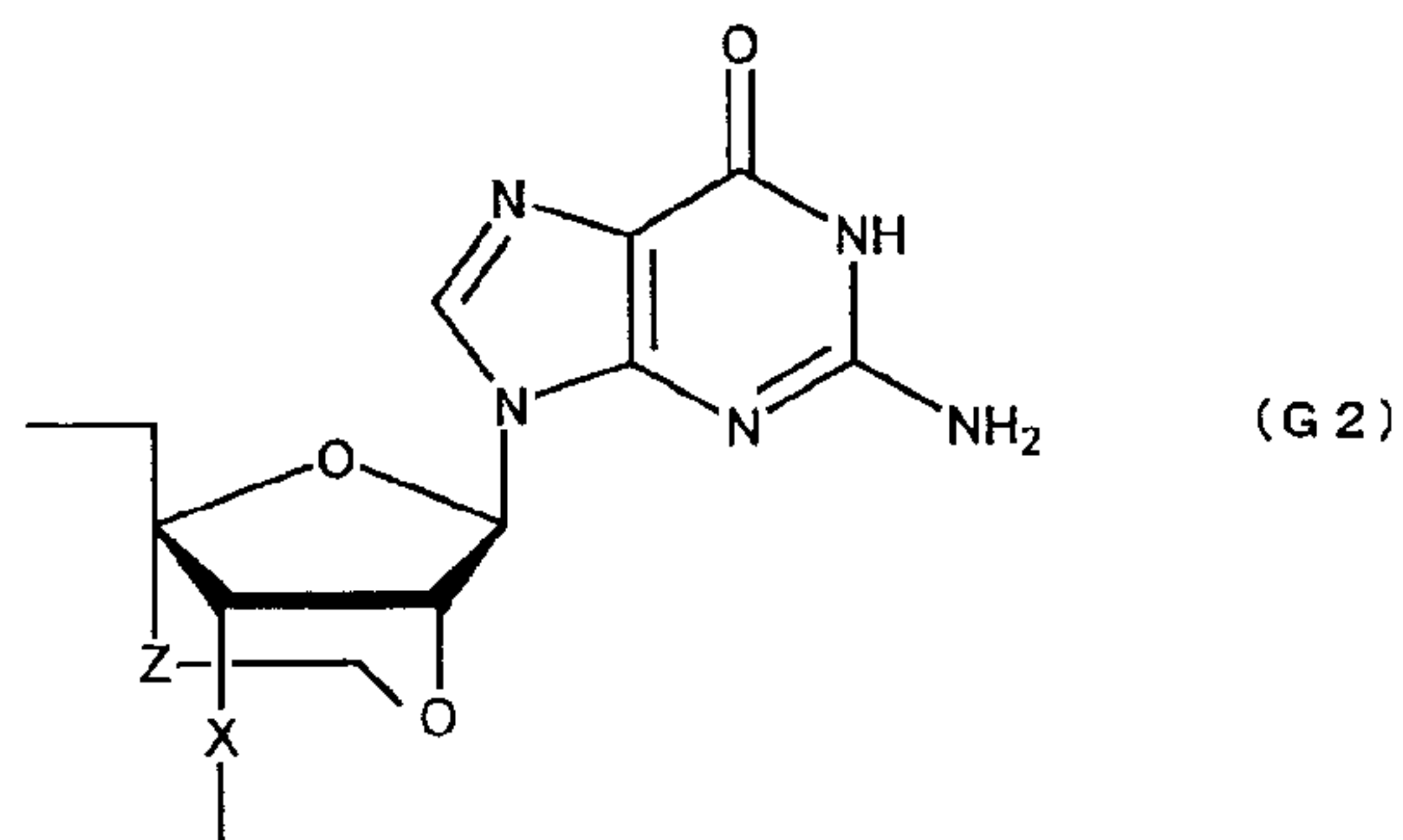
(21d'')HO-Bt-Bc-Ba-, or

(21e'')HO-Bc-Bt-Bc-Ba-

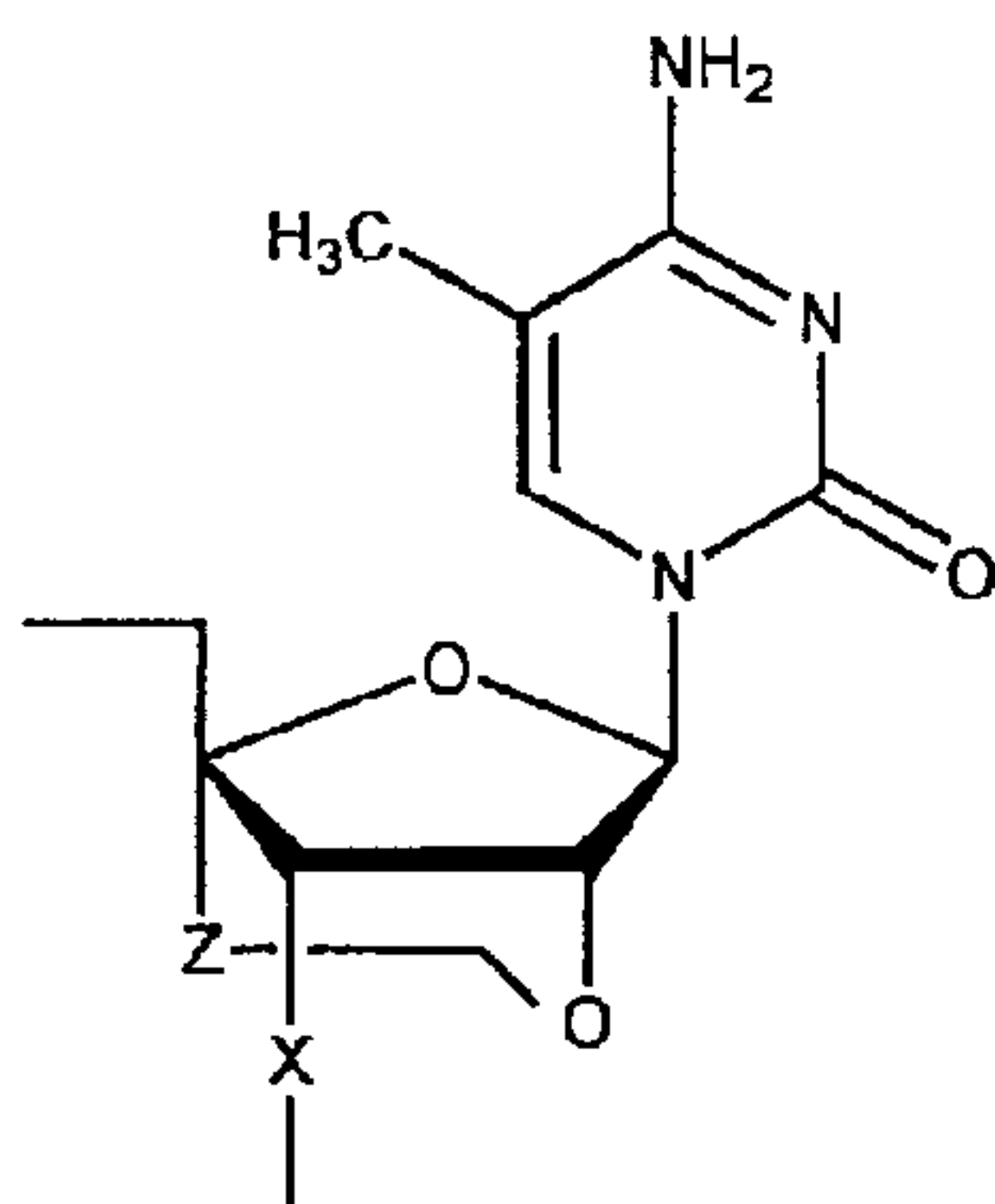
where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the
 20 following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):



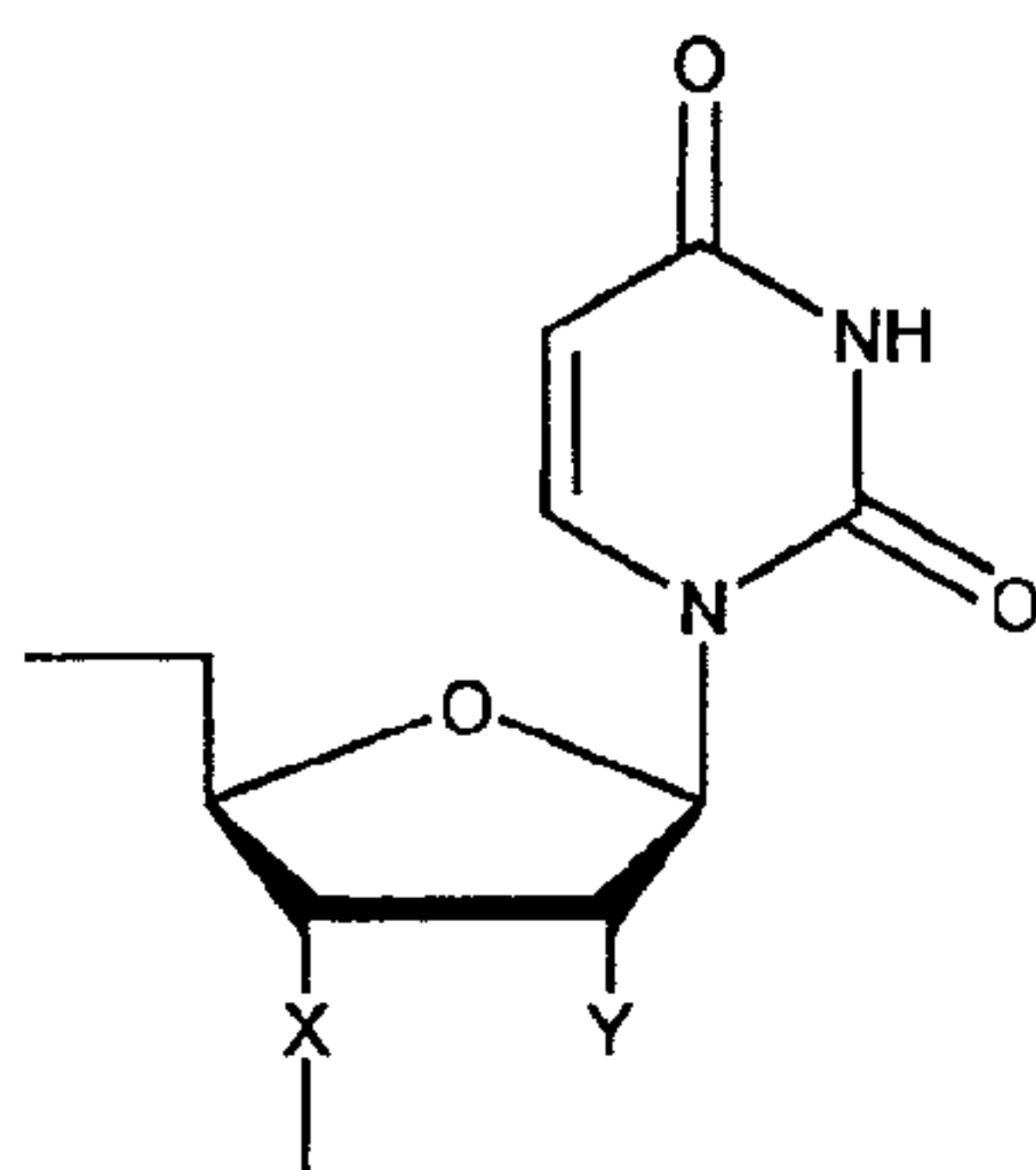
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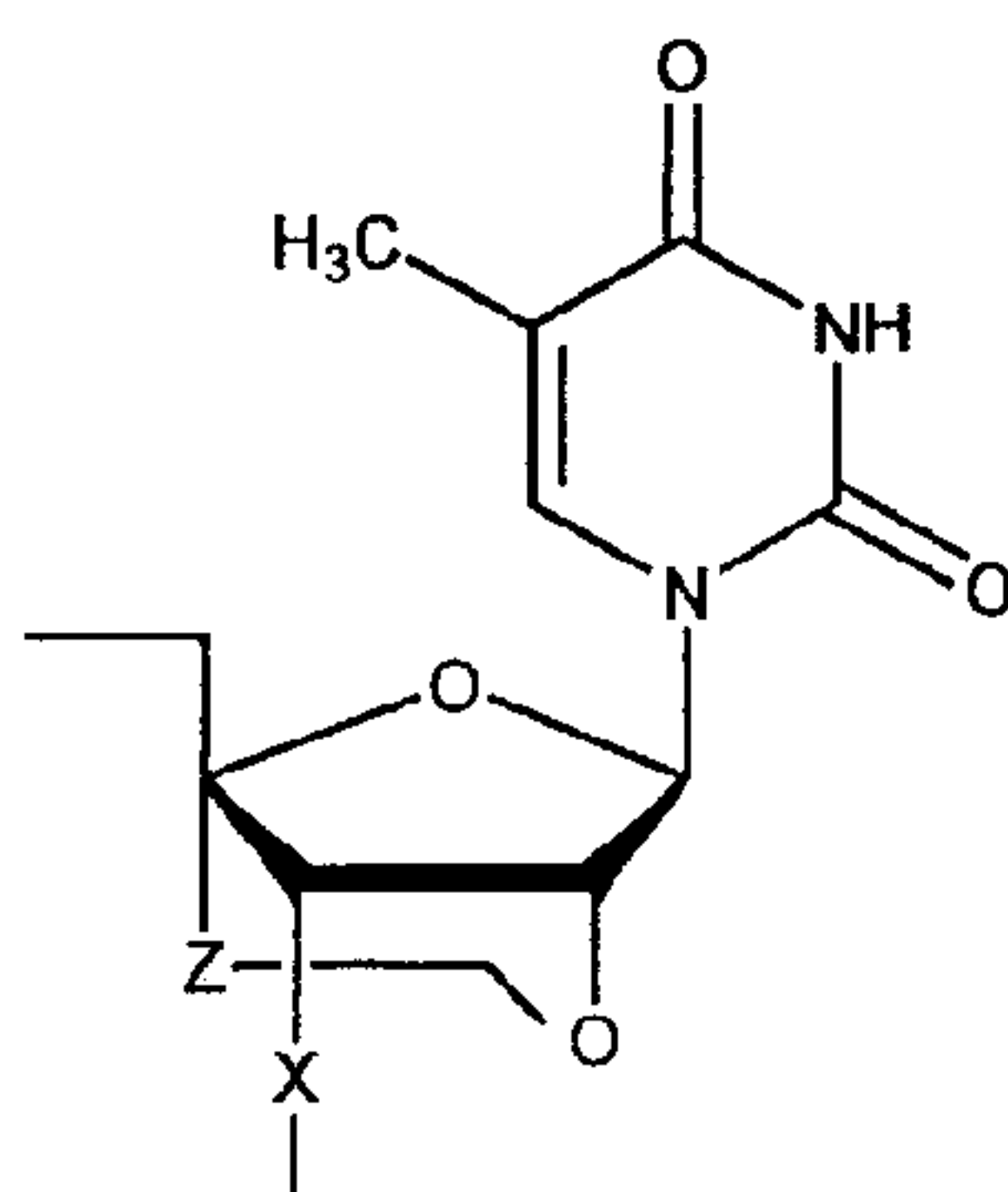
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(C 2)



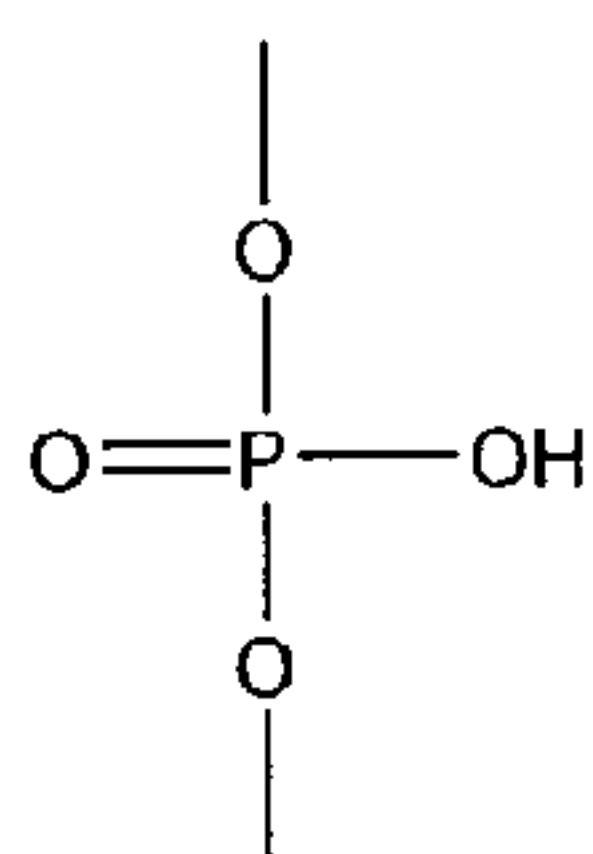
(U 1)



(T 2)

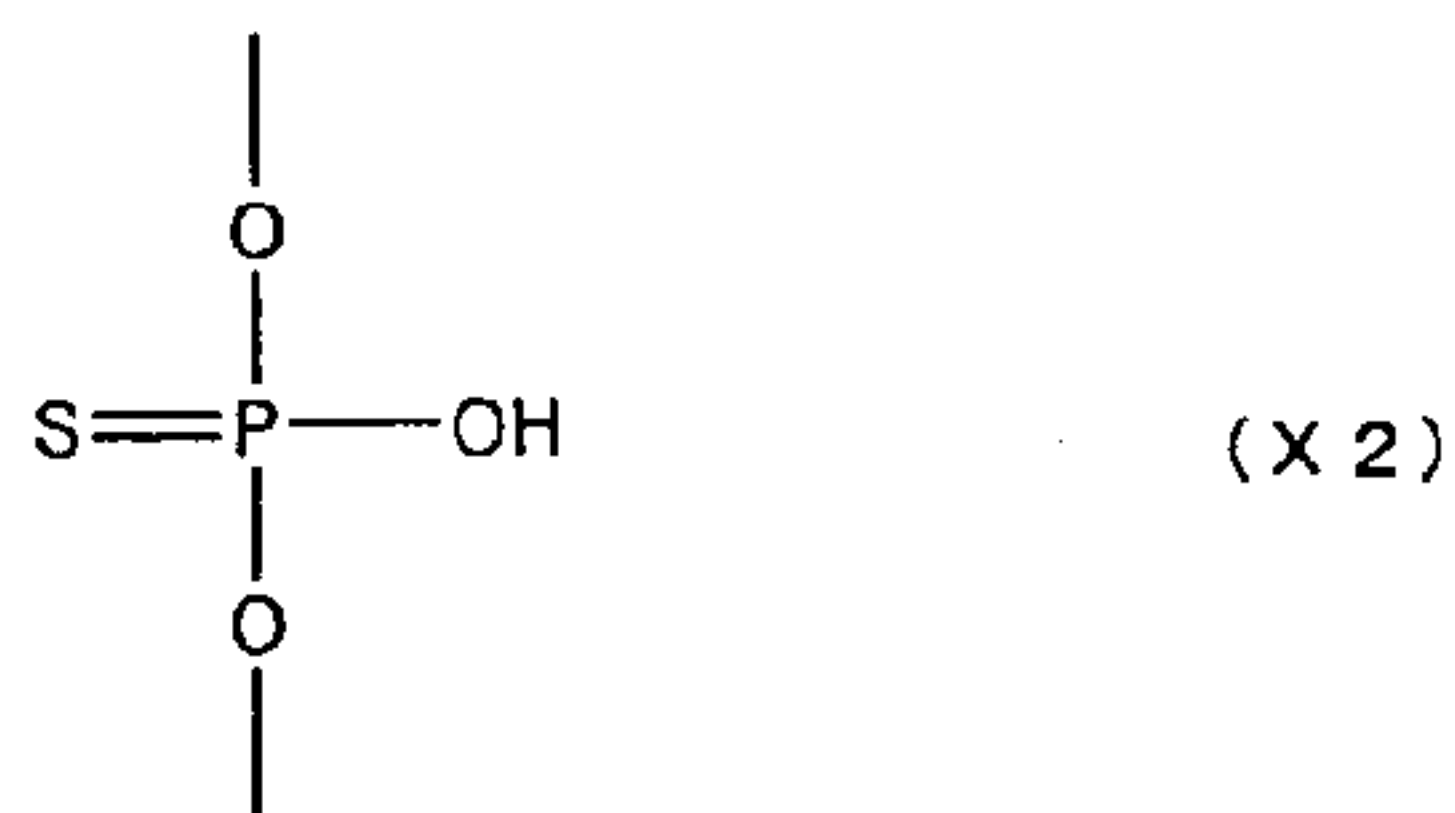
where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



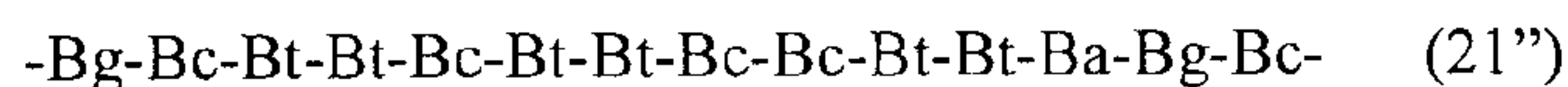
(X 1)

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Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

- 5 $B_{M''21}$ is a group represented by the following formula (21''):



where Bg, Ba, Bt and Bc are as defined above;

$B_{B''21}$ is a group represented by any one of the following (121a'') to (121e''):

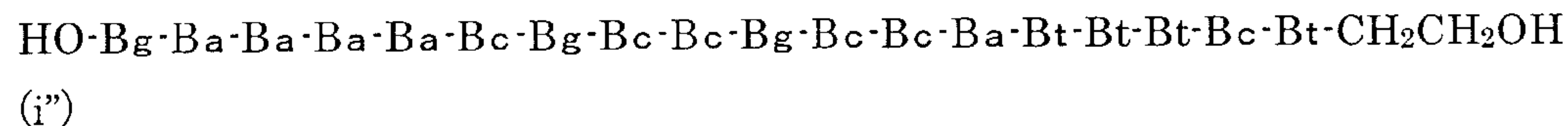
- (121a'')-CH₂CH₂OH,
 10 (121b'')-Bt-CH₂CH₂OH,
 (121c'')-Bt-Bt-CH₂CH₂OH,
 (121d'')-Bt-Bt-Bc-CH₂CH₂OH, or
 (121e'')-Bt-Bt-Bc-Bc-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

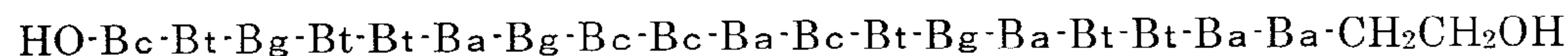
- 15 provided that at least one of the nucleosides constituting the compound represented by formula (XXI'') has 2''-O,4''-C-alkylene group.

[47] The compound of any one of [26] to [46] above which is selected from the group consisting of the following compounds (i'') to (xlix''), or a pharmacologically acceptable salt thereof:

- 20 (i'') a compound represented by the following formula (i''):

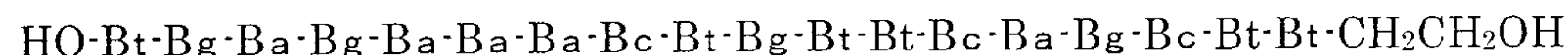


(ii'') a compound represented by the following formula (ii''):



- 25 (ii'')

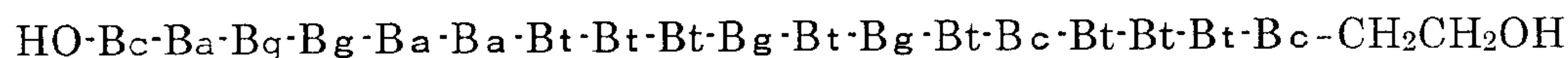
(iii'') a compound represented by the following formula (iii''):



(iii'')

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(iv'') a compound represented by the following formula (iv''):



(iv'')

(v'') a compound represented by the following formula (v''):



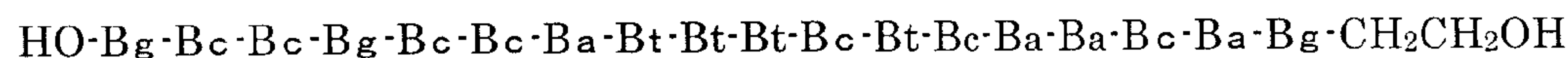
(v'')

(vi'') a compound represented by the following formula (vi''):



(vi'')

10 (vii'') a compound represented by the following formula (vii''):



(vii'')

(viii'') a compound represented by the following formula (viii''):



15 (viii'')

(ix'') a compound represented by the following formula (ix''):



(ix'')

(x'') a compound represented by the following formula (x''):



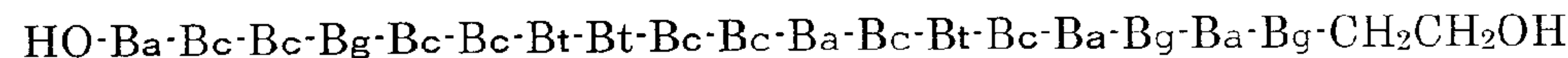
(x'')

(xi'') a compound represented by the following formula (xi''):



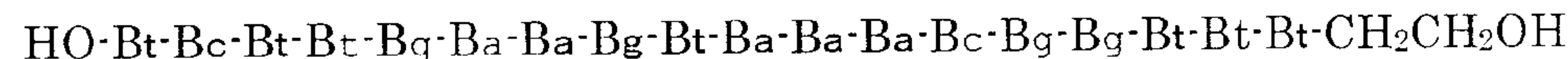
(xi'')

25 (xii'') a compound represented by the following formula (xii''):



(xii'')

(xiii'') a compound represented by the following formula (xiii''):



30 (xiii'')

(xiv'') a compound represented by the following formula (xiv''):



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(xiv")

(xv") a compound represented by the following formula (xv"):

HO-Ba-Bg-Bt-Bc-Bc-Ba-Bg-Bg-Ba-Bg-Bc-Bt-Ba-Bg-Bg-Bt-Bc-Ba-CH₂CH₂OH

(xv")

5 (xvi") a compound represented by the following formula (xvi"):

HO-Bg-Bc-Bt-Bc-Bc-Ba-Ba-Bt-Ba-Bg-Bt-Bg-Bg-Bt-Bc-Ba-Bg-Bt-CH₂CH₂OH

(xvi")

(xvii") a compound represented by the following formula (xvii"):

HO-Bg-Bc-Bt-Ba-Bg-Bg-Bt-Bc-Ba-Bg-Bg-Bc-Bt-Bg-Bc-Bt-Bt-Bt-CH₂CH₂OH

10 (xvii")

(xviii") a compound represented by the following formula (xviii"):

HO-Bg-Bc-Ba-Bg-Bc-Bc-Bt-Bc-Bt-Bc-Bg-Bc-Bt-Bc-Ba-Bc-Bt-Bc-CH₂CH₂OH

(xviii")

(xix") a compound represented by the following formula (xix"):

15 HO-Bt-Bc-Bt-Bt-Bc-Bc-Ba-Ba-Ba-Bg-Bc-Ba-Bg-Bc-Bc-Bt-Bc-Bt-CH₂CH₂OH

(xix")

(xx") a compound represented by the following formula (xx"):

HO-Bt-Bg-Bc-Ba-Bg-Bt-Ba-Ba-Bt-Bc-Bt-Ba-Bt-Bg-Ba-Bg-Bt-Bt-CH₂CH₂OH

(xx")

20 (xxi") a compound represented by the following formula (xxi"):

HO-Bg-Bt-Bt-Bt-Bc-Ba-Bg-Bc-Bt-Bt-Bc-Bt-Bg-Bt-Ba-Ba-Bg-Bc-CH₂CH₂OH

(xxi")

(xxii") a compound represented by the following formula (xxii"):

HO-Bt-Bg-Bt-Ba-Bg-Bg-Ba-Bc-Ba-Bt-Bt-Bg-Bg-Bc-Ba-Bg-Bt-Bt-CH₂CH₂OH

25 (xxii")

(xxiii") a compound represented by the following formula (xxiii"):

HO-Bt-Bc-Bc-Bt-Bt-Ba-Bc-Bg-Bg-Bg-Bt-Ba-Bg-Bc-Ba-Bt-Bc-Bc-
CH₂CH₂OH (xxiii")

(xxiv") a compound represented by the following formula (xxiv"):

30 HO-Ba-Bg-Bc-Bt-Bc-Bt-Bt-Bt-Ba-Bc-Bt-Bc-Bc-Bc-Bt-Bt-Bg-CH₂CH₂OH

(xxiv")

(xxv") a compound represented by the following formula (xxv"):

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HO-Bc-Bc-Ba-Bt-Bt-Bg-Bt-Bt-Bt-Bc-Ba-Bt-Bc-Ba-Bg-Bc-Bt-Bc-CH₂CH₂OH
(xxv")

(xxvi") a compound represented by the following formula (xxvi"):

HO-Bc-Bt-Ba-Bt-Bg-Ba-Bg-Bt-Bt-Bt-Bc-Bt-Bt-Bc-Bc-Ba-Ba-Ba-CH₂CH₂OH
5 (xxvi")

(xxvii") a compound represented by the following formula (xxvii"):

D-Bt-Bg-Bt-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-Bt-Ba-Ba-Bc-Ba-Bg-Bt-
CH₂CH₂OH (xxvii")

(xxviii") a compound represented by the following formula (xxviii"):

10 D-Ba-Bg-Bg-Bt-Bt-Bg-Bt-Bg-Bt-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-Bt-Ba-Ba-
CH₂CH₂OH (xxviii")

(xxix") a compound represented by the following formula (xxix"):

D-Ba-Bg-Bt-Ba-Ba-Bc-Bc-Ba-Bc-Ba-Bg-Bg-Bt-Bt-Bg-Bt-Bg-Bt-Bc-Ba-
CH₂CH₂OH (xxix")

15 (xxx") a compound represented by the following formula (xxx"):

D-Bt-Bt-Bg-Ba-Bt-Bc-Ba-Ba-Bg-Bc-Ba-Bg-Ba-Bg-Ba-Ba-Ba-Bg-Bc-Bc-
CH₂CH₂OH (xxx")

(xxxi") a compound represented by the following formula (xxxi"):

D-Bc-Ba-Bc-Bc-Bc-Bt-Bc-Bt-Bg-Bt-Bg-Ba-Bt-Bt-Bt-Bt-Ba-Bt-Ba-Ba-
20 CH₂CH₂OH (xxxi")

(xxxii") a compound represented by the following formula (xxxii"):

D-Ba-Bc-Bc-Bc-Ba-Bc-Bc-Ba-Bt-Bc-Ba-Bc-Bc-Bc-Bt-Bc-Bt-Bg-Bt-Bg-
CH₂CH₂OH (xxxii")

(xxxiii") a compound represented by the following formula (xxxiii"):

25 D-Bc-Bc-Bt-Bc-Ba-Ba-Bg-Bg-Bt-Bc-Ba-Bc-Bc-Bc-Ba-Bc-Bc-Ba-Bt-Bc-
CH₂CH₂OH (xxxiii")

(xxxiv") a compound represented by the following formula (xxxiv"):

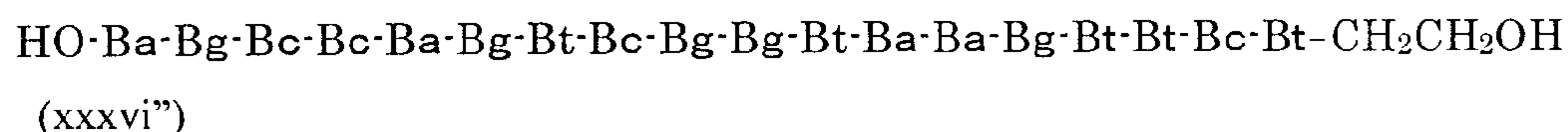
HO-Bt-Ba-Ba-Bc-Ba-Bg-Bt-Bc-Bt-Bg-Ba-Bg-Bt-Ba-Bg-Bg-Ba-Bg-CH₂CH₂OH
(xxxiv")

30 (xxxv") a compound represented by the following formula (xxxv"):

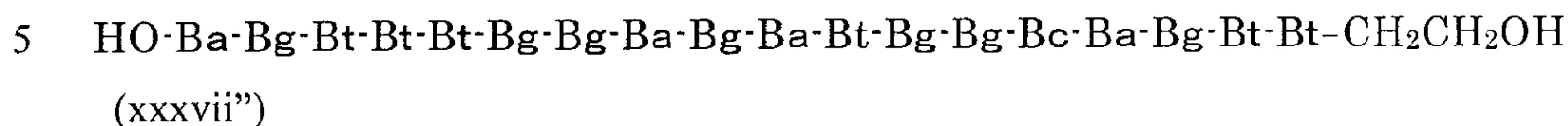
HO-Bg-Bg-Bc-Ba-Bt-Bt-Bt-Bc-Bt-Ba-Bg-Bt-Bt-Bt-Bg-Bg-Ba-Bg-CH₂CH₂OH
(xxxv")

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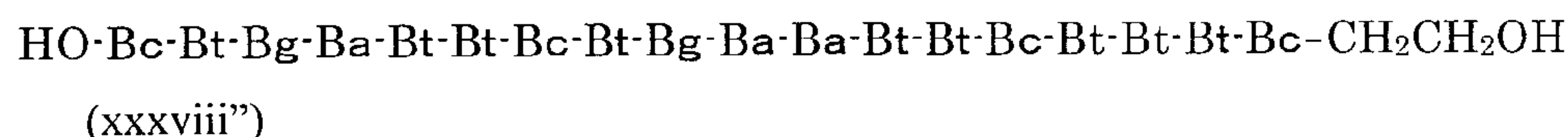
(xxxvi") a compound represented by the following formula (xxxvi"):



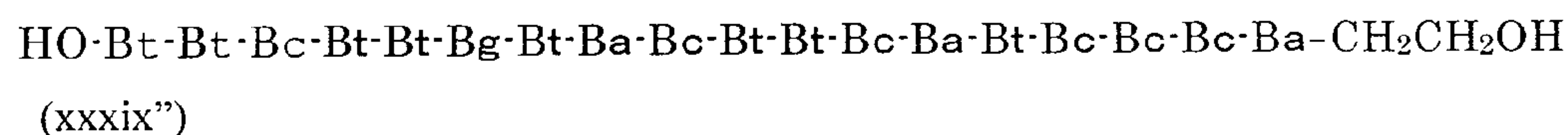
(xxxvii") a compound represented by the following formula (xxxvii"):



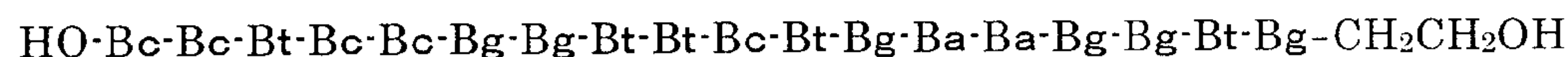
(xxxviii") a compound represented by the following formula (xxxviii"):



10 (xxxix") a compound represented by the following formula (xxxix"):

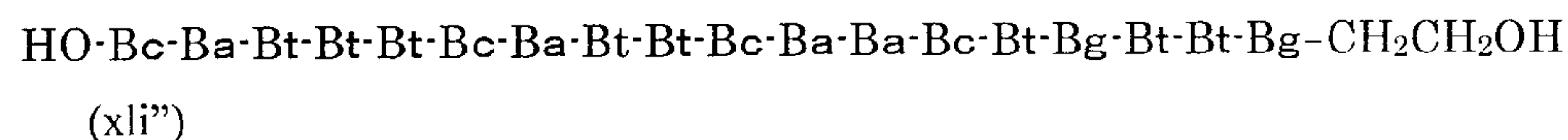


(xli") a compound represented by the following formula (xli"):

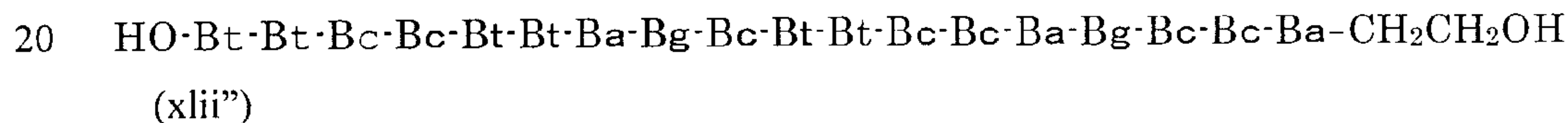


15 (xli")

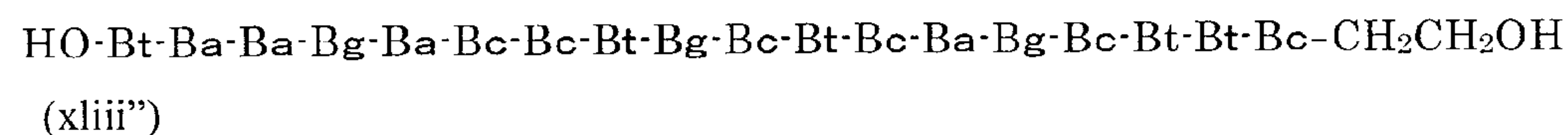
(xlii") a compound represented by the following formula (xlii"):



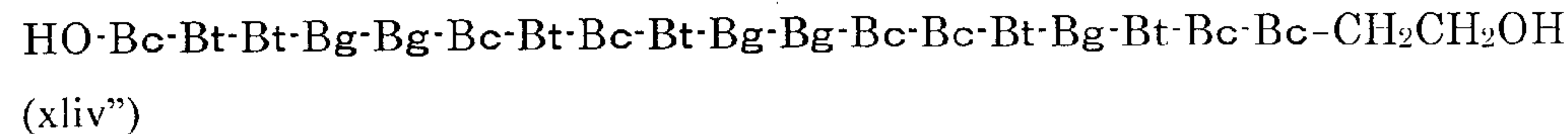
(xlii") a compound represented by the following formula (xlii"):



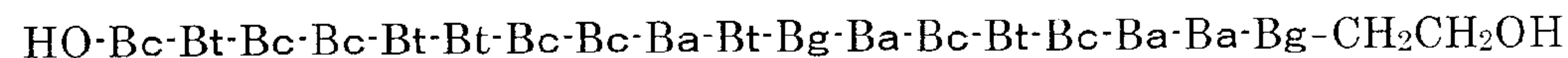
(xlili") a compound represented by the following formula (xlili"):



25 (xliv") a compound represented by the following formula (xliv"):



(xlv") a compound represented by the following formula (xlv"):



30 (xlv")

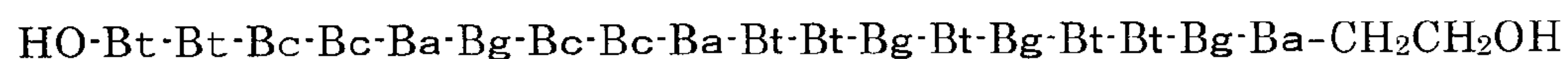
(xlvi") a compound represented by the following formula (xlvi"):



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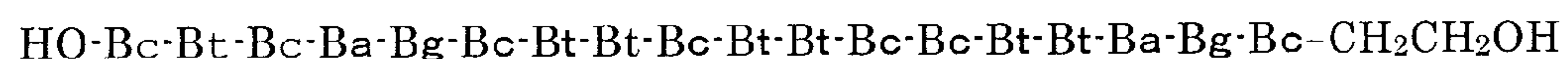
(xlvii")

(xlvii") a compound represented by the following formula (xlvii"):



(xlvii")

5 (xlviii") a compound represented by the following formula (xlviii"):



(xlviii")

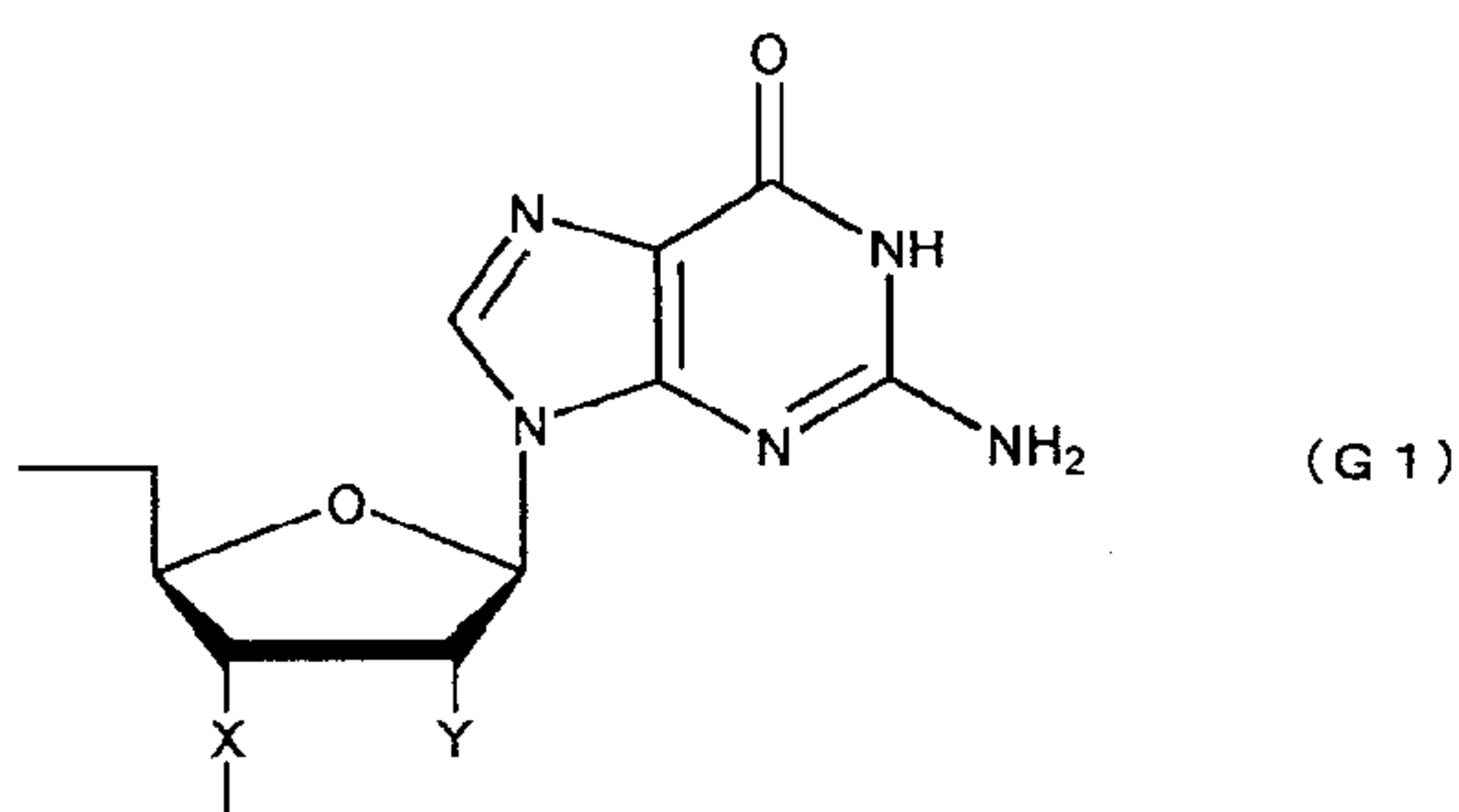
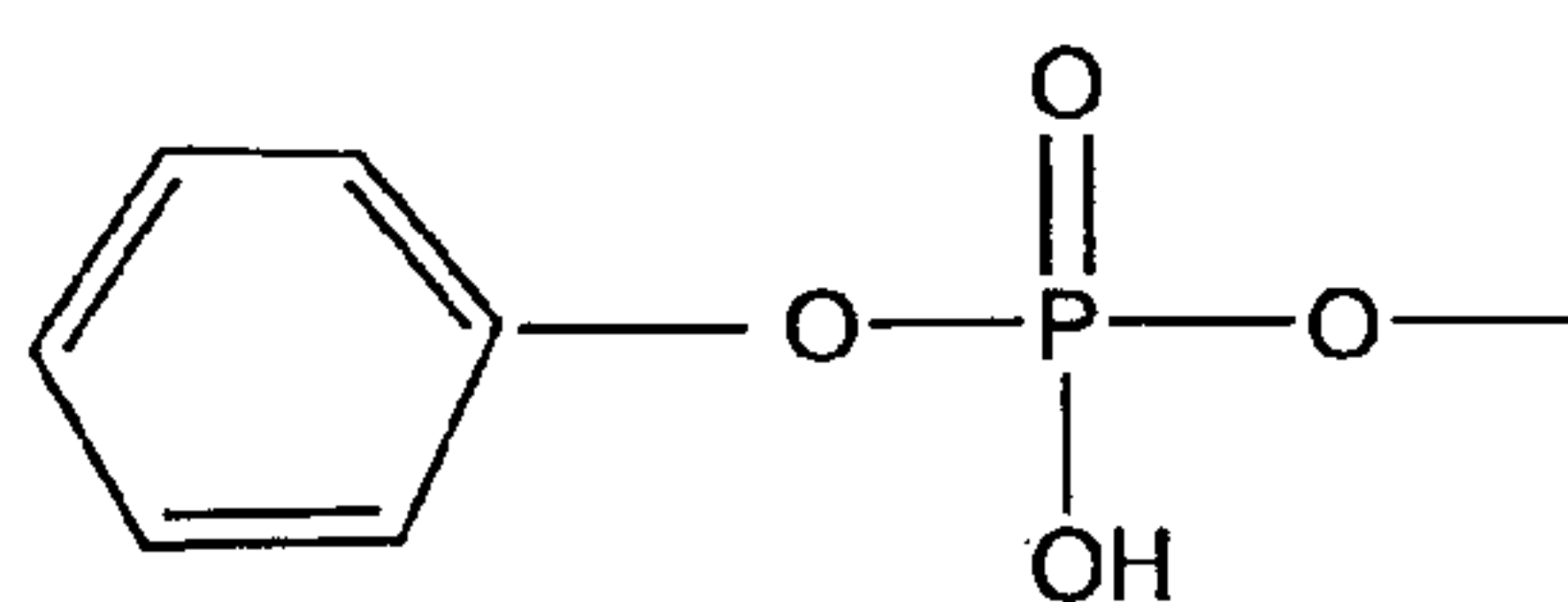
(xlix") a compound represented by the following formula (xlix"):



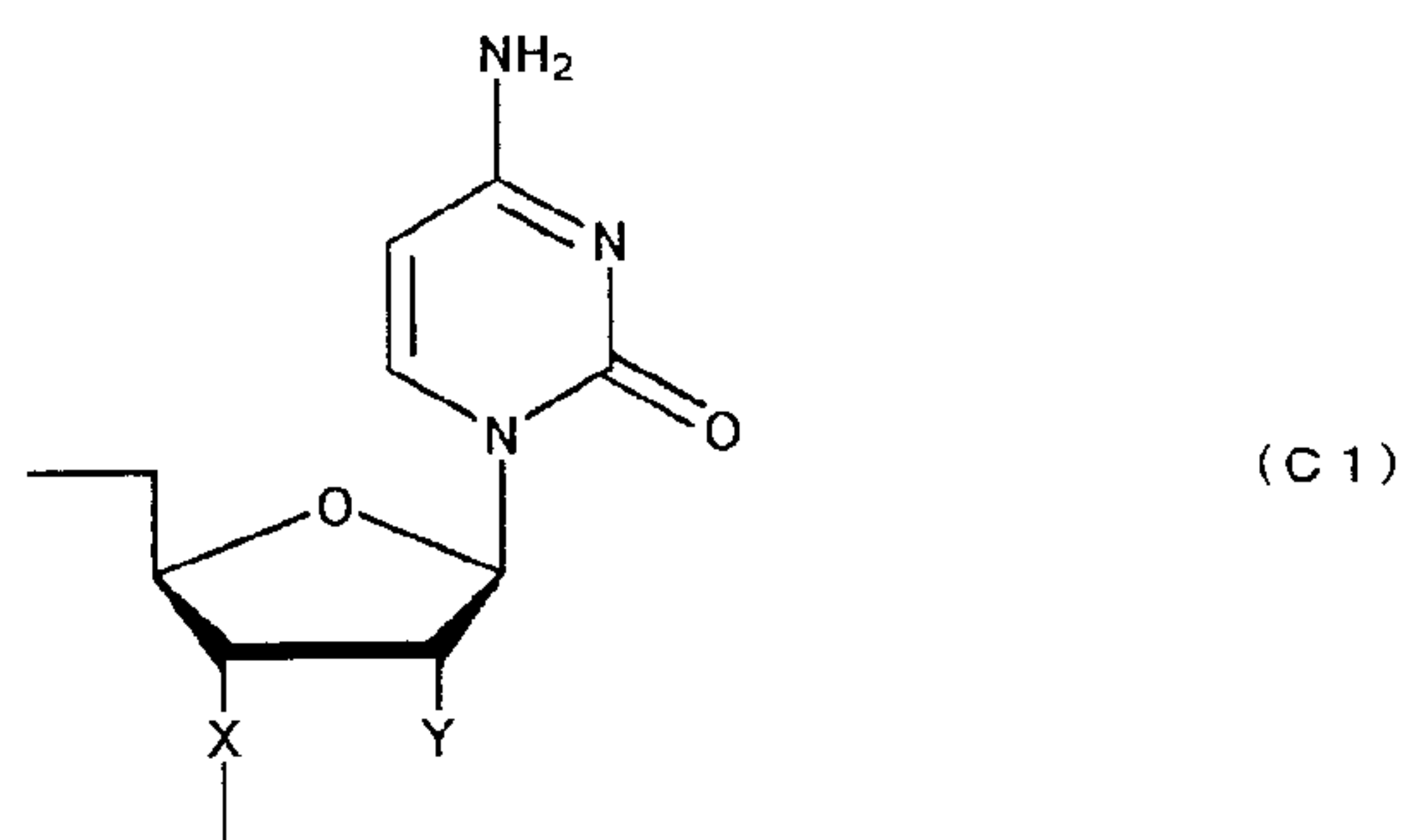
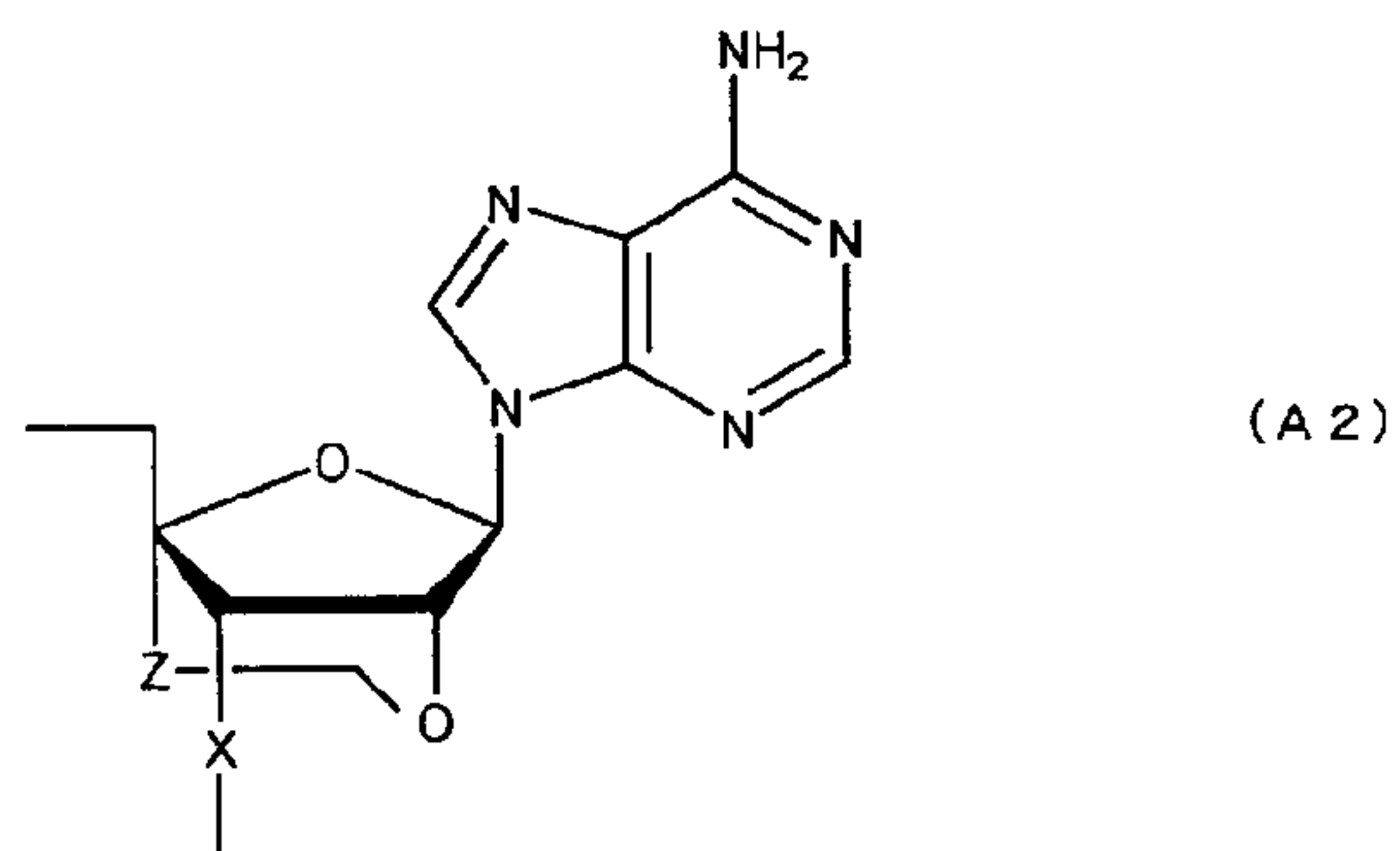
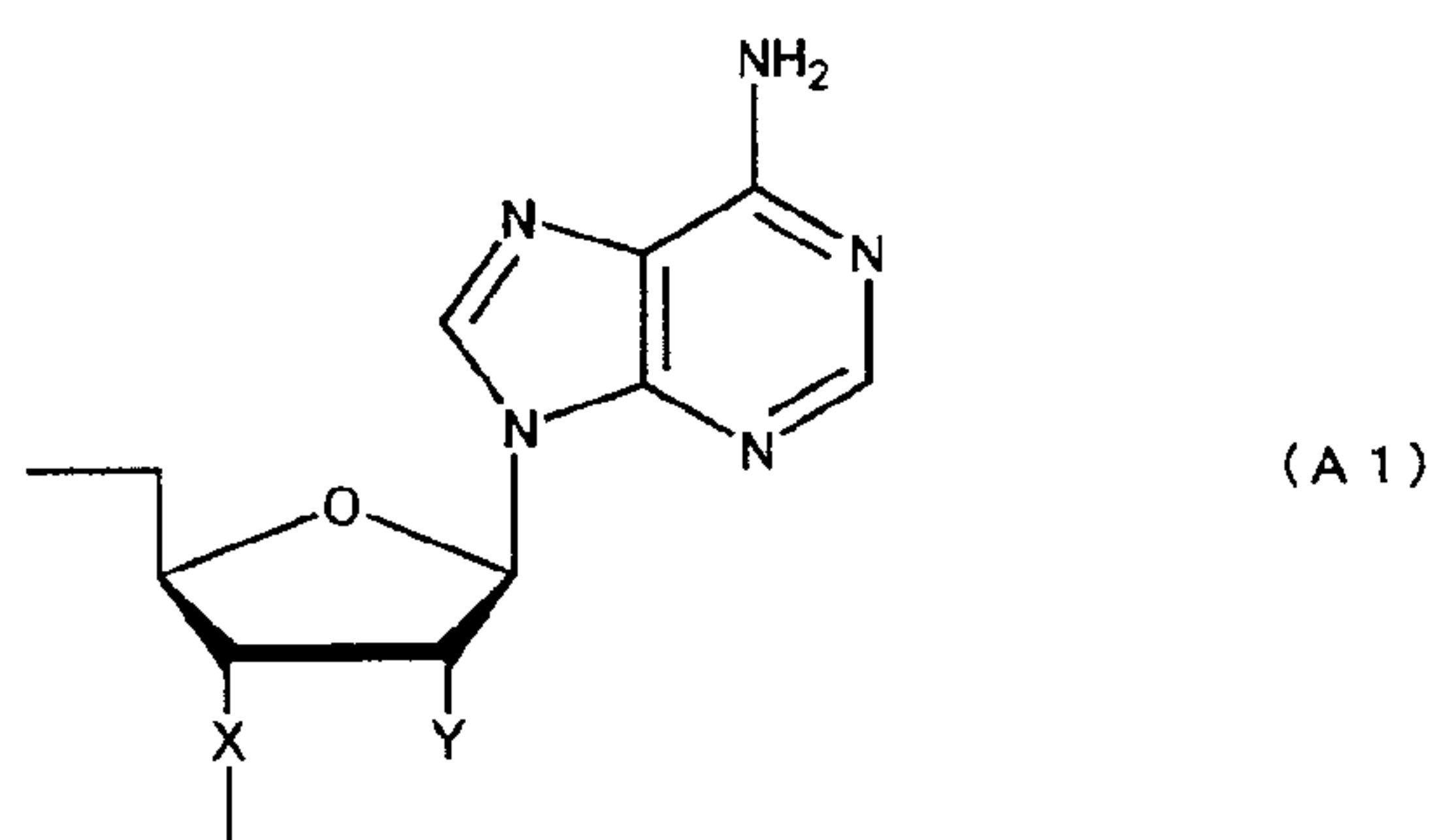
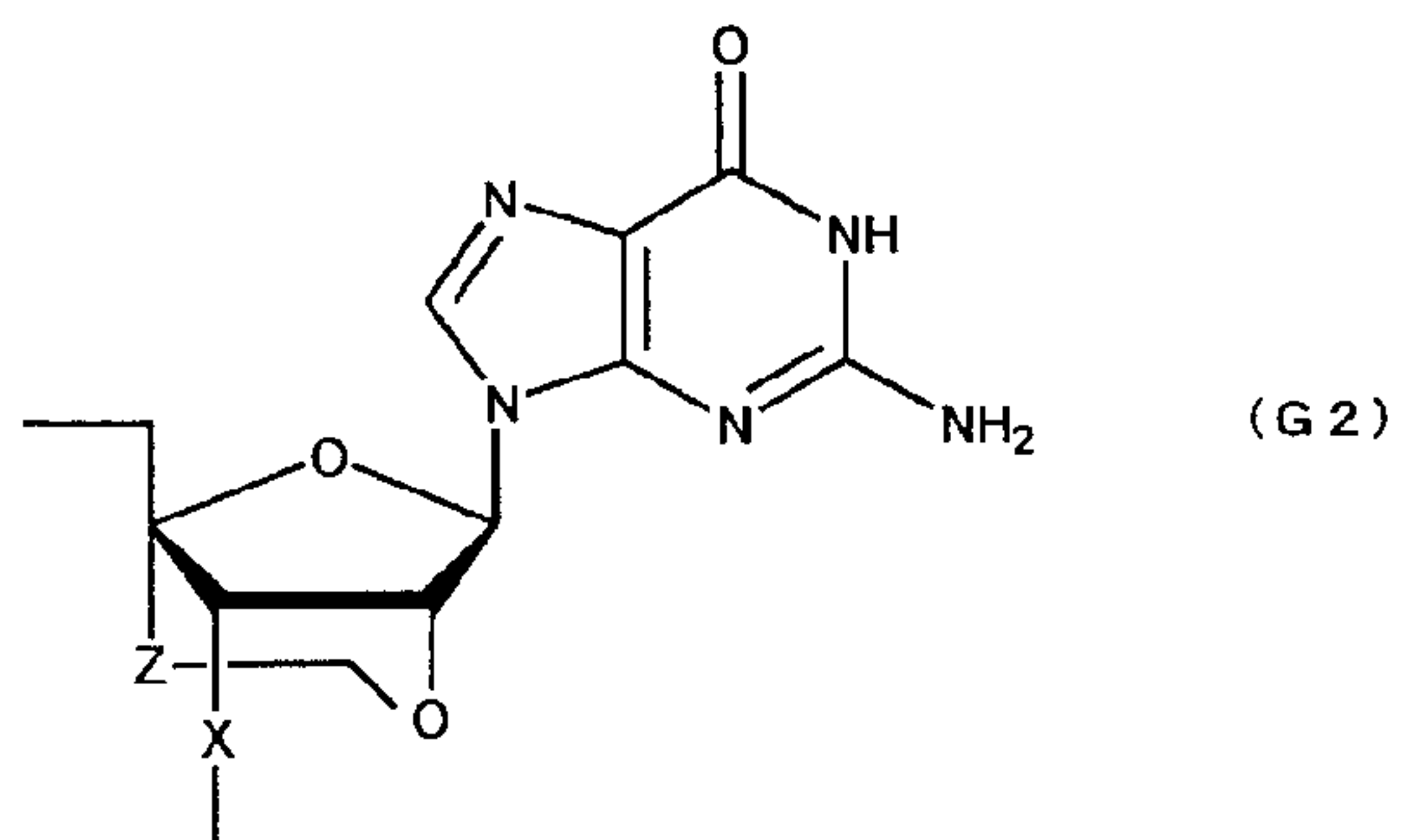
10 (xlix")

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); Bt is a group represented by the following formula (U1) or

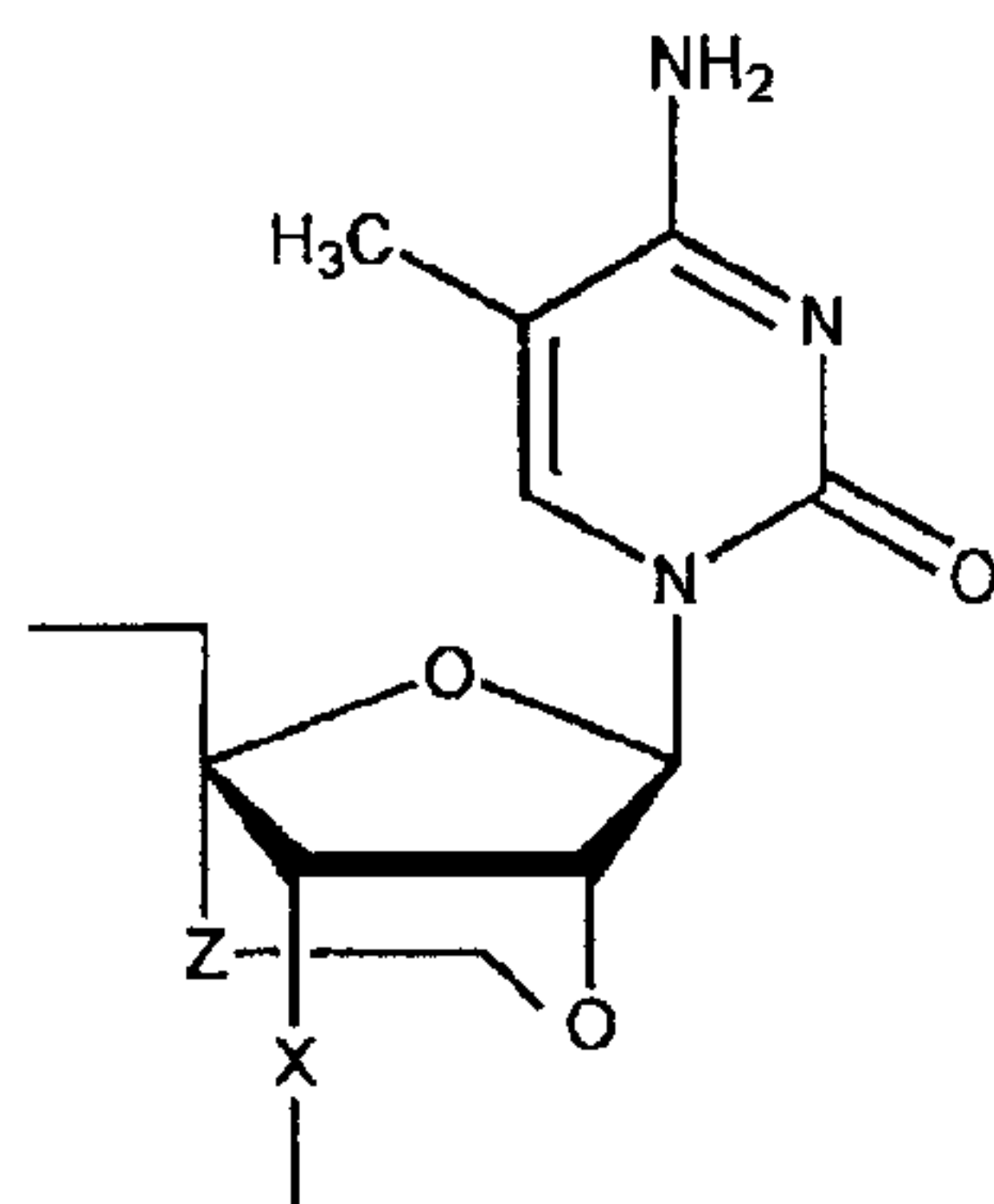
15 (T2); and D is HO- or Ph- wherein Ph- is a group represented by the following first formula:



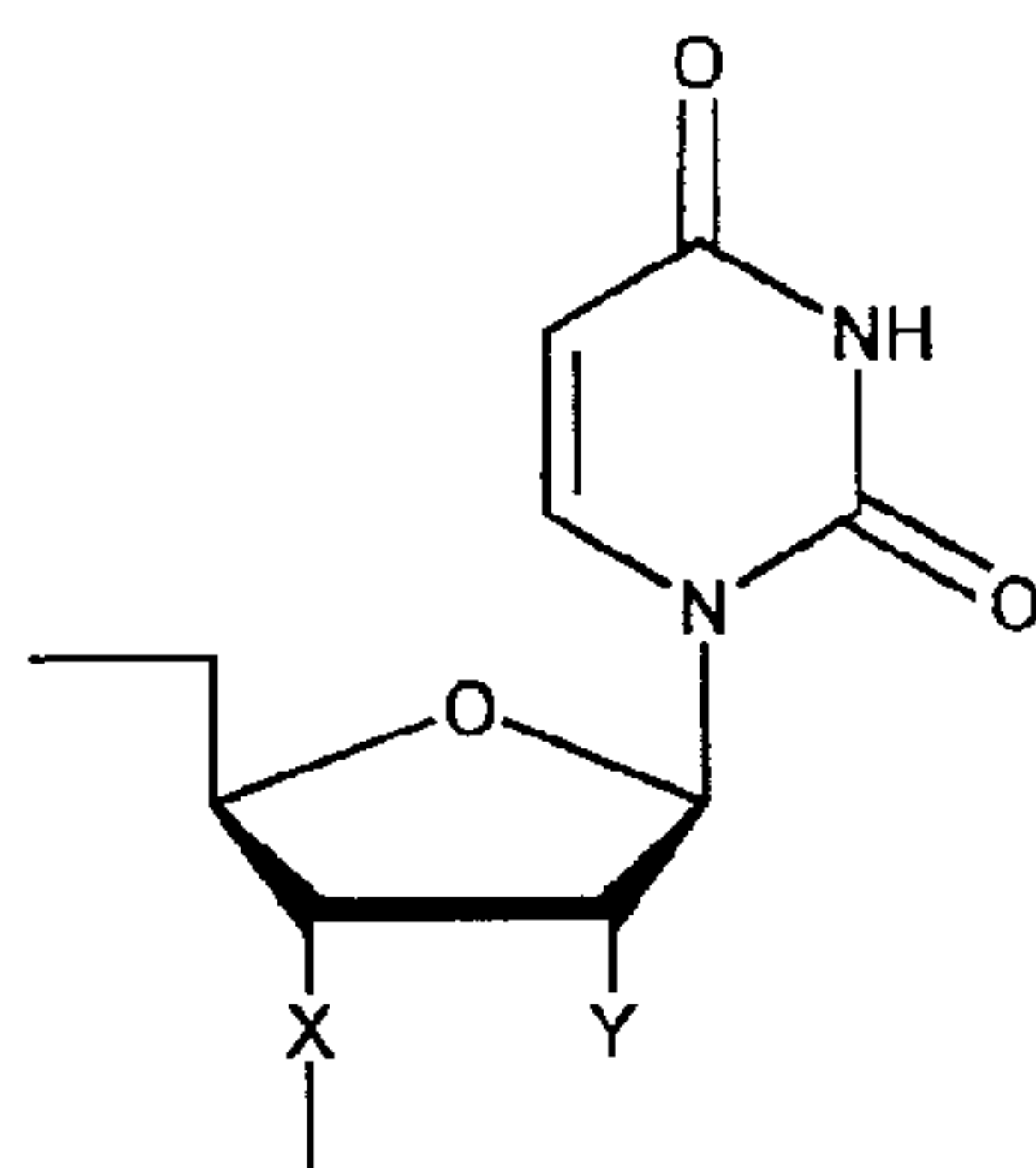
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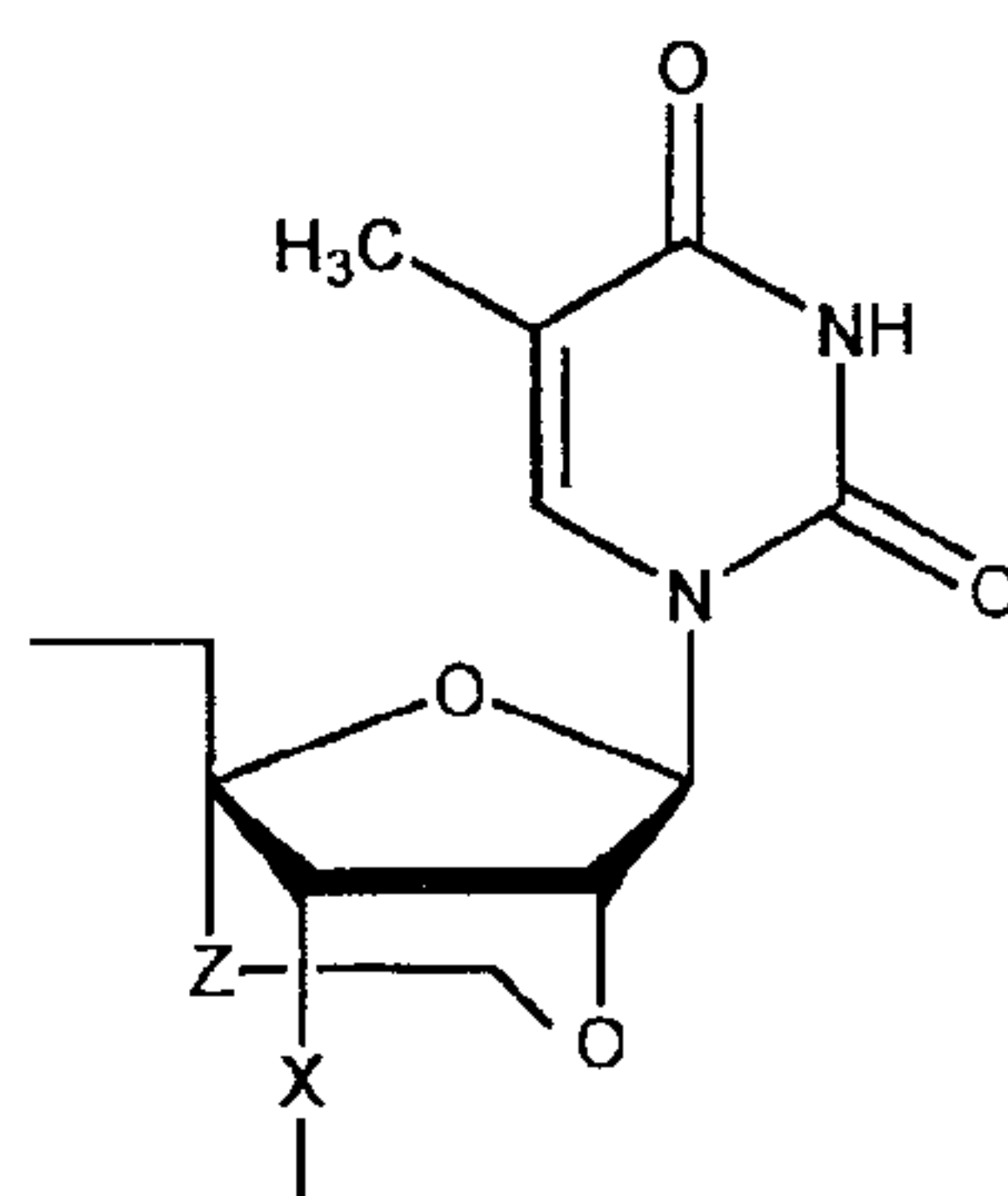
79861-7D



(C 2)



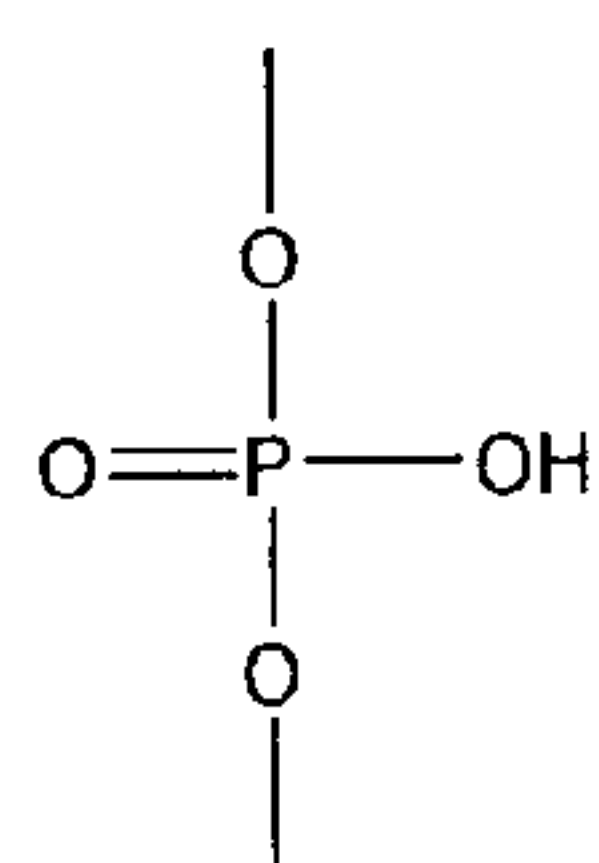
(U 1)



(T 2)

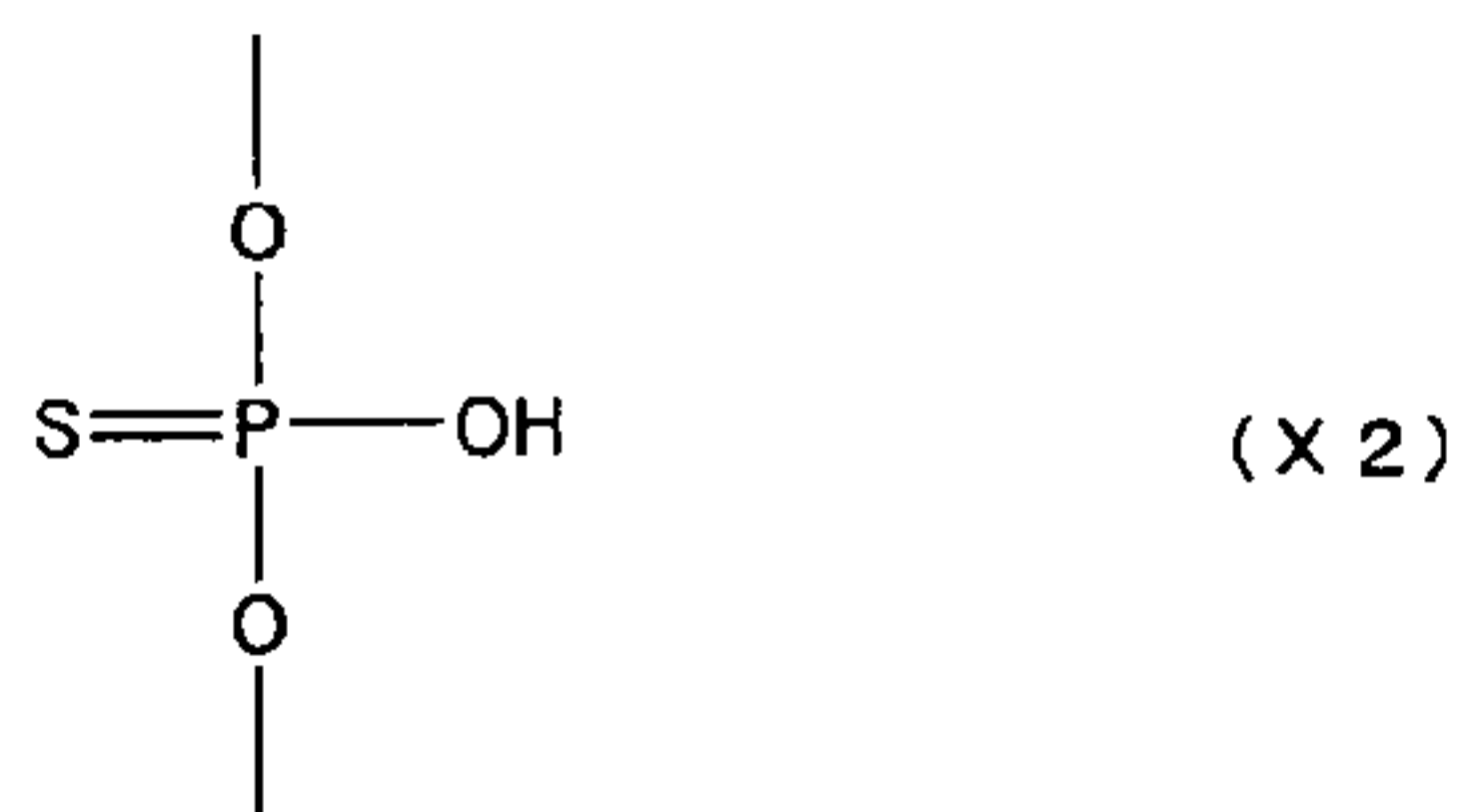
where X is individually and independently a group represented by the following formula

5 (X1) or (X2):



(X 1)

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Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms.

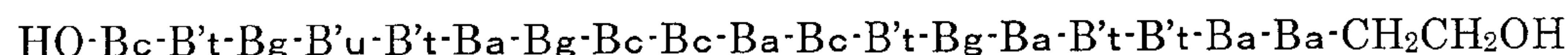
- 5 [48] The compound of any one of [26] to [46] above which is selected from the group consisting of the following compounds (i''-a) to (li''-a), or a pharmacologically acceptable salt thereof:

(i'' -a) a compound represented by the following formula (i'' -a):



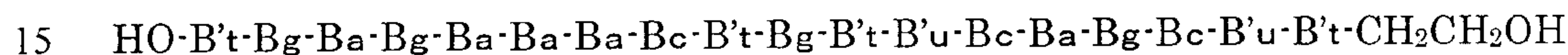
10 (i'' -a)

(ii'' -a) a compound represented by the following formula (ii'' -a):



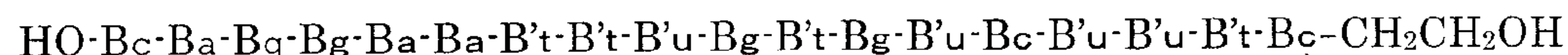
(ii'' -a)

(iii'' -a) a compound represented by the following formula (iii'' -a):



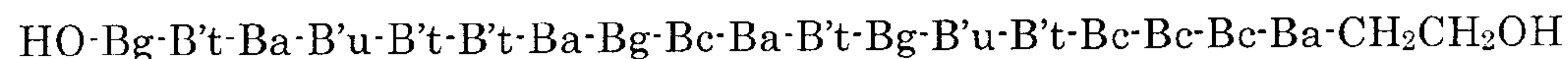
(iii'' -a)

(iv'' -a) a compound represented by the following formula (iv'' -a):



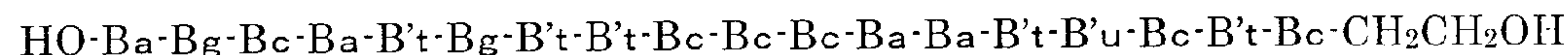
(iv'' -a)

- 20 (v'' -a) a compound represented by the following formula (v'' -a):



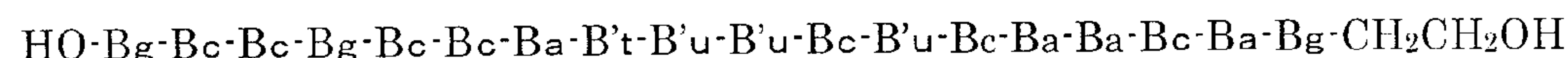
(v'' -a)

(vi'' -a) a compound represented by the following formula (vi'' -a):



25 (vi'' -a)

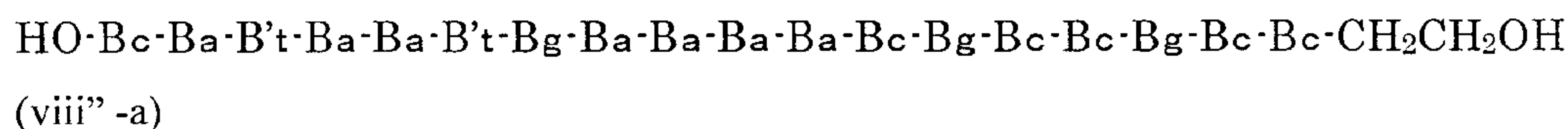
(vii'' -a) a compound represented by the following formula (vii'' -a):



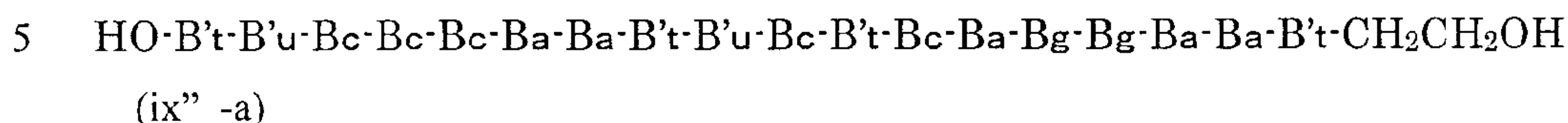
(vii'' -a)

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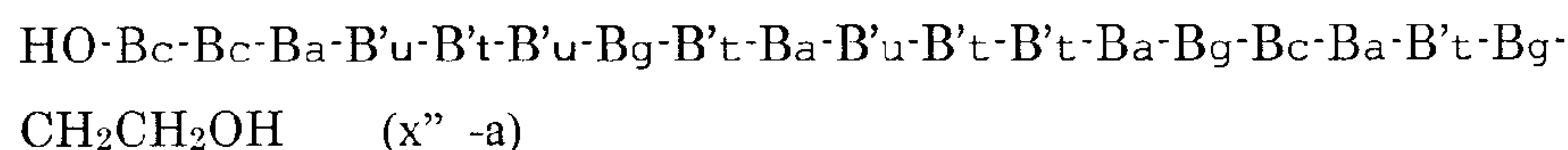
(viii''-a) a compound represented by the following formula (viii'' -a):



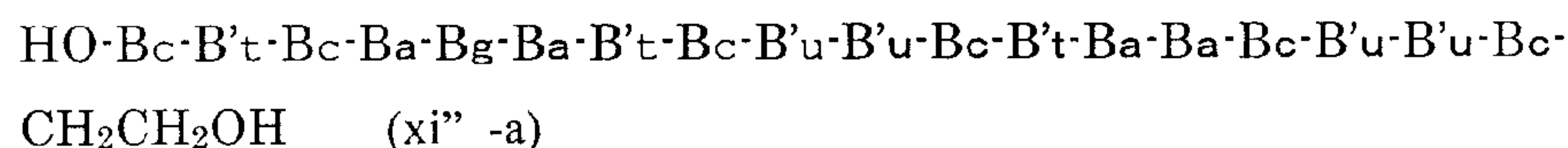
(ix'' -a) a compound represented by the following formula (ix'' -a):



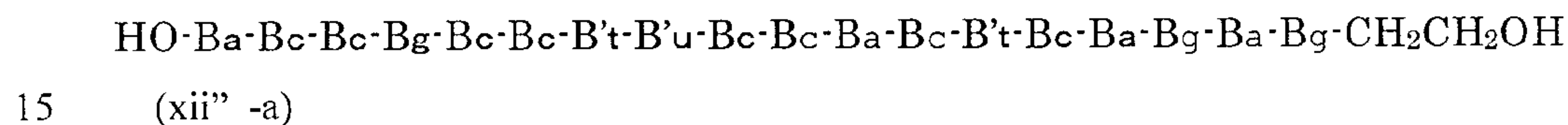
(x'' -a) a compound represented by the following formula (x'' -a):



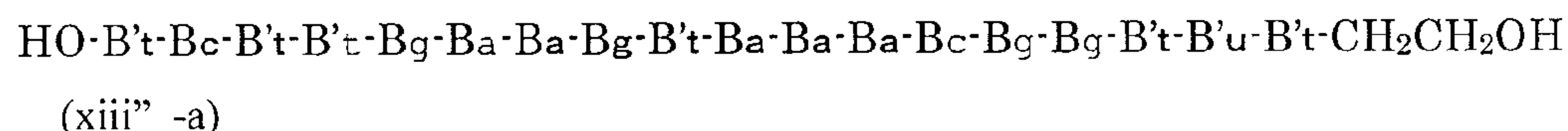
10 (xi'' -a) a compound represented by the following formula (xi'' -a):



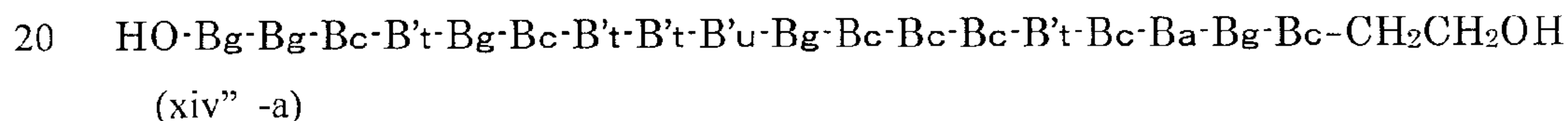
(xii'' -a) a compound represented by the following formula (xii'' -a):



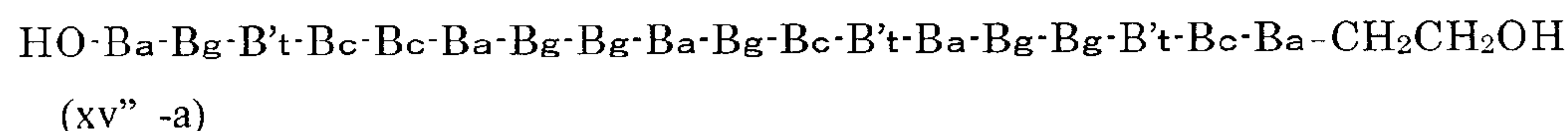
(xiii'' -a) a compound represented by the following formula (xiii'' -a):



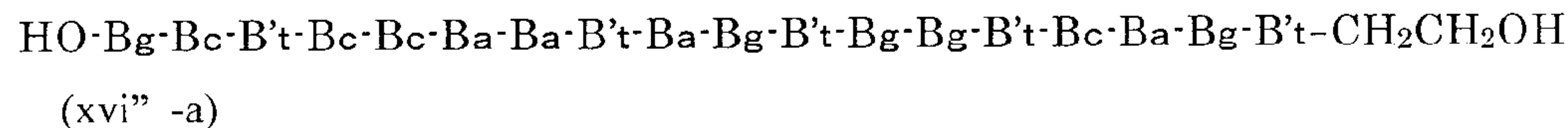
(xiv'' -a) a compound represented by the following formula (xiv'' -a):



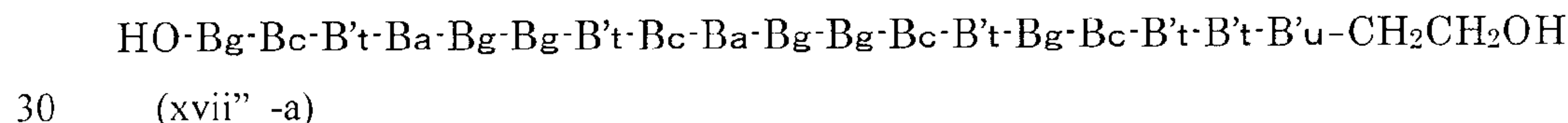
(xv'' -a) a compound represented by the following formula (xv'' -a):



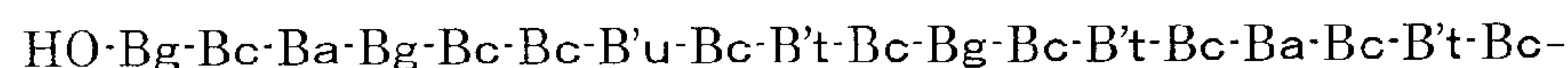
25 (xvi'' -a) a compound represented by the following formula (xvi'' -a):



(xvii'' -a) a compound represented by the following formula (xvii'' -a):



(xviii'' -a) a compound represented by the following formula (xviii'' -a):



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CH₂CH₂OH (xviii" -a)

(xix" -a) a compound represented by the following formula (xix" -a):

HO-B't-Bc-B'u-B'u-Bc-Bc-Ba-Ba-Ba-Bg-Bc-Ba-Bg-Bc-Bc-B'u-Bc-B't-
CH₂CH₂OH (xix" -a)

5 (xx" -a) a compound represented by the following formula (xx" -a):

HO-B't-Bg-Bc-Ba-Bg-B't-Ba-Ba-B't-Bc-B'u-Ba-B't-Bg-Ba-Bg-B't-B't-
CH₂CH₂OH (xx" -a)

(xxi" -a) a compound represented by the following formula (xxi" -a):

HO-Bg-B't-B't-B'u-Bc-Ba-Bg-Bc-B'u-B't-Bc-B't-Bg-B't-Ba-Ba-Bg-Bc-
10 CH₂CH₂OH (xxi" -a)

(xxii" -a) a compound represented by the following formula (xxii" -a):

HO-B't-Bg-B't-Ba-Bg-Bg-Ba-Bc-Ba-B't-B't-Bg-Bg-Bc-Ba-Bg-B't-B't-
CH₂CH₂OH (xxii" -a)

(xxiii" -a) a compound represented by the following formula (xxiii" -a):

15 HO-B't-Bc-Bc-B't-B't-Ba-Bc-Bg-Bg-Bg-B't-Ba-Bg-Bc-Ba-B'u-Bc-Bc-
CH₂CH₂OH (xxiii" -a)

(xxiv" -a) a compound represented by the following formula (xxiv" -a):

HO-Ba-Bg-Bc-B't-Bc-B'u-B't-B'u-B't-Ba-Bc-B't-Bc-Bc-Bc-B't-B't-Bg-
CH₂CH₂OH (xxiv" -a)

20 (xxv" -a) a compound represented by the following formula (xxv" -a):

HO-Bc-Bc-Ba-B'u-B't-Bg-B'u-B't-B'u-Bc-Ba-B'u-Bc-Ba-Bg-Bc-B't-Bc-
CH₂CH₂OH (xxv" -a)

(xxvi" -a) a compound represented by the following formula (xxvi" -a):

HO-Bc-B't-Ba-B't-Bg-Ba-Bg-B't-B't-B't-Bc-B't-B't-Bc-Bc-Ba-Ba-Ba-CH₂CH₂OH
25 (xxvi" -a)

(xxvii" -a) a compound represented by the following formula (xxvii" -a):

D-B't-Bg-B't-Bg-B't-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-B'u-Ba-Ba-Bc-Ba-Bg-B't-
CH₂CH₂OH (xxvii" -a)

(xxviii" -a) a compound represented by the following formula (xxviii" -a):

30 D-Ba-Bg-Bg-B't-B't-Bg-B'u-Bg-B'u-Bc-Ba-Bc-Bc-Ba-Bg-Ba-Bg-B't-Ba-Ba-
CH₂CH₂OH (xxviii" -a)

(xxix" -a) a compound represented by the following formula (xxix" -a):

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D·Ba·Bg·B't·Ba·Ba·Bc·Bc·Ba·Bc·Ba·Bg·Bg·B'u·B'u·Bg·B't·Bg·B't·Bc·Ba-
CH₂CH₂OH (xxix" -a)

(xxx" -a) a compound represented by the following formula (xxx" -a):

D·B't·B't·Bg·Ba·B't·Bc·Ba·Ba·Bg·Bc·Ba·Bg·Ba·Bg·Ba·Ba·Ba·Bg·Bc·Bc-
5 CH₂CH₂OH (xxx" -a)

(xxxi" -a) a compound represented by the following formula (xxxi" -a):

D·Bc·Ba·Bc·Bc·Bc·B'u·Bc·B'u·Bg·B'u·Bg·Ba·B'u·B'u·B'u·B't·Ba·B't·Ba·Ba-CH
2CH₂OH (xxxi" -a)

(xxxii" -a) a compound represented by the following formula (xxxii" -a):

10 D·Ba·Bc·Bc·Bc·Ba·Bc·Bc·Ba·B'u·Bc·Ba·Bc·Bc·Bc·B'u·Bc·B't·Bg·B't·Bg-
CH₂CH₂OH (xxxii" -a)

(xxxiii" -a) a compound represented by the following formula (xxxiii" -a):

D·Bc·Bc·B't·Bc·Ba·Ba·Bg·Bg·B'u·Bc·Ba·Bc·Bc·Bc·Ba·Bc·Bc·Ba·B't·Bc-
CH₂CH₂OH (xxxiii" -a)

15 (xxxiv" -a) a compound represented by the following formula (xxxiv" -a):

HO·B't·Ba·Ba·Bc·Ba·Bg·B'u·Bc·B'u·Bg·Ba·Bg·B'u·Ba·Bg·Bg·Ba·Bg-
CH₂CH₂OH (xxxiv" -a)

(xxxv" -a) a compound represented by the following formula (xxxv" -a):

HO·Bg·Bg·Bc·Ba·B't·B'u·B'u·Bc·B'u·Ba·Bg·B'u·B'u·B't·Bg·Bg·Ba·Bg-
20 CH₂CH₂OH (xxxv" -a)

(xxxvi" -a) a compound represented by the following formula (xxxvi" -a):

HO·Ba·Bg·Bc·Bc·Ba·Bg·B'u·Bc·Bg·Bg·B'u·Ba·Ba·Bg·B't·B't·Bc·B't-
CH₂CH₂OH (xxxvi" -a)

(xxxvii" -a) a compound represented by the following formula (xxxvii" -a):

25 HO·Ba·Bg·B't·B't·B't·Bg·Bg·Ba·Bg·Ba·B'u·Bg·Bg·Bc·Ba·Bg·B't·B't-
CH₂CH₂OH (xxxvii" -a)

(xxxviii" -a) a compound represented by the following formula (xxxviii" -a):

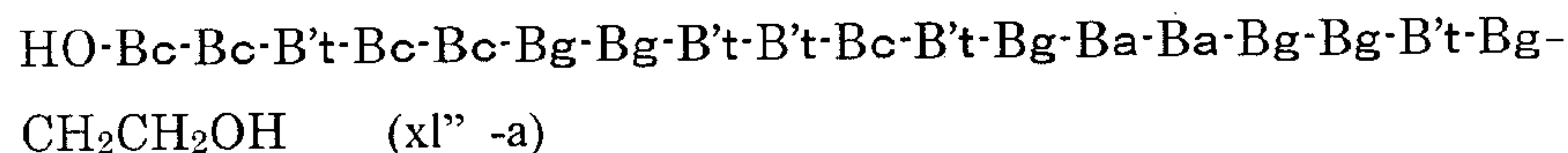
HO·Bc·B't·Bg·Ba·B't·B't·Bc·B't·Bg·Ba·Ba·B't·B't·Bc·B'u·B'u·B't·Bc-
CH₂CH₂OH (xxxviii" -a)

30 (xxxix" -a) a compound represented by the following formula (xxxix" -a):

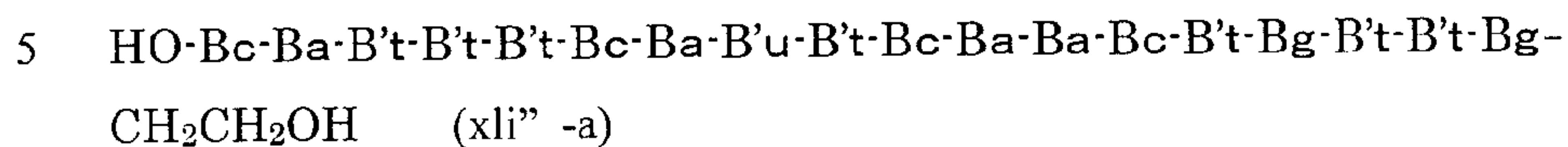
HO·B't·B't·Bc·B't·B't·Bg·B't·Ba·Bc·B't·B't·Bc·Ba·B't·Bc·Bc·Bc·Ba-
CH₂CH₂OH (xxxix" -a)

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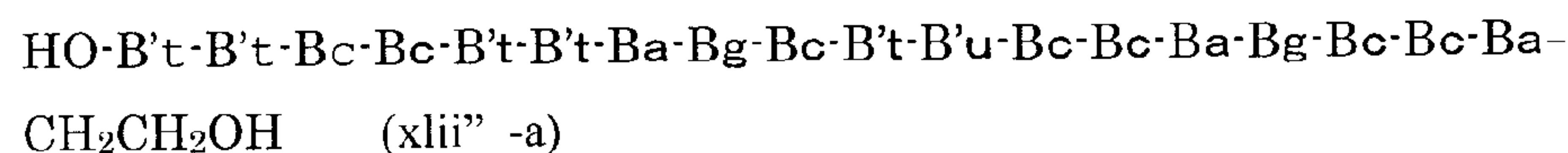
(xl'' -a) a compound represented by the following formula (xl'' -a):



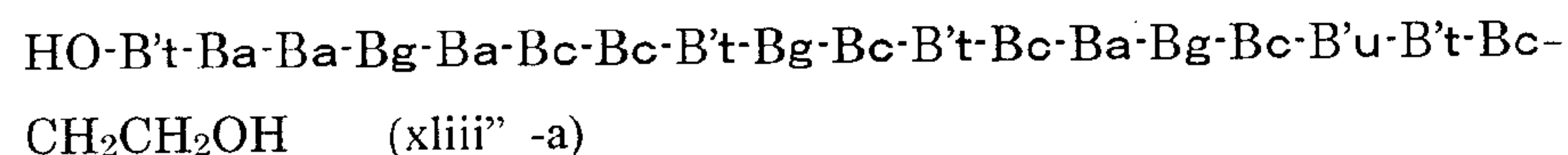
(xli'' -a) a compound represented by the following formula (xli'' -a):



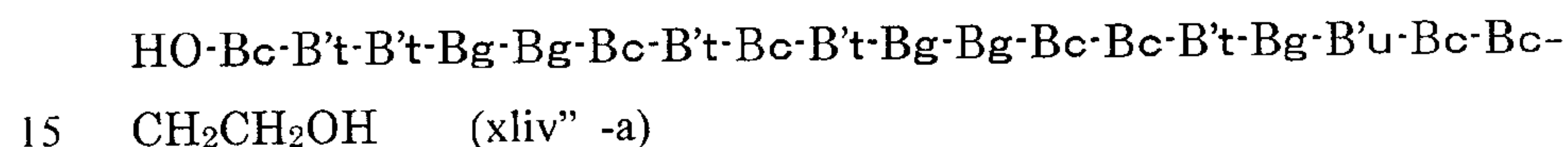
(xlii'' -a) a compound represented by the following formula (xlii'' -a):



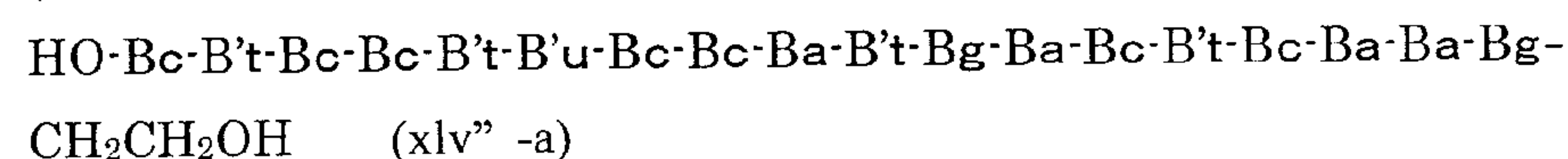
10 (xliii'' -a) a compound represented by the following formula (xliii'' -a):



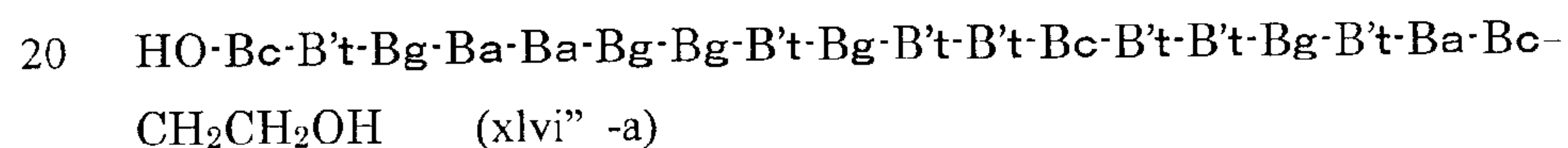
(xliv'' -a) a compound represented by the following formula (xliv'' -a):



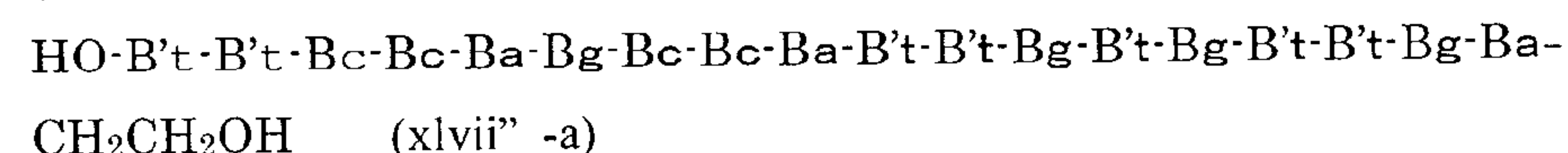
(xlv'' -a) a compound represented by the following formula (xlv'' -a):



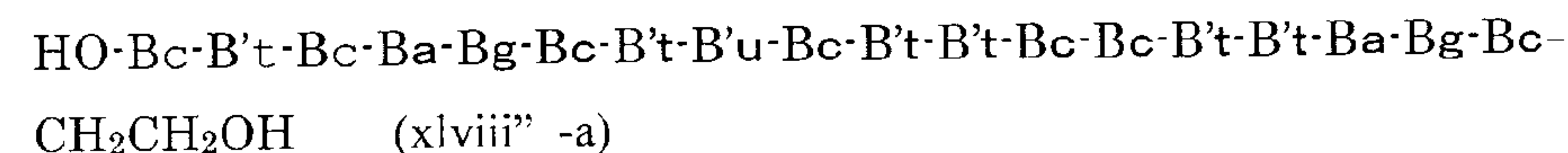
(xlvi'' -a) a compound represented by the following formula (xlvi'' -a):



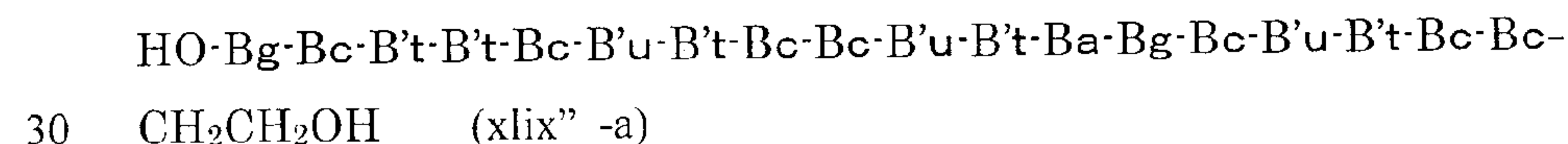
(xlvii'' -a) a compound represented by the following formula (xlvii'' -a):



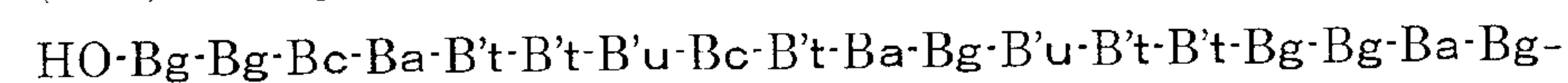
25 (xlviii'' -a) a compound represented by the following formula (xlviii'' -a):



(xlix'' -a) a compound represented by the following formula (xlix'' -a):



(l'' -a) a compound represented by the following formula (l'' -a):



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CH₂CH₂OH (I'' -a)

(I'' -a) a compound represented by the following formula (I'' -a):

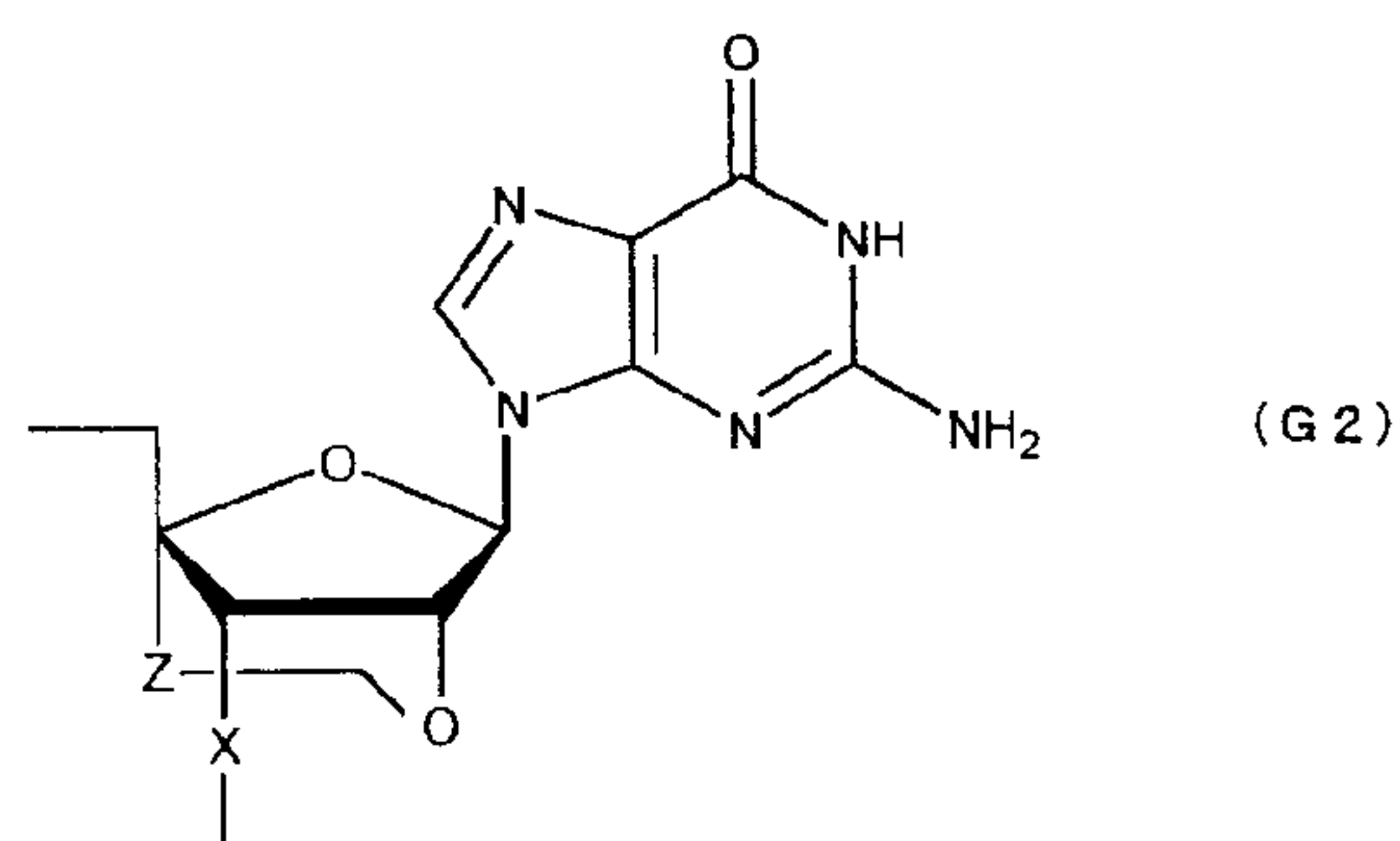
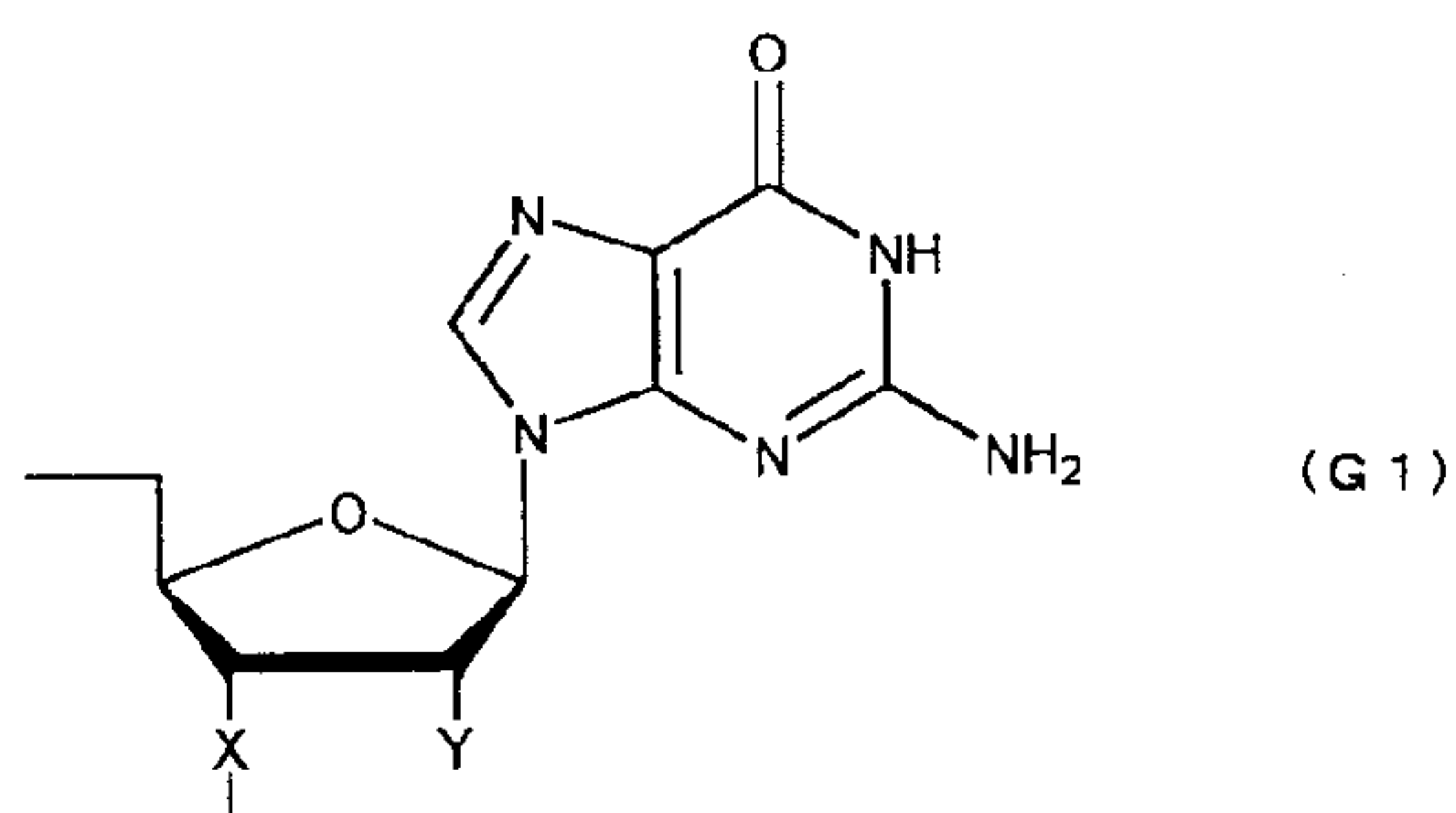
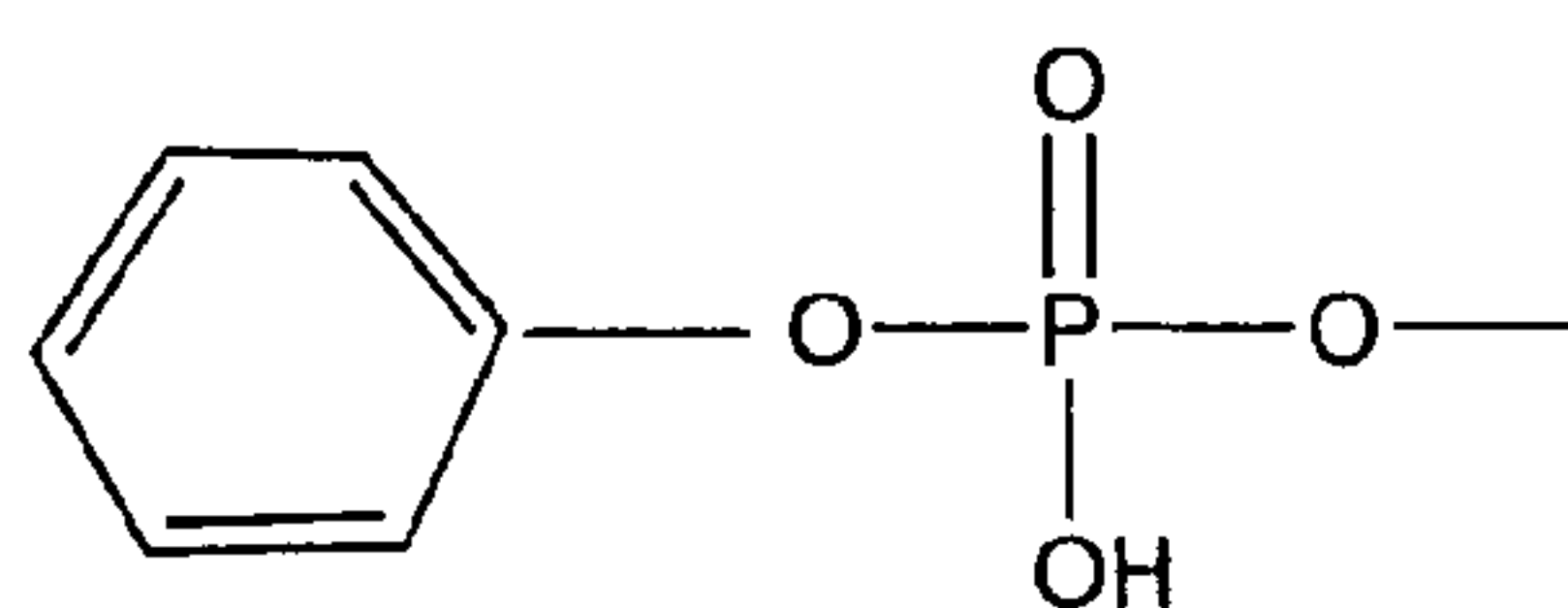
HO-Ba-Bg-B't-B'u-B't-Bg-Bg-Ba-Bg-Ba-B't-Bg-Bg-Bc-Ba-Bg-B't-B't-

CH₂CH₂OH (I'' -a)

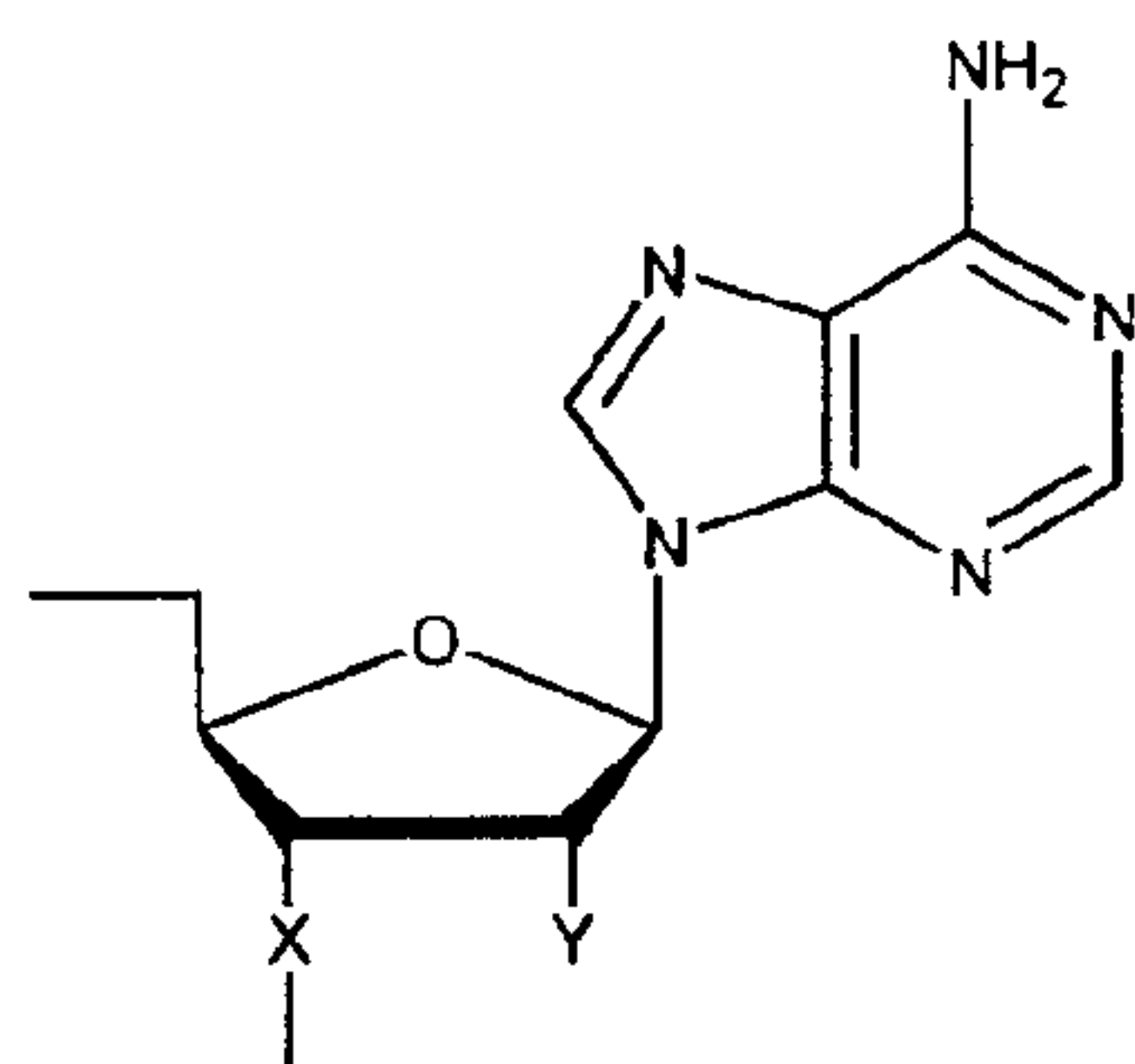
5

where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); B't is a group represented by the following formula (T2); B'u is a formula represented by the following formula (U1); and D is HO- or Ph- wherein

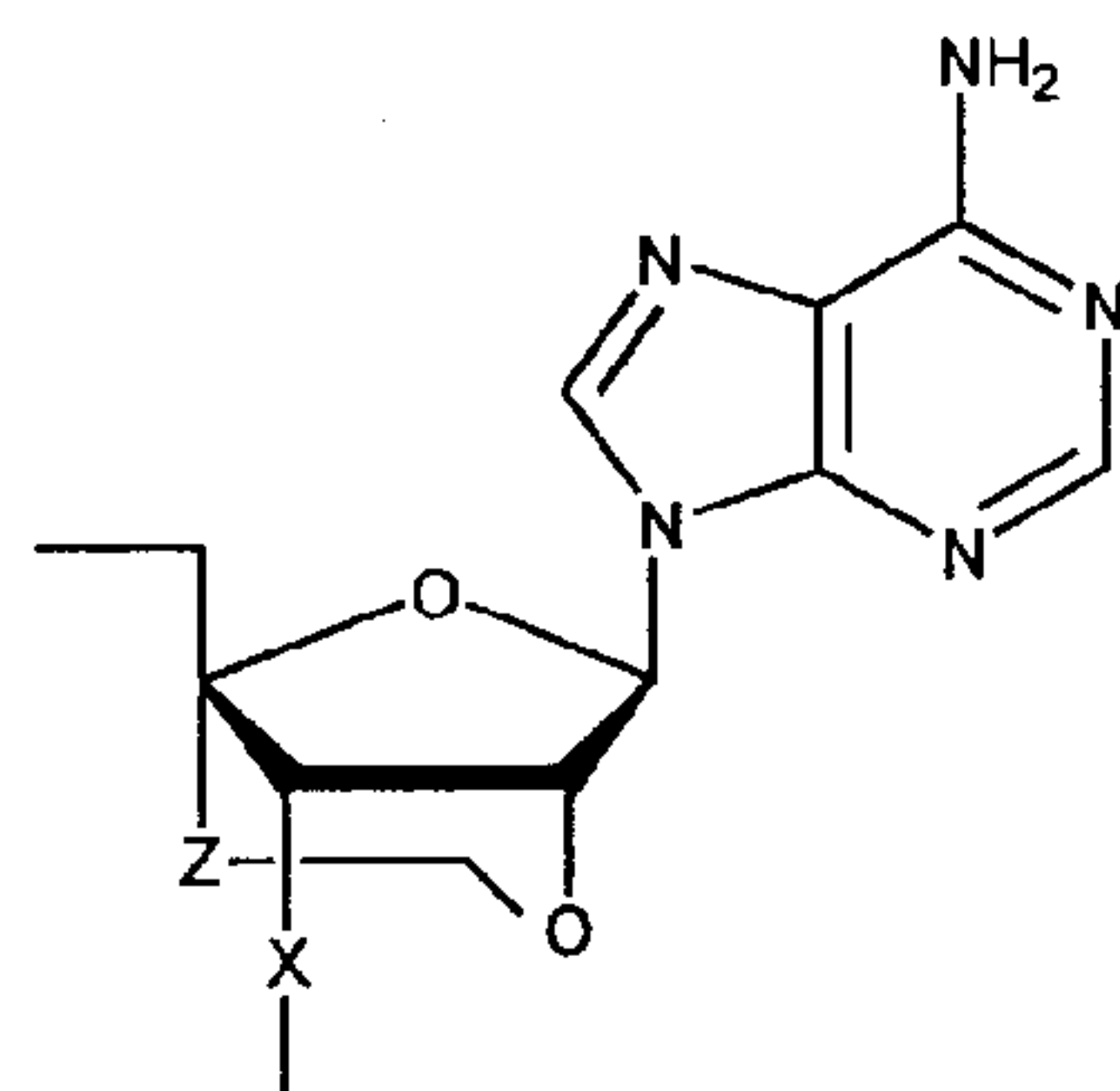
10 Ph- is a group represented by the following first formula:



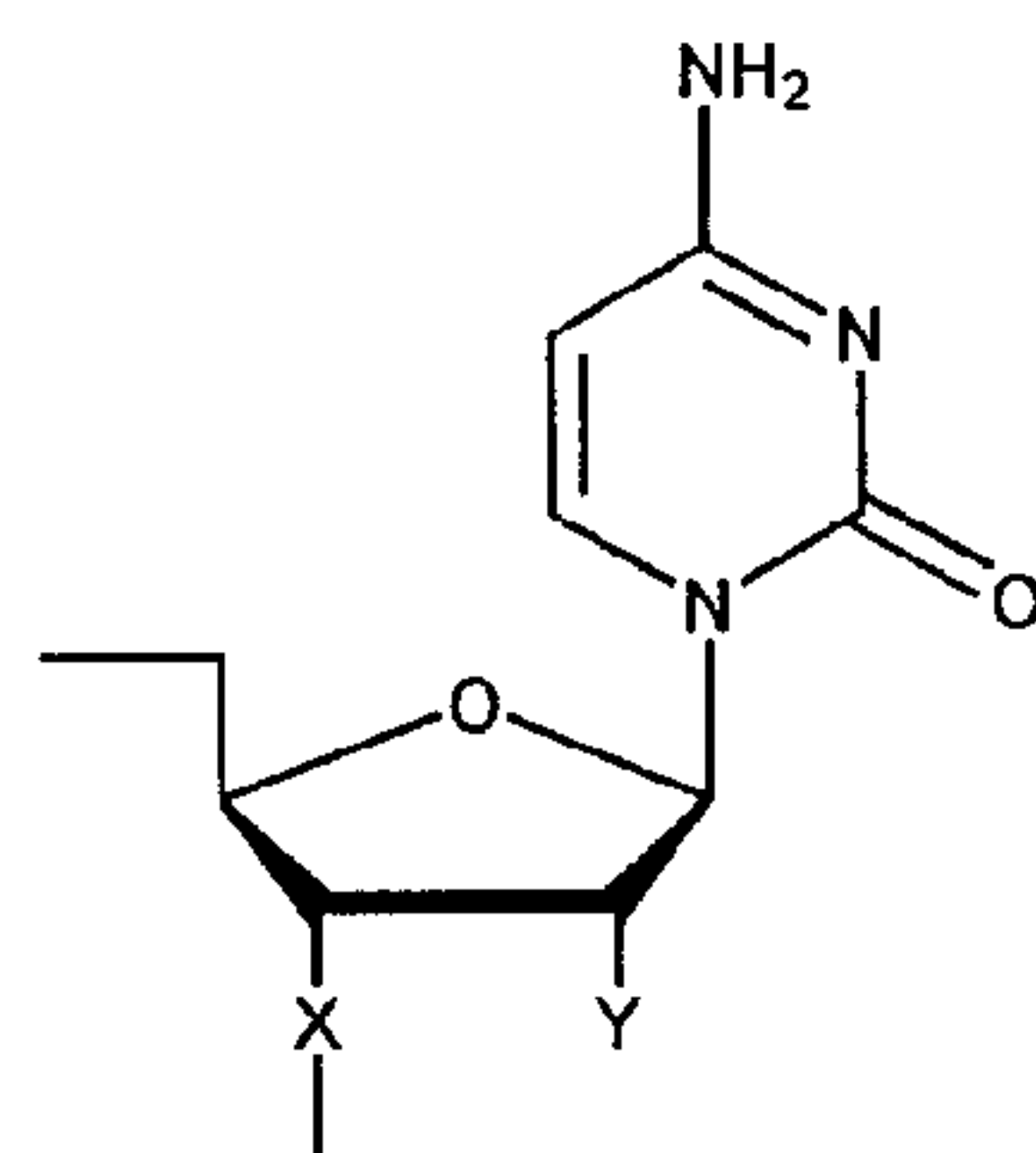
79861-7D



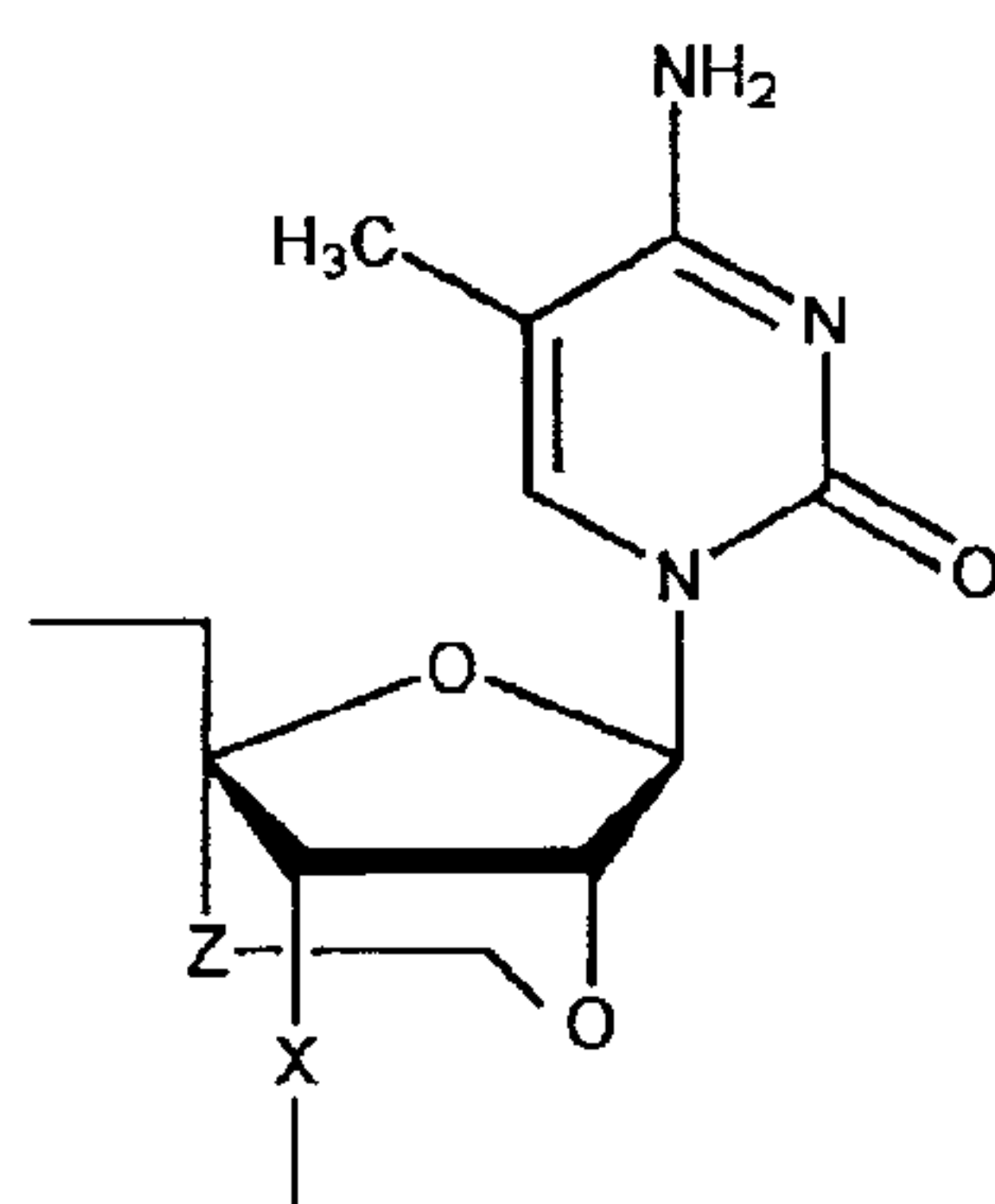
(A 1)



(A 2)

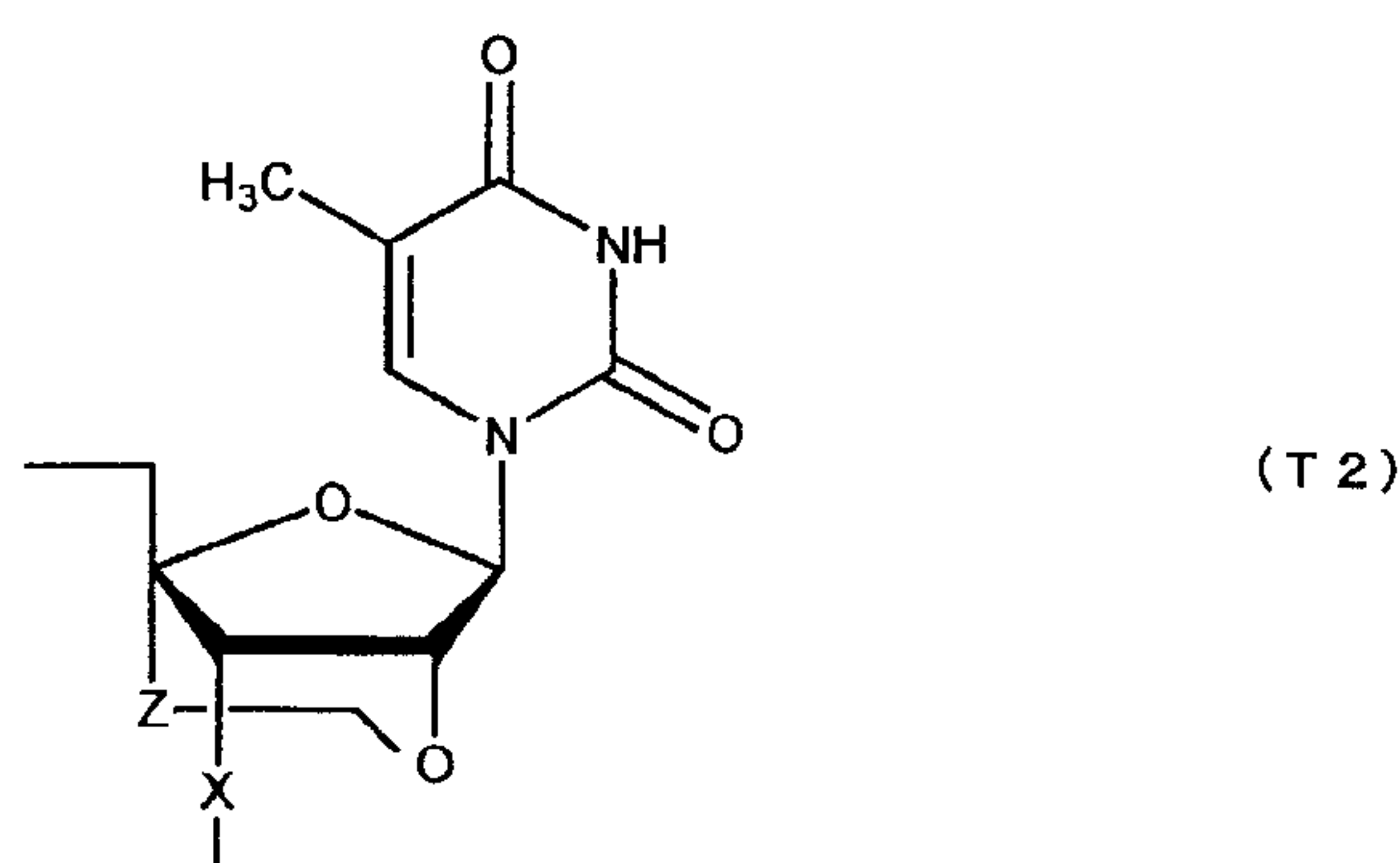
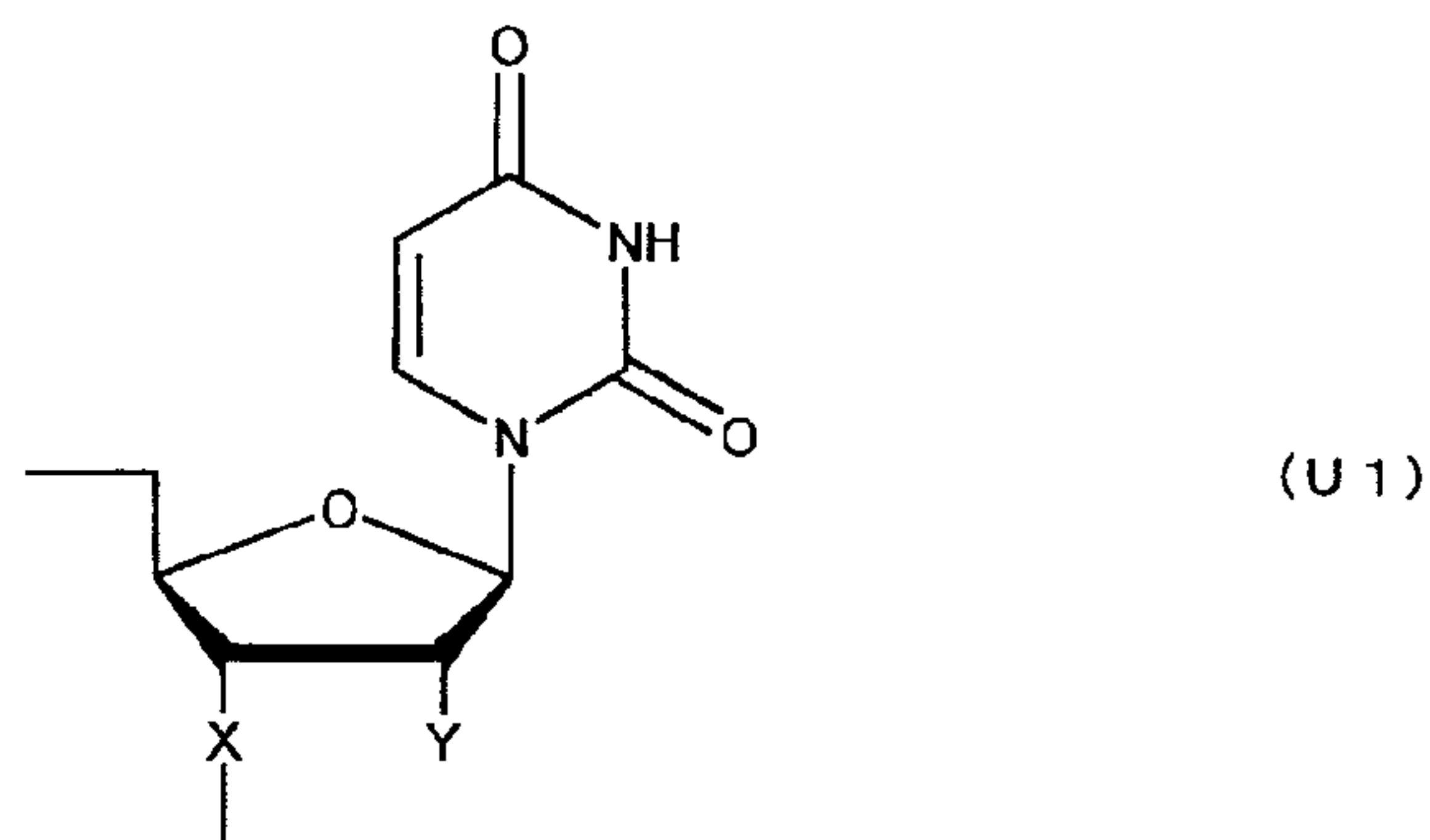


(C 1)

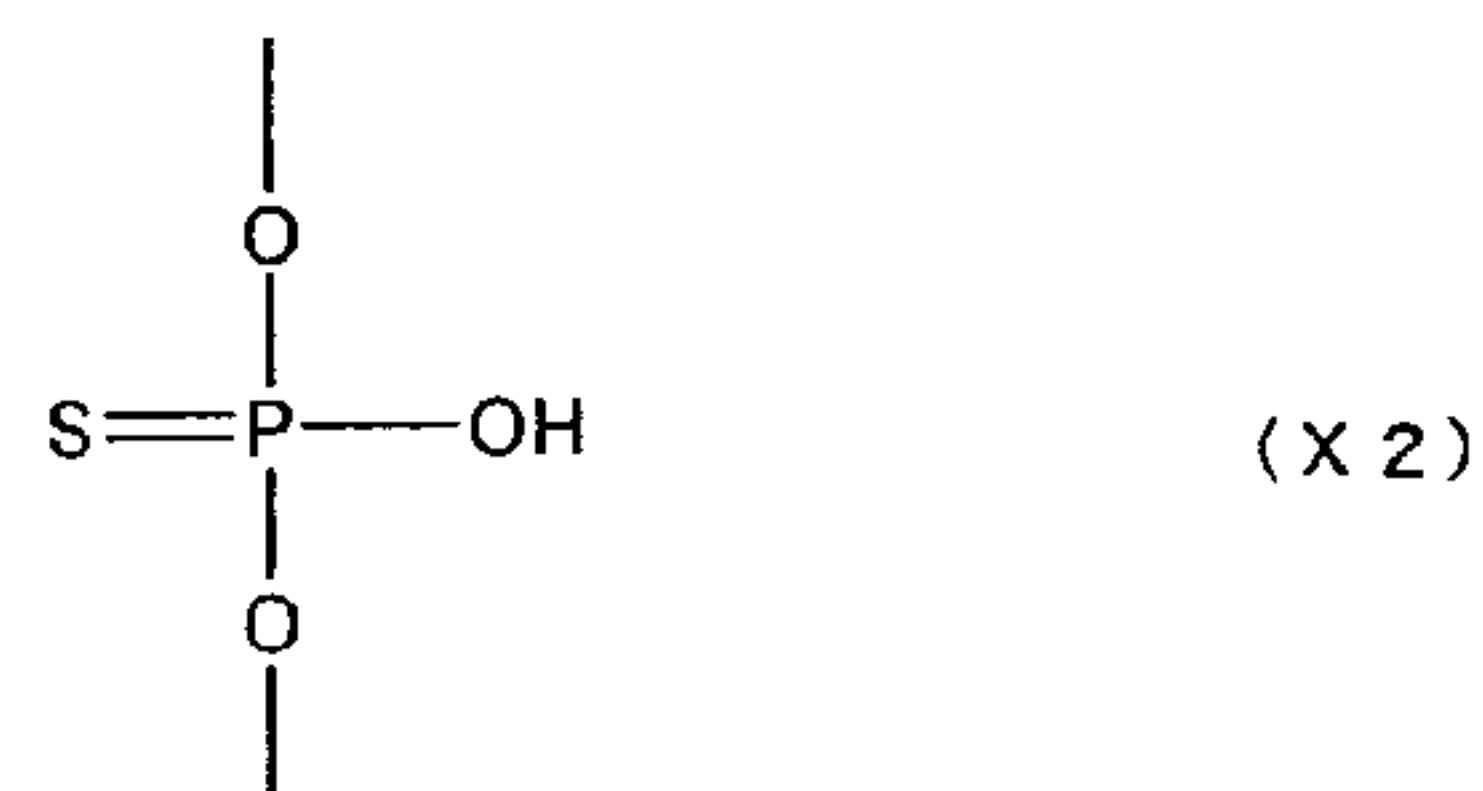
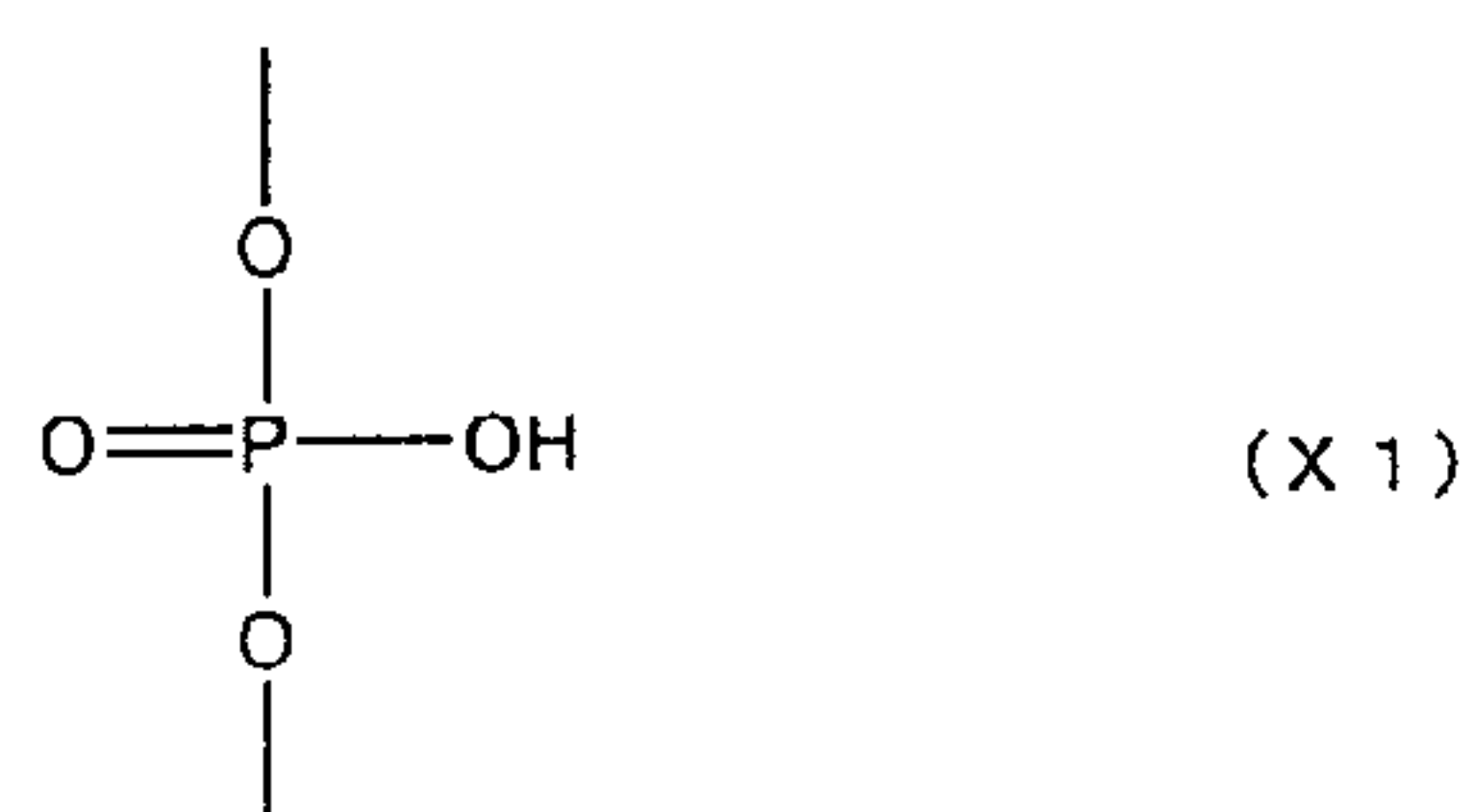


(C 2)

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where X is individually and independently a group represented by the following formula (X1) or (X2):

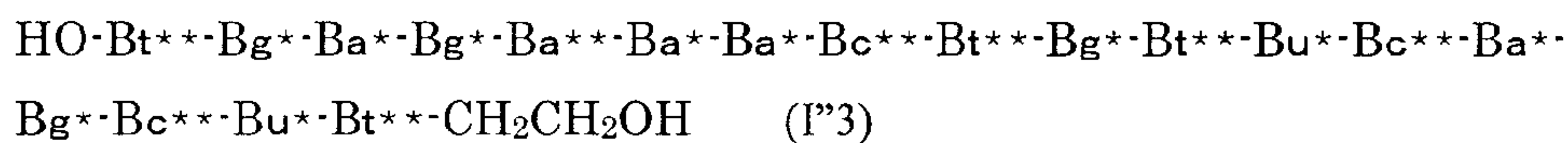
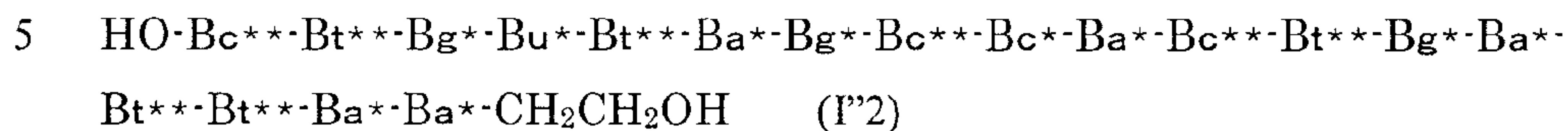
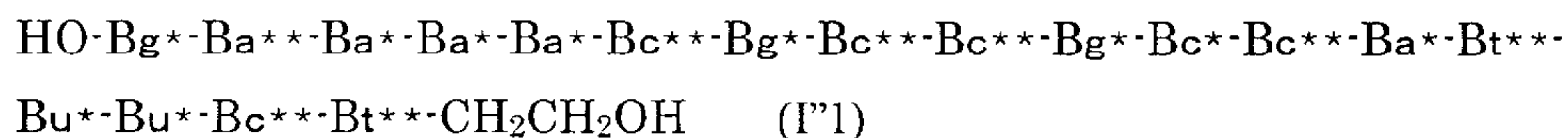


Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms.

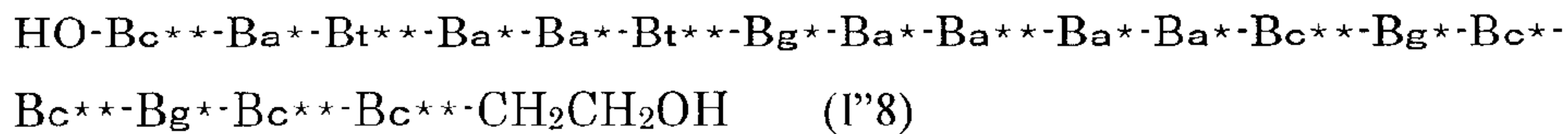
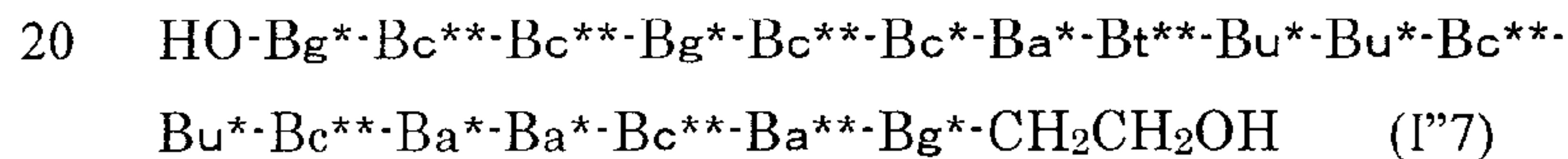
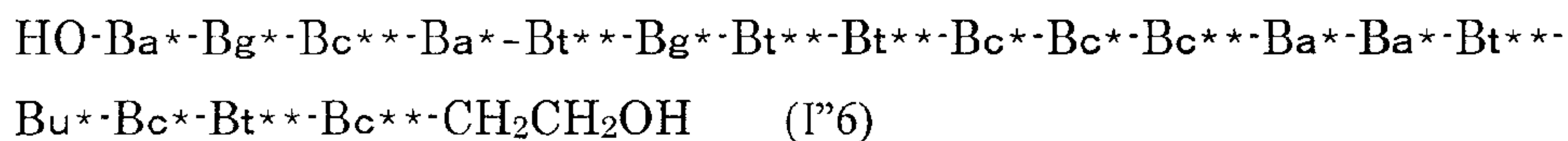
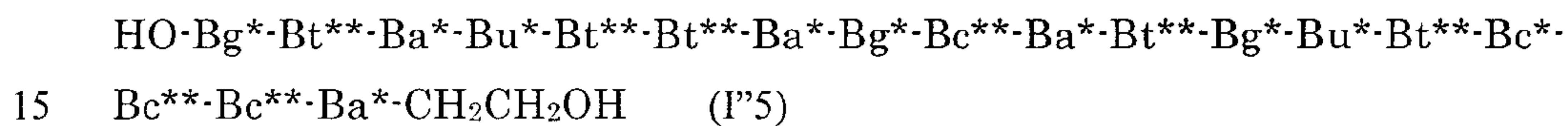
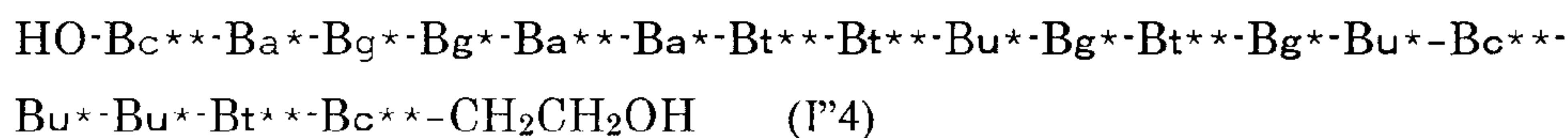
[49] The compound of any one of [26] to [48] above which is represented by any one of

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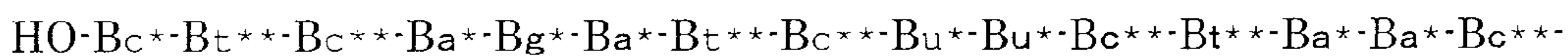
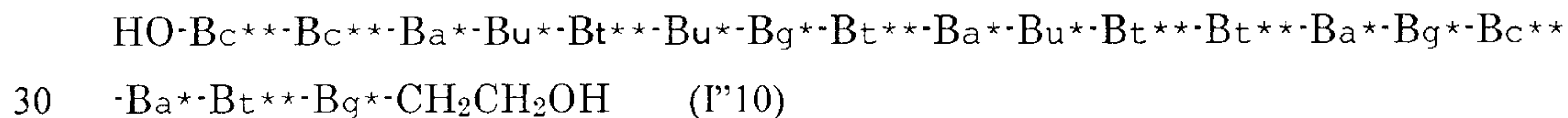
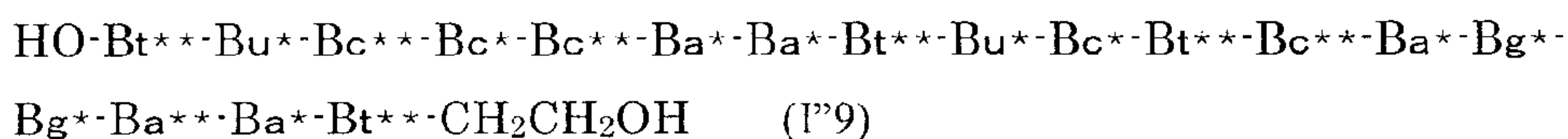
the following formulas (I'1) to (I'51), or a pharmacologically acceptable salt thereof:



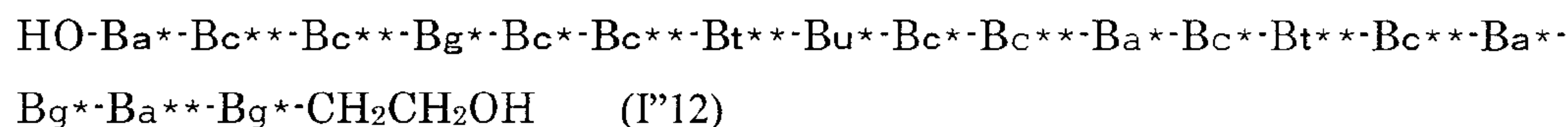
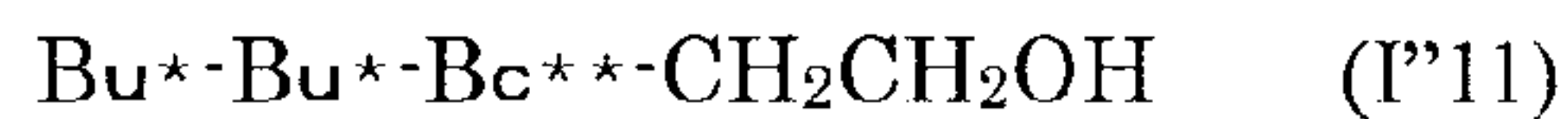
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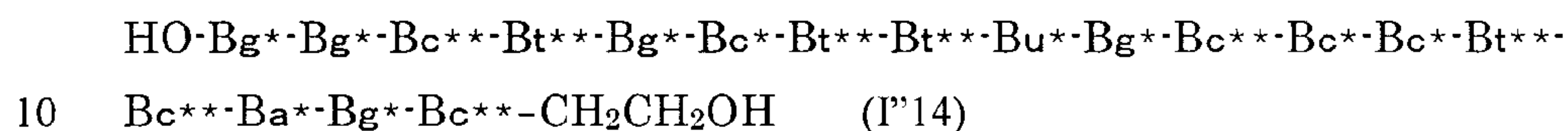
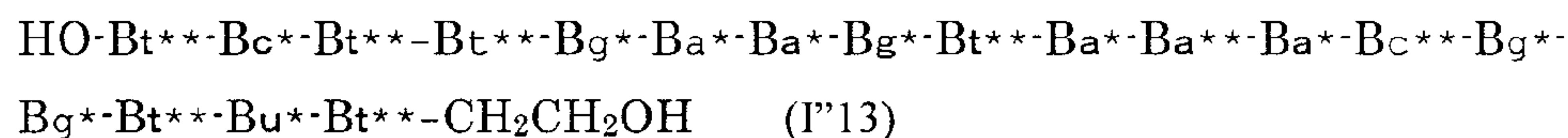
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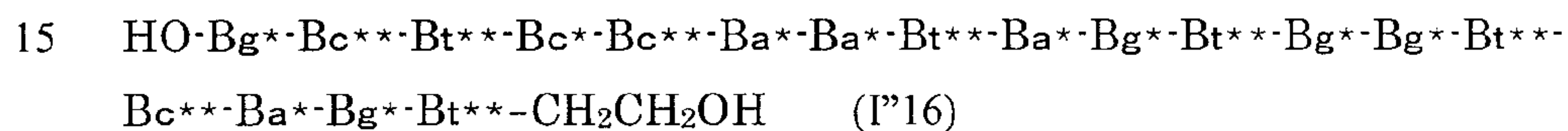
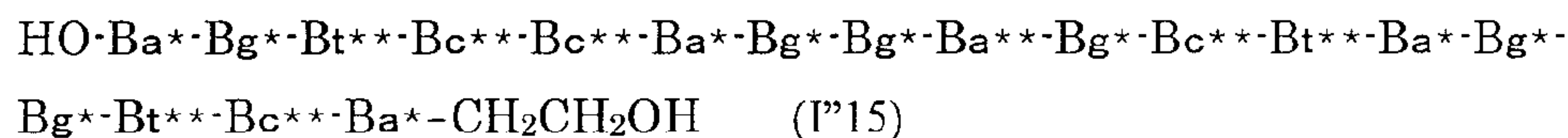
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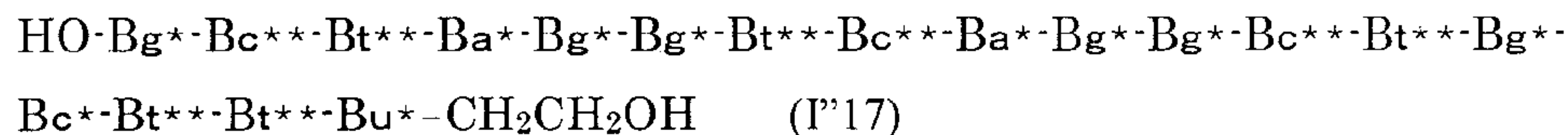
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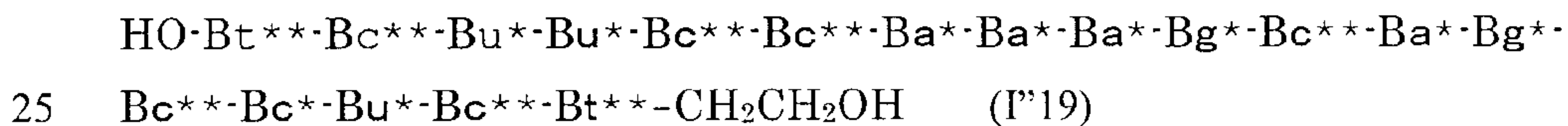
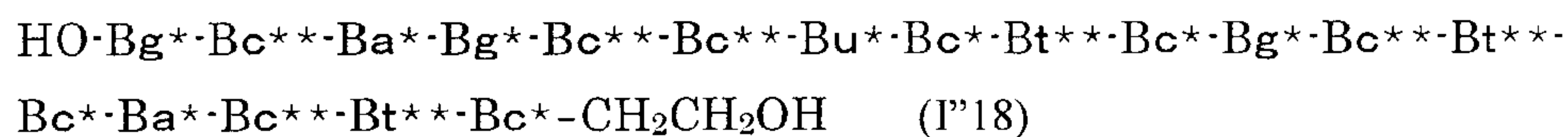
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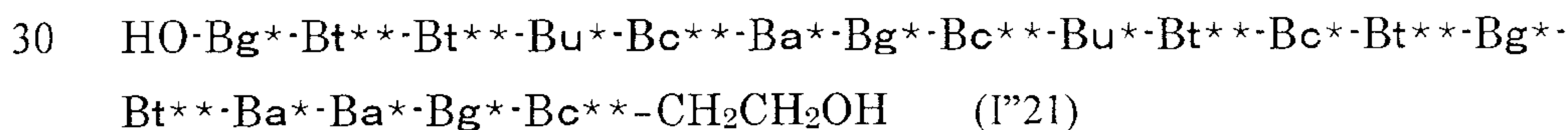
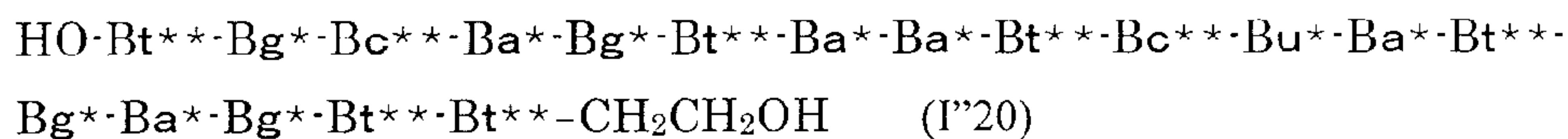
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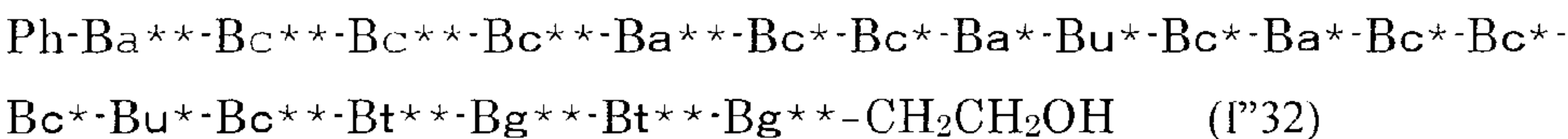
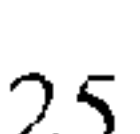
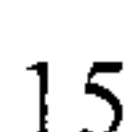


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Ph-Bc**·Bc**·Bt**·Bc**·Ba**·Ba*·Bg*·Bg*·Bu*·Bc*·Ba*·Bc*·Bc*·
Bc*·Ba*·Bc**·Bc**·Ba**·Bt**·Bc**·CH₂CH₂OH (I'33)

5 HO·Bt**·Ba**·Ba**·Bc**·Ba**·Bg*·Bu*·Bc*·Bu*·Bg*·Ba*·Bg*·Bu*·
Ba**·Bg**·Bg**·Ba**·Bg**·CH₂CH₂OH (I'34)

HO·Bg**·Bg**·Bc**·Ba**·Bt**·Bu*·Bu*·Bc*·Bu*·Ba*·Bg*·Bu*·Bu*·
Bt**·Bg**·Bg**·Ba**·Bg**·CH₂CH₂OH (I'35)

10

HO·Ba**·Bg**·Bc**·Bc**·Ba**·Bg*·Bu*·Bc*·Bg*·Bg*·Bu*·Ba*·Ba*·
Bg**·Bt**·Bt**·Bc**·Bt**·CH₂CH₂OH (I'36)

HO·Ba**·Bg**·Bt**·Bt**·Bt**·Bg*·Bg*·Ba*·Bg*·Ba*·Bu*·Bg*·Bg*·
15 Bc**·Ba**·Bg**·Bt**·Bt**·CH₂CH₂OH (I'37)

HO·Bc**·Bt**·Bg*·Ba*·Bt**·Bt**·Bc*·Bt**·Bg*·Ba*·Ba*·Bt**·Bt**·
Bc**·Bu*·Bu*·Bt**·Bc**·CH₂CH₂OH (I'38)

20 HO·Bt**·Bt**·Bc*·Bt**·Bt**·Bg*·Bt**·Ba*·Bc*·Bt**·Bt**·Bc*·Ba*·
Bt**·Bc*·Bc**·Bc**·Ba*·CH₂CH₂OH (I'39)

HO·Bc**·Bc**·Bu*·Bc**·Bc**·Bg*·Bg*·Bt**·Bt**·Bc**·Bt**·Bg*·Ba*·
Ba*·Bg*·Bg*·Bt**·Bg*·CH₂CH₂OH (I'40)

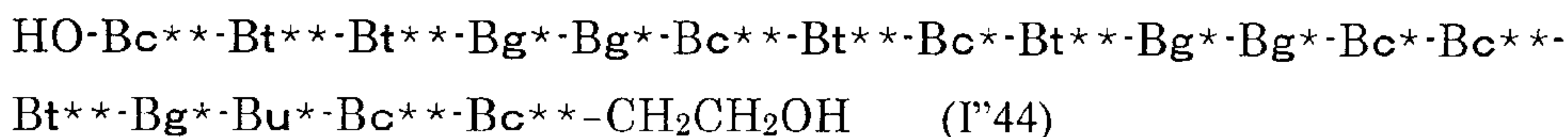
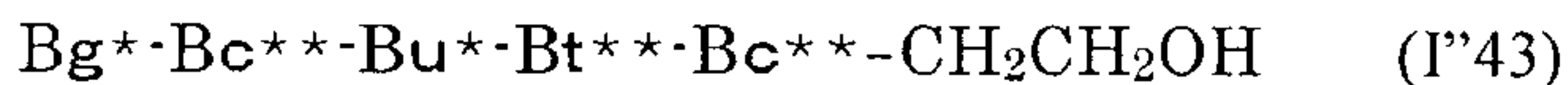
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HO·Bc**·Ba*·Bt**·Bt**·Bu*·Bc**·Ba*·Bu*·Bt**·Bc**·Ba*·Ba*·Bc**·
Bt**·Bg*·Bt**·Bt**·Bg*·CH₂CH₂OH (I'41)

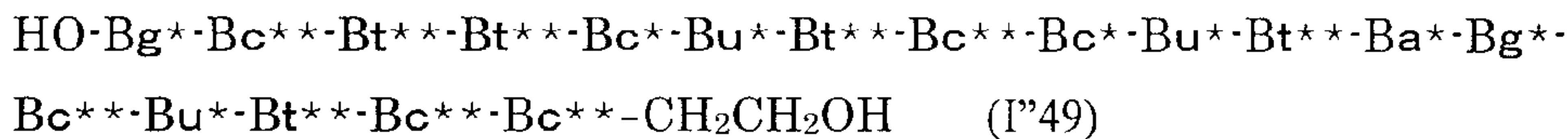
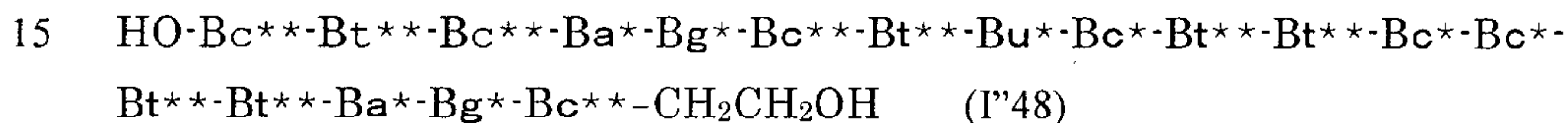
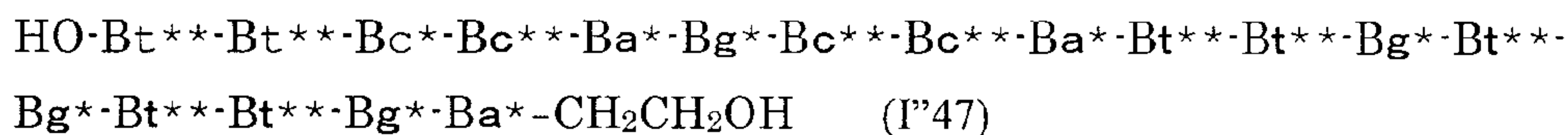
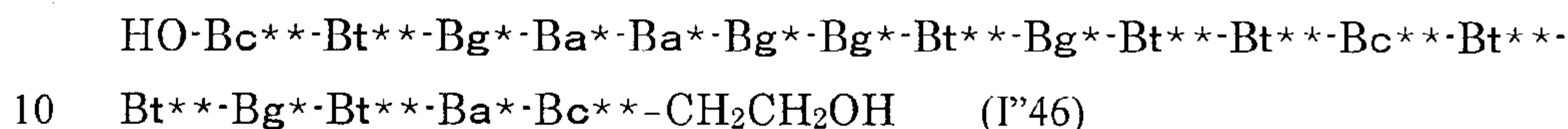
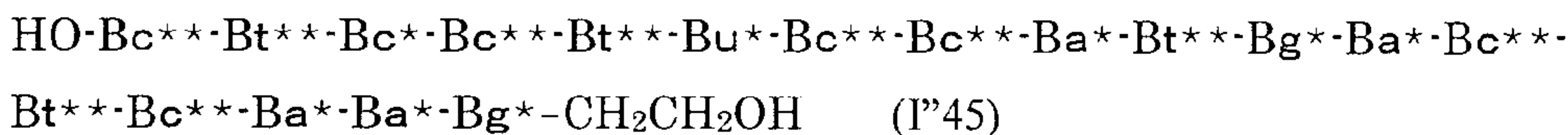
HO·Bt**·Bt**·Bc*·Bc*·Bt**·Bt**·Ba*·Bg*·Bc**·Bt**·Bu*·Bc**·Bc**·
30 Ba*·Bg*·Bc**·Bc**·Ba*·CH₂CH₂OH (I'42)

HO·Bt**·Ba*·Ba*·Bg*·Ba*·Bc**·Bc**·Bt**·Bg*·Bc**·Bt**·Bc**·Ba*

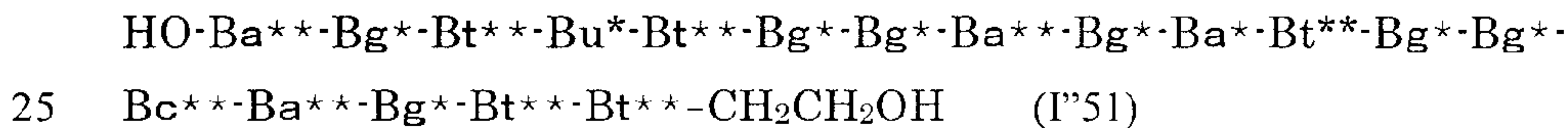
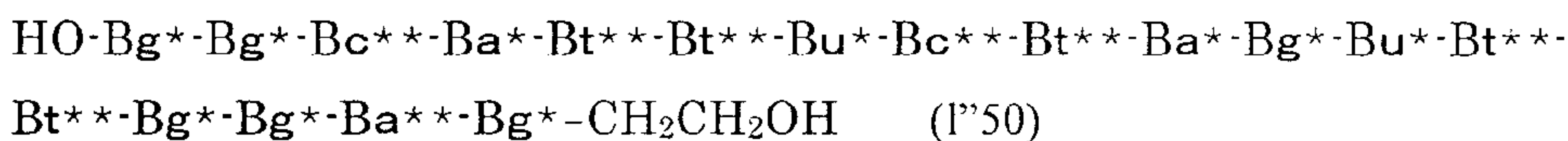
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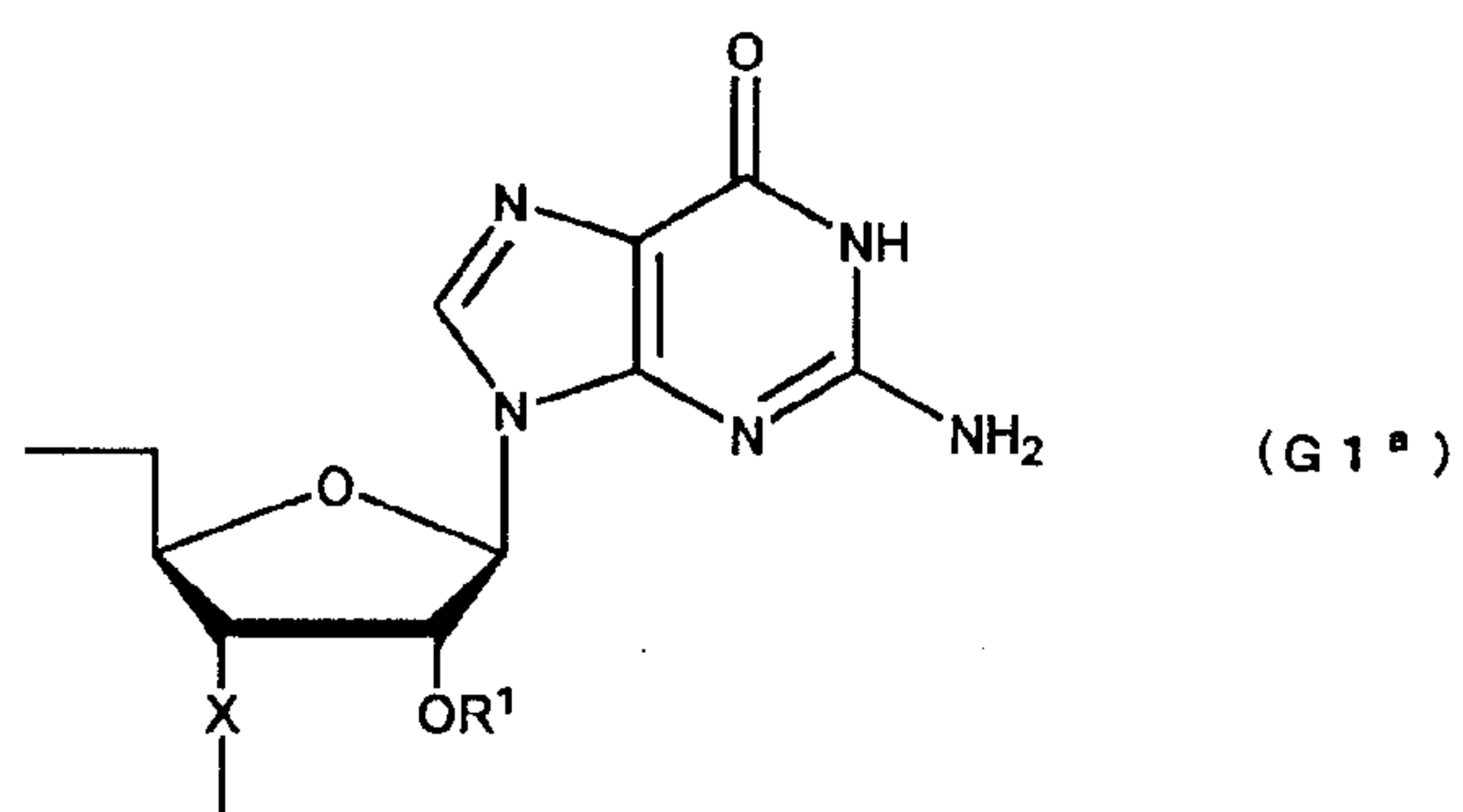
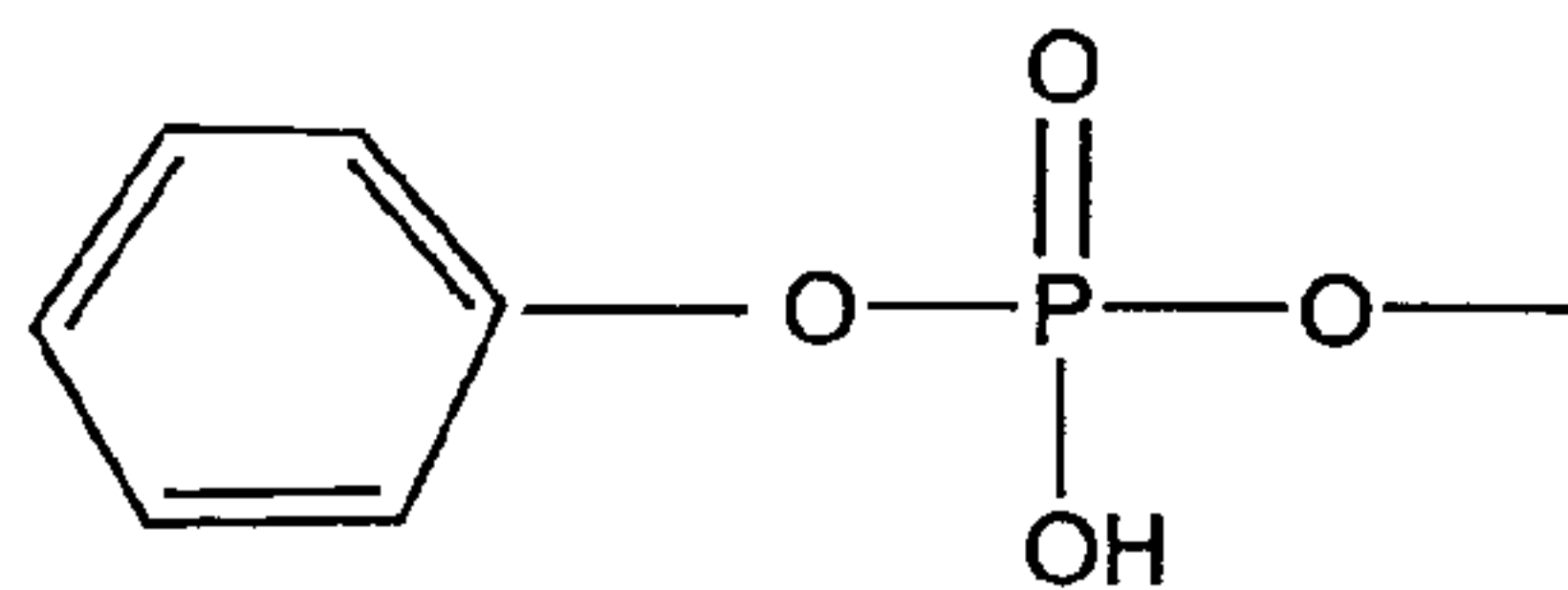


where Bg* is a group represented by the following formula (G1^a), Ba* is a group represented by the following formula (A1^a); Bc* is a group represented by the following formula (C1^a); Bu* is a group represented by the following formula (U1^a); Bg** is a group represented by the following formula (G2); Ba** is a group represented by the following formula (A2); Bc** is a group represented by the following formula (C2); Bt** is a group represented by the following formula (T2); and Ph- is a group represented by the following

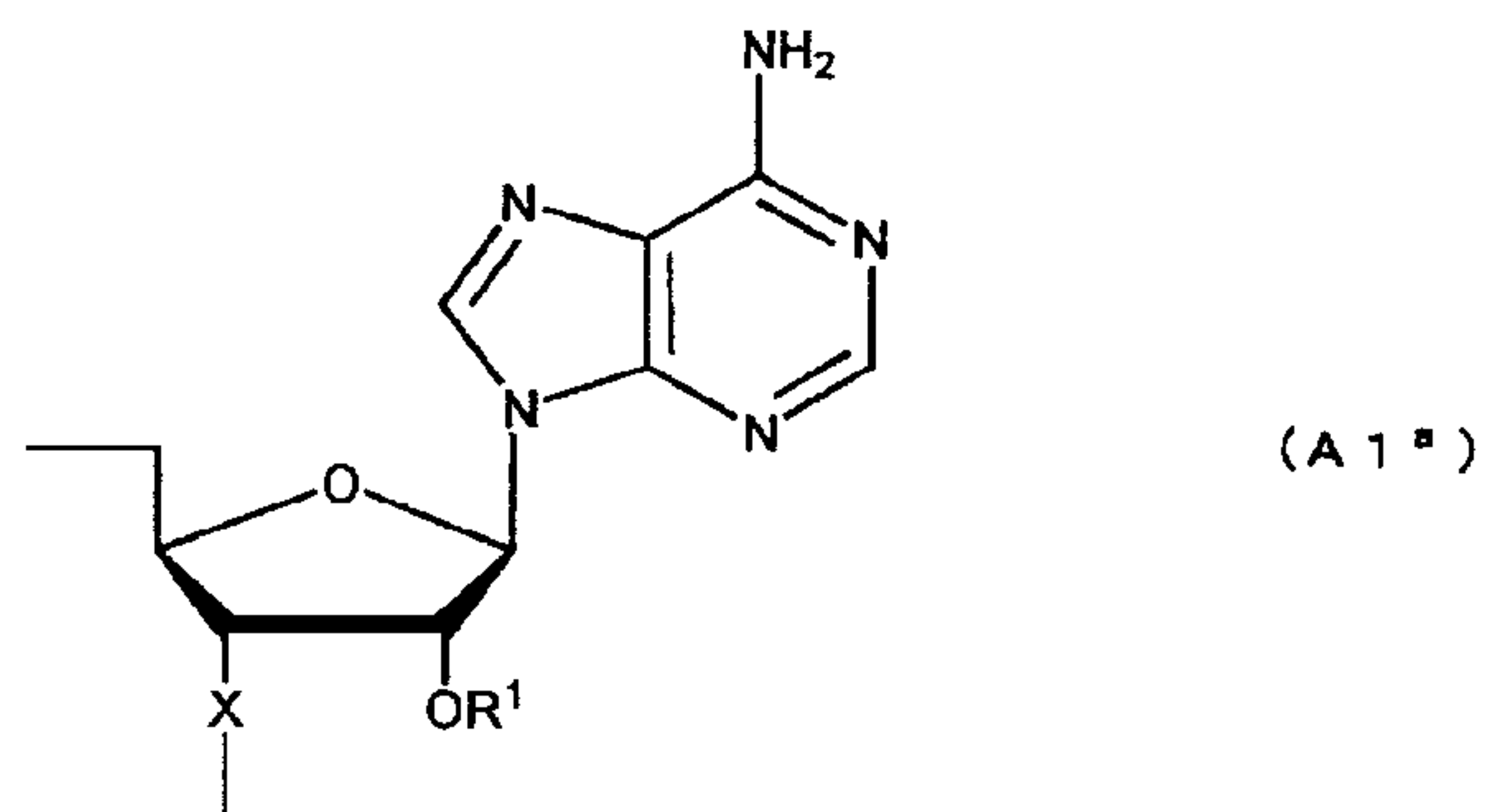
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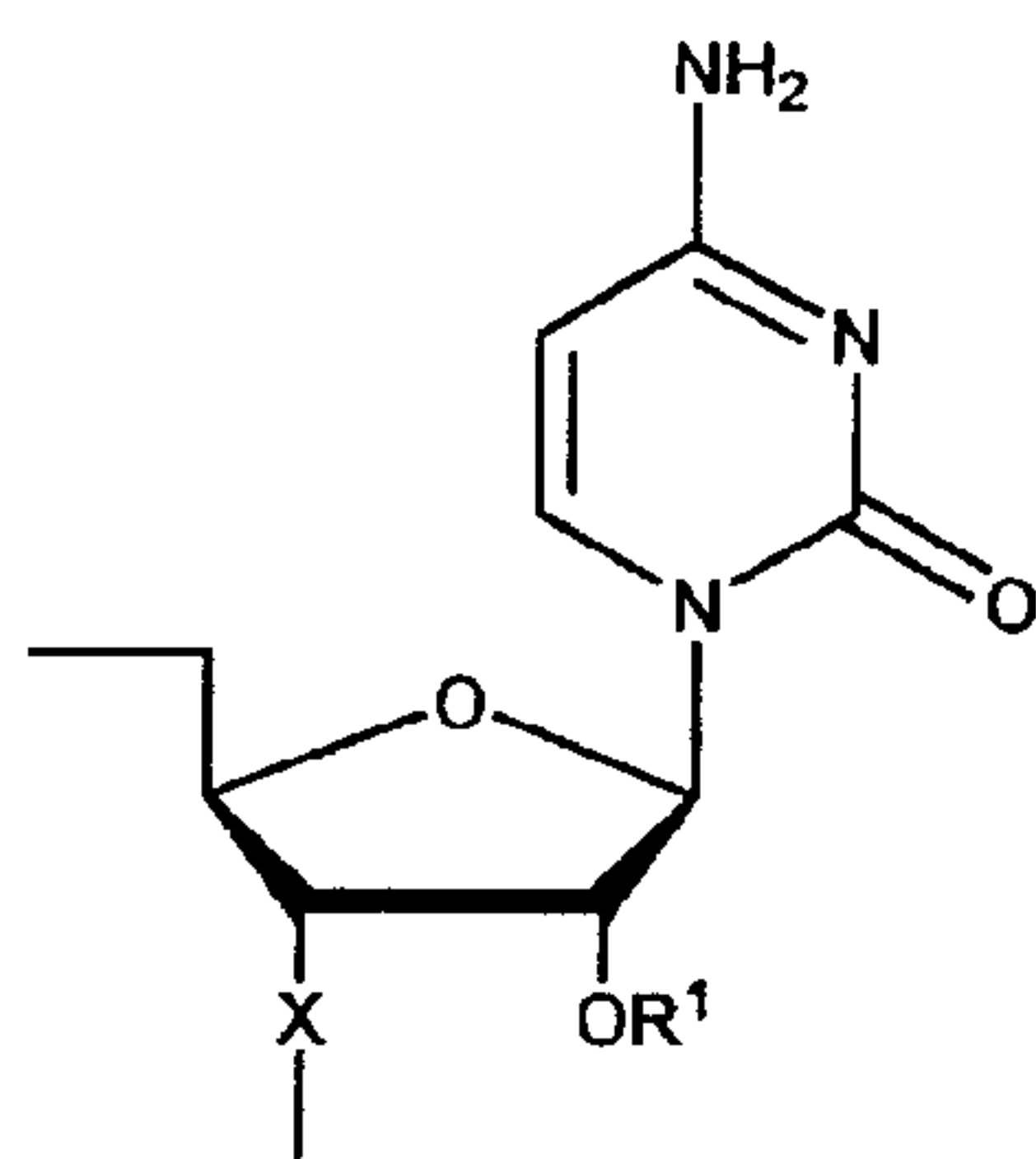
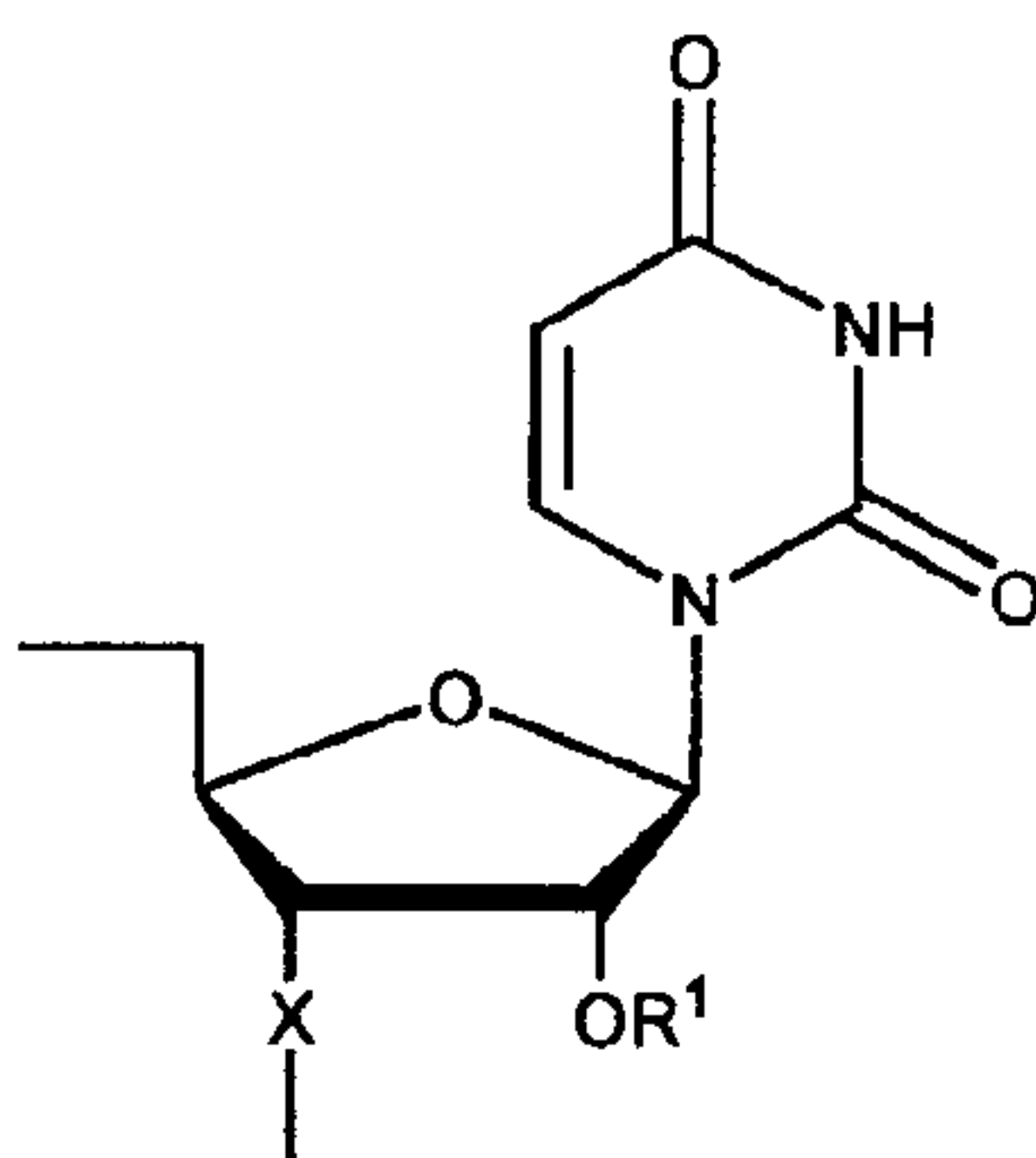
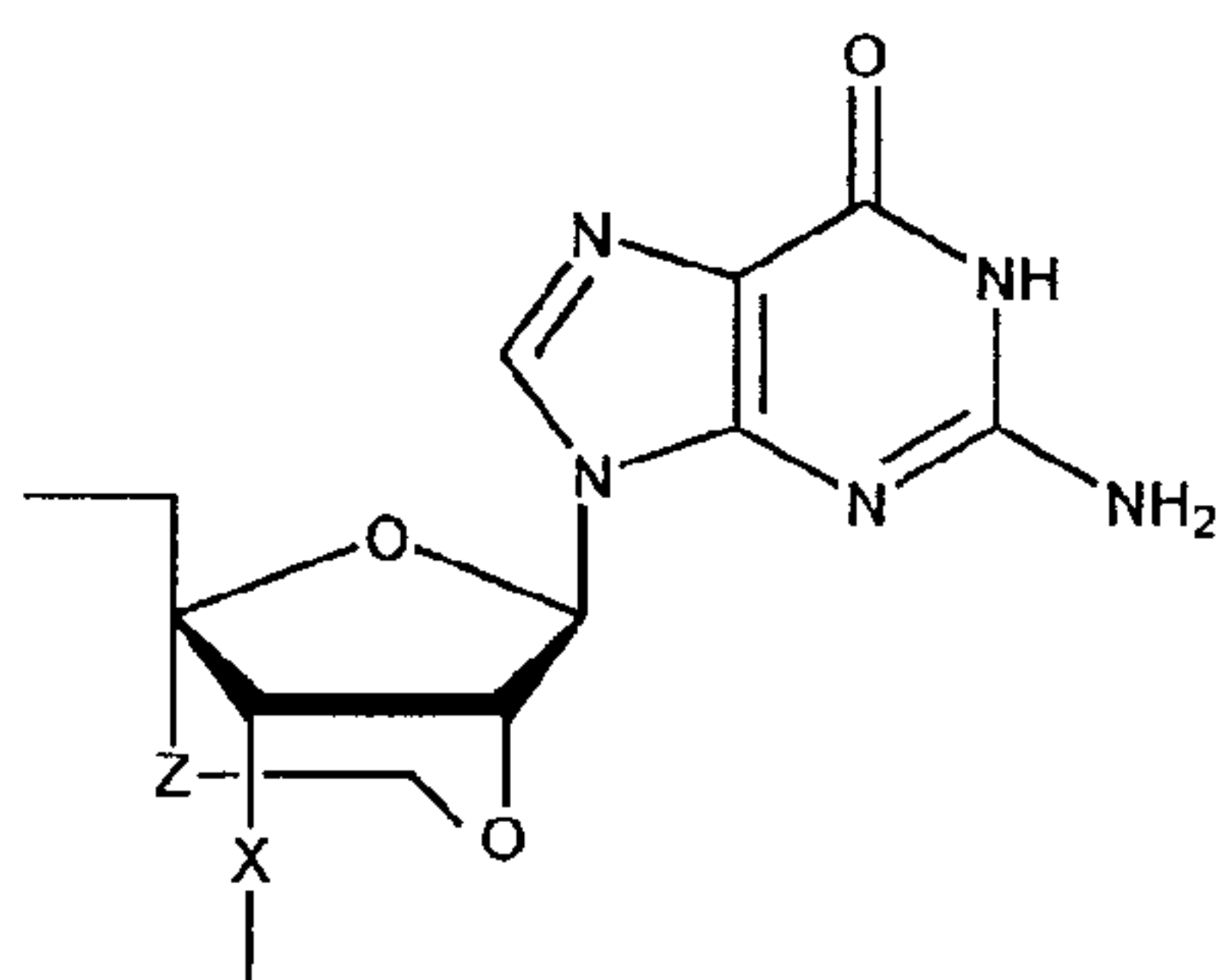
first formula:



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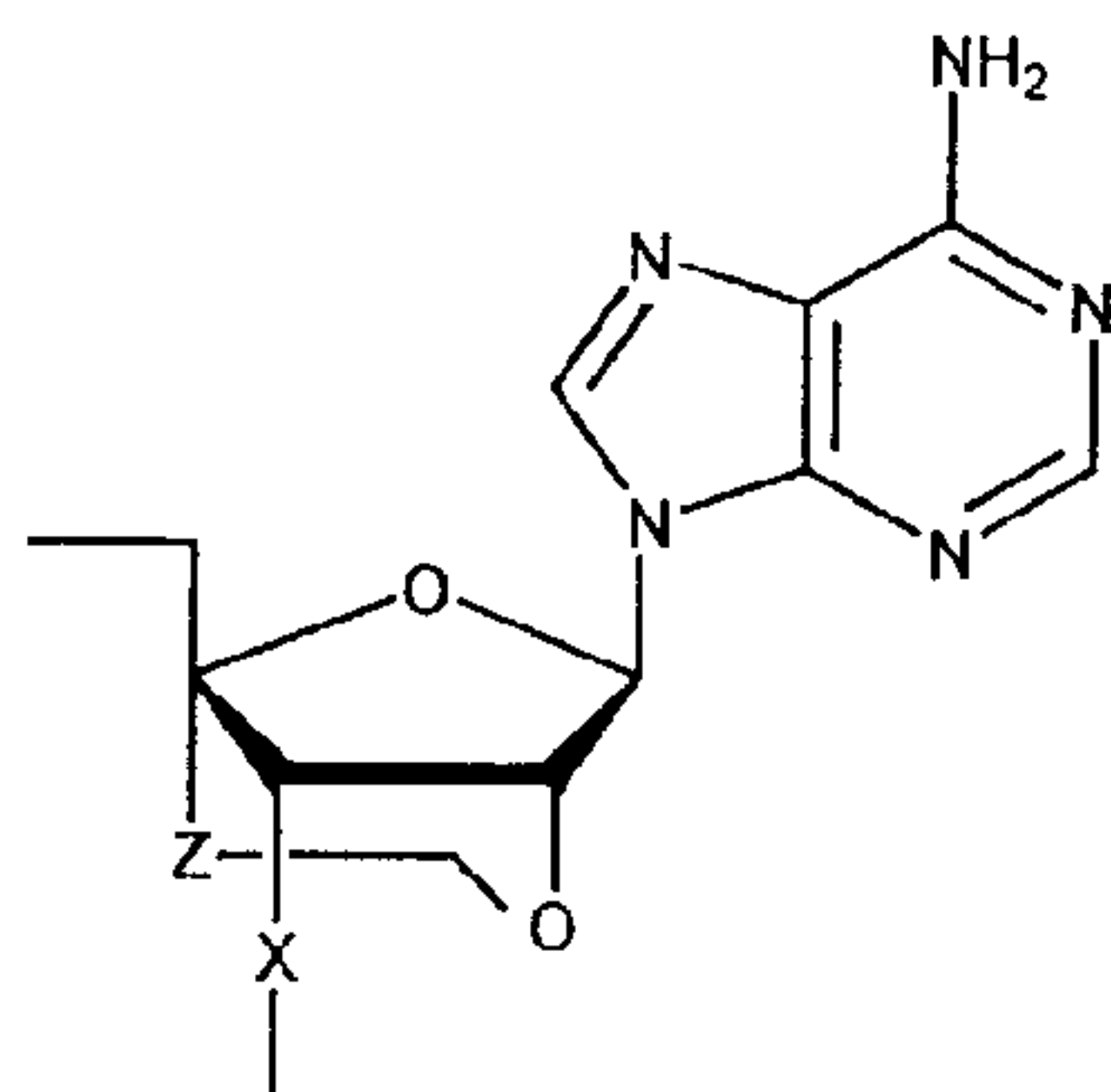


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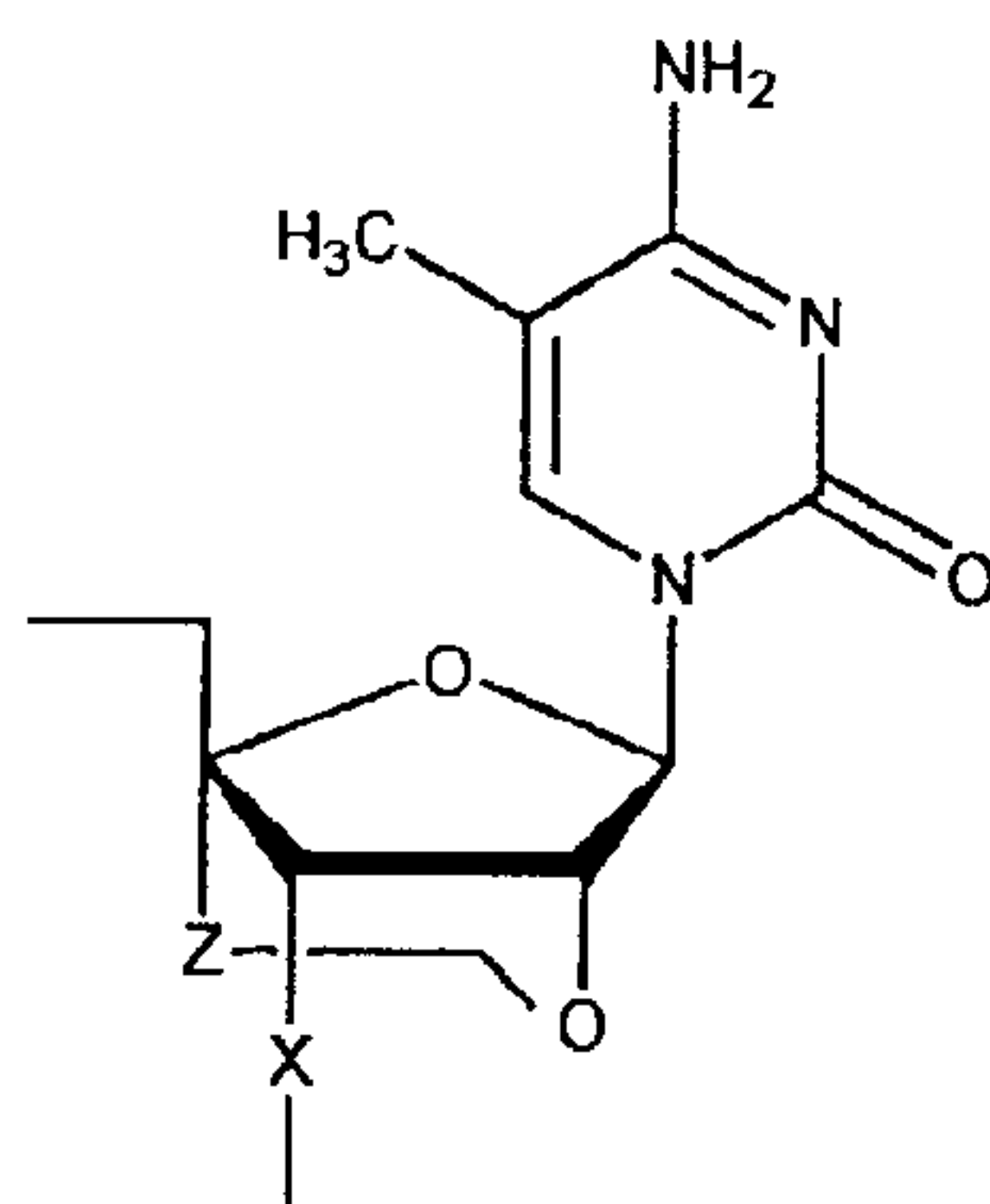
(C 1^{*})(U 1^{*})

(G 2)

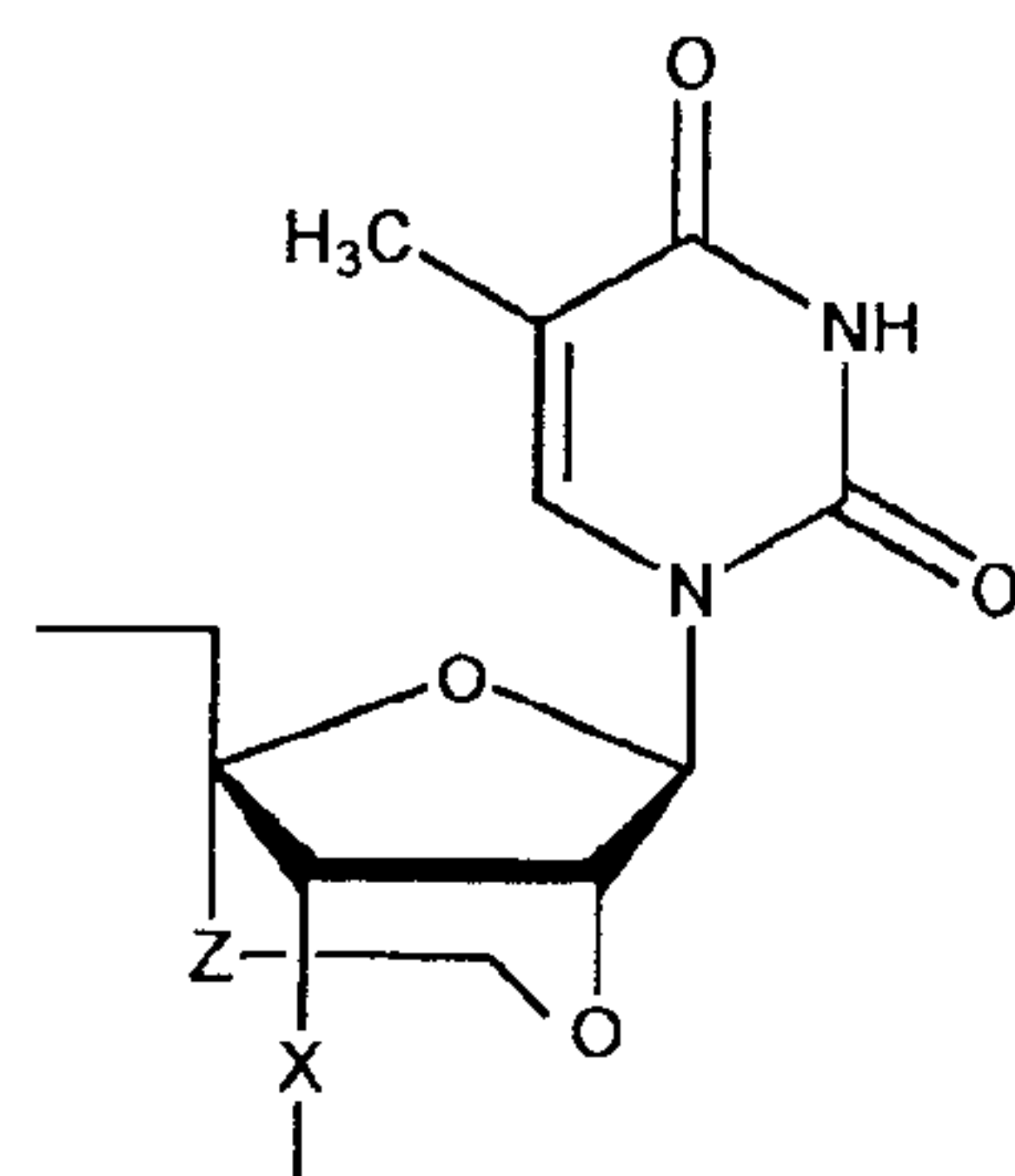
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(A 2)



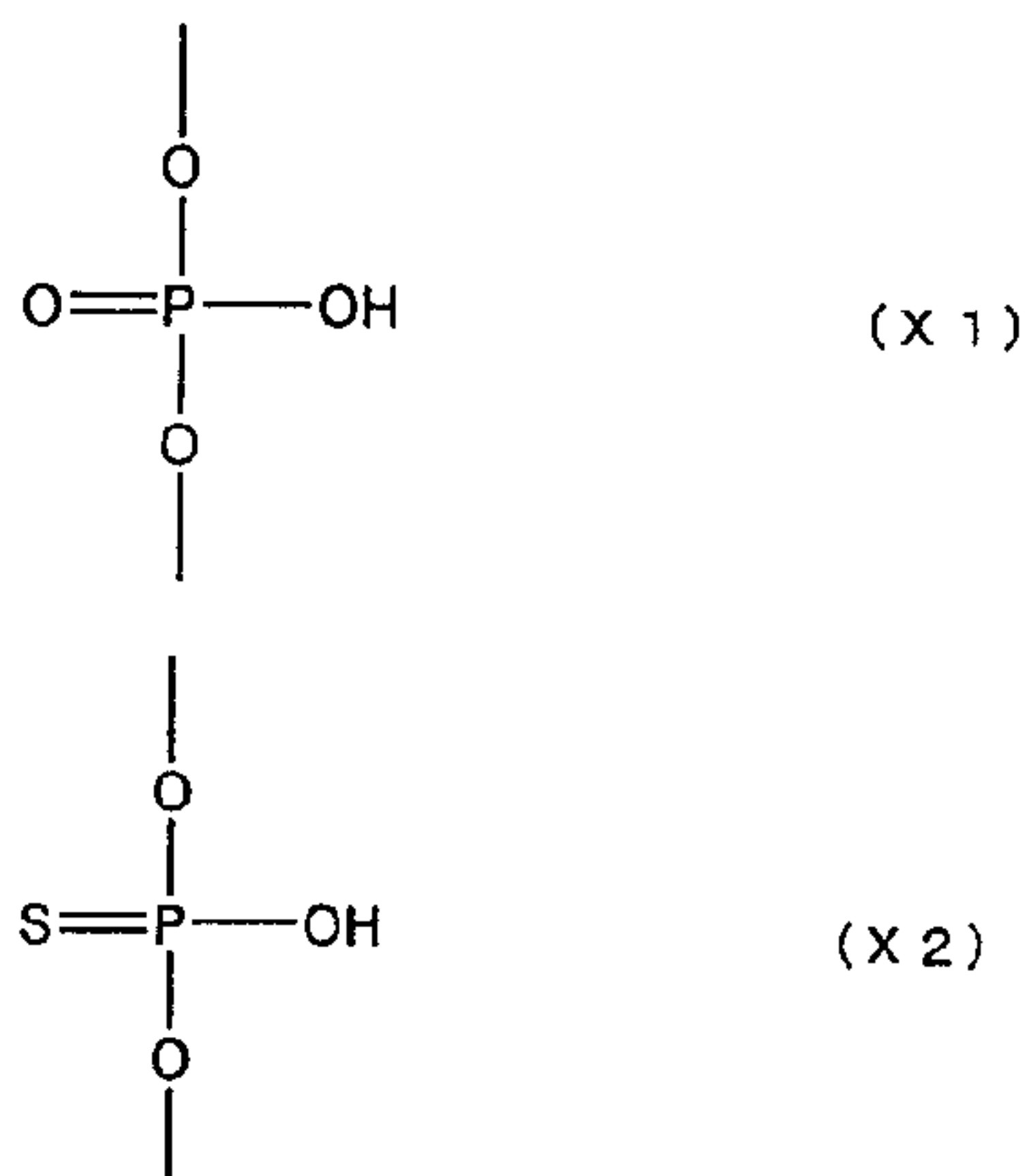
(C 2)



(T 2)

- 5 where X is individually and independently a group represented by the following formula (X1) or (X2); R¹ is individually and independently an alkyl group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms:

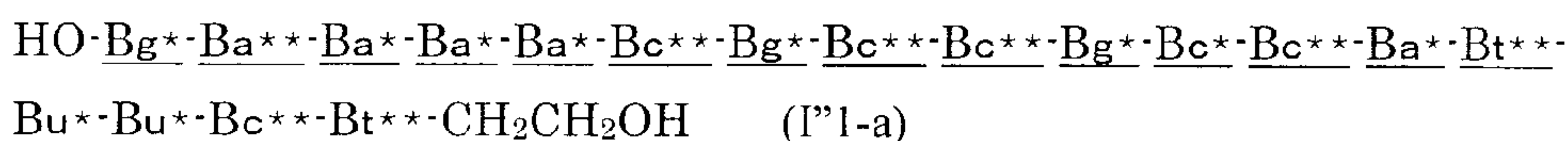
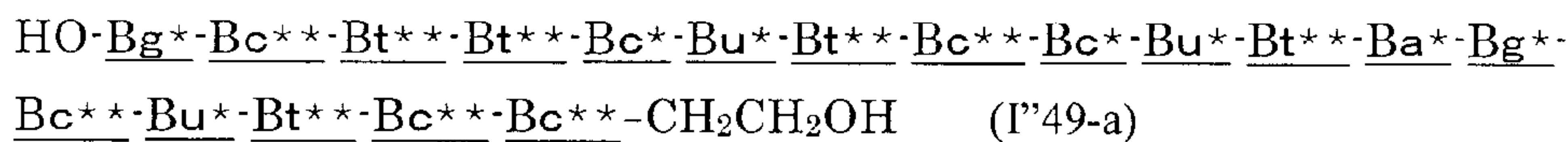
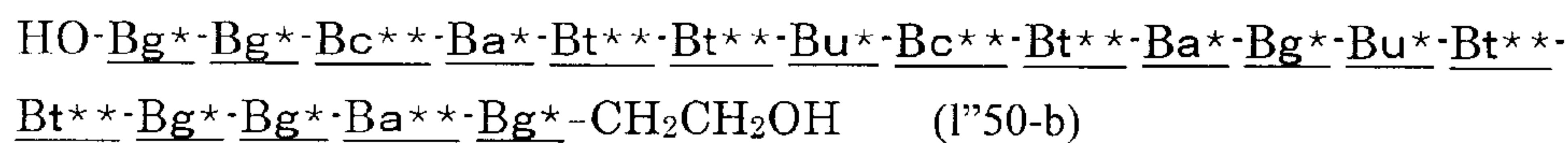
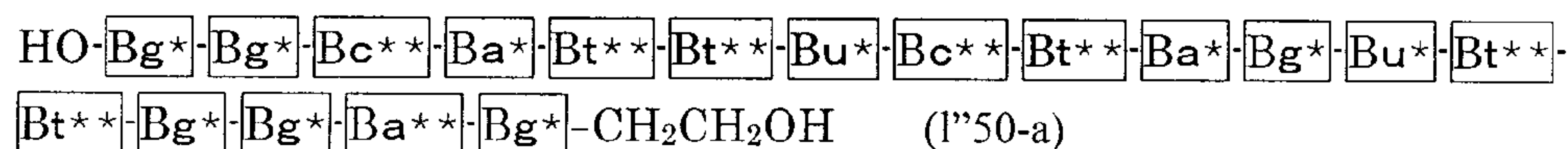
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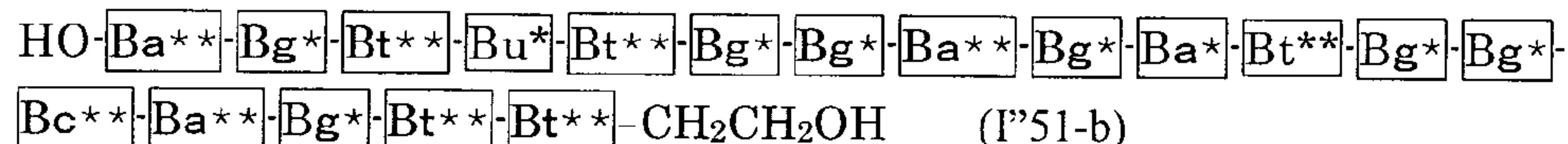
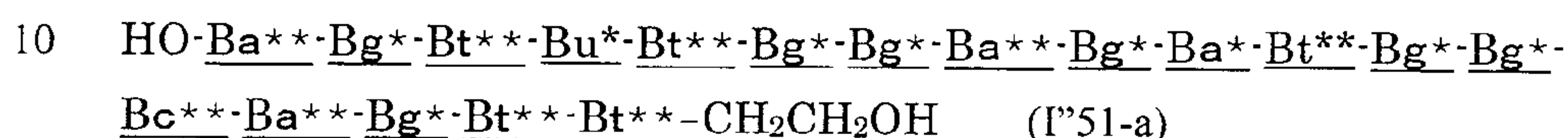
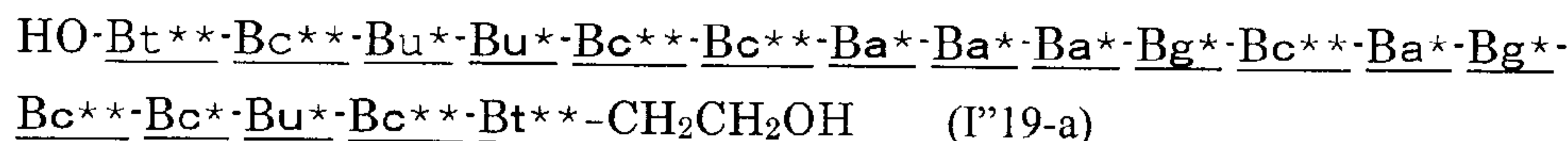
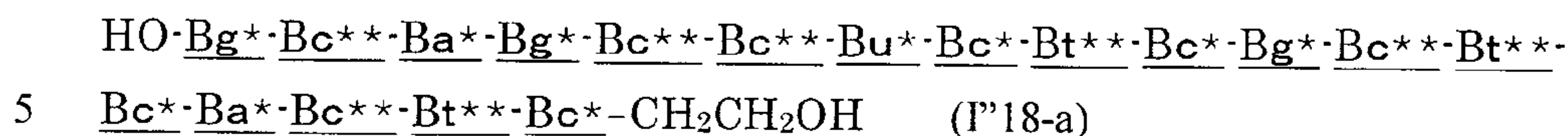
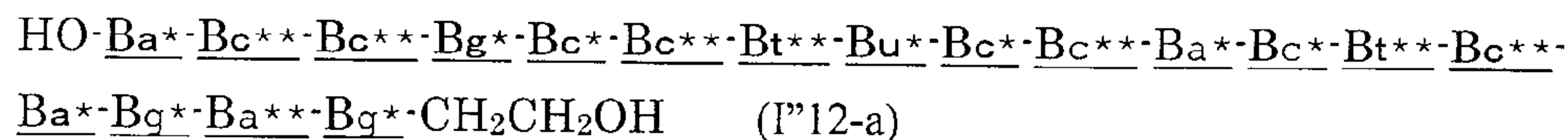
[50] The compound of [49] above where X in formulas (G1^a), (A1^a), (C1^a) and (U1^a) is a group represented by formula (X2) and X in formulas (G2), (A2), (C2) and (T2) is a group represented by formula (X1), or a pharmacologically acceptable salt thereof.

[51] The compound of [49] above where X in all the formulas (G1^a), (A1^a), (C1^a), (U1^a), (G2), (A2), (C2) and (T2) is a group represented by formula (X2), or a pharmacologically acceptable salt thereof.

[52] The compound of [49] above which is represented by any one of the following formulas (I'50-a) to (I'51-b), or a salt thereof:



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where Bg* is a group represented by formula (G1^a), Ba* is a group represented by formula (A1^a); Bc* is a group represented by formula (C1^a); Bu* is a group represented by formula (U1^a); Bg** is a group represented by formula (G2); Ba** is a group represented by formula (A2); Bc** is a group represented by formula (C2); Bt** is a group represented by formula (T2); and in individual formulas, at least one of Bg*, Ba*, Bc*, Bu*, Bg**, Ba**, Bc** and Bt** has a group represented by formula (X2) as X and all of $\boxed{\text{Bg}^*}$, $\boxed{\text{Ba}^*}$, $\boxed{\text{Bc}^*}$, $\boxed{\text{Bt}^*}$, $\boxed{\text{Bg}^{**}}$, $\boxed{\text{Ba}^{**}}$, $\boxed{\text{Bc}^{**}}$ and $\boxed{\text{Bt}^{**}}$ have a group represented by formula (X1) as X.

[53] The compound of any one of [26] to [52] above where Y in formulas (G1), (A1), (C1) and (U1) is a methoxy group and Z in formulas (G2), (A2), (C2) and (T2) is an ethylene group, or a pharmacologically acceptable salt thereof.

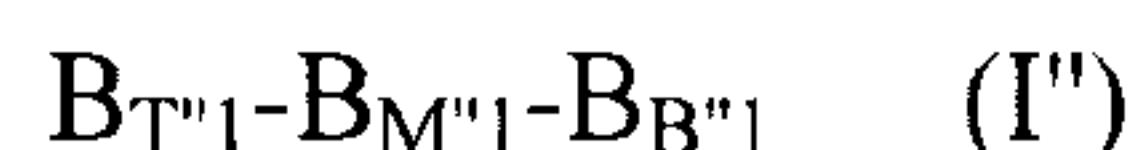
[54] A therapeutic agent for muscular dystrophy, comprising the oligonucleotide of [1] above or a pharmacologically acceptable salt thereof, or the compound of any one of [6], [13] to [19] and [26] to [46] or a pharmacologically acceptable salt thereof.

[55] The therapeutic agent of [54] above, which is an agent for treating Duchenne muscular dystrophy.

[56] The therapeutic agent of [54] above, whose target of treatment is those patients in

which the total number of the amino acids in the open reading frame of the dystrophin gene will be a multiple of 3 when exon 19, 41, 45, 46, 44, 50, 55, 51, or 53 of the dystrophin gene has been skipped.

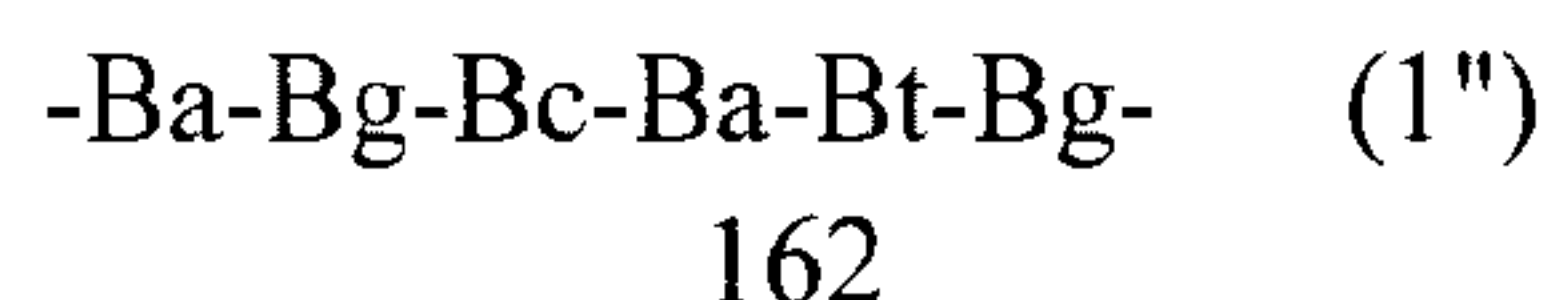
- Specifically, the present invention as claimed relates to a compound for use in
- 5 inducing skipping of exon 44 of the dystrophin gene, which is an oligonucleotide having at least one 2'-O, 4'-C-alkylenated sugar, and which is an oligonucleotide having the nucleotide sequence as shown in any one of SEQ ID NOS: 30-39 or a pharmaceutically acceptable salt thereof; or a compound represented by any one of the general formulae (I'), (II'), and (III') or a pharmaceutically acceptable salt thereof;
- 10 wherein said general formulae are defined as follows:



where $B_{T''1}$ is a group represented by any one of the following (1a'') to (1m''):

- (1a'')HO-,
 (1b'')HO-Bt-,
 15 (1c'')HO-Bt-Bt-,
 (1d'')HO-Bt-Bt-Bt-,
 (1e'')HO-Ba-Bt-Bt-Bt-,
 (1f'')HO-Bt-Ba-Bt-Bt-Bt-,
 (1g'')HO-Bg-Bt-Ba-Bt-Bt-Bt-,
 20 (1h'')HO-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1i'')HO-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1j'')HO-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1k'')HO-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1l'')HO-Bc-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-, or
 25 (1m'')HO-Bc-Bc-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,

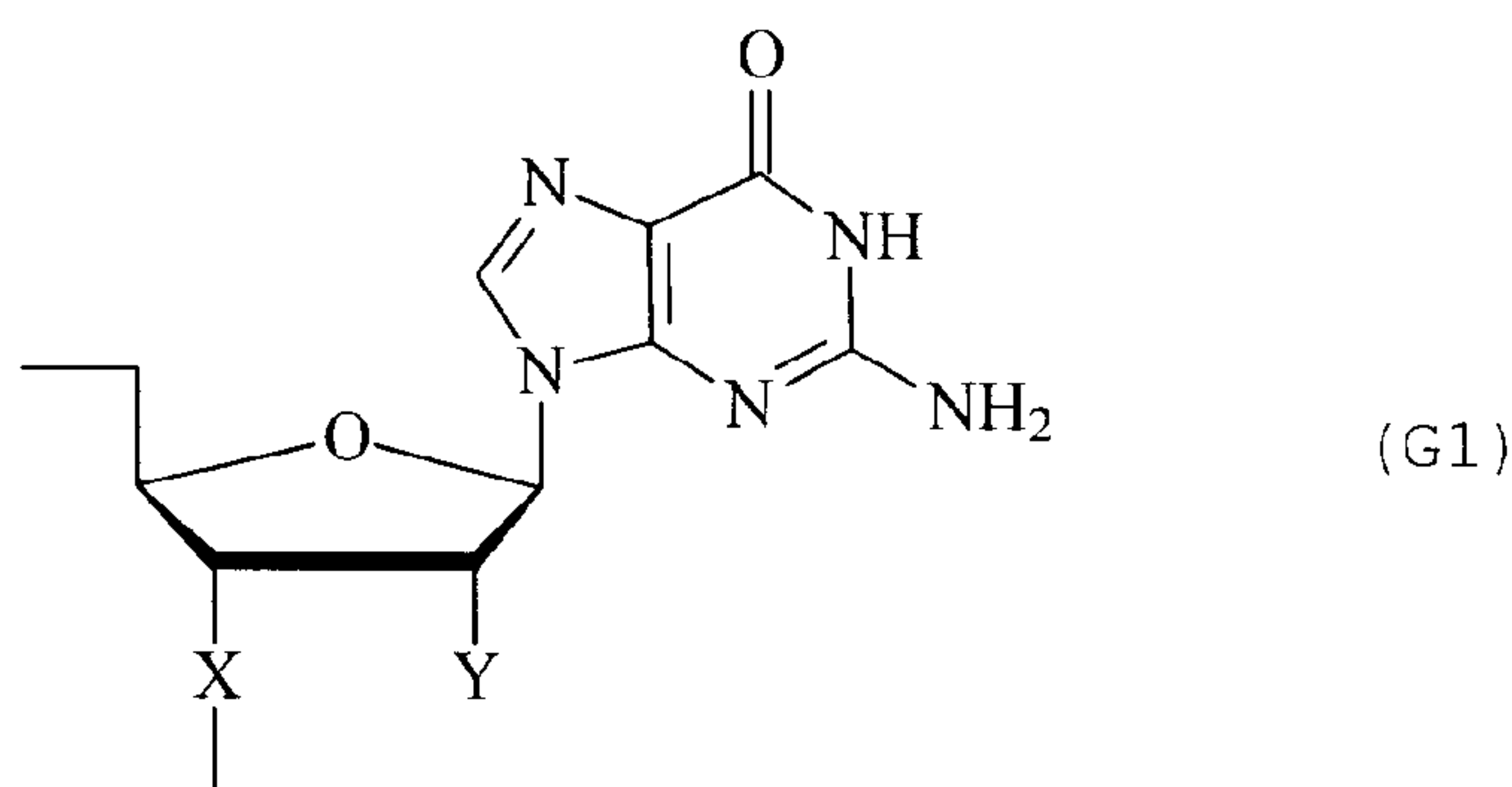
$B_{M''1}$ is a group represented by the following formula (1''):

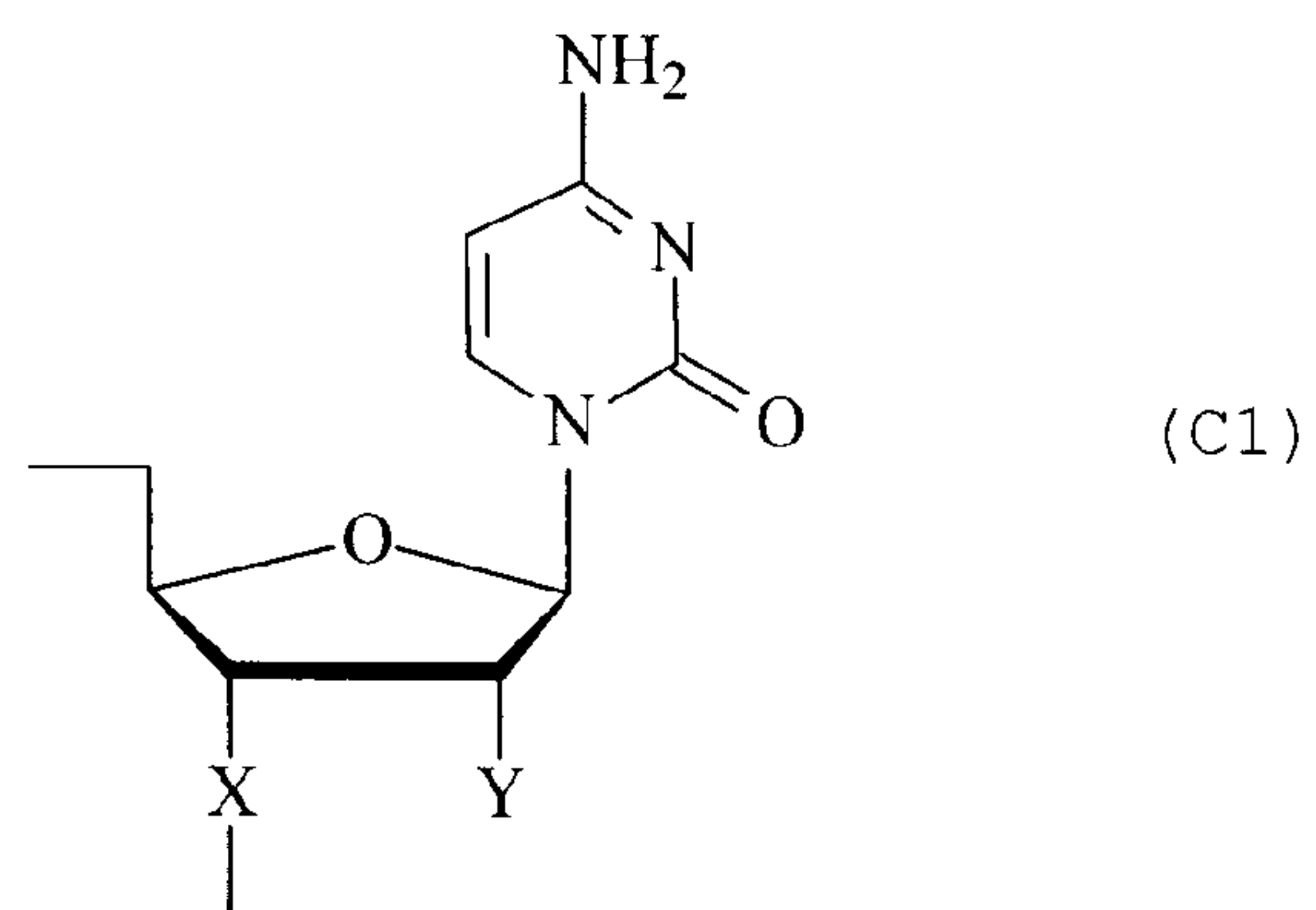
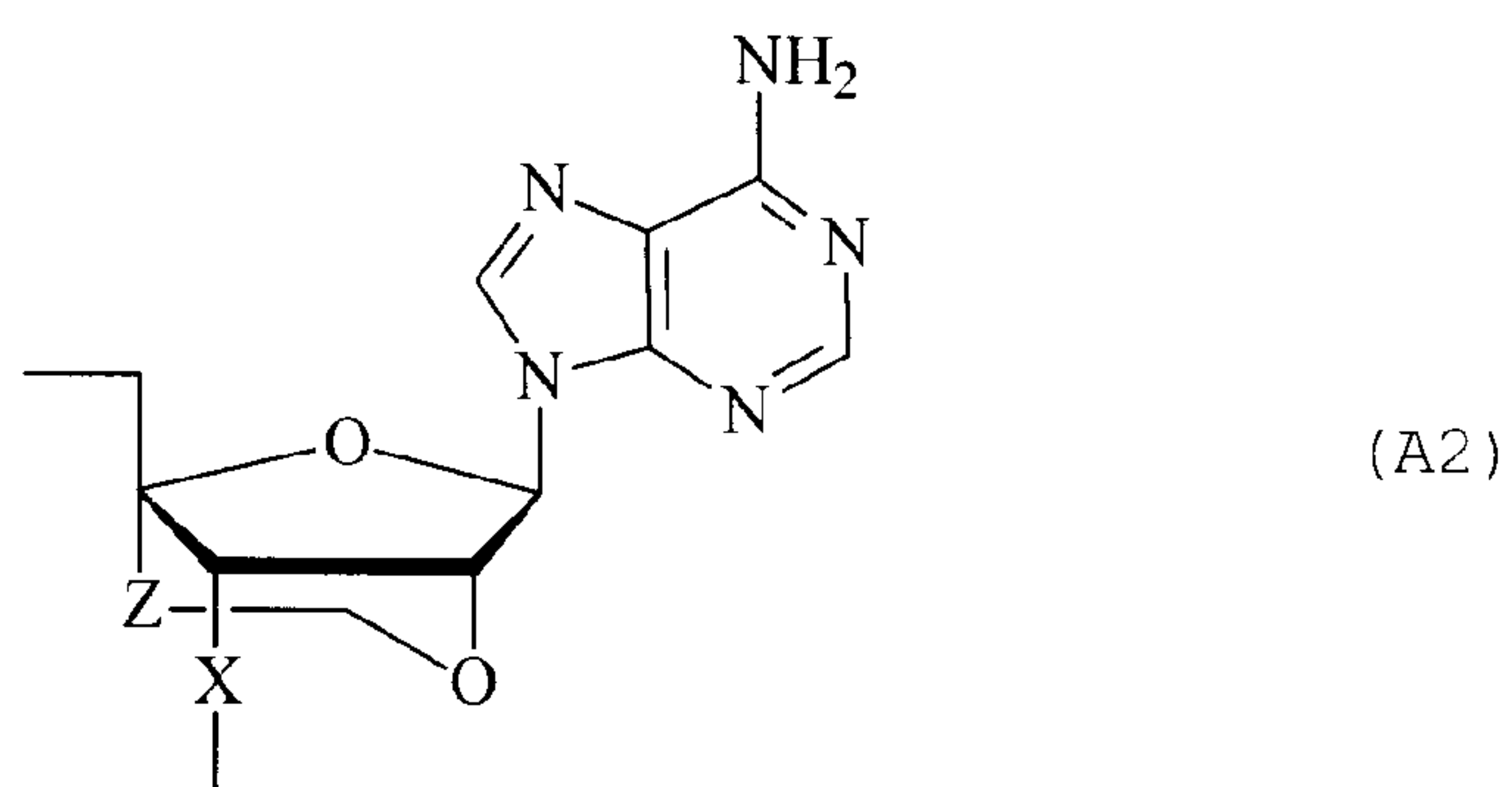
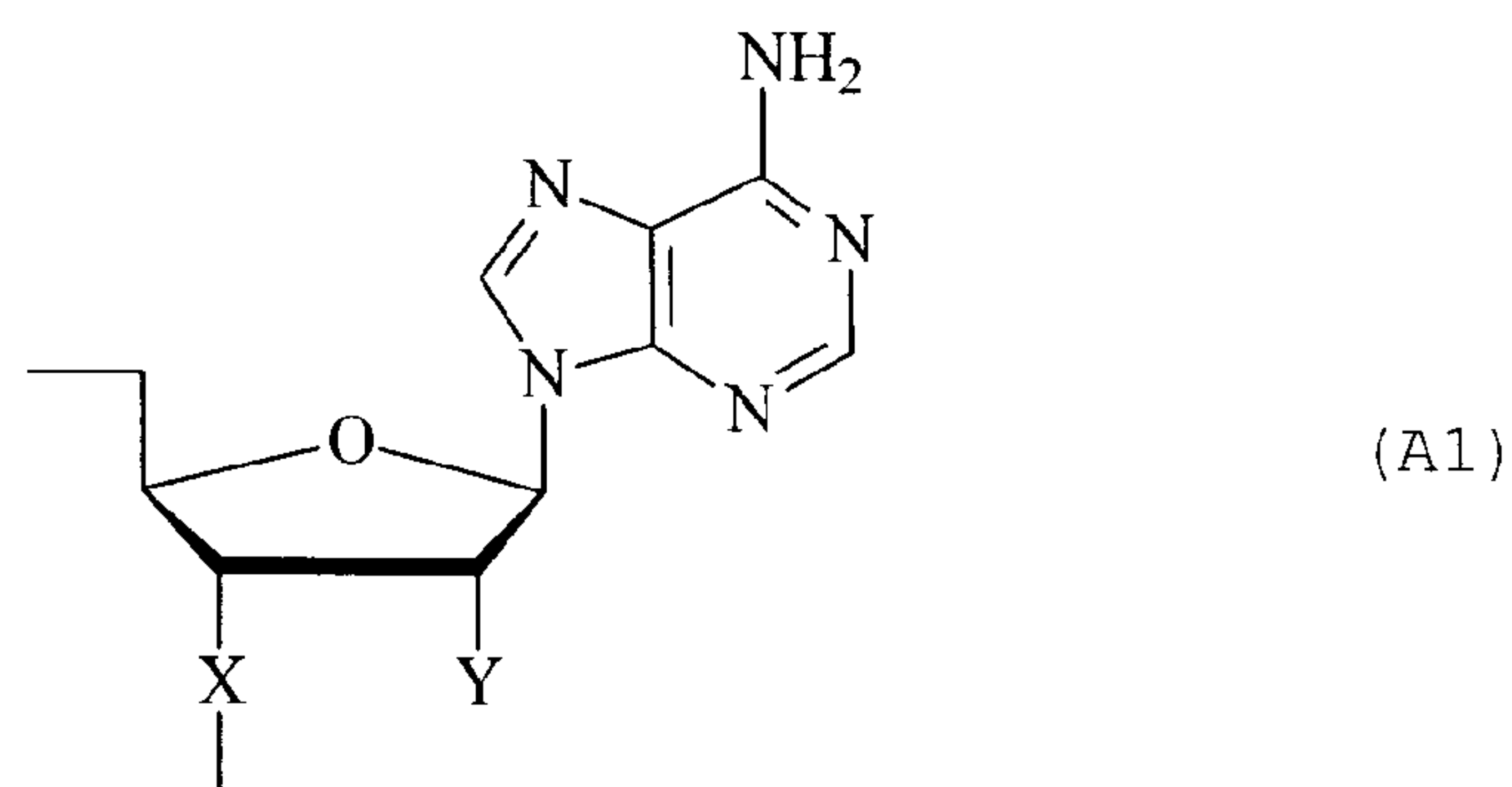
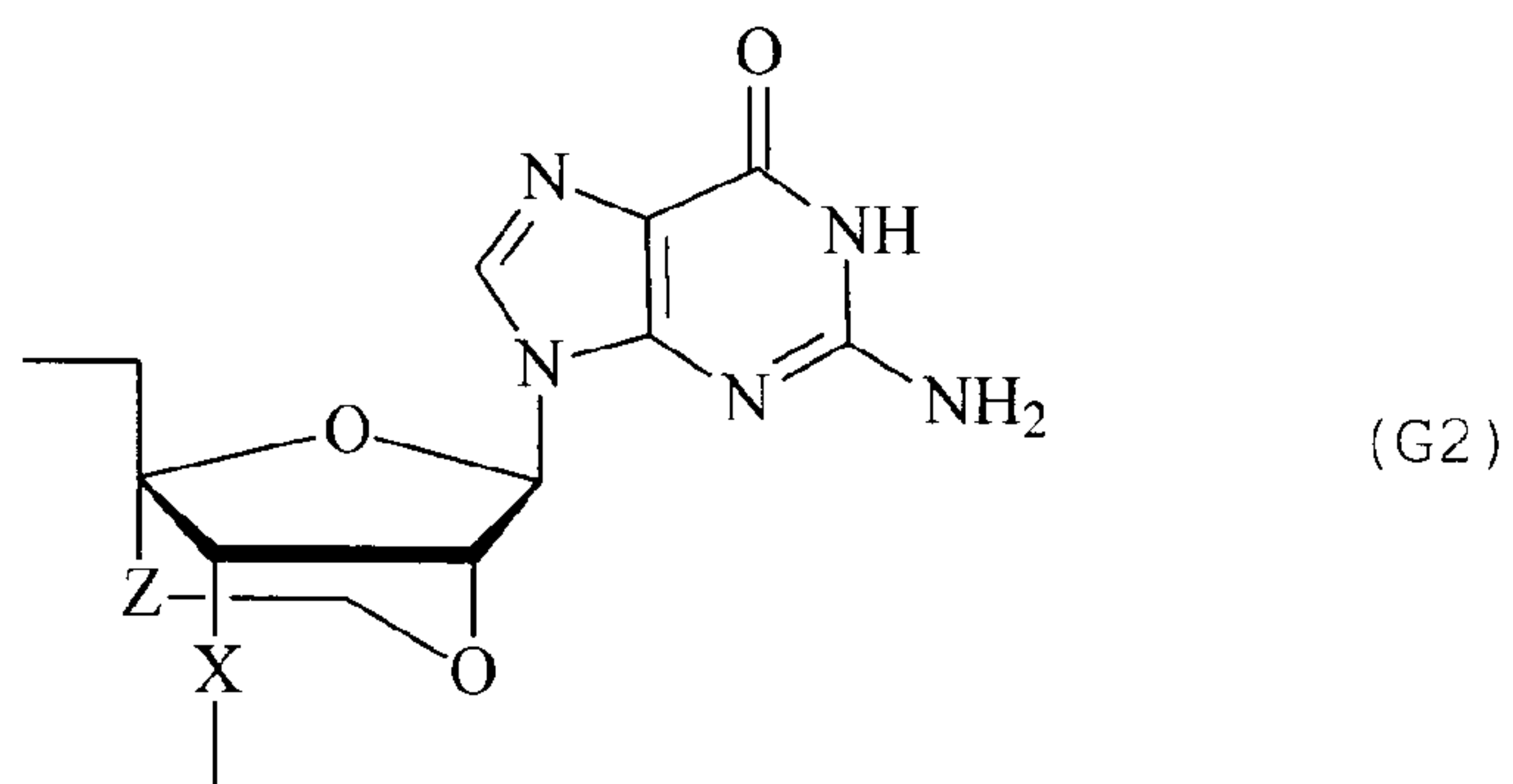


B_{B"1} is a group represented by any one of the following (101a") to (101m"):

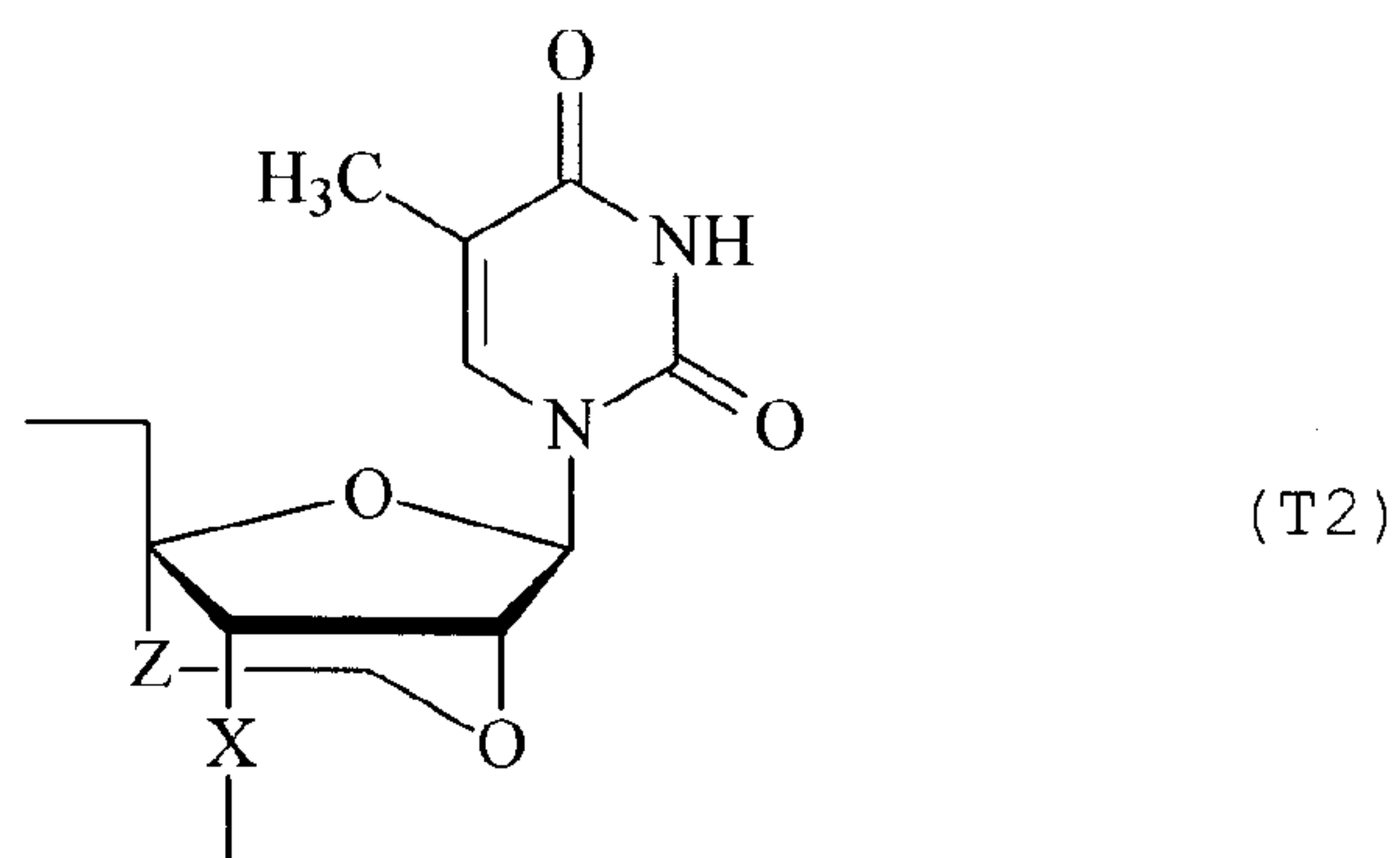
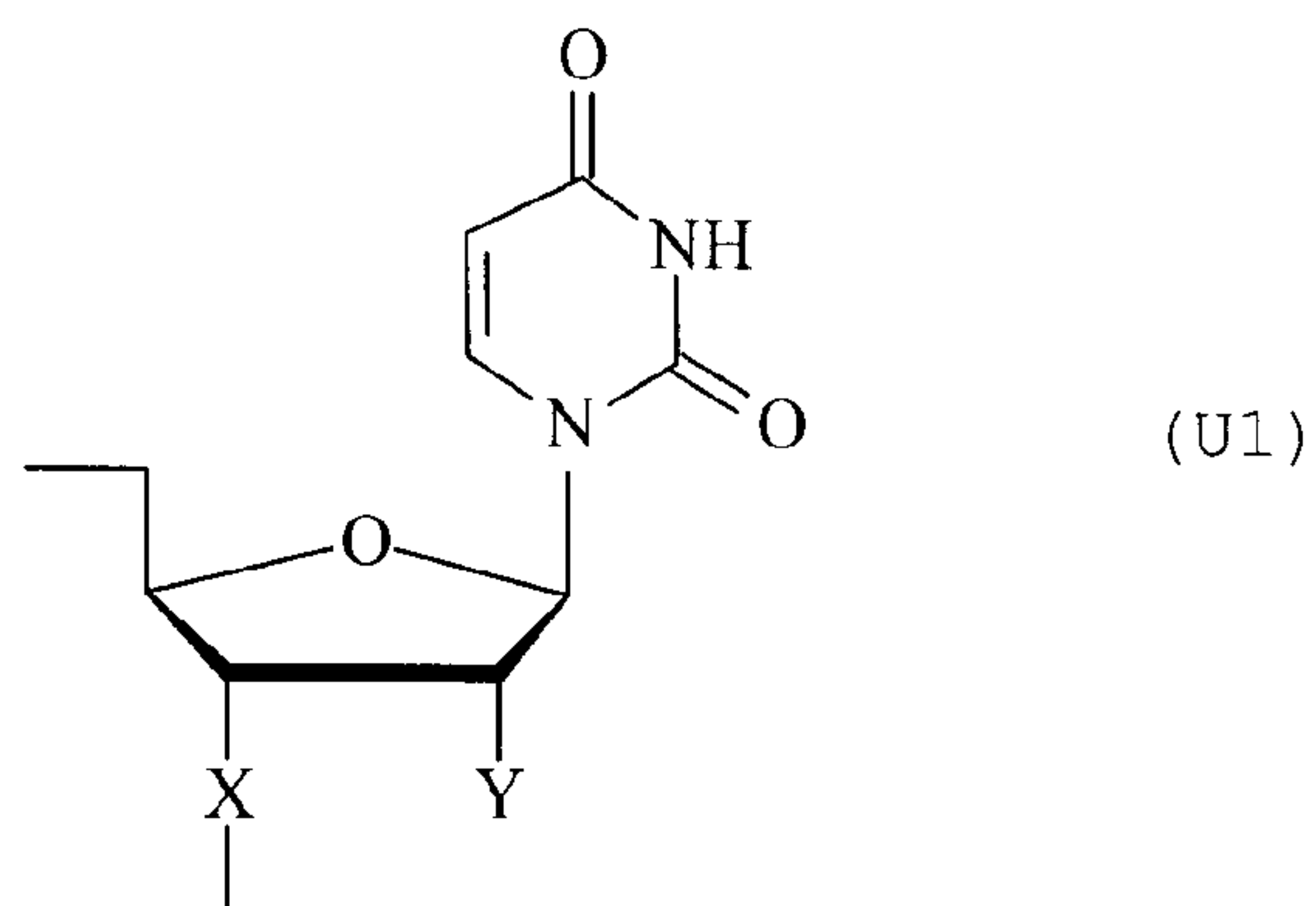
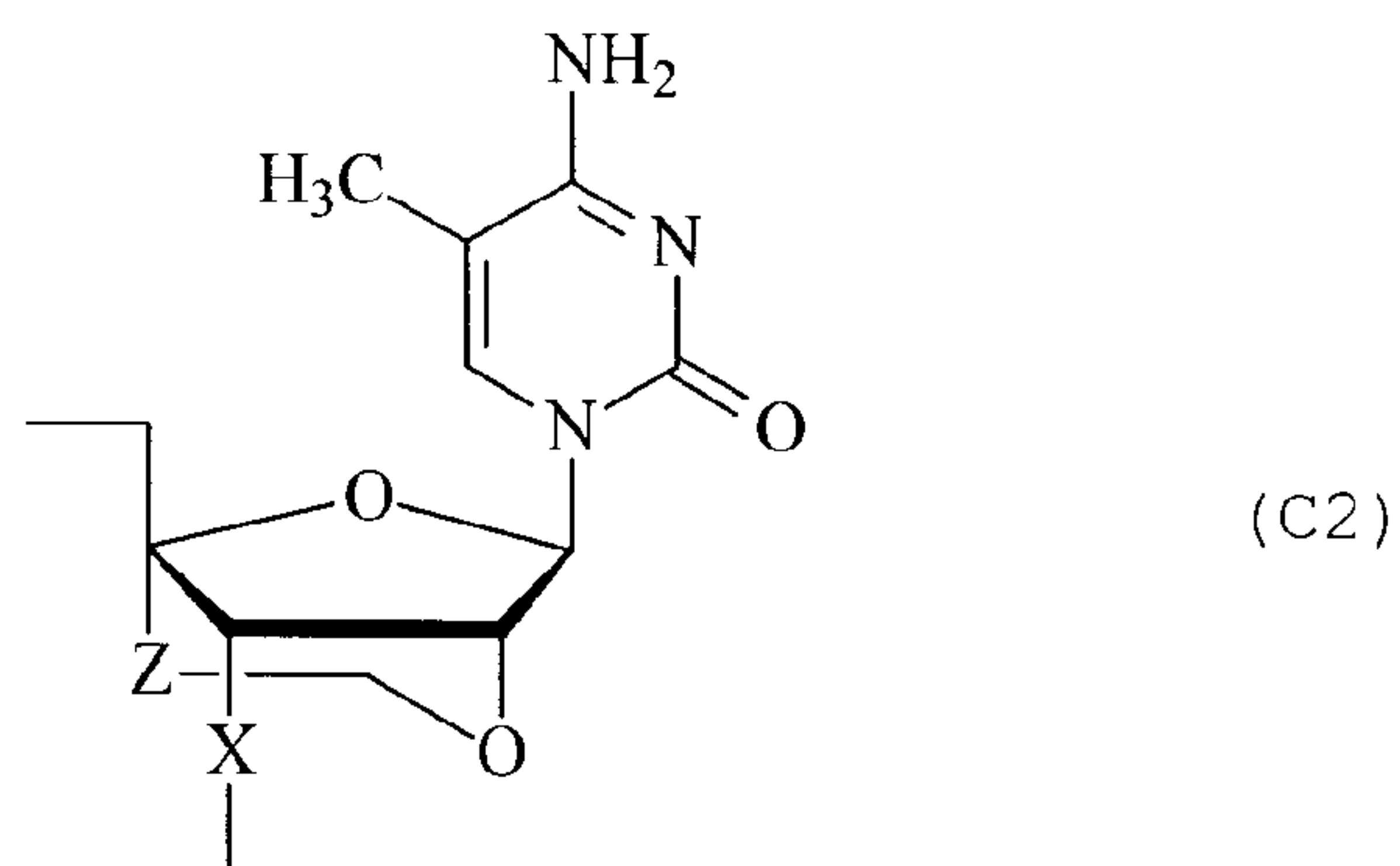
- (101a")-CH₂CH₂OH,
 (101b")-Bt-CH₂CH₂OH,
 (101c")-Bt-Bt-CH₂CH₂OH,
 5 (101d")-Bt-Bt-Bc-CH₂CH₂OH,
 (101e")-Bt-Bt-Bc-Bc-CH₂CH₂OH,
 (101f")-Bt-Bt-Bc-Bc-Bc-CH₂CH₂OH,
 (101g")-Bt-Bt-Bc-Bc-Bc-Ba-CH₂CH₂OH,
 (101h")-Bt-Bt-Bc-Bc-Bc-Ba-Ba-CH₂CH₂OH,
 10 (101i")-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-CH₂CH₂OH,
 (101j")-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-CH₂CH₂OH,
 (101k")-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-CH₂CH₂OH,
 (101l")-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-Bt-CH₂CH₂OH, or
 (101m")-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-Bt-Bc-CH₂CH₂OH,

- 15 where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):

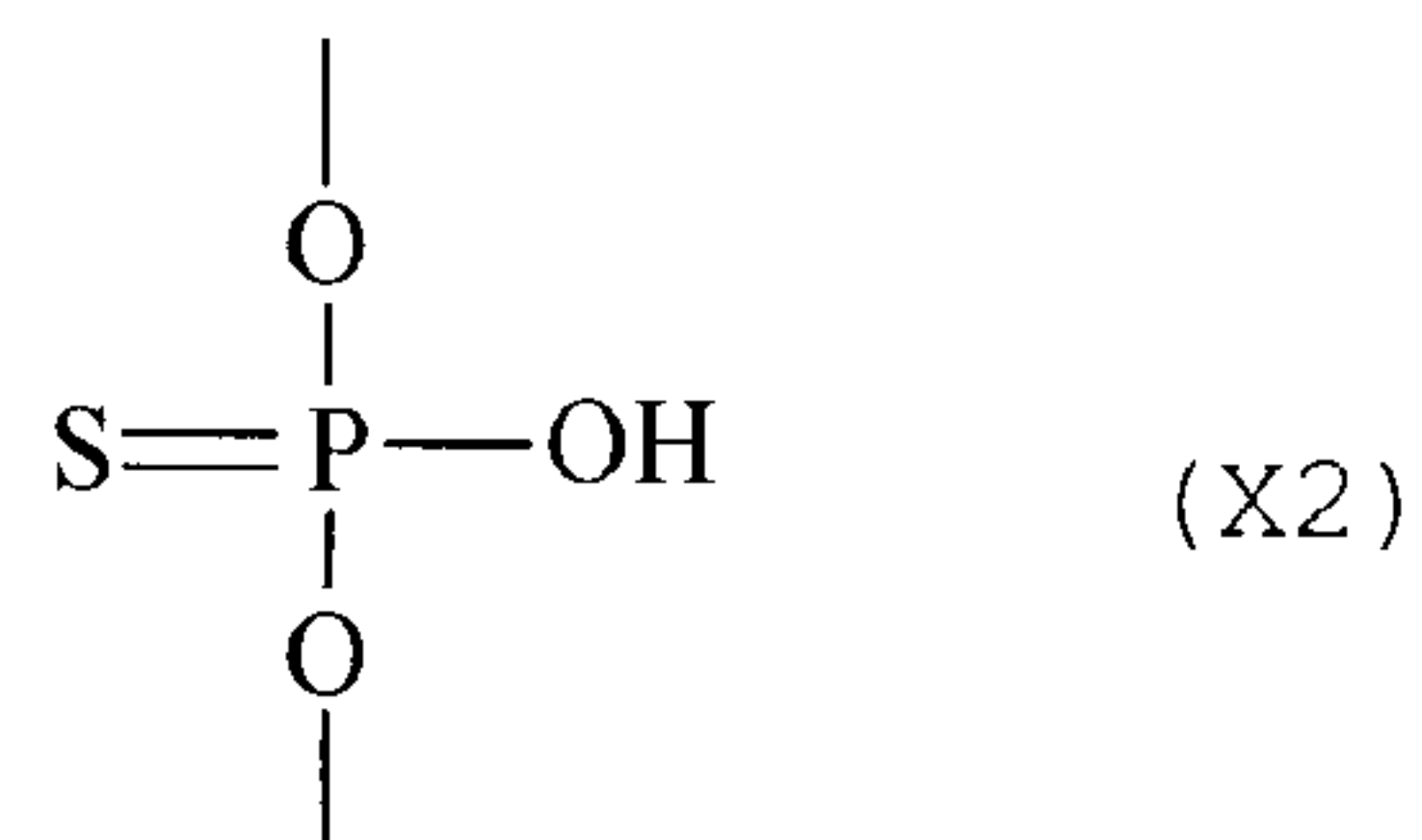
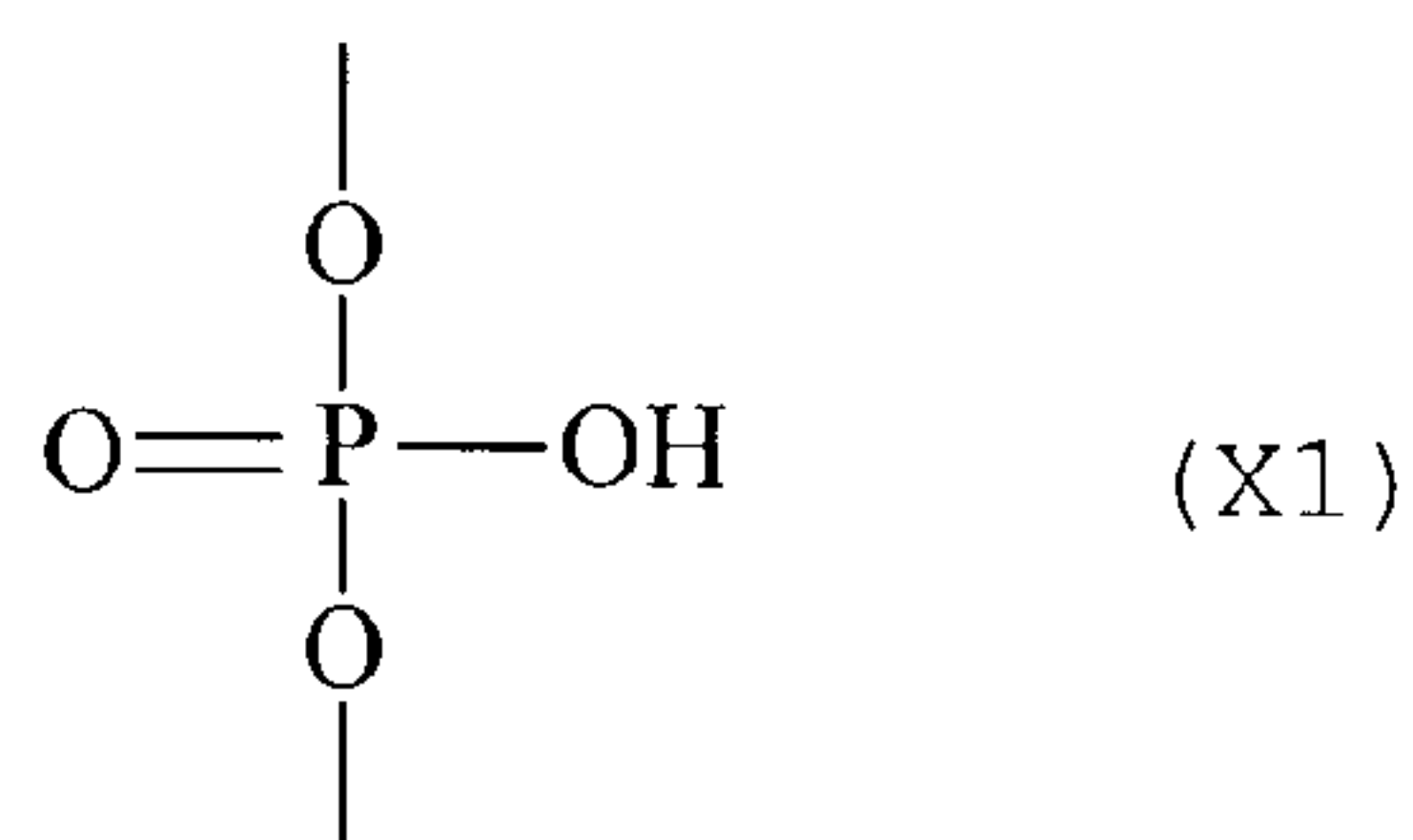




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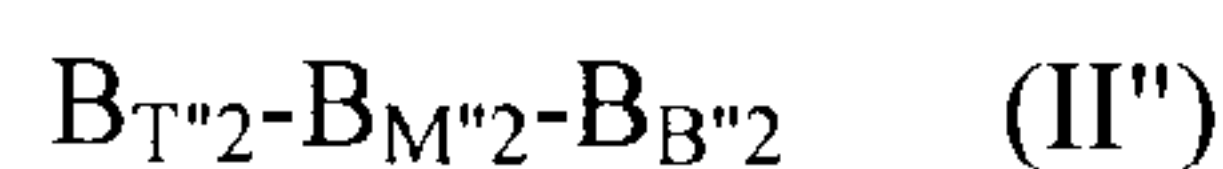


where X is individually and independently a group represented by the following formula (X1)
 5 or (X2):



Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

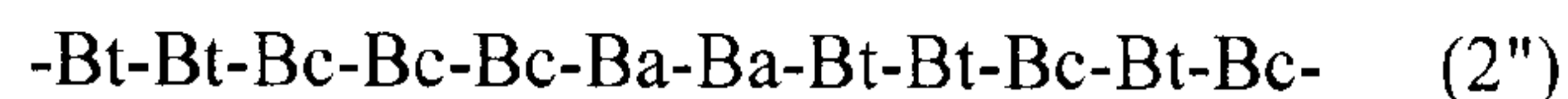
provided that at least one of the nucleosides constituting the compound represented by formula (I'') has 2''-O,4''-C-alkylene group;



where $\text{B}_{\text{T}''2}$ is a group represented by any one of the following (2a'') to (2g''):

- 10 (2a'')HO-,
 (2b'')HO-Bg-,
 (2c'')HO-Bt-Bg-,
 (2d'')HO-Ba-Bt-Bg-,
 (2e'')HO-Bc-Ba-Bt-Bg-,
 15 (2f'')HO-Bg-Bc-Ba-Bt-Bg-, or
 (2g'')HO-Ba-Bg-Bc-Ba-Bt-Bg-,

$\text{B}_{\text{M}''2}$ is a group represented by the following formula (2''):



$B_{B''2}$ is a group represented by any one of the following (102a'') to (102g''):

- (102a'')-CH₂CH₂OH,
 (102b'')-Ba-CH₂CH₂OH,
 (102c'')-Ba-Bg-CH₂CH₂OH,
 5 (102d'')-Ba-Bg-Bg-CH₂CH₂OH,
 (102e'')-Ba-Bg-Bg-Ba-CH₂CH₂OH,
 (102f'')-Ba-Bg-Bg-Ba-Ba-CH₂CH₂OH, or
 (102g'')-Ba-Bg-Bg-Ba-Ba-Bt-CH₂CH₂OH,

where Bg, Ba, Bt and Bc are as defined above;

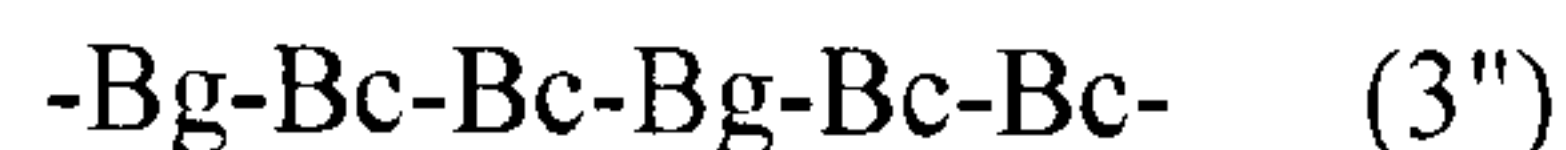
- 10 provided that at least one of the nucleosides constituting the compound represented by formula (II'') has 2''-O,4''-C-alkylene group;



where $B_{T''3}$ is a group represented by any one of the following (3a'') to (3m''):

- (3a'')HO-,
 15 (3b'')HO-Bc-,
 (3c'')HO-Ba-Bc-,
 (3d'')HO-Ba-Ba-Bc-,
 (3e'')HO-Ba-Ba-Ba-Bc-,
 (3f'')HO-Ba-Ba-Ba-Ba-Bc-,
 20 (3g'')HO-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3h'')HO-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3i'')HO-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3j'')HO-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3k'')HO-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 25 (3l'')HO-Ba-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-, or
 (3m'')HO-Bc-Ba-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-

B_M"₃ is a group represented by the following formula (3''):



B_B"₃ is a group represented by any one of the following (103a'') to (103m''):

- (103a'')-CH₂CH₂OH,
- 5 (103b'')-Ba-CH₂CH₂OH,
- (103c'')-Ba-Bt-CH₂CH₂OH,
- (103d'')-Ba-Bt-Bt-CH₂CH₂OH,
- (103e'')-Ba-Bt-Bt-Bt-CH₂CH₂OH,
- (103f'')-Ba-Bt-Bt-Bt-Bc-CH₂CH₂OH,
- 10 (103g'')-Ba-Bt-Bt-Bt-Bc-Bt-CH₂CH₂OH,
- (103h'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-CH₂CH₂OH,
- (103i'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-CH₂CH₂OH,
- (103j'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-CH₂CH₂OH,
- (103k'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-CH₂CH₂OH,
- 15 (103l'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-Ba-CH₂CH₂OH, or
- (103m'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-Ba-Bg-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (III'') has 2''-O,4''-C-alkylene group.

The term "oligonucleotide" used in the present invention encompasses not only
 5 oligo DNA or oligo RNA, but also an oligonucleotide in which at least one D-ribofuranose
 constituting the oligonucleotide is 2'-O-alkylated; an oligonucleotide in which at least one
 D-ribofuranose constituting the oligonucleotide is 2'-O,4'-C-alkylenated; an
 oligonucleotide in which at least one phosphate constituting the oligonucleotide is thioated;
 or a combination thereof. Such oligonucleotides in which at least one D-ribofuranose
 10 constituting the oligonucleotides is 2'-O-alkylated or 2'-O,4'-C-alkylenated have high
 binding strength to RNA and high resistance to nuclease. Thus, they are expected to
 produce higher therapeutic effect than natural nucleotides (i.e. oligo DNA or oligo RNA).
 Further, an oligonucleotide in which at least one phosphate constituting the oligonucleotide
 is thioated also has high resistance to nuclease and, thus, is expected to produce higher
 15 therapeutic effect than natural nucleotides (i.e. oligo DNA or oligo RNA). An
 oligonucleotide comprising both the modified sugar and the modified phosphate as
 described above has still higher resistance to nuclease and, thus, is expected to produce still
 higher therapeutic effect.

With respect to the oligonucleotide of the present invention, examples of the
 20 modification of sugar include, but are not limited to, 2'-O-alkylation (e.g. 2'-O-methylation,
 2'-O-aminoethylation, 2'-O-propylation, 2'-O-allylation, 2'-O-methoxyethylation,
 2'-O-butylation, 2'-O-pentylation, or 2'-O-propargylation) of D-ribofuranose;
 2'-O,4'-C-alkylenation (e.g. 2'-O,4'-C-ethylenation, 2'-O,4'-C-methylenation,
 2'-O,4'-C-propylenation, 2'-O,4'-C-tetramethylation, or 2'-O,4'-C-pentamethylation) of
 25 D-ribofuranose; 3'-deoxy-3'-amino-2'-deoxy-D-ribofuranose; and
 3'-deoxy-3'-amino-2'-deoxy-2'-fluoro-D-ribofuranose.

With respect to the oligonucleotide of the present invention, examples of the
 modification of phosphate include, but are not limited to, phosphorothioate,
 methylphosphonate, methylthiophosphonate, phosphorodithioate and phosphoroamidate.

30 With respect to Y in formulas (G1), (A1), (C1) and (U1), examples of the alkoxy
 group with 1-6 carbon atoms include, but are not limited to, methoxy group, aminoethoxy
 group, propoxy group, allyloxy group, methoxyethoxy group, butoxy group, pentyloxy

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group, and propargyloxy group.

With respect to Z in formulas (G2), (A2), (C2) and (T2), examples of the alkylene group with 1-5 carbon atoms include, but are not limited to, methylene group, ethylene group, propylene group, tetramethylene group and pentamethylene group.

- 5 With respect to R¹ in formulas (G1^a), (A1^a), (C1^a) and (U1^a), examples of the alkyl group with 1-6 carbon atoms include, but are not limited to, methyl group, aminoethyl group, propyl group, allyl group, methoxyethyl group, butyl group, pentyl group and propargyl group.

- 10 Preferable examples of the compound represented by general formula (I) include the following compounds.

- (J-1) HO-G^{e2p}-C^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂OH,
 (J-2) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
 15 (J-3) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂OH,
 (J-4) HO-G^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-A^{mp}-G^{mp}-CH₂CH₂OH,
 (J-5) HO-A^{mp}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-T^{e2p}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{e2p}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
 20 (J-6) HO-G^{e2p}-C^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{e2p}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
 (J-7) HO-A^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
 25 (J-8) HO-A^{ms}-G^{e2s}-C^{e2s}-T^{e2s}-G^{e2s}-A^{ms}-T^{e2s}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{e2s}-C^{e2s}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-CH₂CH₂OH,
 (J-9) HO-A^{ms}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{ms}-T^{e2p}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{e2p}-C^{e2p}-A^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
 (J-10) HO-A^{mp}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
 30 (J-11) HO-A^{ms}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-CH₂CH₂OH,

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- (J-12) HO-A^{ms}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-G^{ms}-C^{e2p}-A^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH,
- (J-13) HO-G^{elp}-C^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{elp}-A^{elp}-G^{elp}-T^{elp}-T^{elp}-CH₂CH₂OH,
- 5 (J-14) HO-G^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- (J-15) HO-G^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{elp}-A^{elp}-G^{elp}-T^{elp}-T^{elp}-CH₂CH₂OH,
- (J-16) HO-G^{elp}-A^{mp}-T^{elp}-C^{elp}-T^{elp}-G^{elp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-T^{elp}-T^{elp}-G^{elp}-C^{elp}-A^{mp}-G^{mp}-CH₂CH₂OH,
- 10 (J-17) HO-A^{mp}-G^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{mp}-T^{elp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{elp}-C^{elp}-A^{mp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- (J-18) HO-G^{elp}-C^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{elp}-C^{elp}-A^{mp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- 15 (J-19) HO-A^{elp}-G^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{elp}-C^{elp}-T^{elp}-G^{elp}-G^{elp}-C^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- (J-20) HO-A^{ms}-G^{els}-C^{els}-T^{els}-G^{els}-A^{ms}-T^{els}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{els}-C^{els}-A^{ms}-T^{els}-C^{els}-T^{els}-CH₂CH₂OH,
- (J-21) HO-A^{ms}-G^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{ms}-T^{elp}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{elp}-C^{elp}-A^{ms}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- 20 (J-22) HO-A^{mp}-G^{mp}-C^{elp}-T^{elp}-G^{mp}-A^{mp}-T^{elp}-C^{elp}-T^{elp}-G^{mp}-C^{elp}-T^{elp}-G^{mp}-G^{mp}-C^{elp}-A^{mp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- (J-23) HO-A^{ms}-G^{ms}-C^{els}-T^{els}-G^{ms}-A^{ms}-T^{els}-C^{els}-T^{els}-G^{ms}-C^{els}-T^{els}-G^{ms}-G^{ms}-C^{els}-A^{ms}-T^{els}-C^{els}-T^{els}-CH₂CH₂OH,
- 25 (J-24) HO-A^{ms}-G^{ms}-C^{elp}-T^{elp}-G^{ms}-A^{ms}-T^{elp}-C^{elp}-T^{elp}-G^{ms}-C^{elp}-T^{elp}-G^{ms}-G^{ms}-C^{elp}-A^{ms}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH,
- (J-25) HO-G^{e2p}-C^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂CH₂OH,
- (J-26) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂CH₂OH,
- 30 (J-27) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂CH₂OH,

(J-29) HO-A^{mp}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-T^{e2p}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{e2p}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂CH₂OH,

$$(J-31) \text{ HO-A}^{e2p}\text{-G}^{e2p}\text{-C}^{e2p}\text{-T}^{e2p}\text{-G}^{e2p}\text{-A}^{e2p}\text{-T}^{e2p}\text{-C}^{e2p}\text{-T}^{e2p}\text{-G}^{e2p}\text{-C}^{e2p}\text{-T}^{e2p}\text{-G}^{e2p}\text{-G}^{e2p}\text{-C}^{e2p}\text{-A}^{e2p}\text{-T}^{e2p}\text{-C}^{e2p}\text{-T}^{e2p}\text{-CH}_2\text{CH}_2\text{CH}_2\text{OH.}$$

(J-33) $\text{HO-A}^{\text{ms}}\text{-G}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{e2p}}\text{-A}^{\text{ms}}\text{-T}^{\text{e2p}}\text{-C}^{\text{ms}}\text{-U}^{\text{ms}}\text{-G}^{\text{ms}}\text{-C}^{\text{ms}}\text{-U}^{\text{ms}}\text{-G}^{\text{ms}}\text{-G}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-A}^{\text{ms}}\text{-T}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-CH}_2\text{CH}_2\text{CH}_2\text{OH},$

$$(J-34) \text{HO-A}^{\text{mp}}\text{-G}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{mp}}\text{-A}^{\text{mp}}\text{-T}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{mp}}\text{-G}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-A}^{\text{mp}}\text{-T}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-CH}_2\text{CH}_2\text{CH}_2\text{OH},$$

(J-36) $\text{HO-A}^{\text{ms}}\text{-G}^{\text{ms}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{ms}}\text{-A}^{\text{ms}}\text{-T}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{ms}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-G}^{\text{ms}}\text{-G}^{\text{ms}}\text{-C}^{\text{e2p}}\text{-A}^{\text{ms}}\text{-T}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-T}^{\text{e2p}}\text{-CH}_2\text{CH}_2\text{CH}_2\text{OH},$

(J-38) HO-A^{ms}-G^{els}-C^{e2s}-T^{e2s}-G^{els}-A^{ms}-T^{e2s}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{els}-C^{e2s}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-CH₂CH₂OH,

(J-40) HO-A^{mp}-G^{mp}-C^{e1p}-T^{e2p}-G^{mp}-A^{mp}-T^{e2p}-C^{e1p}-T^{e2p}-G^{mp}-C^{e1p}-T^{e2p}-G^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-C^{e1p}-T^{e2p}-CH₂CH₂OH,

(J-41) HO-A^{ms}-G^{ms}-C^{els}-T^{e2s}-G^{ms}-A^{ms}-T^{e2s}-C^{els}-T^{e2s}-G^{ms}-C^{els}-T^{e2s}-G^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-C^{els}-T^{e2s}-CH₂CH₂OH,

(J-43) HO-A^{mp}-G^{mp}-C^{mp}-T^{e2p}-G^{mp}-A^{mp}-T^{e2p}-C^{mp}-T^{e2p}-G^{mp}-C^{mp}-T^{e2p}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-T^{e2p}-

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C^{mp}-T^{e2p}-CH₂CH₂OH,(J-44) HO-A^{ms}-G^{ms}-C^{ms}-T^{e2s}-G^{ms}-A^{ms}-T^{e2s}-C^{ms}-T^{e2s}-G^{ms}-C^{ms}-T^{e2s}-G^{ms}-G^{ms}-C^{ms}-A^{ms}-T^{e2s}-C^{ms}-T^{e2s}-CH₂CH₂OH,(J-45) HO-A^{ms}-G^{ms}-C^{ms}-T^{e2p}-G^{ms}-A^{ms}-T^{e2p}-C^{ms}-T^{e2p}-G^{ms}-C^{ms}-T^{e2p}-G^{ms}-G^{ms}-C^{ms}-A^{ms}-T^{e2p}-5 C^{ms}-T^{e2p}-CH₂CH₂OH(J-46) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-CH₂CH₂OH(J-47) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-U^{e2p}-G^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH10 (J-48) HO-G^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{elp}-T^{elp}-T^{elp}-G^{elp}-C^{elp}-CH₂CH₂OH(J-49) HO-G^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{elp}-C^{elp}-U^{elp}-G^{elp}-G^{elp}-C^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH(J-50) HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-15 C^{e2p}-CH₂CH₂OH(J-51) HO-G^{e2s}-A^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-U^{e2s}-G^{e2s}-G^{e2s}-C^{e2s}-A^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-CH₂CH₂OH(J-52) HO-G^{elp}-A^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{elp}-T^{elp}-T^{elp}-G^{elp}-C^{elp}-CH₂CH₂OH20 (J-53) HO-G^{els}-A^{els}-T^{els}-C^{els}-T^{els}-G^{els}-C^{els}-U^{els}-G^{els}-G^{els}-C^{els}-A^{els}-T^{els}-C^{els}-T^{els}-CH₂CH₂OH(J-54) HO-G^{e2s}-A^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{e2s}-T^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-CH₂CH₂OH

Especially preferable are (J-1) to (J-24) and (J-46) to (J-47).

25 Preferable examples of the compound represented by general formula (I') include the following compounds.

(J-1) HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-G^{mp}-A^{mp}-A^{mp}-A^{mp}-C^{mp}-
U^{mp}-G^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-CH₂CH₂OH

(J-2) HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-G^{mp}-A^{mp}-A^{mp}-A^{e2p}-

30 C^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-CH₂CH₂OH

(J-3) HO-A^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-C^{mp}-A^{mp}-A^{mp}-A^{mp}-U^{mp}-T^{e2p}-T^{e2p}-G^{e2p}-

C^{e2p}-T^{e2p}-CH₂CH₂OH

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- (J-4) HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-A^{ms}-G^{ms}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{ms}-
U^{ms}-G^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-CH₂CH₂OH
- (J-5) HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{e2p}-C^{e2p}-
T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-CH₂CH₂OH
- 5 (J-6) HO-A^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-U^{ms}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-
T^{e2p}-CH₂CH₂OH
- (J-7) HO-A^{e2s}-G^{e2s}-T^{e2s}-T^{e2s}-G^{e2s}-A^{ms}-G^{ms}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{ms}-
U^{ms}-G^{e2s}-A^{e2s}-G^{e2s}-C^{e2s}-A^{e2s}-CH₂CH₂OH
- (J-8) HO-A^{e2s}-G^{e2s}-T^{e2s}-T^{e2s}-G^{e2s}-A^{e2s}-G^{e2s}-T^{e2s}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{e2s}-C^{e2s}-
10 T^{e2s}-G^{e2s}-A^{e2s}-G^{e2s}-C^{e2s}-A^{e2s}-CH₂CH₂OH
- (J-9) HO-A^{e2s}-A^{e2s}-A^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-U^{ms}-T^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-
T^{e2s}-CH₂CH₂OH
- (J-10) HO-A^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{elp}-A^{mp}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-G^{mp}-A^{mp}-A^{mp}-A^{mp}-
C^{mp}-U^{mp}-G^{elp}-A^{elp}-G^{elp}-C^{elp}-A^{elp}-CH₂CH₂OH
- 15 (J-11) HO-A^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{elp}-A^{elp}-G^{elp}-T^{elp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-G^{mp}-A^{mp}-A^{mp}-A^{elp}-
C^{elp}-T^{elp}-G^{elp}-A^{elp}-G^{elp}-C^{elp}-A^{elp}-CH₂CH₂OH
- (J-12) HO-A^{elp}-A^{elp}-A^{elp}-C^{elp}-T^{elp}-G^{mp}-A^{mp}-G^{mp}-C^{mp}-A^{mp}-A^{mp}-A^{mp}-U^{mp}-T^{elp}-T^{elp}-G^{elp}-
C^{elp}-T^{elp}-CH₂CH₂OH
- (J-13) HO-A^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{elp}-A^{ms}-G^{ms}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{ms}-
20 U^{ms}-G^{elp}-A^{elp}-G^{elp}-C^{elp}-A^{elp}-CH₂CH₂OH
- (J-14) HO-A^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{elp}-A^{elp}-G^{elp}-T^{elp}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{elp}-
C^{elp}-T^{elp}-G^{elp}-A^{elp}-G^{elp}-C^{elp}-A^{elp}-CH₂CH₂OH
- (J-15) HO-A^{elp}-A^{elp}-A^{elp}-C^{elp}-T^{elp}-G^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-U^{ms}-T^{elp}-T^{elp}-G^{elp}-C^{elp}-
T^{elp}-CH₂CH₂OH
- 25 (J-16) HO-A^{els}-G^{els}-T^{els}-T^{els}-G^{els}-A^{ms}-G^{ms}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{ms}-
U^{ms}-G^{els}-A^{els}-G^{els}-C^{els}-A^{els}-CH₂CH₂OH
- (J-17) HO-A^{els}-G^{els}-T^{els}-T^{els}-G^{els}-A^{els}-G^{els}-T^{els}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-G^{ms}-A^{ms}-A^{ms}-A^{els}-C^{els}-
T^{els}-G^{els}-A^{els}-G^{els}-C^{els}-A^{els}-CH₂CH₂OH
- (J-18) HO-A^{els}-A^{els}-A^{els}-C^{els}-T^{els}-G^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-U^{ms}-T^{els}-T^{els}-G^{els}-C^{els}-
30 T^{els}-CH₂CH₂OH

Especially preferable are (J-1) to (J-9).

Preferable examples of the compound represented by general formula (II') include

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the following compounds.

- (k-1) HO-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-A^{mp}-A^{mp}-A^{mp}-A^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-CH₂CH₂OH
- (k-2) HO-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-A^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{e2s}-CH₂CH₂OH
- 5 (k-3) HO-T^{e2s}-T^{e2s}-G^{e2s}-A^{e2s}-G^{e2s}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-A^{e2s}-C^{e2s}-T^{e2s}-G^{e2s}-A^{e2s}-CH₂CH₂OH
- (k-4) HO-T^{e2p}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-A^{mp}-A^{mp}-A^{mp}-A^{mp}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-CH₂CH₂OH
- 10 (k-5) HO-T^{e2p}-T^{e2p}-G^{ms}-A^{ms}-G^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-A^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-CH₂CH₂OH
- (k-6) HO-T^{e2s}-T^{e2s}-G^{ms}-A^{ms}-G^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-C^{e2s}-A^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-CH₂CH₂OH
- (k-7) HO-G^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-A^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
- 15 (k-8) HO-G^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-A^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-A^{ms}-G^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
- (k-9) HO-G^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-A^{e2s}-A^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-A^{ms}-G^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-C^{e2s}-CH₂CH₂OH
- 20 (k-10) HO-G^{mp}-T^{e2p}-G^{mp}-C^{e2p}-A^{mp}-A^{mp}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
- (k-11) HO-G^{ms}-T^{e2p}-G^{ms}-C^{e2p}-A^{ms}-A^{ms}-A^{ms}-G^m-T^{e2p}-T^{e2p}-G^{ms}-A^{ms}-G^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
- (k-12) HO-G^{ms}-T^{e2s}-G^{ms}-C^{e2s}-A^{ms}-A^{ms}-A^{ms}-G^m-T^{e2s}-T^{e2s}-G^{ms}-A^{ms}-G^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-C^{e2s}-CH₂CH₂OH
- 25 (k-13) HO-T^{elp}-T^{elp}-G^{elp}-A^{elp}-G^{elp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-A^{mp}-A^{mp}-A^{mp}-A^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{elp}-CH₂CH₂OH
- (k-14) HO-T^{elp}-T^{elp}-G^{elp}-A^{elp}-G^{elp}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-A^{elp}-C^{elp}-T^{elp}-G^{elp}-A^{els}-CH₂CH₂OH
- 30 (k-15) HO-T^{els}-T^{els}-G^{els}-A^{els}-G^{els}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-A^{ms}-A^{ms}-A^{ms}-A^{els}-C^{els}-T^{els}-G^{els}-A^{els}-CH₂CH₂OH
- (k-16) HO-T^{elp}-T^{elp}-G^{mp}-A^{mp}-G^{mp}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-C^{elp}-A^{mp}-A^{mp}-A^{mp}-A^{mp}-C^{elp}-T^{elp}-G^{elp}-A^{elp}-CH₂CH₂OH

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 $G^{mp}-A^{mp}-CH_2CH_2OH$

(k-17) $HO-T^{elp}-T^{elp}-G^{ms}-A^{ms}-G^{ms}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-C^{elp}-A^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{elp}-T^{elp}-G^{ms}-A^{ms}-CH_2CH_2OH$

(k-18) $HO-T^{els}-T^{els}-G^{ms}-A^{ms}-G^{ms}-T^{els}-C^{els}-T^{els}-T^{els}-C^{els}-A^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{els}-T^{els}-G^{ms}-A^{ms}-CH_2CH_2OH$

5 $A^{ms}-CH_2CH_2OH$

(k-19) $HO-G^{elp}-T^{elp}-G^{elp}-C^{elp}-A^{elp}-A^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-C^{elp}-CH_2CH_2OH$

(k-20) $HO-G^{elp}-T^{elp}-G^{elp}-C^{elp}-A^{elp}-A^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-A^{ms}-G^{ms}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-C^{elp}-CH_2CH_2OH$

10 (k-21) $HO-G^{els}-T^{els}-G^{els}-C^{els}-A^{els}-A^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-A^{ms}-G^{ms}-T^{els}-C^{els}-T^{els}-T^{els}-C^{els}-CH_2CH_2OH$

(k-22) $HO-G^{mp}-T^{elp}-G^{mp}-C^{elp}-A^{mp}-A^{mp}-A^{mp}-G^{mp}-T^{elp}-T^{elp}-G^{mp}-A^{mp}-G^{mp}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-C^{elp}-CH_2CH_2OH$

(k-23) $HO-G^{ms}-T^{elp}-G^{ms}-C^{elp}-A^{ms}-A^{ms}-A^{ms}-G^{m}-T^{elp}-T^{elp}-G^{ms}-A^{ms}-G^{ms}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-C^{elp}-CH_2CH_2OH$

15 $C^{elp}-CH_2CH_2OH$ の

(k-24) $HO-G^{ms}-T^{els}-G^{ms}-C^{els}-A^{ms}-A^{ms}-A^{ms}-G^{m}-T^{els}-T^{els}-G^{ms}-A^{ms}-G^{ms}-T^{els}-C^{els}-T^{els}-T^{els}-C^{els}-CH_2CH_2OH$

Especially preferable are (k-1) to (k-12).

Preferable examples of the compound represented by general formula (III') include

20 the following compounds.

(m-1) $HO-G^{e2p}-C^{e2p}-C^{e2p}-G^{e2p}-C^{e2p}-U^{mp}-G^{mp}-C^{mp}-C^{mp}-C^{mp}-A^{e2p}-A^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-CH_2CH_2OH$

(m-2) $HO-G^{e2p}-C^{e2p}-C^{e2p}-G^{e2p}-C^{e2p}-U^{ms}-G^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{e2p}-A^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-CH_2CH_2OH$

25 (m-3) $HO-G^{e2s}-C^{e2s}-C^{e2s}-G^{e2s}-C^{e2s}-U^{ms}-G^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{e2s}-A^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-CH_2CH_2OH$

(m-4) $HO-C^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-C^{e2p}-C^{e2p}-A^{mp}-A^{mp}-T^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-A^{mp}-U^{mp}-C^{e2p}-C^{e2p}-CH_2CH_2OH$

(m-5) $HO-C^{e2p}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-C^{ms}-C^{e2p}-C^{e2p}-A^{ms}-A^{ms}-T^{e2p}-G^{ms}-C^{e2p}-C^{e2p}-A^{ms}-U^{ms}-C^{e2p}-C^{e2p}-CH_2CH_2OH$

30 $C^{e2p}-CH_2CH_2OH$

(m-6) $HO-C^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-C^{ms}-C^{e2s}-C^{e2s}-A^{ms}-A^{ms}-T^{e2s}-G^{ms}-C^{e2s}-C^{e2s}-A^{ms}-U^{ms}-C^{e2s}-C^{e2s}-CH_2CH_2OH$

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- (m-7) HO-G^{elp}-C^{elp}-C^{elp}-G^{elp}-C^{elp}-U^{mp}-G^{mp}-C^{mp}-C^{mp}-C^{mp}-A^{elp}-A^{elp}-T^{elp}-G^{elp}-C^{elp}-CH₂CH₂OH
- (m-8) HO-G^{elp}-C^{elp}-C^{elp}-G^{elp}-C^{elp}-U^{ms}-G^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{elp}-A^{elp}-T^{elp}-G^{elp}-C^{elp}-CH₂CH₂OH
- 5 (m-9) HO-G^{els}-C^{els}-C^{els}-G^{els}-C^{els}-U^{ms}-G^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{els}-A^{els}-T^{els}-G^{els}-C^{els}-CH₂CH₂OH
- (m-10) HO-C^{elp}-G^{mp}-C^{elp}-T^{elp}-G^{mp}-C^{elp}-C^{elp}-C^{elp}-A^{mp}-A^{mp}-T^{elp}-G^{mp}-C^{elp}-C^{elp}-A^{mp}-U^{mp}-C^{elp}-C^{elp}-CH₂CH₂OH
- (m-11) HO-C^{elp}-G^{ms}-C^{elp}-T^{elp}-G^{ms}-C^{elp}-C^{elp}-C^{elp}-A^{ms}-A^{ms}-T^{elp}-G^{ms}-C^{elp}-C^{elp}-A^{ms}-U^{ms}-C^{elp}-C^{elp}-CH₂CH₂OH
- 10 (m-12) HO-C^{els}-G^{ms}-C^{els}-T^{els}-G^{ms}-C^{els}-C^{els}-C^{els}-A^{ms}-A^{ms}-T^{els}-G^{ms}-C^{els}-C^{els}-A^{ms}-U^{ms}-C^{els}-C^{els}-CH₂CH₂OH

Especially preferable are (m-1) to (m-6).

- Preferable examples of the compound represented by general formula (IV') include the following compounds.

- 15 (n-1) HO-C^{e2p}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-U^{mp}-G^{mp}-C^{e2p}-C^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-C^{e2p}-A^{mp}-A^{mp}-CH₂CH₂OH
- (n-2) HO-T^{e2p}-G^{mp}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-C^{e2p}-A^{mp}-A^{mp}-C^{e2p}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-T^{e2p}-G^{mp}-CH₂CH₂OH
- 20 (n-3) HO-C^{e2p}-A^{ms}-G^{ms}-T^{e2p}-T^{e2p}-U^{ms}-G^{ms}-C^{e2p}-C^{e2p}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-C^{e2p}-C^{e2p}-C^{e2p}-A^{ms}-A^{ms}-CH₂CH₂OH
- (n-4) HO-T^{e2p}-G^{ms}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-C^{e2p}-A^{ms}-A^{ms}-C^{e2p}-A^{ms}-G^{ms}-T^{e2p}-T^{e2p}-T^{e2p}-G^{ms}-CH₂CH₂OH
- (n-5) HO-C^{e2s}-A^{ms}-G^{ms}-T^{e2s}-T^{e2s}-U^{ms}-G^{ms}-C^{e2s}-C^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-C^{e2s}-C^{e2s}-A^{ms}-A^{ms}-CH₂CH₂OH
- 25 (n-6) HO-T^{e2s}-G^{ms}-T^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-C^{e2s}-A^{ms}-A^{ms}-C^{e2s}-A^{ms}-G^{ms}-T^{e2s}-T^{e2s}-T^{e2s}-G^{ms}-CH₂CH₂OH
- (n-7) HO-C^{elp}-A^{mp}-G^{mp}-T^{elp}-T^{elp}-U^{mp}-G^{mp}-C^{elp}-C^{elp}-G^{mp}-C^{elp}-T^{elp}-G^{mp}-C^{elp}-C^{elp}-C^{elp}-A^{mp}-A^{mp}-CH₂CH₂OH
- 30 (n-8) HO-T^{elp}-G^{mp}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{mp}-A^{mp}-C^{elp}-A^{mp}-A^{mp}-C^{elp}-A^{mp}-G^{mp}-T^{elp}-T^{elp}-T^{elp}-G^{mp}-CH₂CH₂OH
- (n-9) HO-C^{elp}-A^{ms}-G^{ms}-T^{elp}-T^{elp}-U^{ms}-G^{ms}-C^{elp}-C^{elp}-G^{ms}-C^{elp}-T^{elp}-G^{ms}-C^{elp}-C^{elp}-C^{elp}-A^{ms}-A^{ms}-CH₂CH₂OH

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A^{ms}-CH₂CH₂OH

(n-10) HO-T^{elp}-G^{ms}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{ms}-A^{ms}-C^{elp}-A^{ms}-A^{ms}-C^{elp}-A^{ms}-G^{ms}-T^{elp}-T^{elp}-T^{elp}-
G^{ms}-CH₂CH₂OH

(n-11) HO-C^{els}-A^{ms}-G^{ms}-T^{els}-T^{els}-U^{ms}-G^{ms}-C^{els}-C^{els}-G^{ms}-C^{els}-T^{els}-G^{ms}-C^{els}-C^{els}-C^{els}-A^{ms}-

5 A^{ms}-CH₂CH₂OH

(n-12) HO-T^{els}-G^{ms}-T^{els}-T^{els}-C^{els}-T^{els}-G^{ms}-A^{ms}-C^{els}-A^{ms}-A^{ms}-C^{els}-A^{ms}-G^{ms}-T^{els}-T^{els}-T^{els}-
G^{ms}-CH₂CH₂OH

Especially preferable are (m-1), (m-3) and (m-5).

Preferable examples of the compound represented by general formula (V') include

10 the following compounds.

(o-1) HO-G^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-U^{mp}-U^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{e2p}-C^{e2p}-
T^{e2p}-G^{e2p}-C^{e2p}-CH₂CH₂OH

(o-2) HO-G^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{e2p}-C^{e2p}-
T^{e2p}-G^{e2p}-C^{e2p}-CH₂CH₂OH

15 (o-3) HO-G^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-T^{e2s}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{e2s}-C^{e2s}-
T^{e2s}-G^{e2s}-C^{e2s}-CH₂CH₂OH

(o-4) HO-C^{mp}-U^{mp}-U^{mp}-U^{mp}-U^{mp}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-
T^{e2p}-U^{mp}-U^{mp}-U^{mp}-C^{mp}-C^{mp}-CH₂CH₂OH

(o-5) HO-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-

20 U^{ms}-U^{ms}-U^{ms}-C^{ms}-C^{ms}-CH₂CH₂OH

(o-6) HO-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{e2s}-G^{e2s}-T^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-
U^{ms}-U^{ms}-U^{ms}-C^{ms}-C^{ms}-CH₂CH₂OH

(o-7) HO-G^{elp}-C^{elp}-T^{elp}-T^{elp}-T^{elp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-U^{mp}-U^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{elp}-C^{elp}-
T^{elp}-G^{elp}-C^{elp}-CH₂CH₂OH

25 (o-8) HO-G^{elp}-C^{elp}-T^{elp}-T^{elp}-T^{elp}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{elp}-C^{elp}-
T^{elp}-G^{elp}-C^{elp}-CH₂CH₂OH

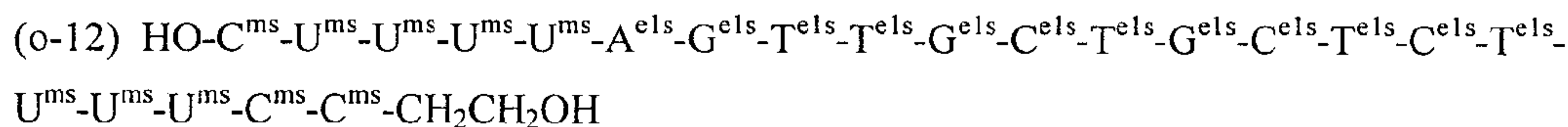
(o-9) HO-G^{els}-C^{els}-T^{els}-T^{els}-T^{els}-U^{ms}-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{els}-C^{els}-
T^{els}-G^{els}-C^{els}-CH₂CH₂OH

(o-10) HO-C^{mp}-U^{mp}-U^{mp}-U^{mp}-U^{mp}-A^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{elp}-C^{elp}-T^{elp}-G^{elp}-C^{elp}-T^{elp}-C^{elp}-

30 T^{elp}-U^{mp}-U^{mp}-U^{mp}-C^{mp}-C^{mp}-CH₂CH₂OH

(o-11) HO-C^{ms}-U^{ms}-U^{ms}-U^{ms}-U^{ms}-A^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{elp}-C^{elp}-T^{elp}-G^{elp}-C^{elp}-T^{elp}-C^{elp}-
T^{elp}-U^{ms}-U^{ms}-U^{ms}-C^{ms}-C^{ms}-CH₂CH₂OH

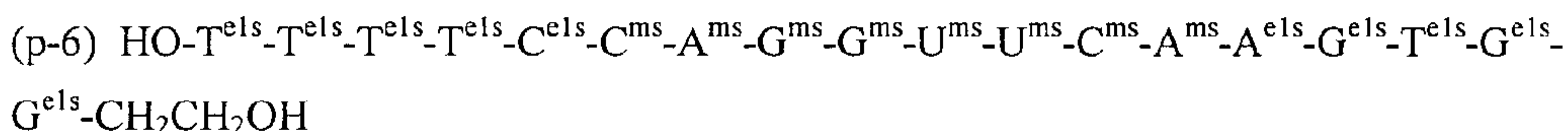
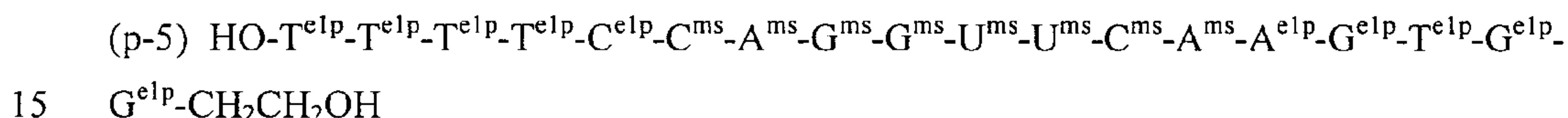
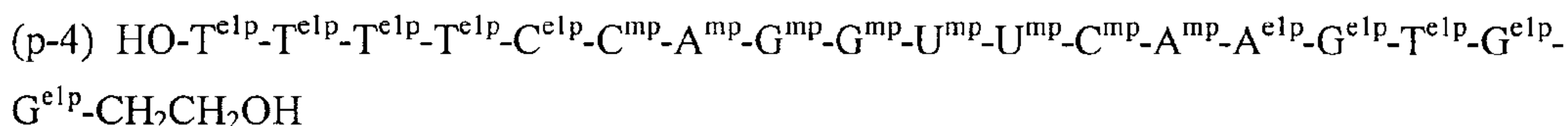
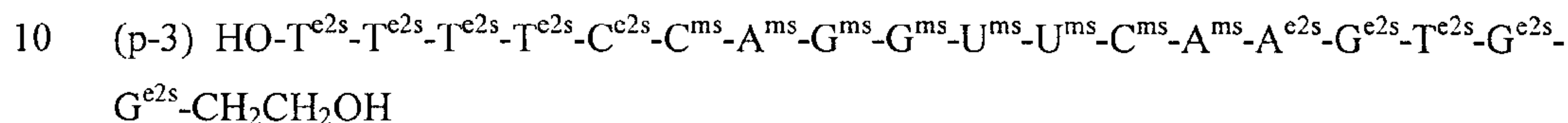
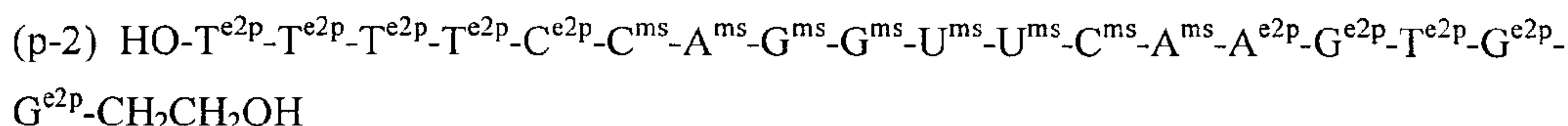
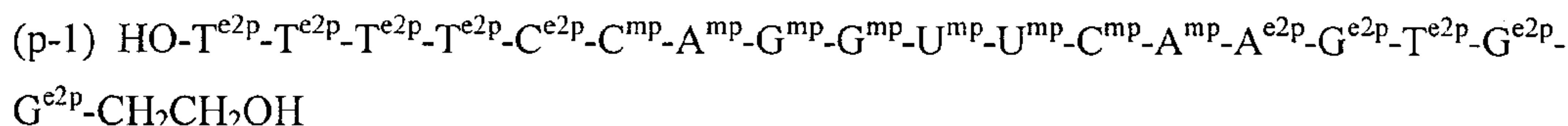
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Especially preferable are (o-1) to (o-6).

Preferable examples of the compound represented by general formula (VI') include

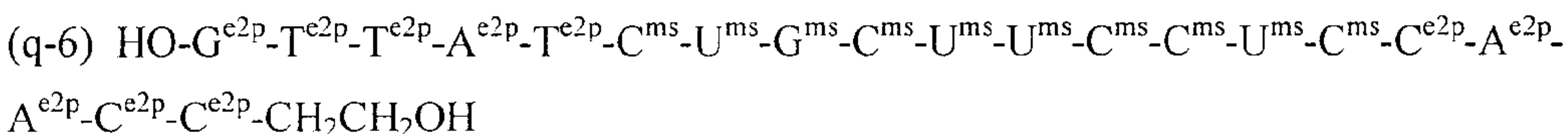
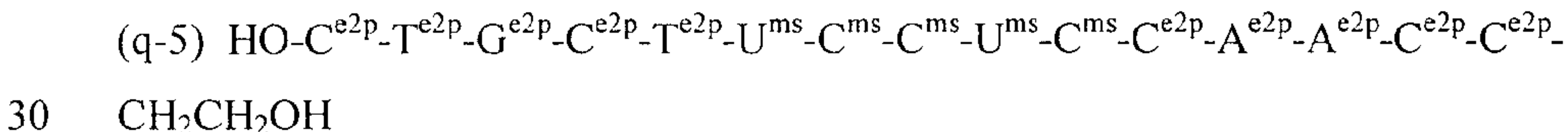
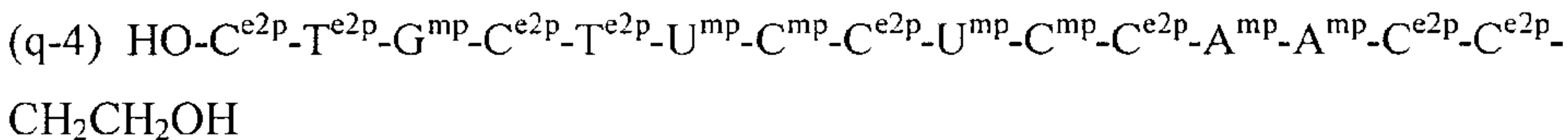
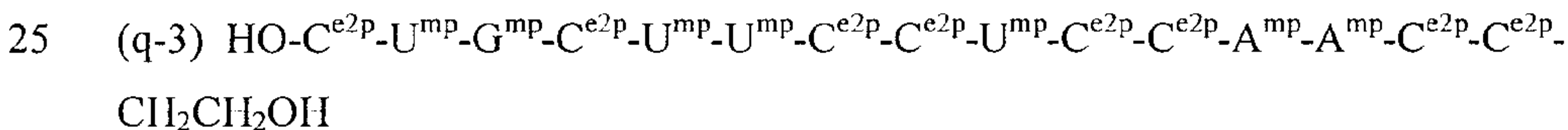
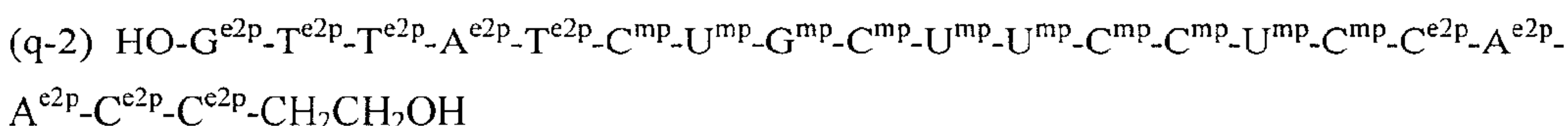
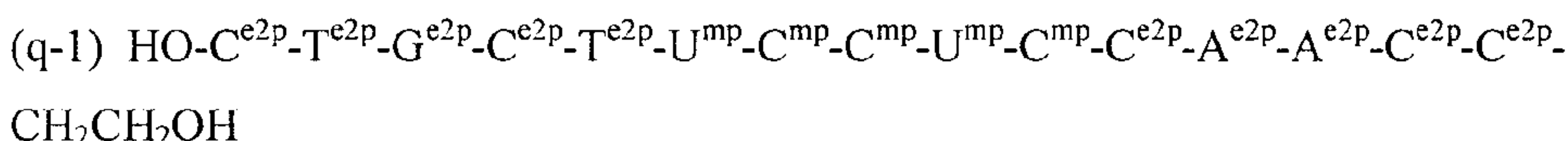
5 the following compounds.



Especially preferable are (p-1) to (p-3).

Preferable examples of the compound represented by general formula (VII') include the following compounds.

20 include the following compounds.



(q-9) HO-C^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-T^{e2s}-U^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{ms}-C^{e2s}-A^{e2s}-A^{e2s}-C^{e2s}-C^{e2s}-

5 $\text{CH}_3\text{CH}_2\text{OH}$

(q-10) HO-G^{e2s}-T^{e2s}-T^{e2s}-A^{e2s}-T^{e2s}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{ms}-C^{e2s}-A^{e2s}-A^{e2s}-C^{e2s}-C^{e2s}-CH₂CH₂OH

$$(q-11) \text{HO-C}^{e2s}\text{-U}^{ms}\text{-G}^{ms}\text{-C}^{e2s}\text{-U}^{ms}\text{-U}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-U}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-A}^{ms}\text{-A}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-CH}_2\text{CH}_2\text{OH}$$

10 (q-12) HO-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-U^{ms}-C^{ms}-C^{e2s}-U^{ms}-C^{ms}-C^{e2s}-A^{ms}-A^{ms}-C^{e2s}-C^{e2s}-
CH₂CH₂OH

(q-13) HO-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-U^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{mp}-C^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH

(q-14) HO-G^{e2p}-T^{e2p}-T^{e2p}-A^{e2p}-T^{e2p}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{mp}-C^{e2p}-
 15 A^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH

$$(q-15) \text{HO-C}^{e2p}\text{-U}^{mp}\text{-G}^{mp}\text{-C}^{e2p}\text{-U}^{mp}\text{-U}^{mp}\text{-C}^{e2p}\text{-C}^{e2p}\text{-U}^{mp}\text{-C}^{e2p}\text{-C}^{e2p}\text{-A}^{mp}\text{-A}^{mp}\text{-C}^{e2p}\text{-C}^{e2p}\text{-CH}_2\text{CH}_2\text{OH}$$

(q-16) HO-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-U^{mp}-C^{mp}-C^{e2p}-U^{mp}-C^{mp}-C^{e2p}-A^{mp}-A^{mp}-C^{e2p}-C^{e2p}-CH₂CH₂OH

20 (q-17) HO-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-U^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{ms}-C^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-
CH₂CH₂OH

$$(q-18) \text{HO-G}^{e2p}\text{-T}^{e2p}\text{-T}^{e2p}\text{-A}^{e2p}\text{-T}^{e2p}\text{-C}^{ms}\text{-U}^{ms}\text{-G}^{ms}\text{-C}^{ms}\text{-U}^{ms}\text{-U}^{ms}\text{-C}^{ms}\text{-C}^{ms}\text{-U}^{ms}\text{-C}^{ms}\text{-C}^{e2p}\text{-A}^{e2p}\text{-A}^{e2p}\text{-C}^{e2p}\text{-C}^{e2p}\text{-CH}_2\text{CH}_2\text{OH}$$

(q-19) $\text{HO-C}^{e2s}\text{-U}^{ms}\text{-G}^{ms}\text{-C}^{e2s}\text{-U}^{ms}\text{-U}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-U}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-A}^{ms}\text{-A}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-}$

25 $\text{CH}_3\text{CH}_2\text{OH}$

(q-20) HO-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-U^{ms}-C^{ms}-C^{e2s}-U^{ms}-C^{ms}-C^{e2s}-A^{ms}-A^{ms}-C^{e2s}-C^{e2s}-CH₂CH₂OH

(q-21) HO-C^{e2s}-T^{e2s}-G^{e2s}-C^{e2s}-T^{e2s}-U^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{ms}-C^{e2s}-A^{e2s}-A^{e2s}-C^{e2s}-C^{e2s}-CH₂CH₂OH

30 (q-22) HO-G^{e2s}-T^{e2s}-T^{e2s}-A^{e2s}-T^{e2s}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-U^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{ms}-C^{e2s}-A^{e2s}-
A^{e2s}-C^{e2s}-C^{e2s}-CH₂CH₂OH

$$(q-23) \text{ HO-C}^{e2s}\text{-U}^{ms}\text{-G}^{ms}\text{-C}^{e2s}\text{-U}^{ms}\text{-U}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-U}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-A}^{ms}\text{-A}^{ms}\text{-C}^{e2s}\text{-C}^{e2s}\text{-}$$

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CH₂CH₂OH(q-24) HO-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-U^{ms}-C^{ms}-C^{e2s}-U^{ms}-C^{ms}-C^{e2s}-A^{ms}-A^{ms}-C^{e2s}-C^{e2s}-CH₂CH₂OH

Especially preferable are (q-1) to (q-12).

- 5 Preferable examples of the compound represented by general formula (I') include the following compounds.

(I''-1)HO-G^{mp}-T^{e2p}-A^{mp}-U^{mp}-T^{e2p}-T^{e2p}-A^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-G^{mp}-U^{mp}-T^{e2p}-C^{mp}-C^{e2p}-C^{e2p}-
A^{mp}-CH₂CH₂OH

(I''-2)HO-C^{e2p}-C^{e2p}-A^{mp}-U^{mp}-T^{e2p}-U^{mp}-G^{mp}-T^{e2p}-A^{mp}-U^{mp}-T^{e2p}-T^{e2p}-A^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-

- 10 G^{mp}-CH₂CH₂OH

(I''-3)HO-G^{mp}-T^{e1p}-A^{mp}-U^{mp}-T^{e1p}-T^{e1p}-A^{mp}-G^{mp}-C^{e1p}-A^{mp}-T^{e1p}-G^{mp}-U^{mp}-T^{e1p}-C^{mp}-C^{e1p}-C^{e1p}-
A^{mp}-CH₂CH₂OH

(I''-4)HO-C^{e1p}-C^{e1p}-A^{mp}-U^{mp}-T^{e1p}-U^{mp}-G^{mp}-T^{e1p}-A^{mp}-U^{mp}-T^{e1p}-T^{e1p}-A^{mp}-G^{mp}-C^{e1p}-A^{mp}-T^{e1p}-
G^{mp}-CH₂CH₂OH

- 15 (I''-5)HO-G^{ms}-T^{e2p}-A^{ms}-U^{ms}-T^{e2p}-T^{e2p}-A^{ms}-G^{ms}-C^{e2p}-A^{ms}-T^{e2p}-G^{ms}-U^{ms}-T^{e2p}-C^{ms}-C^{e2p}-C^{e2p}-
A^{ms}-CH₂CH₂OH

(I''-6)HO-C^{e2p}-C^{e2p}-A^{ms}-U^{ms}-T^{e2p}-U^{ms}-G^{ms}-T^{e2p}-A^{ms}-U^{ms}-T^{e2p}-T^{e2p}-A^{ms}-G^{ms}-C^{e2p}-A^{ms}-T^{e2p}-
G^{ms}-CH₂CH₂OH

(I''-7)HO-G^{ms}-T^{e1p}-A^{ms}-U^{ms}-T^{e1p}-T^{e1p}-A^{ms}-G^{ms}-C^{e1p}-A^{ms}-T^{e1p}-G^{ms}-U^{ms}-T^{e1p}-C^{ms}-C^{e1p}-C^{e1p}-

- 20 A^{ms}-CH₂CH₂OH

(I''-8)HO-C^{e1p}-C^{e1p}-A^{ms}-U^{ms}-T^{e1p}-U^{ms}-G^{ms}-T^{e1p}-A^{ms}-U^{ms}-T^{e1p}-T^{e1p}-A^{ms}-G^{ms}-C^{e1p}-A^{ms}-T^{e1p}-
G^{ms}-CH₂CH₂OH

(I''-9)HO-G^{ms}-T^{e2s}-A^{ms}-U^{ms}-T^{e2s}-T^{e2s}-A^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-G^{ms}-U^{ms}-T^{e2s}-C^{ms}-C^{e2s}-C^{e2s}-
A^{ms}-CH₂CH₂OH

- 25 (I''-10)HO-C^{e2s}-C^{e2s}-A^{ms}-U^{ms}-T^{e2s}-U^{ms}-G^{ms}-T^{e2s}-A^{ms}-U^{ms}-T^{e2s}-T^{e2s}-A^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-
G^{ms}-CH₂CH₂OH

(I''-11)HO-G^{ms}-T^{e1s}-A^{ms}-U^{ms}-T^{e1s}-T^{e1s}-A^{ms}-G^{ms}-C^{e1s}-A^{ms}-T^{e1s}-G^{ms}-U^{ms}-T^{e1s}-C^{ms}-C^{e1s}-C^{e1s}-
A^{ms}-CH₂CH₂OH

(I''-12)HO-C^{e1s}-C^{e1s}-A^{ms}-U^{ms}-T^{e1s}-U^{ms}-G^{ms}-T^{e1s}-A^{ms}-U^{ms}-T^{e1s}-T^{e1s}-A^{ms}-G^{ms}-C^{e1s}-A^{ms}-T^{e1s}-

- 30 G^{ms}-CH₂CH₂OH

Especially preferable are (I''-1), (I''-2), (I''-9) and (I''-10).

Preferable examples of the compound represented by general formula (II'') include

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the following compounds.

- (II''-1)HO-A^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-G^{mp}-T^{e2p}-T^{e2p}-C^{mp}-C^{mp}-C^{e2p}-A^{mp}-A^{mp}-T^{e2p}-U^{mp}-C^{mp}-T^{e2p}-C^{e2p}-CH₂CH₂OH
- (II''-2)HO-T^{e2p}-U^{mp}-C^{e2p}-C^{mp}-C^{e2p}-A^{mp}-A^{mp}-T^{e2p}-U^{mp}-C^{mp}-T^{e2p}-C^{e2p}-A^{mp}-G^{mp}-G^{mp}-A^{e2p}-A^{mp}-T^{e2p}-CH₂CH₂OH
- (II''-3)HO-A^{mp}-G^{mp}-C^{elp}-A^{mp}-T^{elp}-G^{mp}-T^{elp}-T^{elp}-C^{mp}-C^{mp}-C^{elp}-A^{mp}-A^{mp}-T^{elp}-U^{mp}-C^{mp}-T^{elp}-C^{elp}-CH₂CH₂OH
- (II''-4)HO-T^{elp}-U^{mp}-C^{elp}-C^{mp}-C^{elp}-A^{mp}-A^{mp}-T^{elp}-U^{mp}-C^{mp}-T^{elp}-C^{elp}-A^{mp}-G^{mp}-G^{mp}-A^{elp}-A^{mp}-T^{elp}-CH₂CH₂OH
- 10 (II''-5)HO-A^{ms}-G^{ms}-C^{e2p}-A^{ms}-T^{e2p}-G^{ms}-T^{e2p}-T^{e2p}-C^{ms}-C^{ms}-C^{e2p}-A^{ms}-A^{ms}-T^{e2p}-U^{ms}-C^{ms}-T^{e2p}-C^{e2p}-CH₂CH₂OH
- (II''-6)HO-T^{e2p}-U^{ms}-C^{e2p}-C^{ms}-C^{e2p}-A^{ms}-A^{ms}-T^{e2p}-U^{ms}-C^{ms}-T^{e2p}-C^{e2p}-A^{ms}-G^{ms}-G^{ms}-A^{e2p}-A^{ms}-T^{e2p}-CH₂CH₂OH
- (II''-7)HO-A^{ms}-G^{ms}-C^{elp}-A^{ms}-T^{elp}-G^{ms}-T^{elp}-T^{elp}-C^{ms}-C^{ms}-C^{elp}-A^{ms}-A^{ms}-T^{elp}-U^{ms}-C^{ms}-T^{elp}-C^{elp}-CH₂CH₂OH
- 15 (II''-8)HO-T^{elp}-U^{ms}-C^{elp}-C^{ms}-C^{elp}-A^{ms}-A^{ms}-T^{elp}-U^{ms}-C^{ms}-T^{elp}-C^{elp}-A^{ms}-G^{ms}-G^{ms}-A^{elp}-A^{ms}-T^{elp}-CH₂CH₂OH
- (II''-9)HO-A^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-G^{ms}-T^{e2s}-T^{e2s}-C^{ms}-C^{ms}-C^{e2s}-A^{ms}-A^{ms}-T^{e2s}-U^{ms}-C^{ms}-T^{e2s}-C^{e2s}-CH₂CH₂OH
- 20 (II''-10)HO-T^{e2s}-U^{ms}-C^{e2s}-C^{ms}-C^{e2s}-A^{ms}-A^{ms}-T^{e2s}-U^{ms}-C^{ms}-T^{e2s}-C^{e2s}-A^{ms}-G^{ms}-G^{ms}-A^{e2s}-A^{ms}-T^{e2s}-CH₂CH₂OH
- (II''-11)HO-A^{ms}-G^{ms}-C^{els}-A^{ms}-T^{els}-G^{ms}-T^{els}-T^{els}-C^{ms}-C^{ms}-C^{els}-A^{ms}-A^{ms}-T^{els}-U^{ms}-C^{ms}-T^{els}-C^{els}-CH₂CH₂OH
- (II''-12)HO-T^{els}-U^{ms}-C^{els}-C^{ms}-C^{els}-A^{ms}-A^{ms}-T^{els}-U^{ms}-C^{ms}-T^{els}-C^{els}-A^{ms}-G^{ms}-G^{ms}-A^{els}-A^{ms}-T^{els}-CH₂CH₂OH
- 25 T^{els}-CH₂CH₂OH

Especially preferable are (II''-1), (II''-2), (II''-9) and (II''-10).

Preferable examples of the compound represented by general formula (III'') include the following compounds.

- (III''-1)HO-G^{mp}-A^{e2p}-A^{mp}-A^{mp}-A^{mp}-C^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-G^{mp}-C^{mp}-C^{e2p}-A^{mp}-T^{e2p}-U^{mp}-U^{mp}-C^{e2p}-T^{e2p}-CH₂CH₂OH
- 30 (III''-2)HO-G^{mp}-C^{e2p}-C^{e2p}-G^{mp}-C^{e2p}-C^{mp}-A^{mp}-T^{e2p}-U^{mp}-U^{mp}-C^{e2p}-U^{mp}-C^{e2p}-A^{mp}-A^{mp}-C^{e2p}-A^{e2p}-G^{mp}-CH₂CH₂OH

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- (III'',-3)HO-C^{e2p}-A^{mp}-T^{e2p}-A^{mp}-A^{mp}-T^{e2p}-G^{mp}-A^{mp}-A^{e2p}-A^{mp}-A^{mp}-C^{e2p}-G^{mp}-C^{mp}-C^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-CH₂CH₂OH
- (III'',-4)HO-G^{mp}-A^{elp}-A^{mp}-A^{mp}-A^{mp}-C^{elp}-G^{mp}-C^{elp}-C^{elp}-G^{mp}-C^{mp}-C^{elp}-A^{mp}-T^{elp}-U^{mp}-U^{mp}-C^{elp}-T^{elp}-CH₂CH₂OH
- 5 (III'',-5)HO-G^{mp}-C^{elp}-C^{elp}-G^{mp}-C^{elp}-C^{mp}-A^{mp}-T^{elp}-U^{mp}-U^{mp}-C^{elp}-U^{mp}-C^{elp}-A^{mp}-A^{mp}-C^{elp}-A^{elp}-G^{mp}-CH₂CH₂OH
- (III'',-6)HO-C^{elp}-A^{mp}-T^{elp}-A^{mp}-A^{mp}-T^{elp}-G^{mp}-A^{mp}-A^{elp}-A^{mp}-A^{mp}-C^{elp}-G^{mp}-C^{mp}-C^{elp}-G^{mp}-C^{elp}-C^{elp}-CH₂CH₂OH
- (III'',-7)HO-G^{ms}-A^{e2p}-A^{ms}-A^{ms}-A^{ms}-C^{e2p}-G^{ms}-C^{e2p}-C^{e2p}-G^{ms}-C^{ms}-C^{e2p}-A^{ms}-T^{e2p}-U^{ms}-U^{ms}-C^{e2p}-T^{e2p}-CH₂CH₂OH
- 10 (III'',-8)HO-G^{ms}-C^{e2p}-C^{e2p}-G^{ms}-C^{e2p}-C^{ms}-A^{ms}-T^{e2p}-U^{ms}-U^{ms}-C^{e2p}-U^{ms}-C^{e2p}-A^{ms}-A^{ms}-C^{e2p}-A^{e2p}-G^{ms}-CH₂CH₂OH
- (III'',-9)HO-C^{e2p}-A^{ms}-T^{e2p}-A^{ms}-A^{ms}-T^{e2p}-G^{ms}-A^{ms}-A^{e2p}-A^{ms}-A^{ms}-C^{e2p}-G^{ms}-C^{ms}-C^{e2p}-G^{ms}-C^{e2p}-C^{e2p}-CH₂CH₂OH
- 15 (III'',-10)HO-G^{ms}-A^{elp}-A^{ms}-A^{ms}-A^{ms}-C^{elp}-G^{ms}-C^{elp}-C^{elp}-G^{ms}-C^{ms}-C^{elp}-A^{ms}-T^{elp}-U^{ms}-U^{ms}-C^{elp}-T^{elp}-CH₂CH₂OH
- (III'',-11)HO-G^{ms}-C^{elp}-C^{elp}-G^{ms}-C^{elp}-C^{ms}-A^{ms}-T^{elp}-U^{ms}-U^{ms}-C^{elp}-U^{ms}-C^{elp}-A^{ms}-A^{ms}-C^{elp}-A^{elp}-G^{ms}-CH₂CH₂OH
- (III'',-12)HO-C^{elp}-A^{ms}-T^{elp}-A^{ms}-A^{ms}-T^{elp}-G^{ms}-A^{ms}-A^{elp}-A^{ms}-A^{ms}-C^{elp}-G^{ms}-C^{ms}-C^{elp}-G^{ms}-C^{elp}-C^{elp}-CH₂CH₂OH
- 20 (III'',-13)HO-G^{ms}-A^{e2s}-A^{ms}-A^{ms}-A^{ms}-C^{e2s}-G^{ms}-C^{e2s}-C^{e2s}-G^{ms}-C^{ms}-C^{e2s}-A^{ms}-T^{e2s}-U^{ms}-U^{ms}-C^{e2s}-T^{e2s}-CH₂CH₂OH
- (III'',-14)HO-G^{ms}-C^{e2s}-C^{e2s}-G^{ms}-C^{e2s}-C^{ms}-A^{ms}-T^{e2s}-U^{ms}-U^{ms}-C^{e2s}-U^{ms}-C^{e2s}-A^{ms}-A^{ms}-C^{e2s}-A^{e2s}-G^{ms}-CH₂CH₂OH
- 25 (III'',-15)HO-C^{e2s}-A^{ms}-T^{e2s}-A^{ms}-A^{ms}-T^{e2s}-G^{ms}-A^{ms}-A^{e2s}-A^{ms}-A^{ms}-C^{e2s}-G^{ms}-C^{ms}-C^{e2s}-G^{ms}-C^{e2s}-C^{e2s}-CH₂CH₂OH
- (III'',-16)HO-G^{ms}-A^{els}-A^{ms}-A^{ms}-A^{ms}-C^{els}-G^{ms}-C^{els}-C^{els}-G^{ms}-C^{ms}-C^{els}-A^{ms}-T^{els}-U^{ms}-U^{ms}-C^{els}-T^{els}-CH₂CH₂OH
- (III'',-17)HO-G^{ms}-C^{els}-C^{els}-G^{ms}-C^{els}-C^{ms}-A^{ms}-T^{els}-U^{ms}-U^{ms}-C^{els}-U^{ms}-C^{els}-A^{ms}-A^{ms}-C^{els}-A^{els}-G^{ms}-CH₂CH₂OH
- 30 (III'',-18)HO-C^{els}-A^{ms}-T^{els}-A^{ms}-A^{ms}-T^{els}-G^{ms}-A^{ms}-A^{els}-A^{ms}-A^{ms}-C^{els}-G^{ms}-C^{ms}-C^{els}-G^{ms}-C^{els}-C^{els}-CH₂CH₂OH

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Especially preferable are (III''-1), (III''-2), (III''-3), (III''-13), (III''-14) and (III''-15).

Preferable examples of the compound represented by general formula (IV'') include the following compounds.

- (IV''-1)HO-G^{mp}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-T^{e2p}-T^{e2p}-U^{mp}-G^{mp}-C^{e2p}-C^{mp}-C^{mp}-T^{e2p}-C^{e2p}-A^{mp}-
 5 G^{mp}-C^{e2p}-CH₂CH₂OH
- (IV''-2)HO-G^{mp}-C^{e2p}-T^{e2p}-A^{mp}-G^{mp}-G^{mp}-T^{e2p}-C^{e2p}-A^{mp}-G^{mp}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-T^{e2p}-
 T^{e2p}-U^{mp}-CH₂CH₂OH
- (IV''-3)HO-G^{mp}-G^{mp}-C^{elp}-T^{elp}-G^{mp}-C^{mp}-T^{elp}-T^{elp}-U^{mp}-G^{mp}-C^{elp}-C^{mp}-C^{mp}-T^{elp}-C^{elp}-A^{mp}-
 G^{mp}-C^{elp}-CH₂CH₂OH
- 10 (IV''-4)HO-G^{mp}-C^{elp}-T^{elp}-A^{mp}-G^{mp}-G^{mp}-T^{elp}-C^{elp}-A^{mp}-G^{mp}-G^{mp}-C^{elp}-T^{elp}-G^{mp}-C^{mp}-T^{elp}-
 T^{elp}-U^{mp}-CH₂CH₂OH
- (IV''-5)HO-G^{ms}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-C^{ms}-T^{e2p}-T^{e2p}-U^{ms}-G^{ms}-C^{e2p}-C^{ms}-C^{ms}-T^{e2p}-C^{e2p}-A^{ms}-G^{ms}-
 C^{e2p}-CH₂CH₂OH
- (IV''-6)HO-G^{ms}-C^{e2p}-T^{e2p}-A^{ms}-G^{ms}-G^{ms}-T^{e2p}-C^{e2p}-A^{ms}-G^{ms}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-C^{ms}-T^{e2p}-T^{e2p}-
 15 U^{ms}-CH₂CH₂OH
- (IV''-7)HO-G^{ms}-G^{ms}-C^{elp}-T^{elp}-G^{ms}-C^{ms}-T^{elp}-T^{elp}-U^{ms}-G^{ms}-C^{elp}-C^{ms}-C^{ms}-T^{elp}-C^{elp}-A^{ms}-G^{ms}-
 C^{elp}-CH₂CH₂OH
- (IV''-8)HO-G^{ms}-C^{elp}-T^{elp}-A^{ms}-G^{ms}-G^{ms}-T^{elp}-C^{elp}-A^{ms}-G^{ms}-G^{ms}-C^{elp}-T^{elp}-G^{ms}-C^{ms}-T^{elp}-T^{elp}-
 U^{ms}-CH₂CH₂OH
- 20 (IV''-9)HO-G^{ms}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-C^{ms}-T^{e2s}-T^{e2s}-U^{ms}-G^{ms}-C^{e2s}-C^{ms}-C^{ms}-T^{e2s}-C^{e2s}-A^{ms}-G^{ms}-
 C^{e2s}-CH₂CH₂OH
- (IV''-10)HO-G^{ms}-C^{e2s}-T^{e2s}-A^{ms}-G^{ms}-G^{ms}-T^{e2s}-C^{e2s}-A^{ms}-G^{ms}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-C^{ms}-T^{e2s}-T^{e2s}-
 U^{ms}-CH₂CH₂OH
- (IV''-11)HO-G^{ms}-G^{ms}-C^{els}-T^{els}-G^{ms}-C^{ms}-T^{els}-T^{els}-U^{ms}-G^{ms}-C^{els}-C^{ms}-C^{ms}-T^{els}-C^{els}-A^{ms}-G^{ms}-
 25 C^{els}-CH₂CH₂OH
- (IV''-12)HO-G^{ms}-C^{els}-T^{els}-A^{ms}-G^{ms}-G^{ms}-T^{els}-C^{els}-A^{ms}-G^{ms}-G^{ms}-C^{els}-T^{els}-G^{ms}-C^{ms}-T^{els}-T^{els}-
 U^{ms}-CH₂CH₂OH

Especially preferable are (IV''-1), (IV''-2), (IV''-9) and (IV''-10).

Preferable examples of the compound represented by general formula (V'') include the following compounds.

- (V''-1)HO-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-C^{e2p}-A^{mp}-G^{mp}-G^{mp}-A^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-A^{mp}-G^{mp}-G^{mp}-T^{e2p}-
 C^{e2p}-A^{mp}-CH₂CH₂OH

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- (V''-2)HO-A^{mp}-G^{mp}-T^{elp}-C^{elp}-C^{elp}-A^{mp}-G^{mp}-G^{mp}-A^{elp}-G^{mp}-C^{elp}-T^{elp}-A^{mp}-G^{mp}-G^{mp}-T^{elp}-C^{elp}-A^{mp}-CH₂CH₂OH
- (V''-3)HO-A^{ms}-G^{ms}-T^{e2p}-C^{e2p}-C^{e2p}-A^{ms}-G^{ms}-G^{ms}-A^{e2p}-G^{ms}-C^{e2p}-T^{e2p}-A^{ms}-G^{ms}-G^{ms}-T^{e2p}-C^{e2p}-A^{ms}-CH₂CH₂OH
- 5 (V''-4)HO-A^{ms}-G^{ms}-T^{elp}-C^{elp}-C^{elp}-A^{ms}-G^{ms}-G^{ms}-A^{elp}-G^{ms}-C^{elp}-T^{elp}-A^{ms}-G^{ms}-G^{ms}-T^{elp}-C^{elp}-A^{ms}-CH₂CH₂OH
- (V''-5)HO-A^{ms}-G^{ms}-T^{e2s}-C^{e2s}-C^{e2s}-A^{ms}-G^{ms}-G^{ms}-A^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-A^{ms}-G^{ms}-G^{ms}-T^{e2s}-C^{e2s}-A^{ms}-CH₂CH₂OH
- (V''-6)HO-A^{ms}-G^{ms}-T^{els}-C^{els}-C^{els}-A^{ms}-G^{ms}-G^{ms}-A^{els}-G^{ms}-C^{els}-T^{els}-A^{ms}-G^{ms}-G^{ms}-T^{els}-C^{els}-A^{ms}-CH₂CH₂OH
- 10 A^{ms}-CH₂CH₂OH

Especially preferable are (V''-1) and (V''-5).

Preferable examples of the compound represented by general formula (VI'') include the following compounds.

- (VI''-1)HO-G^{mp}-C^{e2p}-A^{mp}-G^{mp}-C^{e2p}-C^{e2p}-U^{mp}-C^{mp}-T^{e2p}-C^{mp}-G^{mp}-C^{e2p}-T^{e2p}-C^{mp}-A^{mp}-C^{e2p}-T^{e2p}-C^{mp}-CH₂CH₂OH
- 15 (VI''-2)HO-T^{e2p}-C^{e2p}-U^{mp}-U^{mp}-C^{e2p}-C^{e2p}-A^{mp}-A^{mp}-A^{mp}-G^{mp}-C^{e2p}-A^{mp}-G^{mp}-C^{e2p}-C^{mp}-U^{mp}-C^{e2p}-T^{e2p}-CH₂CH₂OH
- (VI''-3)HO-G^{mp}-C^{elp}-A^{mp}-G^{mp}-C^{elp}-C^{elp}-U^{mp}-C^{mp}-T^{elp}-C^{mp}-G^{mp}-C^{elp}-T^{elp}-C^{mp}-A^{mp}-C^{elp}-T^{elp}-C^{mp}-CH₂CH₂OH
- 20 (VI''-4)HO-T^{elp}-C^{elp}-U^{mp}-U^{mp}-C^{elp}-C^{elp}-A^{mp}-A^{mp}-A^{mp}-G^{mp}-C^{elp}-A^{mp}-G^{mp}-C^{elp}-C^{mp}-U^{mp}-C^{elp}-T^{elp}-CH₂CH₂OH
- (VI''-5)HO-G^{ms}-C^{e2p}-A^{ms}-G^{ms}-C^{e2p}-C^{e2p}-U^{ms}-C^{ms}-T^{e2p}-C^{ms}-G^{ms}-C^{e2p}-T^{e2p}-C^{ms}-A^{ms}-C^{e2p}-T^{e2p}-C^{ms}-CH₂CH₂OH
- (VI''-6)HO-T^{e2p}-C^{e2p}-U^{ms}-U^{ms}-C^{e2p}-C^{e2p}-A^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{e2p}-A^{ms}-G^{ms}-C^{e2p}-C^{ms}-U^{ms}-C^{e2p}-T^{e2p}-C^{ms}-CH₂CH₂OH
- 25 (VI''-7)HO-G^{ms}-C^{elp}-A^{ms}-G^{ms}-C^{elp}-C^{elp}-U^{ms}-C^{ms}-T^{elp}-C^{ms}-G^{ms}-C^{elp}-T^{elp}-C^{ms}-A^{ms}-C^{elp}-T^{elp}-C^{ms}-CH₂CH₂OH
- (VI''-8)HO-T^{elp}-C^{elp}-U^{ms}-U^{ms}-C^{elp}-C^{elp}-A^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{elp}-A^{ms}-G^{ms}-C^{elp}-C^{ms}-U^{ms}-C^{elp}-T^{elp}-CH₂CH₂OH
- 30 (VI''-9)HO-G^{ms}-C^{e2s}-A^{ms}-G^{ms}-C^{e2s}-C^{e2s}-U^{ms}-C^{ms}-T^{e2s}-C^{ms}-G^{ms}-C^{e2s}-T^{e2s}-C^{ms}-A^{ms}-C^{e2s}-T^{e2s}-C^{ms}-CH₂CH₂OH
- (VI''-10)HO-T^{e2s}-C^{e2s}-U^{ms}-U^{ms}-C^{e2s}-C^{e2s}-A^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{e2s}-A^{ms}-G^{ms}-C^{e2s}-C^{ms}-U^{ms}-C^{e2s}-T^{e2s}-C^{ms}-CH₂CH₂OH

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 T^{e2s} -CH₂CH₂OH(VI''-11)HO-G^{ms}-C^{els}-A^{ms}-G^{ms}-C^{els}-C^{els}-U^{ms}-C^{ms}-T^{els}-C^{ms}-G^{ms}-C^{els}-T^{els}-C^{ms}-A^{ms}-C^{els}-T^{els}-C^{ms}-CH₂CH₂OH(VI''-12)HO-T^{els}-C^{els}-U^{ms}-U^{ms}-C^{els}-C^{els}-A^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{els}-A^{ms}-G^{ms}-C^{els}-C^{ms}-U^{ms}-C^{els}-5 T^{els}-CH₂CH₂OH

Especially preferable are (VI''-1), (VI''-2), (VI''-9) and (VI''-10).

Preferable examples of the compound represented by general formula (VII'') include the following compounds.

(VII''-1)HO-C^{mp}-T^{e2p}-A^{mp}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-T^{e2p}-C^{mp}-T^{e2p}-T^{e2p}-C^{mp}-C^{mp}-A^{mp}-10 A^{e2p}-A^{mp}-CH₂CH₂OH(VII''-2)HO-C^{mp}-T^{e1p}-A^{mp}-T^{e1p}-G^{mp}-A^{mp}-G^{mp}-T^{e1p}-T^{e1p}-T^{e1p}-C^{mp}-T^{e1p}-T^{e1p}-C^{mp}-C^{mp}-A^{mp}-A^{e1p}-A^{mp}-CH₂CH₂OH(VII''-3)HO-C^{ms}-T^{e2p}-A^{ms}-T^{e2p}-G^{ms}-A^{ms}-G^{ms}-T^{e2p}-T^{e2p}-T^{e2p}-C^{ms}-T^{e2p}-T^{e2p}-C^{ms}-C^{ms}-A^{ms}-A^{e2p}-A^{ms}-CH₂CH₂OH15 (VII''-4)HO-C^{ms}-T^{e1p}-A^{ms}-T^{e1p}-G^{ms}-A^{ms}-G^{ms}-T^{e1p}-T^{e1p}-T^{e1p}-C^{ms}-T^{e1p}-T^{e1p}-C^{ms}-C^{ms}-A^{ms}-A^{e1p}-A^{ms}-CH₂CH₂OH(VII''-5)HO-C^{ms}-T^{e2s}-A^{ms}-T^{e2s}-G^{ms}-A^{ms}-G^{ms}-T^{e2s}-T^{e2s}-T^{e2s}-C^{ms}-T^{e2s}-T^{e2s}-C^{ms}-C^{ms}-A^{ms}-A^{e2s}-A^{ms}-CH₂CH₂OH(VII''-6)HO-C^{ms}-T^{e1s}-A^{ms}-T^{e1s}-G^{ms}-A^{ms}-G^{ms}-T^{e1s}-T^{e1s}-T^{e1s}-C^{ms}-T^{e1s}-T^{e1s}-C^{ms}-C^{ms}-A^{ms}-A^{e1s}-20 A^{ms}-CH₂CH₂OH

Especially preferable are (VII''-1) and (VII''-5).

Preferable examples of the compound represented by general formula (VIII'') include the following compounds.

(VIII''-1)HO-A^{mp}-G^{mp}-C^{e2p}-T^{e2p}-C^{mp}-U^{mp}-T^{e2p}-U^{mp}-T^{e2p}-A^{mp}-C^{mp}-T^{e2p}-C^{e2p}-C^{mp}-C^{mp}-T^{e2p}-25 T^{e2p}-G^{mp}-CH₂CH₂OH(VIII''-2)HO-C^{e2p}-C^{e2p}-A^{mp}-U^{mp}-T^{e2p}-G^{mp}-U^{mp}-T^{e2p}-U^{mp}-C^{e2p}-A^{mp}-U^{mp}-C^{e2p}-A^{mp}-G^{mp}-C^{mp}-T^{e2p}-C^{e2p}-CH₂CH₂OH(VIII''-3)HO-A^{mp}-G^{mp}-C^{e1p}-T^{e1p}-C^{mp}-U^{mp}-T^{e1p}-U^{mp}-T^{e1p}-A^{mp}-C^{mp}-T^{e1p}-C^{e1p}-C^{mp}-C^{mp}-T^{e1p}-T^{e1p}-G^{mp}-CH₂CH₂OH30 (VIII''-4)HO-C^{e1p}-C^{e1p}-A^{mp}-U^{mp}-T^{e1p}-G^{mp}-U^{mp}-T^{e1p}-U^{mp}-C^{e1p}-A^{mp}-U^{mp}-C^{e1p}-A^{mp}-G^{mp}-C^{mp}-T^{e1p}-C^{e1p}-CH₂CH₂OH(VIII''-5)HO-A^{ms}-G^{ms}-C^{e2p}-T^{e2p}-C^{ms}-U^{ms}-T^{e2p}-U^{ms}-T^{e2p}-A^{ms}-C^{ms}-T^{e2p}-C^{e2p}-C^{ms}-C^{ms}-T^{e2p}-

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- $T^{e2p}-G^{ms}-CH_2CH_2OH$
 (VIII''-6) $HO-C^{e2p}-C^{e2p}-A^{ms}-U^{ms}-T^{e2p}-G^{ms}-U^{ms}-T^{e2p}-U^{ms}-C^{e2p}-A^{ms}-U^{ms}-C^{e2p}-A^{ms}-G^{ms}-C^{ms}-$
 $T^{e2p}-C^{e2p}-CH_2CH_2OH$
 (VIII''-7) $HO-A^{ms}-G^{ms}-C^{elp}-T^{elp}-C^{ms}-U^{ms}-T^{elp}-U^{ms}-T^{elp}-A^{ms}-C^{ms}-T^{elp}-C^{elp}-C^{ms}-C^{ms}-T^{elp}-$
 5 $T^{elp}-G^{ms}-CH_2CH_2OH$
 (VIII''-8) $HO-C^{elp}-C^{elp}-A^{ms}-U^{ms}-T^{elp}-G^{ms}-U^{ms}-T^{elp}-U^{ms}-C^{elp}-A^{ms}-U^{ms}-C^{elp}-A^{ms}-G^{ms}-C^{ms}-$
 $T^{elp}-C^{elp}-CH_2CH_2OH$
 (VIII''-9) $HO-A^{ms}-G^{ms}-C^{e2s}-T^{e2s}-C^{ms}-U^{ms}-T^{e2s}-U^{ms}-T^{e2s}-A^{ms}-C^{ms}-T^{e2s}-C^{e2s}-C^{ms}-C^{ms}-T^{e2s}-T^{e2s}-$
 $G^{ms}-CH_2CH_2OH$
 10 (VIII''-10) $HO-C^{e2s}-C^{e2s}-A^{ms}-U^{ms}-T^{e2s}-G^{ms}-U^{ms}-T^{e2s}-U^{ms}-C^{e2s}-A^{ms}-U^{ms}-C^{e2s}-A^{ms}-G^{ms}-C^{ms}-$
 $T^{e2s}-C^{e2s}-CH_2CH_2OH$
 (VIII''-11) $HO-A^{ms}-G^{ms}-C^{els}-T^{els}-C^{ms}-U^{ms}-T^{els}-U^{ms}-T^{els}-A^{ms}-C^{ms}-T^{els}-C^{els}-C^{ms}-C^{ms}-T^{els}-$
 $T^{els}-G^{ms}-CH_2CH_2OH$
 (VIII''-12) $HO-C^{els}-C^{els}-A^{ms}-U^{ms}-T^{els}-G^{ms}-U^{ms}-T^{els}-U^{ms}-C^{els}-A^{ms}-U^{ms}-C^{els}-A^{ms}-G^{ms}-C^{ms}-$
 15 $T^{els}-C^{els}-CH_2CH_2OH$

Especially preferable are (VIII''-1), (VIII''-2), (VIII''-9) and (VIII''-10).

Preferable examples of the compound represented by general formula (IX'') include the following compounds.

- (IX''-1) $HO-T^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-A^{e2p}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{e2p}-G^{e2p}-G^{e2p}-$
 20 $A^{e2p}-G^{e2p}-CH_2CH_2OH$
 (IX''-2) $Ph-T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-T^{e2p}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{e2p}-$
 $C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-CH_2CH_2OH$
 (IX''-3) $HO-T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-T^{e2p}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{e2p}-$
 $C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-CH_2CH_2OH$
 25 (IX''-4) $HO-T^{elp}-A^{elp}-A^{elp}-C^{elp}-A^{elp}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{elp}-G^{elp}-G^{elp}-$
 $A^{elp}-G^{elp}-CH_2CH_2OH$
 (IX''-5) $Ph-T^{elp}-G^{elp}-T^{elp}-G^{elp}-T^{elp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{elp}-$
 $C^{elp}-A^{elp}-G^{elp}-T^{elp}-CH_2CH_2OH$
 (IX''-6) $HO-T^{elp}-G^{elp}-T^{elp}-G^{elp}-T^{elp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{elp}-$
 30 $C^{elp}-A^{elp}-G^{elp}-T^{elp}-CH_2CH_2OH$
 (IX''-7) $HO-T^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-A^{e2p}-G^{ms}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-A^{ms}-G^{ms}-U^{ms}-A^{e2p}-G^{e2p}-G^{e2p}-$
 $A^{e2p}-G^{e2p}-CH_2CH_2OH$

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- (IX''-8)Ph-T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-T^{e2p}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{e2p}-C^{e2p}-
A^{e2p}-G^{e2p}-T^{e2p}-CH₂CH₂OH
- (IX''-9)HO-T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-T^{e2p}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{e2p}-C^{e2p}-
A^{e2p}-G^{e2p}-T^{e2p}-CH₂CH₂OH
- 5 (IX''-10)HO-T^{elp}-A^{elp}-A^{elp}-C^{elp}-A^{elp}-G^{ms}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-A^{ms}-G^{ms}-U^{ms}-A^{elp}-G^{elp}-G^{elp}-
A^{elp}-G^{elp}-CH₂CH₂OH
- (IX''-11)Ph-T^{elp}-G^{elp}-T^{elp}-G^{elp}-T^{elp}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{elp}-C^{elp}-
A^{elp}-G^{elp}-T^{elp}-CH₂CH₂OH
- (IX''-12)HO-T^{elp}-G^{elp}-T^{elp}-G^{elp}-T^{elp}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{elp}-
10 C^{elp}-A^{elp}-G^{elp}-T^{elp}-CH₂CH₂OH
- (IX''-13)HO-T^{e2s}-A^{e2s}-A^{e2s}-C^{e2s}-A^{e2s}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{e2s}-G^{e2s}-G^{e2s}-
A^{e2s}-G^{e2s}-CH₂CH₂OH
- (IX''-14)Ph-T^{e2s}-G^{e2s}-T^{e2s}-G^{e2s}-T^{e2s}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{e2s}-
C^{e2s}-A^{e2s}-G^{e2s}-T^{e2s}-CH₂CH₂OH
- 15 (IX''-15)HO-T^{e2s}-G^{e2s}-T^{e2s}-G^{e2s}-T^{e2s}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{e2s}-
C^{e2s}-A^{e2s}-G^{e2s}-T^{e2s}-CH₂CH₂OH
- (IX''-16)HO-T^{els}-A^{els}-A^{els}-C^{els}-A^{els}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{els}-G^{els}-G^{els}-
A^{els}-G^{els}-CH₂CH₂OH
- (IX''-17)Ph-T^{els}-G^{els}-T^{els}-G^{els}-T^{els}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{els}-
20 C^{els}-A^{els}-G^{els}-T^{els}-CH₂CH₂OH
- (IX''-18)HO-T^{els}-G^{els}-T^{els}-G^{els}-T^{els}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{els}-
C^{els}-A^{els}-G^{els}-T^{els}-CH₂CH₂OH

Especially preferable are (IX''-1), (IX''-2), (IX''-3), (IX''-13), (IX''-14) and (IX''-15).

- Preferable examples of the compound represented by general formula (X'') include
25 the following compounds.

- (X''-1)Ph-A^{e2p}-G^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{mp}-U^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{e2p}-
G^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-CH₂CH₂OH
- (X''-2)HO-A^{e2p}-G^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{mp}-U^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{e2p}-
G^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-CH₂CH₂OH
- 30 (X''-3)Ph-A^{elp}-G^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{mp}-U^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{elp}-
G^{elp}-T^{elp}-A^{elp}-A^{elp}-CH₂CH₂OH
- (X''-4)HO-A^{elp}-G^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{mp}-U^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{elp}-

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- $G^{elp}-T^{elp}-A^{elp}-A^{elp}-CH_2CH_2OH$
 $(X''-5)Ph-A^{e2p}-G^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{e2p}-G^{e2p}-$
 $T^{e2p}-A^{e2p}-A^{e2p}-CH_2CH_2OH$
 $(X''-6)HO-A^{e2p}-G^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{e2p}-G^{e2p}-$
 $T^{e2p}-A^{e2p}-A^{e2p}-CH_2CH_2OH$
 $(X''-7)Ph-A^{elp}-G^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{elp}-G^{elp}-$
 $T^{elp}-A^{elp}-A^{elp}-CH_2CH_2OH$
 $(X''-8)HO-A^{elp}-G^{elp}-G^{elp}-T^{elp}-T^{elp}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{elp}-G^{elp}-$
 $T^{elp}-A^{elp}-A^{elp}-CH_2CH_2OH$
 $(X''-9)Ph-A^{e2s}-G^{e2s}-G^{e2s}-T^{e2s}-T^{e2s}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{e2s}-G^{e2s}-$
 $T^{e2s}-A^{e2s}-A^{e2s}-CH_2CH_2OH$
 $(X''-10)HO-A^{e2s}-G^{e2s}-G^{e2s}-T^{e2s}-T^{e2s}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{e2s}-G^{e2s}-$
 $T^{e2s}-A^{e2s}-A^{e2s}-CH_2CH_2OH$
 $(X''-11)Ph-A^{els}-G^{els}-G^{els}-T^{els}-T^{els}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{els}-G^{els}-$
 $T^{els}-A^{els}-A^{els}-CH_2CH_2OH$
 $(X''-12)HO-A^{els}-G^{els}-G^{els}-T^{els}-T^{els}-G^{ms}-U^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{els}-G^{els}-$
 $T^{els}-A^{els}-A^{els}-CH_2CH_2OH$

Especially preferable are (X''-1), (X''-2), (X''-9) and (X'-10).

- Preferable examples of the compound represented by general formula (XI'') include the following compounds.

- $(XI''-1)Ph-A^{e2p}-G^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-C^{mp}-C^{mp}-A^{mp}-C^{mp}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-T^{e2p}-$
 $G^{e2p}-T^{e2p}-C^{e2p}-A^{e2p}-CH_2CH_2OH$
 $(XI''-2)HO-A^{e2p}-G^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-C^{mp}-C^{mp}-A^{mp}-C^{mp}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-T^{e2p}-$
 $G^{e2p}-T^{e2p}-C^{e2p}-A^{e2p}-CH_2CH_2OH$
 $(XI''-3)Ph-A^{elp}-G^{elp}-T^{elp}-A^{elp}-A^{elp}-C^{mp}-C^{mp}-A^{mp}-C^{mp}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-T^{elp}-$
 $G^{elp}-T^{elp}-C^{elp}-A^{elp}-CH_2CH_2OH$
 $(XI''-4)HO-A^{elp}-G^{elp}-T^{elp}-A^{elp}-A^{elp}-C^{mp}-C^{mp}-A^{mp}-C^{mp}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-T^{elp}-$
 $G^{elp}-T^{elp}-C^{elp}-A^{elp}-CH_2CH_2OH$
 $(XI''-5)Ph-A^{e2p}-G^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{e2p}-G^{e2p}-$
 $T^{e2p}-C^{e2p}-A^{e2p}-CH_2CH_2OH$
 $(XI''-6)HO-A^{e2p}-G^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{e2p}-G^{e2p}-$
 $T^{e2p}-C^{e2p}-A^{e2p}-CH_2CH_2OH$

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- (XI''-7)Ph-A^{elp}-G^{elp}-T^{elp}-A^{elp}-A^{elp}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{elp}-G^{elp}-
T^{elp}-C^{elp}-A^{elp}-CH₂CH₂OH
- (XI''-8)HO-A^{elp}-G^{elp}-T^{elp}-A^{elp}-A^{elp}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{elp}-G^{elp}-
T^{elp}-C^{elp}-A^{elp}-CH₂CH₂OH
- 5 (XI''-9)Ph-A^{e2s}-G^{e2s}-T^{e2s}-A^{e2s}-A^{e2s}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{e2s}-G^{e2s}-
T^{e2s}-C^{e2s}-A^{e2s}-CH₂CH₂OH
- (XI''-10)HO-A^{e2s}-G^{e2s}-T^{e2s}-A^{e2s}-A^{e2s}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{e2s}-G^{e2s}-
T^{e2s}-C^{e2s}-A^{e2s}-CH₂CH₂OH
- (XI''-11)Ph-A^{els}-G^{els}-T^{els}-A^{els}-A^{els}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{els}-G^{els}-
10 T^{els}-C^{els}-A^{els}-CH₂CH₂OH
- (XI''-12)HO-A^{els}-G^{els}-T^{els}-A^{els}-A^{els}-C^{ms}-C^{ms}-A^{ms}-C^{ms}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-U^{ms}-G^{ms}-T^{els}-G^{els}-
T^{els}-C^{els}-A^{els}-CH₂CH₂OH

Especially preferable are (XI''-1), (XI''-2), (XI''-9) and (XI''-10).

- Preferable examples of the compound represented by general formula (XII'') include the following compounds.
- 15 (XII''-1)Ph-C^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-U^{mp}-U^{mp}-T^{e2p}-
A^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-CH₂CH₂OH
- (XII''-2)Ph-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-A^{e2p}-C^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{e2p}-
T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-CH₂CH₂OH
- 20 (XII''-3)HO-C^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-U^{mp}-U^{mp}-T^{e2p}-
A^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-CH₂CH₂OH
- (XII''-4)HO-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-A^{e2p}-C^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{e2p}-
T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-CH₂CH₂OH
- (XII''-5)Ph-C^{elp}-A^{elp}-C^{elp}-C^{elp}-C^{elp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-U^{mp}-U^{mp}-T^{elp}-
25 A^{elp}-T^{elp}-A^{elp}-A^{elp}-CH₂CH₂OH
- (XII''-6)Ph-A^{elp}-C^{elp}-C^{elp}-C^{elp}-A^{elp}-C^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{elp}-
T^{elp}-G^{elp}-T^{elp}-G^{elp}-CH₂CH₂OH
- (XII''-7)HO-C^{elp}-A^{elp}-C^{elp}-C^{elp}-C^{elp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-U^{mp}-U^{mp}-T^{elp}-
A^{elp}-T^{elp}-A^{elp}-A^{elp}-CH₂CH₂OH
- 30 (XII''-8)HO-A^{elp}-C^{elp}-C^{elp}-C^{elp}-A^{elp}-C^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{elp}-
T^{elp}-G^{elp}-T^{elp}-G^{elp}-CH₂CH₂OH
- (XII''-9)Ph-C^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{e2p}-A^{e2p}-

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- $T^{e2p}-A^{e2p}-A^{e2p}-CH_2CH_2OH$
 (XII''-10) $Ph-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-A^{e2p}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{e2p}-$
 $T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-CH_2CH_2OH$
 (XII''-11) $HO-C^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{e2p}-$
 5 $A^{e2p}-T^{e2p}-A^{e2p}-A^{e2p}-CH_2CH_2OH$
 (XII''-12) $HO-A^{e2p}-C^{e2p}-C^{e2p}-C^{e2p}-A^{e2p}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{e2p}-$
 $T^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-CH_2CH_2OH$
 (XII''-13) $Ph-C^{elp}-A^{elp}-C^{elp}-C^{elp}-C^{elp}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{elp}-$
 $A^{elp}-T^{elp}-A^{elp}-A^{elp}-CH_2CH_2OH$
 10 (XII''-14) $Ph-A^{elp}-C^{elp}-C^{elp}-C^{elp}-A^{elp}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{elp}-$
 $T^{elp}-G^{elp}-T^{elp}-G^{elp}-CH_2CH_2OH$
 (XII''-15) $HO-C^{elp}-A^{elp}-C^{elp}-C^{elp}-C^{elp}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{elp}-$
 $A^{elp}-T^{elp}-A^{elp}-A^{elp}-CH_2CH_2OH$
 (XII''-16) $HO-A^{elp}-C^{elp}-C^{elp}-C^{elp}-A^{elp}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{elp}-$
 15 $T^{elp}-G^{elp}-T^{elp}-G^{elp}-CH_2CH_2OH$
 (XII''-17) $Ph-C^{e2s}-A^{e2s}-C^{e2s}-C^{e2s}-C^{e2s}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{e2s}-A^{e2s}-$
 $T^{e2s}-A^{e2s}-A^{e2s}-CH_2CH_2OH$
 (XII''-18) $Ph-A^{e2s}-C^{e2s}-C^{e2s}-C^{e2s}-A^{e2s}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{e2s}-T^{e2s}-$
 $G^{e2s}-T^{e2s}-G^{e2s}-CH_2CH_2OH$
 20 (XII''-19) $HO-C^{e2s}-A^{e2s}-C^{e2s}-C^{e2s}-C^{e2s}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{e2s}-$
 $A^{e2s}-T^{e2s}-A^{e2s}-A^{e2s}-CH_2CH_2OH$
 (XII''-20) $HO-A^{e2s}-C^{e2s}-C^{e2s}-C^{e2s}-A^{e2s}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{e2s}-$
 $T^{e2s}-G^{e2s}-T^{e2s}-G^{e2s}-CH_2CH_2OH$
 (XII''-21) $Ph-C^{els}-A^{els}-C^{els}-C^{els}-C^{els}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{els}-A^{els}-$
 25 $T^{els}-A^{els}-A^{els}-CH_2CH_2OH$
 (XII''-22) $Ph-A^{els}-C^{els}-C^{els}-C^{els}-A^{els}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{els}-T^{els}-$
 $G^{els}-T^{els}-G^{els}-CH_2CH_2OH$
 (XII''-23) $HO-C^{els}-A^{els}-C^{els}-C^{els}-C^{els}-U^{ms}-C^{ms}-U^{ms}-G^{ms}-U^{ms}-G^{ms}-A^{ms}-U^{ms}-U^{ms}-U^{ms}-T^{els}-$
 $A^{els}-T^{els}-A^{els}-A^{els}-CH_2CH_2OH$
 30 (XII''-24) $HO-A^{els}-C^{els}-C^{els}-C^{els}-A^{els}-C^{ms}-C^{ms}-A^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-U^{ms}-C^{els}-$
 $T^{els}-G^{els}-T^{els}-G^{els}-CH_2CH_2OH$

Especially preferable are (XII''-1), (XII''-2), (XII''-3), (XII''-4), (XII''-17), (XII''-18),

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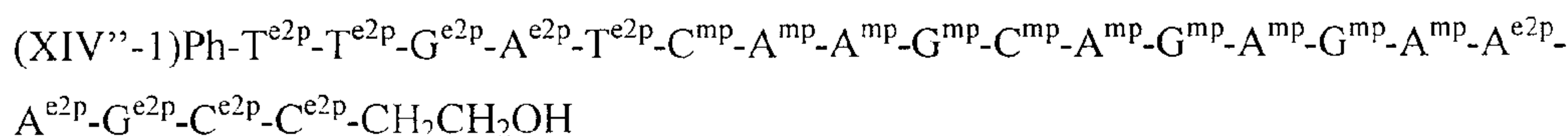
(XII''-19) and (XII''-20).

Preferable examples of the compound represented by general formula (XIII'') include the following compounds.

- (XIII''-1) Ph-C^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-A^{e2p}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-A^{mp}-C^{e2p}-
 5 C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
 (XIII''-2) HO-C^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-A^{e2p}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-A^{mp}-C^{e2p}-
 C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
 (XIII''-3) Ph-C^{e1p}-C^{e1p}-T^{e1p}-C^{e1p}-A^{e1p}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-A^{mp}-C^{e1p}-
 C^{e1p}-A^{e1p}-T^{e1p}-C^{e1p}-CH₂CH₂OH
 10 (XIII''-4) HO-C^{e1p}-C^{e1p}-T^{e1p}-C^{e1p}-A^{e1p}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-C^{mp}-A^{mp}-C^{mp}-C^{mp}-C^{mp}-A^{mp}-C^{e1p}-
 C^{e1p}-A^{e1p}-T^{e1p}-C^{e1p}-CH₂CH₂OH
 (XIII''-5) Ph-C^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-A^{e2p}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e2p}-
 C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
 (XIII''-6) HO-C^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-A^{e2p}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e2p}-
 15 C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH
 (XIII''-7) Ph-C^{e1p}-C^{e1p}-T^{e1p}-C^{e1p}-A^{e1p}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e1p}-
 C^{e1p}-A^{e1p}-T^{e1p}-C^{e1p}-CH₂CH₂OH
 (XIII''-8) HO-C^{e1p}-C^{e1p}-T^{e1p}-C^{e1p}-A^{e1p}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e1p}-
 C^{e1p}-A^{e1p}-T^{e1p}-C^{e1p}-CH₂CH₂OH
 20 (XIII''-9) Ph-C^{e2s}-C^{e2s}-T^{e2s}-C^{e2s}-A^{e2s}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e2s}-C^{e2s}-
 A^{e2s}-T^{e2s}-C^{e2s}-CH₂CH₂OH
 (XIII''-10) HO-C^{e2s}-C^{e2s}-T^{e2s}-C^{e2s}-A^{e2s}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e2s}-
 C^{e2s}-A^{e2s}-T^{e2s}-C^{e2s}-CH₂CH₂OH
 (XIII''-11) Ph-C^{e1s}-C^{e1s}-T^{e1s}-C^{e1s}-A^{e1s}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e1s}-C^{e1s}-
 25 A^{e1s}-T^{e1s}-C^{e1s}-CH₂CH₂OH
 (XIII''-12) HO-C^{e1s}-C^{e1s}-T^{e1s}-C^{e1s}-A^{e1s}-A^{ms}-G^{ms}-G^{ms}-U^{ms}-C^{ms}-A^{ms}-C^{ms}-C^{ms}-C^{ms}-A^{ms}-C^{e1s}-
 C^{e1s}-A^{e1s}-T^{e1s}-C^{e1s}-CH₂CH₂OH

Especially preferable are (XIII''-1), (XIII''-2), (XIII''-9) and (XIII''-10).

- Preferable examples of the compound represented by general formula (XIV'') include the following compounds.



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- (XIV''-2)HO-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-T^{e2p}-C^{mp}-A^{mp}-A^{mp}-G^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-A^{mp}-A^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH
- (XIV''-3)HO-A^{e2p}-G^{e2p}-C^{e2p}-C^{e2p}-A^{e2p}-G^{mp}-U^{mp}-C^{mp}-G^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{mp}-G^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH
- 5 (XIV''-4)Ph-T^{elp}-T^{elp}-G^{elp}-A^{elp}-T^{elp}-C^{mp}-A^{mp}-A^{mp}-G^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-A^{mp}-A^{elp}-A^{elp}-G^{elp}-C^{elp}-C^{elp}-CH₂CH₂OH
- (XIV''-5)HO-T^{elp}-T^{elp}-G^{elp}-A^{elp}-T^{elp}-C^{mp}-A^{mp}-A^{mp}-G^{mp}-C^{mp}-A^{mp}-G^{mp}-A^{mp}-G^{mp}-A^{mp}-A^{elp}-A^{elp}-G^{elp}-C^{elp}-C^{elp}-CH₂CH₂OH
- (XIV''-6)HO-A^{elp}-G^{elp}-C^{elp}-C^{elp}-A^{elp}-G^{mp}-U^{mp}-C^{mp}-G^{mp}-G^{mp}-U^{mp}-A^{mp}-A^{mp}-G^{elp}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH
- 10 (XIV''-7)Ph-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-T^{e2p}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH
- (XIV''-8)HO-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-T^{e2p}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH
- 15 (XIV''-9)HO-A^{e2p}-G^{e2p}-C^{e2p}-C^{e2p}-A^{e2p}-G^{ms}-U^{ms}-C^{ms}-G^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{ms}-G^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH
- (XIV''-10)Ph-T^{elp}-T^{elp}-G^{elp}-A^{elp}-T^{elp}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{elp}-A^{elp}-G^{elp}-C^{elp}-C^{elp}-CH₂CH₂OH
- (XIV''-11)HO-T^{elp}-T^{elp}-G^{elp}-A^{elp}-T^{elp}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{elp}-A^{elp}-G^{elp}-C^{elp}-C^{elp}-CH₂CH₂OH
- 20 (XIV''-12)HO-A^{elp}-G^{elp}-C^{elp}-C^{elp}-A^{elp}-G^{ms}-U^{ms}-C^{ms}-G^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{ms}-G^{elp}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-CH₂CH₂OH
- (XIV''-13)Ph-T^{e2s}-T^{e2s}-G^{e2s}-A^{e2s}-T^{e2s}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{e2s}-A^{e2s}-G^{e2s}-C^{e2s}-C^{e2s}-CH₂CH₂OH
- 25 (XIV''-14)HO-T^{e2s}-T^{e2s}-G^{e2s}-A^{e2s}-T^{e2s}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{e2s}-A^{e2s}-G^{e2s}-C^{e2s}-C^{e2s}-CH₂CH₂OH
- (XIV''-15)HO-A^{e2s}-G^{e2s}-C^{e2s}-C^{e2s}-A^{e2s}-G^{ms}-U^{ms}-C^{ms}-G^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{ms}-G^{e2s}-T^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-CH₂CH₂OH
- (XIV''-16)Ph-T^{els}-T^{els}-G^{els}-A^{els}-T^{els}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{els}-A^{els}-G^{els}-C^{els}-C^{els}-CH₂CH₂OH
- 30 (XIV''-17)HO-T^{els}-T^{els}-G^{els}-A^{els}-T^{els}-C^{ms}-A^{ms}-A^{ms}-G^{ms}-C^{ms}-A^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-A^{els}-A^{els}-G^{els}-C^{els}-C^{els}-CH₂CH₂OH

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(XIV''-18)HO-A^{els}-G^{els}-C^{els}-C^{els}-A^{els}-G^{ms}-U^{ms}-C^{ms}-G^{ms}-G^{ms}-U^{ms}-A^{ms}-A^{ms}-G^{els}-T^{els}-T^{els}-C^{els}-T^{els}-CH₂CH₂OH

Especially preferable are (XIV''-1), (XIV''-2), (XIV''-3), (XIV''-13), (XIV''-14) and (XIV''-15).

5 Preferable examples of the compound represented by general formula (XV'') include the following compounds.

(XV''-1)HO-G^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-T^{e2p}-U^{mp}-U^{mp}-C^{mp}-U^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-T^{e2p}-G^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-CH₂CH₂OH

10 (XV''-2)HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-G^{mp}-G^{mp}-A^{mp}-G^{mp}-A^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂OH

(XV''-3)HO-G^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-T^{e2p}-U^{mp}-C^{e2p}-T^{e2p}-A^{mp}-G^{mp}-U^{mp}-T^{e2p}-T^{e2p}-G^{mp}-G^{mp}-A^{e2p}-G^{mp}-CH₂CH₂OH

(XV''-4)HO-A^{e2p}-G^{mp}-T^{e2p}-U^{mp}-T^{e2p}-G^{mp}-G^{mp}-A^{e2p}-G^{mp}-A^{mp}-T^{e2p}-G^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{mp}-T^{e2p}-T^{e2p}-CH₂CH₂OH

15 (XV''-5)HO-G^{elp}-G^{elp}-C^{elp}-A^{elp}-T^{elp}-U^{mp}-U^{mp}-C^{mp}-U^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-T^{elp}-G^{elp}-G^{elp}-A^{elp}-G^{elp}-CH₂CH₂OH

(XV''-6)HO-A^{elp}-G^{elp}-T^{elp}-T^{elp}-T^{elp}-G^{mp}-G^{mp}-A^{mp}-G^{mp}-A^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{elp}-A^{elp}-G^{elp}-T^{elp}-T^{elp}-CH₂CH₂OH

20 (XV''-7)HO-G^{mp}-G^{mp}-C^{elp}-A^{mp}-T^{elp}-T^{elp}-U^{mp}-C^{elp}-T^{elp}-A^{mp}-G^{mp}-U^{mp}-T^{elp}-T^{elp}-G^{mp}-G^{mp}-A^{elp}-G^{mp}-CH₂CH₂OH

(XV''-8)HO-A^{elp}-G^{mp}-T^{elp}-U^{mp}-T^{elp}-G^{mp}-G^{mp}-A^{elp}-G^{mp}-A^{mp}-T^{elp}-G^{mp}-G^{mp}-C^{elp}-A^{elp}-G^{mp}-T^{elp}-T^{elp}-CH₂CH₂OH

(XV''-9)HO-G^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-T^{e2p}-U^{ms}-U^{ms}-C^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-T^{e2p}-G^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-CH₂CH₂OH

25 (XV''-10)HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-G^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂OH

(XV''-11)HO-G^{ms}-G^{ms}-C^{e2p}-A^{ms}-T^{e2p}-T^{e2p}-U^{ms}-C^{e2p}-T^{e2p}-A^{ms}-G^{ms}-U^{ms}-T^{e2p}-T^{e2p}-G^{ms}-G^{ms}-A^{e2p}-G^{ms}-CH₂CH₂OH

30 (XV''-12)HO-A^{e2p}-G^{ms}-T^{e2p}-U^{ms}-T^{e2p}-G^{ms}-G^{ms}-A^{e2p}-G^{ms}-A^{ms}-T^{e2p}-G^{ms}-G^{ms}-C^{e2p}-A^{e2p}-G^{ms}-T^{e2p}-T^{e2p}-CH₂CH₂OH

(XV''-13)HO-G^{elp}-G^{elp}-C^{elp}-A^{elp}-T^{elp}-U^{ms}-U^{ms}-C^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-T^{elp}-G^{elp}-G^{elp}-A^{elp}-G^{elp}-CH₂CH₂OH

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(XV''-14)HO-A^{elp}-G^{elp}-T^{elp}-T^{elp}-T^{elp}-G^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{elp}-A^{elp}-G^{elp}-
T^{elp}-T^{elp}-CH₂CH₂OH

(XV''-15)HO-G^{ms}-G^{ms}-C^{elp}-A^{ms}-T^{elp}-T^{elp}-U^{ms}-C^{elp}-T^{elp}-A^{ms}-G^{ms}-U^{ms}-T^{elp}-T^{elp}-G^{ms}-G^{ms}-
A^{elp}-G^{ms}-CH₂CH₂OH

5 (XV''-16)HO-A^{elp}-G^{ms}-T^{elp}-U^{ms}-T^{elp}-G^{ms}-G^{ms}-A^{elp}-G^{ms}-A^{ms}-T^{elp}-G^{ms}-G^{ms}-C^{elp}-A^{elp}-G^{ms}-
T^{elp}-T^{elp}-CH₂CH₂OH

(XV''-17)HO-G^{e2s}-G^{e2s}-C^{e2s}-A^{e2s}-T^{e2s}-U^{ms}-U^{ms}-C^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-T^{e2s}-G^{e2s}-G^{e2s}-
A^{e2s}-G^{e2s}-CH₂CH₂OH

(XV''-18)HO-A^{e2s}-G^{e2s}-T^{e2s}-T^{e2s}-T^{e2s}-G^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{e2s}-A^{e2s}-G^{e2s}-
10 T^{e2s}-T^{e2s}-CH₂CH₂OH

(XV''-19)HO-G^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-T^{e2s}-U^{ms}-C^{e2s}-T^{e2s}-A^{ms}-G^{ms}-U^{ms}-T^{e2s}-T^{e2s}-G^{ms}-G^{ms}-
A^{e2s}-G^{ms}-CH₂CH₂OH

(XV''-20)HO-A^{e2s}-G^{ms}-T^{e2s}-U^{ms}-T^{e2s}-G^{ms}-G^{ms}-A^{e2s}-G^{ms}-A^{ms}-T^{e2s}-G^{ms}-G^{ms}-C^{e2s}-A^{e2s}-G^{ms}-
T^{e2s}-T^{e2s}-CH₂CH₂OH

15 (XV''-21)HO-G^{els}-G^{els}-C^{els}-A^{els}-T^{els}-U^{ms}-U^{ms}-C^{ms}-U^{ms}-A^{ms}-G^{ms}-U^{ms}-U^{ms}-T^{els}-G^{els}-G^{els}-
A^{els}-G^{els}-CH₂CH₂OH

(XV''-22)HO-A^{els}-G^{els}-T^{els}-T^{els}-T^{els}-G^{ms}-G^{ms}-A^{ms}-G^{ms}-A^{ms}-U^{ms}-G^{ms}-G^{ms}-C^{els}-A^{els}-G^{els}-
T^{els}-T^{els}-CH₂CH₂OH

(XV''-23)HO-G^{ms}-G^{ms}-C^{els}-A^{ms}-T^{els}-T^{els}-U^{ms}-C^{els}-T^{els}-A^{ms}-G^{ms}-U^{ms}-T^{els}-T^{els}-G^{ms}-G^{ms}-
20 A^{els}-G^{ms}-CH₂CH₂OH

(XV''-24)HO-A^{els}-G^{ms}-T^{els}-U^{ms}-T^{els}-G^{ms}-G^{ms}-A^{els}-G^{ms}-A^{ms}-T^{els}-G^{ms}-G^{ms}-C^{els}-A^{els}-G^{ms}-
T^{els}-T^{els}-CH₂CH₂OH

Especially preferable are (XV''-1), (XV''-2), (XV''-3), (XV''-4), (XV''-17), (XV''-18),
(XV''-19) and (XV''-20).

25 Preferable examples of the compound represented by general formula (XVI'')
include the following compounds.

(XVI''-1)HO-T^{e2p}-T^{e2p}-C^{mp}-T^{e2p}-T^{e2p}-G^{mp}-T^{e2p}-A^{mp}-C^{mp}-T^{e2p}-T^{e2p}-C^{mp}-A^{mp}-T^{e2p}-C^{mp}-C^{e2p}-
C^{e2p}-A^{mp}-CH₂CH₂OH

(XVI''-2)HO-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-A^{mp}-G^{mp}-G^{mp}-T^{e2p}-G^{mp}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-G^{mp}-T^{e2p}-
30 A^{mp}-C^{e2p}-CH₂CH₂OH

(XVI''-3)HO-T^{elp}-T^{elp}-C^{mp}-T^{elp}-T^{elp}-G^{mp}-T^{elp}-A^{mp}-C^{mp}-T^{elp}-T^{elp}-C^{mp}-A^{mp}-T^{elp}-C^{mp}-C^{elp}-
C^{elp}-A^{mp}-CH₂CH₂OH

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- (XVI''-4)HO-C^{elp}-T^{elp}-G^{mp}-A^{mp}-A^{mp}-G^{mp}-G^{mp}-T^{elp}-G^{mp}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-G^{mp}-T^{elp}-A^{mp}-C^{elp}-CH₂CH₂OH
- (XVI''-5)HO-T^{e2p}-T^{e2p}-C^{ms}-T^{e2p}-T^{e2p}-G^{ms}-T^{e2p}-A^{ms}-C^{ms}-T^{e2p}-T^{e2p}-C^{ms}-A^{ms}-T^{e2p}-C^{ms}-C^{e2p}-C^{e2p}-A^{ms}-CH₂CH₂OH
- 5 (XVI''-6)HO-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{e2p}-G^{ms}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-G^{ms}-T^{e2p}-A^{ms}-C^{e2p}-CH₂CH₂OH
- (XVI''-7)HO-T^{elp}-T^{elp}-C^{ms}-T^{elp}-T^{elp}-G^{ms}-T^{elp}-A^{ms}-C^{ms}-T^{elp}-T^{elp}-C^{ms}-A^{ms}-T^{elp}-C^{ms}-C^{elp}-C^{elp}-A^{ms}-CH₂CH₂OH
- (XVI''-8)HO-C^{elp}-T^{elp}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{elp}-G^{ms}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-T^{elp}-G^{ms}-T^{elp}-A^{ms}-C^{elp}-CH₂CH₂OH
- 10 (XVI''-9)HO-T^{e2s}-T^{e2s}-C^{ms}-T^{e2s}-T^{e2s}-G^{ms}-T^{e2s}-A^{ms}-C^{ms}-T^{e2s}-T^{e2s}-C^{ms}-A^{ms}-T^{e2s}-C^{ms}-C^{e2s}-C^{e2s}-A^{ms}-CH₂CH₂OH
- (XVI''-10)HO-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{e2s}-G^{ms}-T^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-G^{ms}-T^{e2s}-A^{ms}-C^{e2s}-CH₂CH₂OH
- 15 (XVI''-11)HO-T^{els}-T^{els}-C^{ms}-T^{els}-T^{els}-G^{ms}-T^{els}-A^{ms}-C^{ms}-T^{els}-T^{els}-C^{ms}-A^{ms}-T^{els}-C^{ms}-C^{els}-C^{els}-A^{ms}-CH₂CH₂OH
- (XVI''-12)HO-C^{els}-T^{els}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{els}-G^{ms}-T^{els}-T^{els}-C^{els}-T^{els}-T^{els}-G^{ms}-T^{els}-A^{ms}-C^{els}-CH₂CH₂OH
- Especially preferable are (XVI''-1), (XVI''-2), (XVI''-9) and (XVI''-10).
- 20 Preferable examples of the compound represented by general formula (XVII'') include the following compounds.
- (XVII''-1)HO-C^{e2p}-C^{e2p}-U^{mp}-C^{e2p}-C^{e2p}-G^{mp}-G^{mp}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-A^{mp}-G^{mp}-G^{mp}-T^{e2p}-G^{mp}-CH₂CH₂OH
- (XVII''-2)HO-C^{elp}-C^{elp}-U^{mp}-C^{elp}-C^{elp}-G^{mp}-G^{mp}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{mp}-A^{mp}-A^{mp}-G^{mp}-G^{mp}-T^{elp}-G^{mp}-CH₂CH₂OH
- 25 (XVII''-3)HO-C^{e2p}-C^{e2p}-U^{ms}-C^{e2p}-C^{e2p}-G^{ms}-G^{ms}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{e2p}-G^{ms}-CH₂CH₂OH
- (XVII''-4)HO-C^{elp}-C^{elp}-U^{ms}-C^{elp}-C^{elp}-G^{ms}-G^{ms}-T^{elp}-T^{elp}-C^{elp}-T^{elp}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{elp}-G^{ms}-CH₂CH₂OH
- 30 (XVII''-5)HO-C^{e2s}-C^{e2s}-U^{ms}-C^{e2s}-C^{e2s}-G^{ms}-G^{ms}-T^{e2s}-T^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{e2s}-G^{ms}-CH₂CH₂OH
- (XVII''-6)HO-C^{els}-C^{els}-U^{ms}-C^{els}-C^{els}-G^{ms}-G^{ms}-T^{els}-T^{els}-C^{els}-T^{els}-G^{ms}-A^{ms}-A^{ms}-G^{ms}-G^{ms}-T^{els}-G^{ms}-CH₂CH₂OH

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$$T^{els}-G^{ms}-CH_2CH_2OH$$

Especially preferable are (XVII''-1) and (XVII''-5).

Preferable examples of the compound represented by general formula (XVIII'') include the following compounds.

- 5 (XVIII''-1) $HO-T^{e2p}-A^{mp}-A^{mp}-G^{mp}-A^{mp}-C^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-C^{e2p}-A^{mp}-G^{mp}-C^{e2p}-U^{mp}-T^{e2p}-C^{e2p}-CH_2CH_2OH$
- (XVIII''-2) $HO-C^{e2p}-T^{e2p}-C^{e2p}-A^{mp}-G^{mp}-C^{e2p}-T^{e2p}-U^{mp}-C^{mp}-T^{e2p}-T^{e2p}-C^{mp}-C^{mp}-T^{e2p}-T^{e2p}-A^{mp}-G^{mp}-C^{e2p}-CH_2CH_2OH$
- (XVIII''-3) $HO-T^{elp}-A^{mp}-A^{mp}-G^{mp}-A^{mp}-C^{elp}-C^{elp}-T^{elp}-G^{mp}-C^{elp}-T^{elp}-C^{elp}-A^{mp}-G^{mp}-C^{elp}-U^{mp}-T^{elp}-C^{elp}-CH_2CH_2OH$
- 10 (XVIII''-4) $HO-C^{elp}-T^{elp}-C^{elp}-A^{mp}-G^{mp}-C^{elp}-T^{elp}-U^{mp}-C^{mp}-T^{elp}-T^{elp}-C^{mp}-C^{mp}-T^{elp}-T^{elp}-A^{mp}-G^{mp}-C^{elp}-CH_2CH_2OH$
- (XVIII''-5) $HO-T^{e2p}-A^{ms}-A^{ms}-G^{ms}-A^{ms}-C^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-C^{e2p}-T^{e2p}-C^{e2p}-A^{ms}-G^{ms}-C^{e2p}-U^{ms}-T^{e2p}-C^{e2p}-CH_2CH_2OH$
- 15 (XVIII''-6) $HO-C^{e2p}-T^{e2p}-C^{e2p}-A^{ms}-G^{ms}-C^{e2p}-T^{e2p}-U^{ms}-C^{ms}-T^{e2p}-T^{e2p}-C^{ms}-C^{ms}-T^{e2p}-T^{e2p}-A^{ms}-G^{ms}-C^{e2p}-CH_2CH_2OH$
- (XVIII''-7) $HO-T^{elp}-A^{ms}-A^{ms}-G^{ms}-A^{ms}-C^{elp}-C^{elp}-T^{elp}-G^{ms}-C^{elp}-T^{elp}-C^{elp}-A^{ms}-G^{ms}-C^{elp}-U^{ms}-T^{elp}-C^{elp}-CH_2CH_2OH$
- (XVIII''-8) $HO-C^{elp}-T^{elp}-C^{elp}-A^{ms}-G^{ms}-C^{elp}-T^{elp}-U^{ms}-C^{ms}-T^{elp}-T^{elp}-C^{ms}-C^{ms}-T^{elp}-T^{elp}-A^{ms}-G^{ms}-C^{elp}-CH_2CH_2OH$
- 20 (XVIII''-9) $HO-T^{e2s}-A^{ms}-A^{ms}-G^{ms}-A^{ms}-C^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-C^{e2s}-A^{ms}-G^{ms}-C^{e2s}-U^{ms}-T^{e2s}-C^{e2s}-CH_2CH_2OH$
- (XVIII''-10) $HO-C^{e2s}-T^{e2s}-C^{e2s}-A^{ms}-G^{ms}-C^{e2s}-T^{e2s}-U^{ms}-C^{ms}-T^{e2s}-T^{e2s}-C^{ms}-C^{ms}-T^{e2s}-T^{e2s}-A^{ms}-G^{ms}-C^{e2s}-CH_2CH_2OH$
- 25 (XVIII''-11) $HO-T^{els}-A^{ms}-A^{ms}-G^{ms}-A^{ms}-C^{els}-C^{els}-T^{els}-G^{ms}-C^{els}-T^{els}-C^{els}-A^{ms}-G^{ms}-C^{els}-U^{ms}-T^{els}-C^{els}-CH_2CH_2OH$
- (XVIII''-12) $HO-C^{els}-T^{els}-C^{els}-A^{ms}-G^{ms}-C^{els}-T^{els}-U^{ms}-C^{ms}-T^{els}-T^{els}-C^{ms}-C^{ms}-T^{els}-T^{els}-A^{ms}-G^{ms}-C^{els}-CH_2CH_2OH$

Especially preferable are (XVIII''-1), (XVIII''-2), (XVIII''-9) and (XVIII''-10).

- 30 Preferable examples of the compound represented by general formula (XIX'') include the following compounds.

(XIX''-1) $HO-T^{e2p}-T^{e2p}-C^{mp}-C^{e2p}-A^{mp}-G^{mp}-C^{e2p}-C^{e2p}-A^{mp}-T^{e2p}-T^{e2p}-G^{mp}-T^{e2p}-G^{mp}-T^{e2p}-T^{e2p}-$

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G^{mp}-A^{mp}-CH₂CH₂OH(XIX''-2)HO-T^{elp}-T^{elp}-C^{mp}-C^{elp}-A^{mp}-G^{mp}-C^{elp}-C^{elp}-A^{mp}-T^{elp}-T^{elp}-G^{mp}-T^{elp}-G^{mp}-T^{elp}-T^{elp}-G^{mp}-A^{mp}-CH₂CH₂OH(XIX''-3)HO-T^{e2p}-T^{e2p}-C^{ms}-C^{e2p}-A^{ms}-G^{ms}-C^{e2p}-C^{e2p}-A^{ms}-T^{e2p}-T^{e2p}-G^{ms}-T^{e2p}-G^{ms}-T^{e2p}-T^{e2p}-5 G^{ms}-A^{ms}-CH₂CH₂OH(XIX''-4)HO-T^{elp}-T^{elp}-C^{ms}-C^{elp}-A^{ms}-G^{ms}-C^{elp}-C^{elp}-A^{ms}-T^{elp}-T^{elp}-G^{ms}-T^{elp}-G^{ms}-T^{elp}-T^{elp}-G^{ms}-A^{ms}-CH₂CH₂OH(XIX''-5)HO-T^{e2s}-T^{e2s}-C^{ms}-C^{e2s}-A^{ms}-G^{ms}-C^{e2s}-C^{e2s}-A^{ms}-T^{e2s}-T^{e2s}-G^{ms}-T^{e2s}-G^{ms}-T^{e2s}-T^{e2s}-G^{ms}-A^{ms}-CH₂CH₂OH10 (XIX''-6)HO-T^{els}-T^{els}-C^{ms}-C^{els}-A^{ms}-G^{ms}-C^{els}-C^{els}-A^{ms}-T^{els}-T^{els}-G^{ms}-T^{els}-G^{ms}-T^{els}-T^{els}-G^{ms}-A^{ms}-CH₂CH₂OH

Especially preferable are (XIX''-1) and (XIX''-5).

Preferable examples of the compound represented by general formula (XX'') include the following compounds.

15 (XX''-1)HO-T^{e2p}-T^{e2p}-C^{mp}-C^{mp}-T^{e2p}-T^{e2p}-A^{mp}-G^{mp}-C^{e2p}-T^{e2p}-U^{mp}-C^{e2p}-C^{e2p}-A^{mp}-G^{mp}-C^{e2p}-C^{e2p}-A^{mp}-CH₂CH₂OH

(XX''-2)HO-T^{elp}-T^{elp}-C^{mp}-C^{mp}-T^{elp}-T^{elp}-A^{mp}-G^{mp}-C^{elp}-T^{elp}-U^{mp}-C^{elp}-C^{elp}-A^{mp}-G^{mp}-C^{elp}-C^{elp}-A^{mp}-CH₂CH₂OH

20 (XX''-3)HO-T^{e2p}-T^{e2p}-C^{ms}-C^{ms}-T^{e2p}-T^{e2p}-A^{ms}-G^{ms}-C^{e2p}-T^{e2p}-U^{ms}-C^{e2p}-C^{e2p}-A^{ms}-G^{ms}-C^{e2p}-C^{e2p}-A^{ms}-CH₂CH₂OH

(XX''-4)HO-T^{elp}-T^{elp}-C^{ms}-C^{ms}-T^{elp}-T^{elp}-A^{ms}-G^{ms}-C^{elp}-T^{elp}-U^{ms}-C^{elp}-C^{elp}-A^{ms}-G^{ms}-C^{elp}-C^{elp}-A^{ms}-CH₂CH₂OH

(XX''-5)HO-T^{e2s}-T^{e2s}-C^{ms}-C^{ms}-T^{e2s}-T^{e2s}-A^{ms}-G^{ms}-C^{e2s}-T^{e2s}-U^{ms}-C^{e2s}-C^{e2s}-A^{ms}-G^{ms}-C^{e2s}-C^{e2s}-A^{ms}-CH₂CH₂OH

25 (XX''-6)HO-T^{els}-T^{els}-C^{ms}-C^{ms}-T^{els}-T^{els}-A^{ms}-G^{ms}-C^{els}-T^{els}-U^{ms}-C^{els}-C^{els}-A^{ms}-G^{ms}-C^{els}-C^{els}-A^{ms}-CH₂CH₂OH

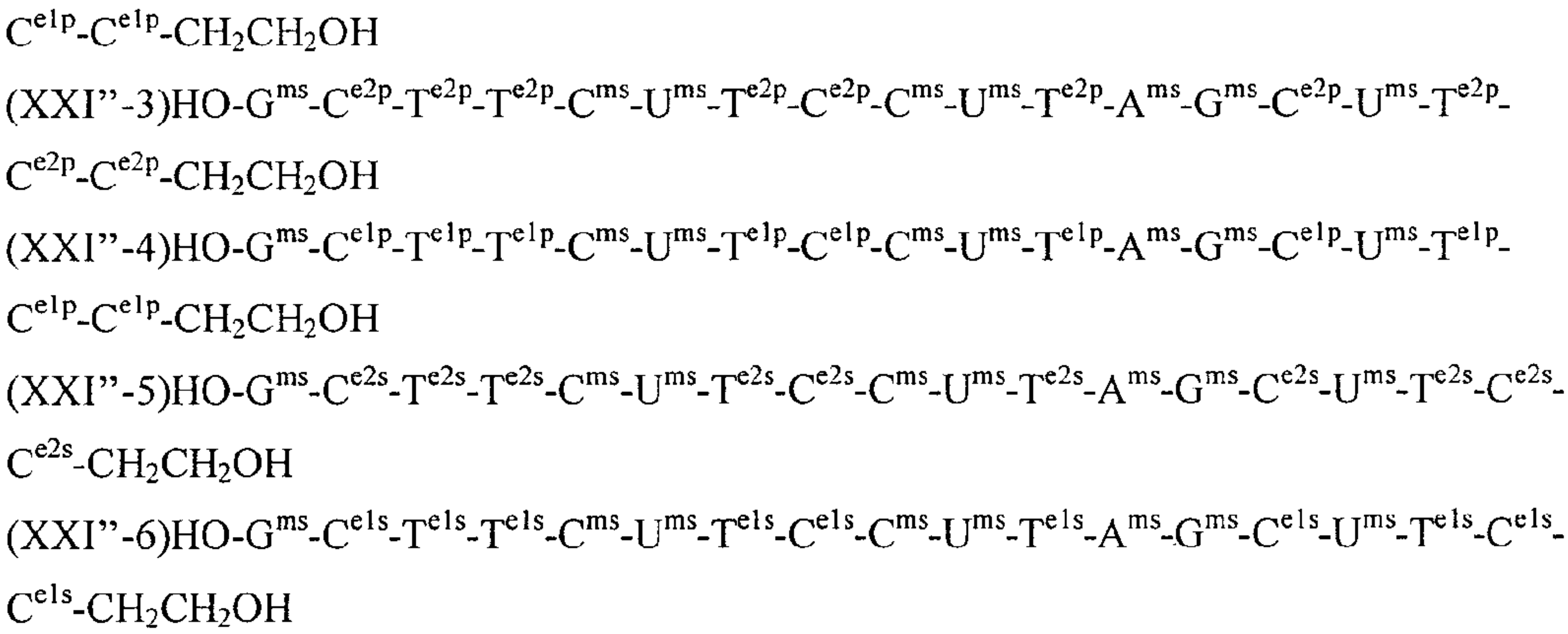
Especially preferable are (XX''-1) and (XX''-5).

Preferable examples of the compound represented by general formula (XXI'') include the following compounds.

30 (XXI''-1)HO-G^{mp}-C^{e2p}-T^{e2p}-T^{e2p}-C^{mp}-U^{mp}-T^{e2p}-C^{e2p}-C^{mp}-U^{mp}-T^{e2p}-A^{mp}-G^{mp}-C^{e2p}-U^{mp}-T^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH

(XXI''-2)HO-G^{mp}-C^{elp}-T^{elp}-T^{elp}-C^{mp}-U^{mp}-T^{elp}-C^{elp}-C^{mp}-U^{mp}-T^{elp}-A^{mp}-G^{mp}-C^{elp}-U^{mp}-T^{elp}-C^{elp}-C^{elp}-CH₂CH₂OH

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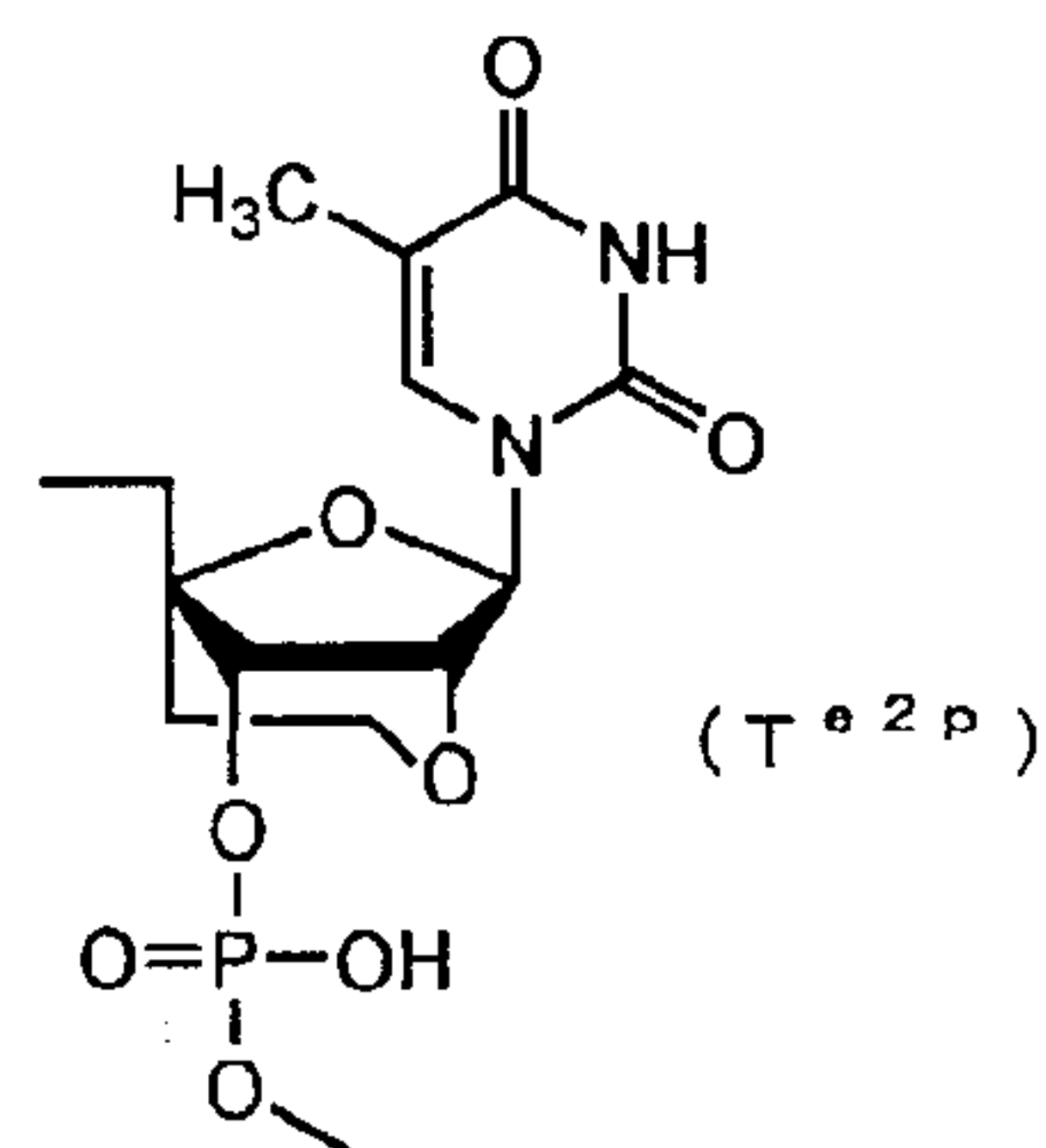
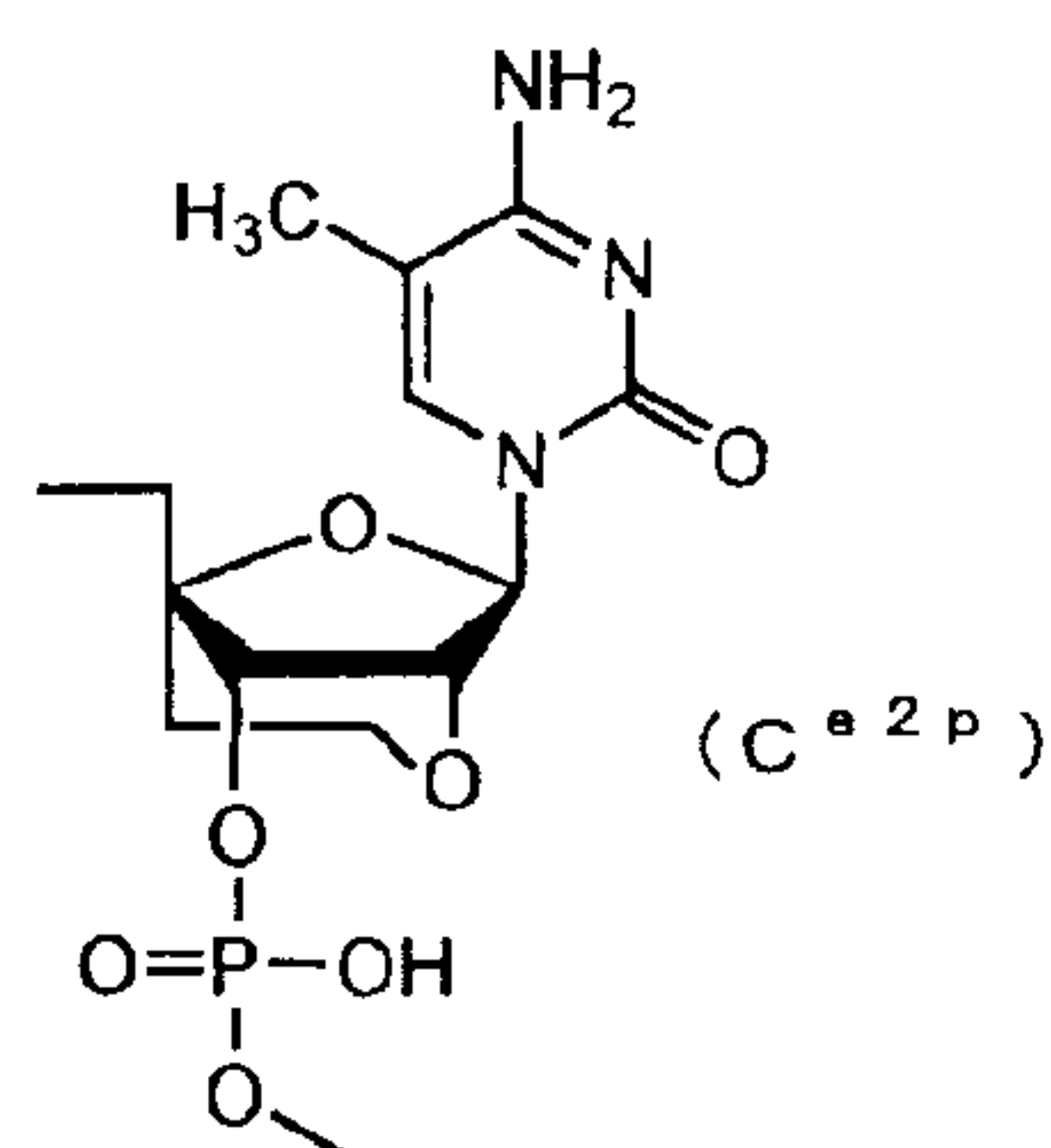
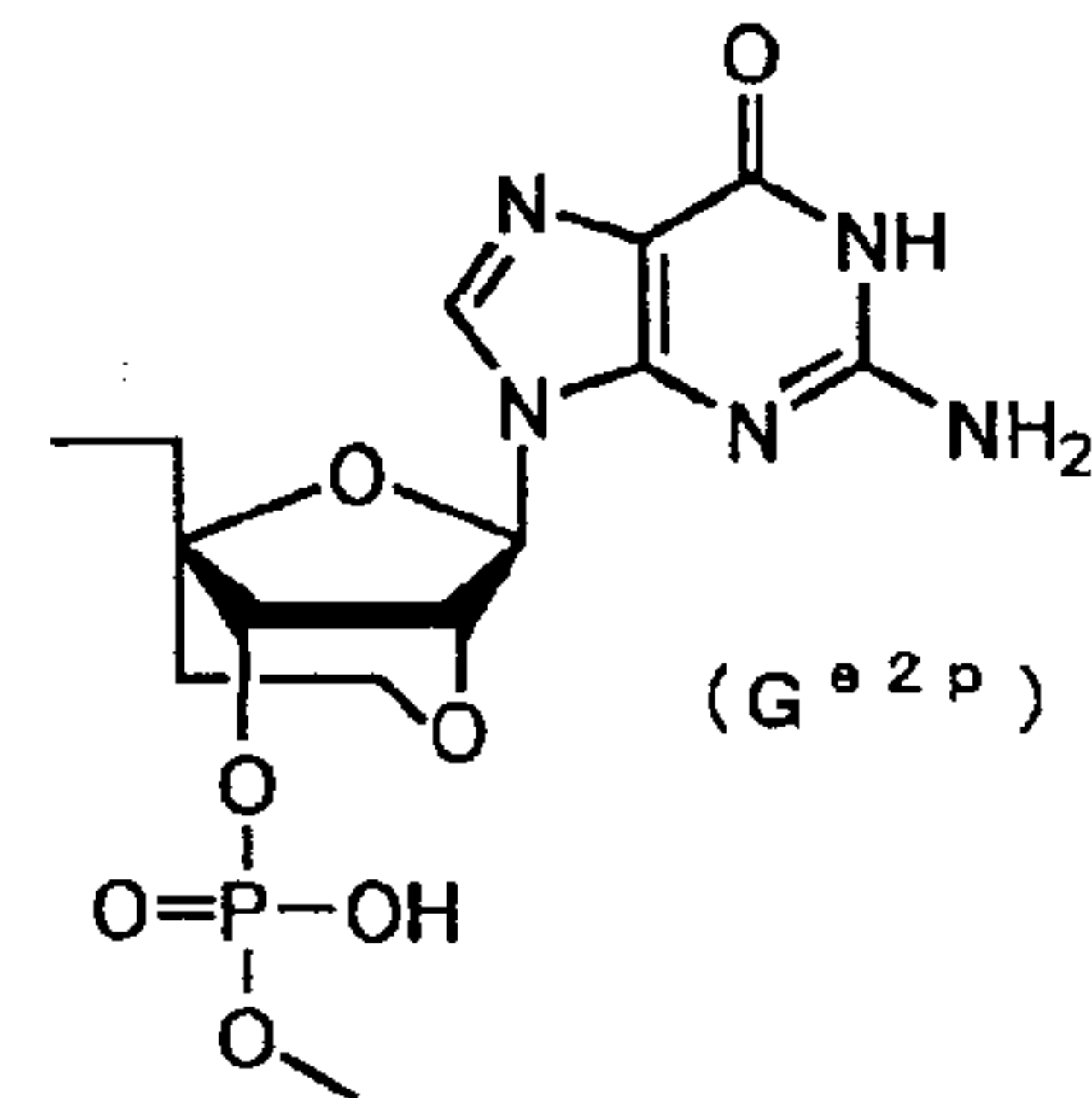
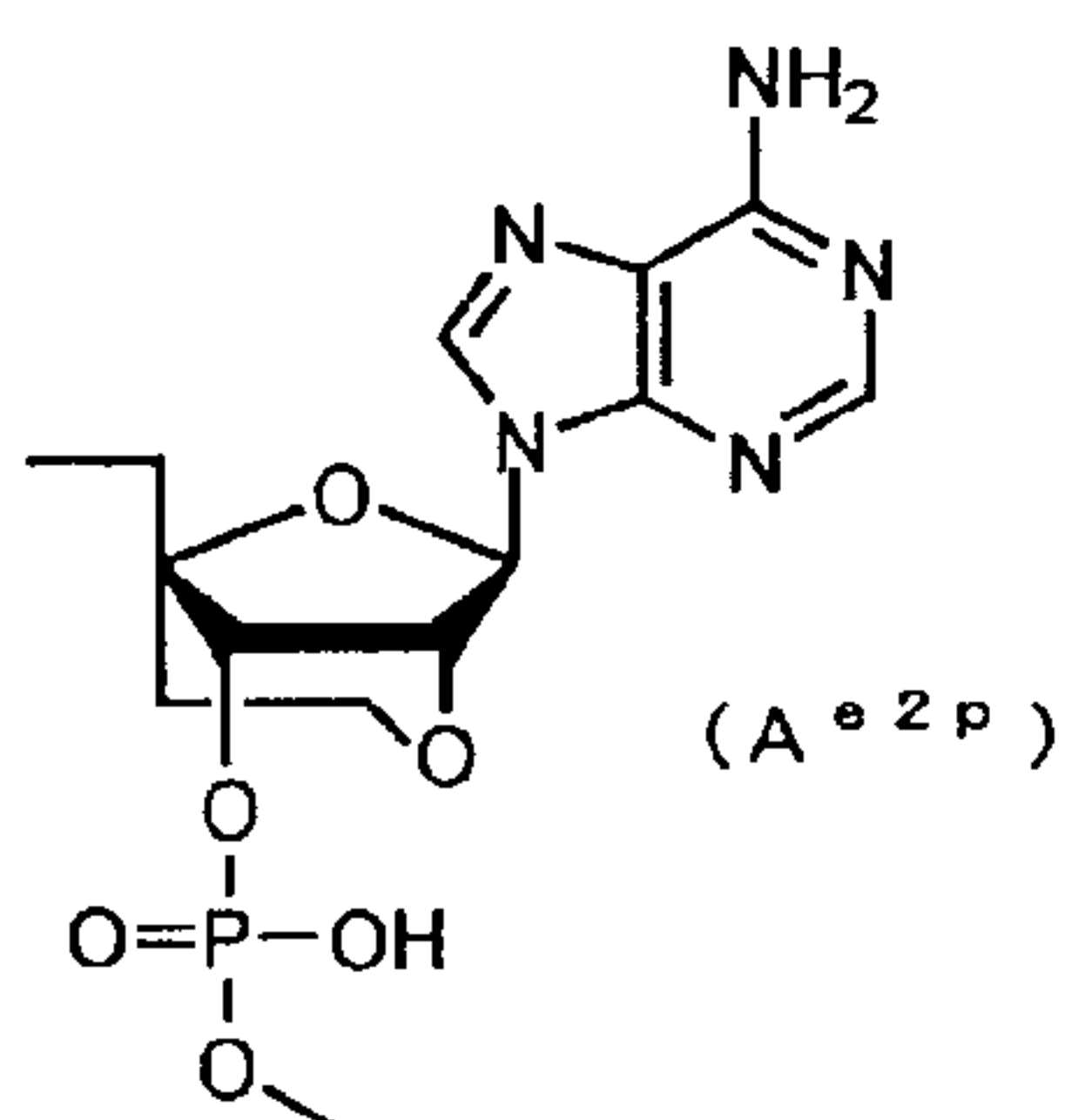
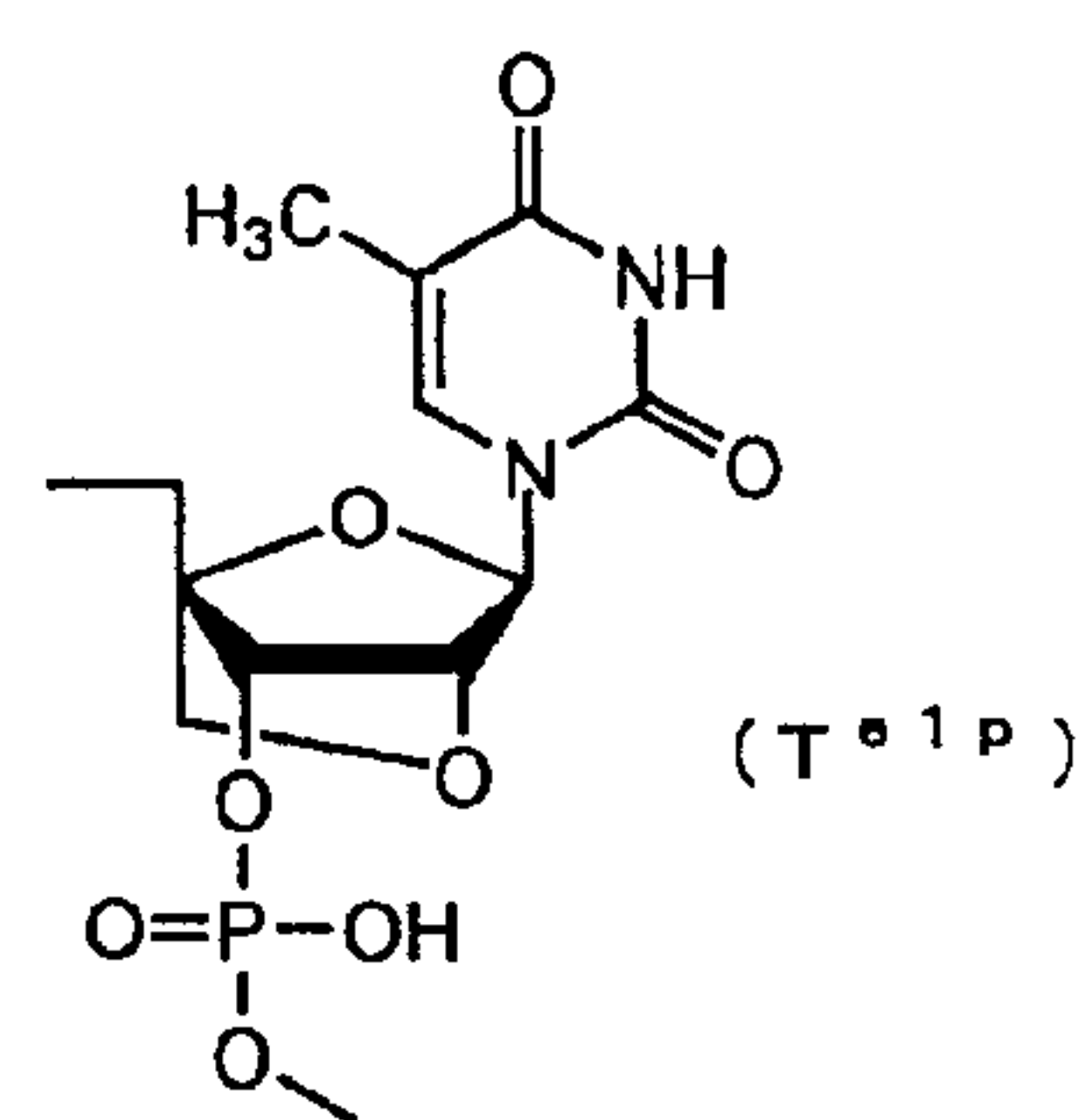
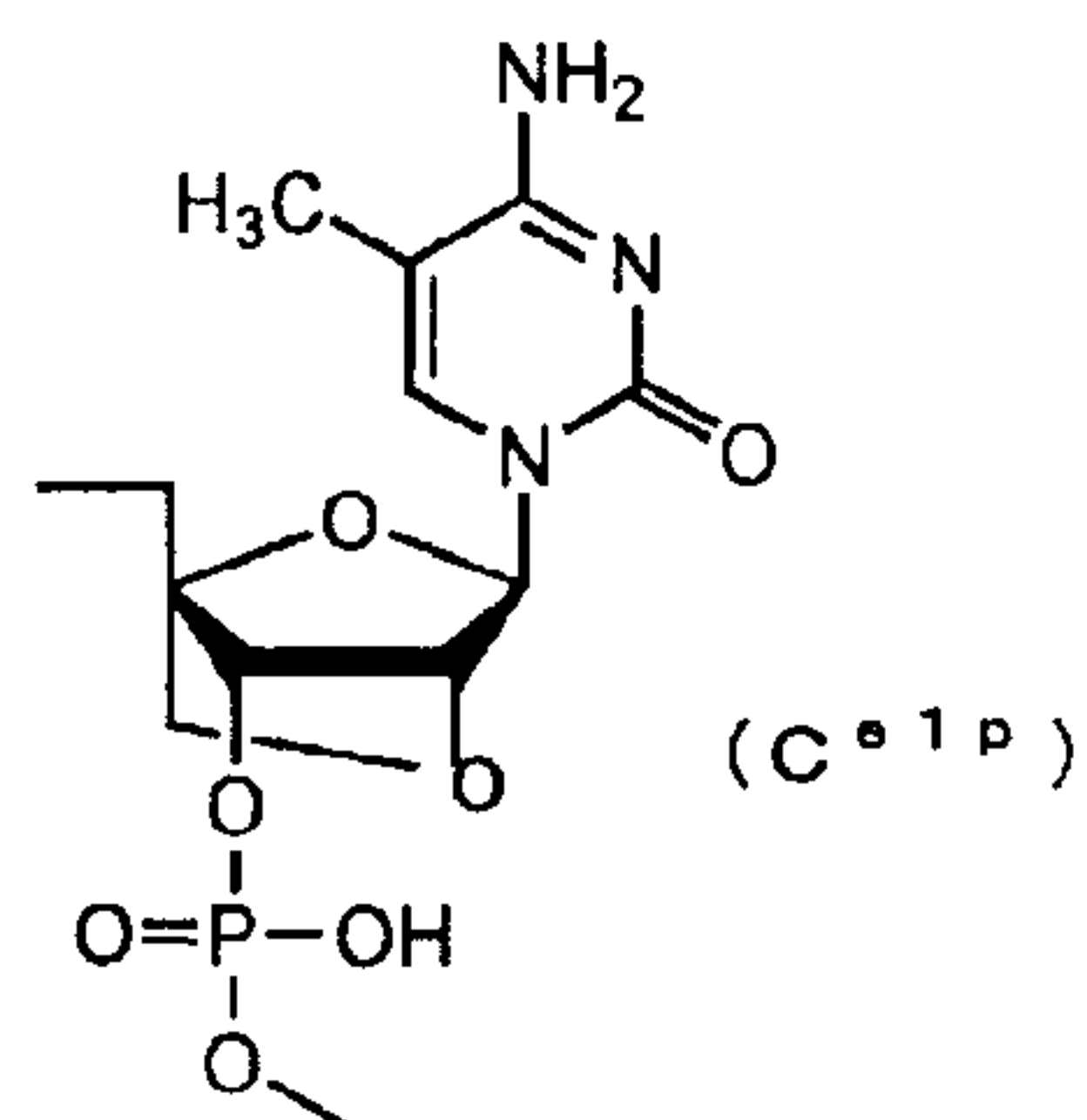
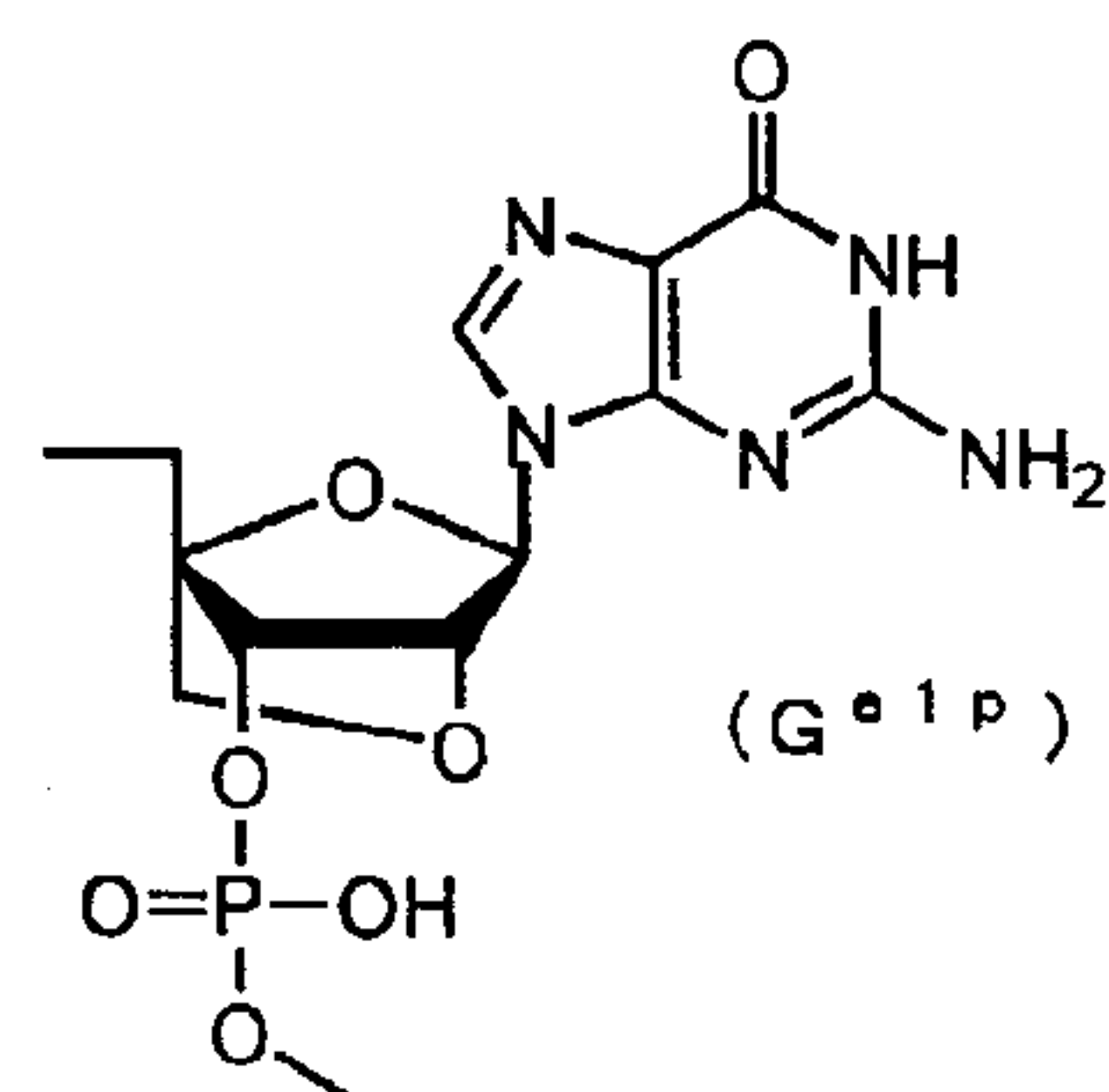
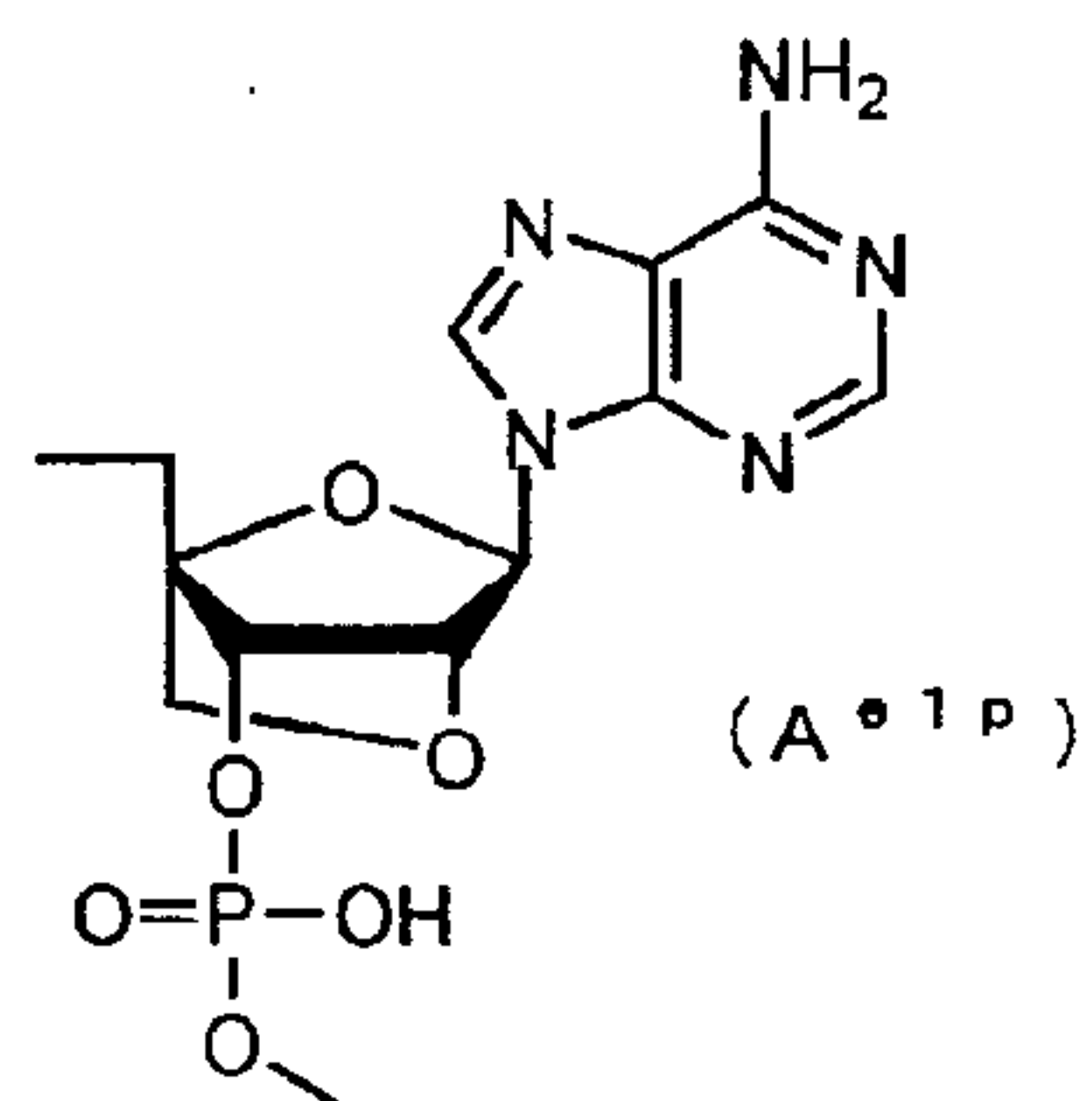


10 Especially preferable are (XXI''-1) and (XXI''-5).

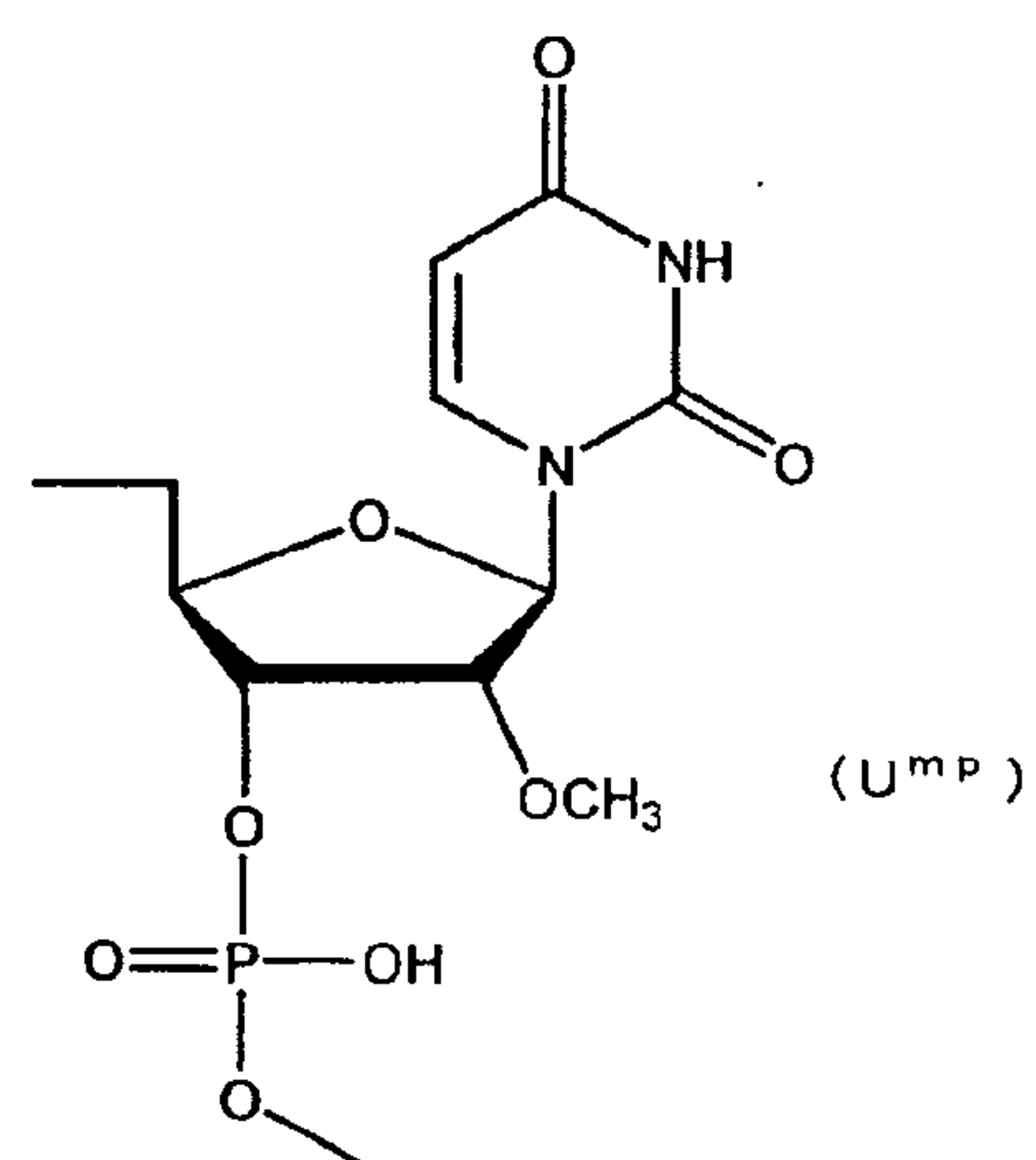
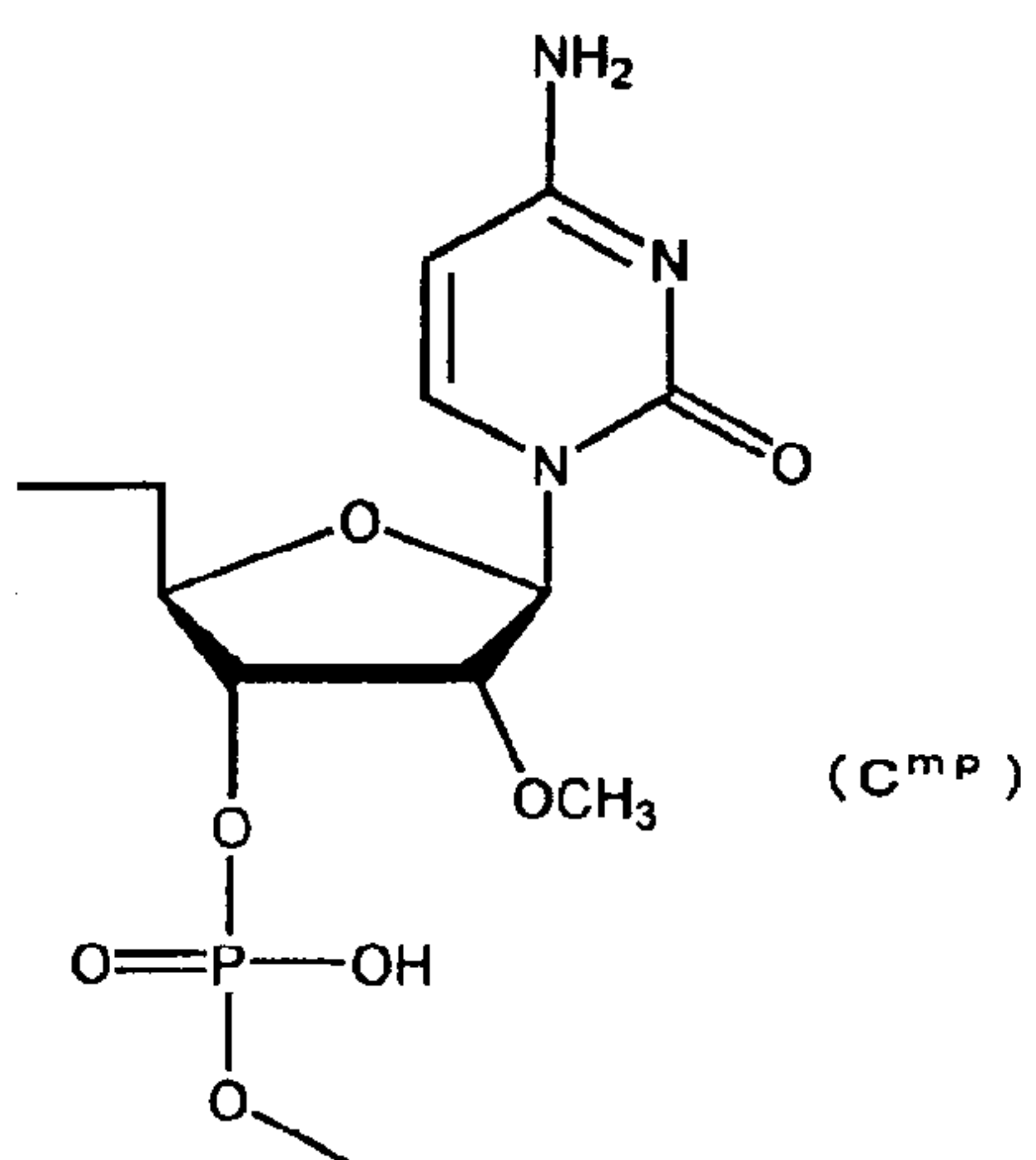
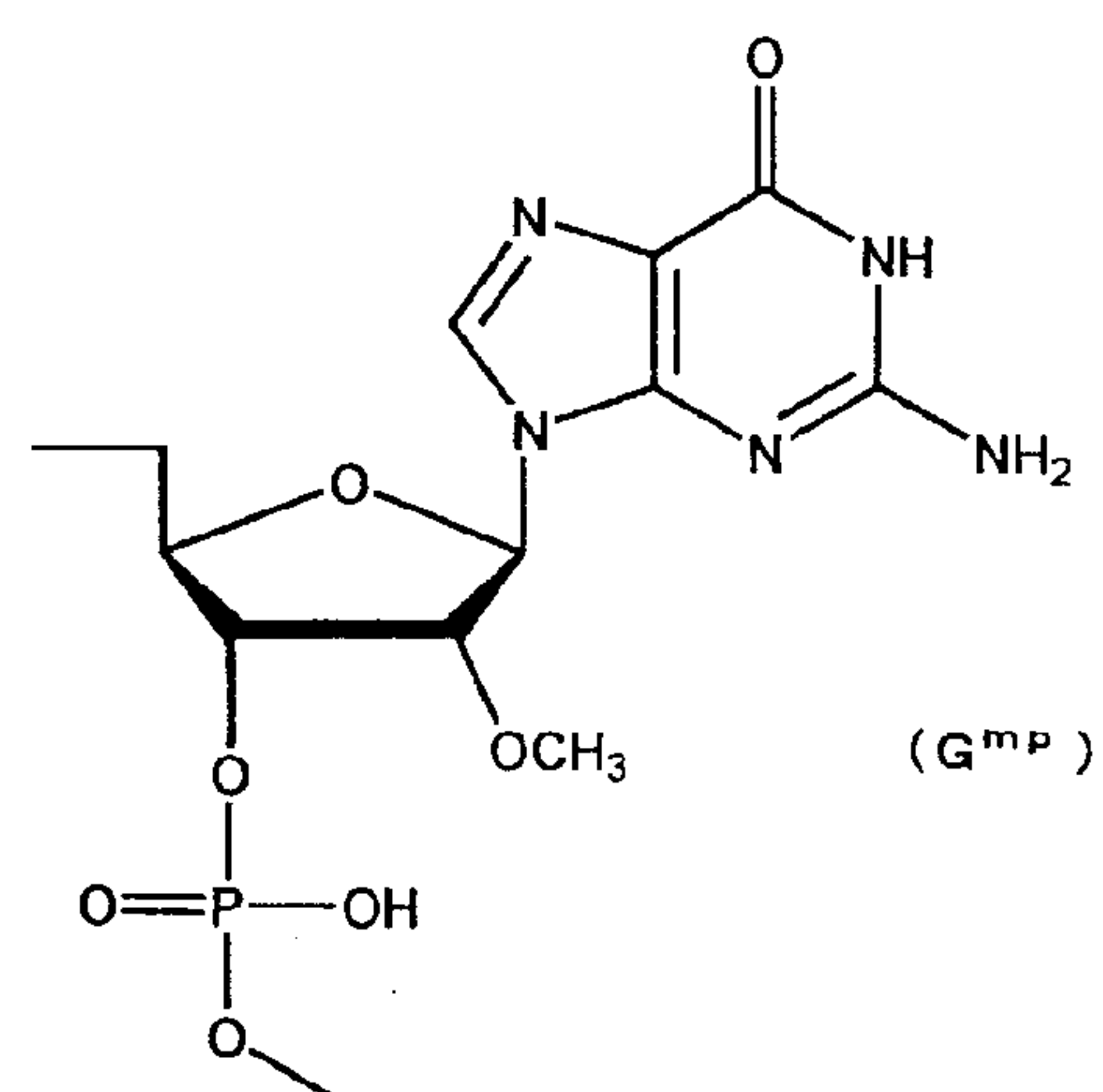
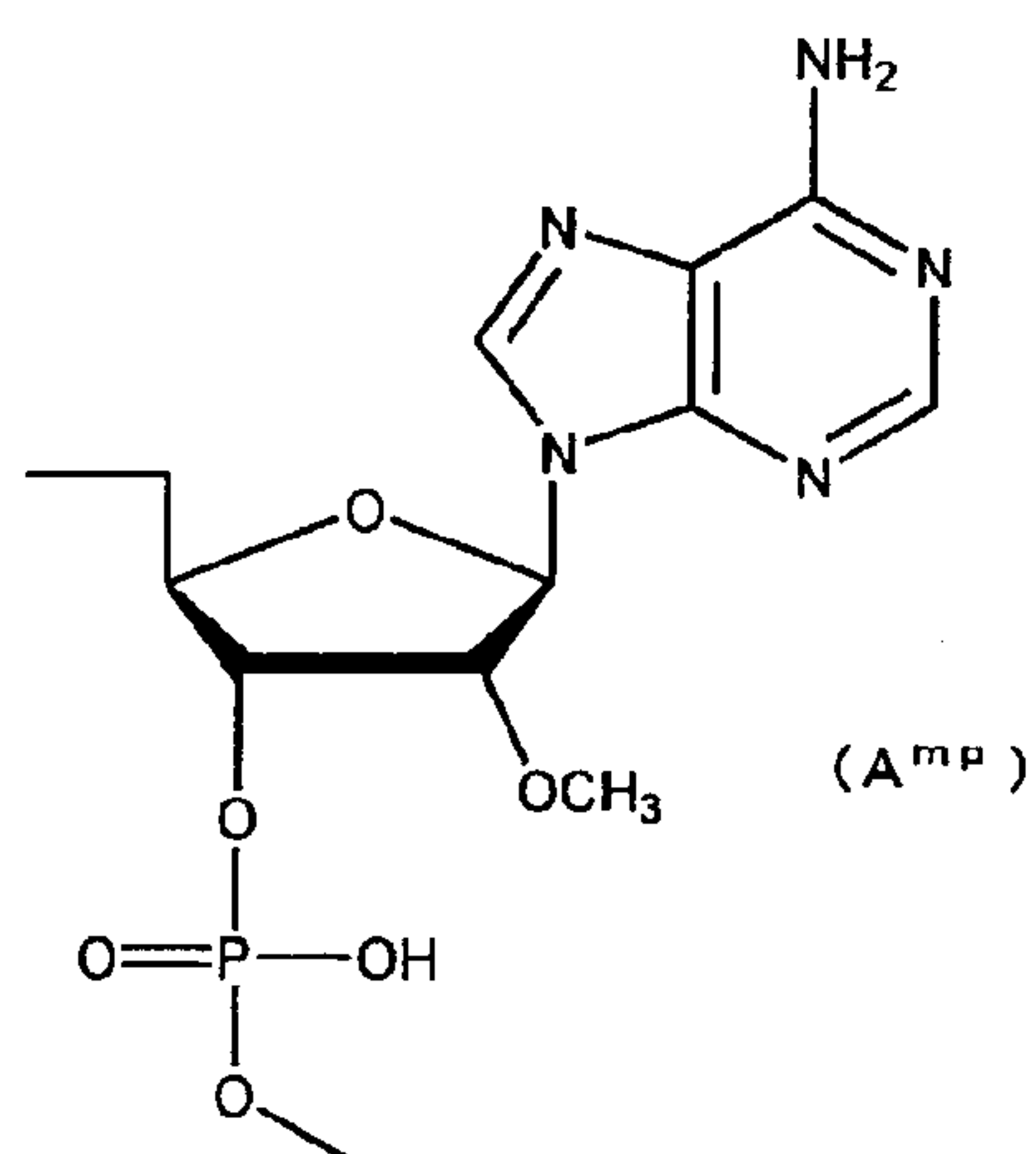
In the present specification, A^{elp} , G^{elp} , C^{elp} , T^{elp} , A^{e2p} , G^{e2p} , C^{e2p} , T^{e2p} , A^{mp} , G^{mp} , C^{mp} , U^{mp} , A^{els} , G^{els} , C^{els} , T^{els} , A^{e2s} , G^{e2s} , C^{e2s} , T^{e2s} , A^{ms} , G^{ms} , C^{ms} , U^{ms} and Ph are groups having the following structures, respectively.

15

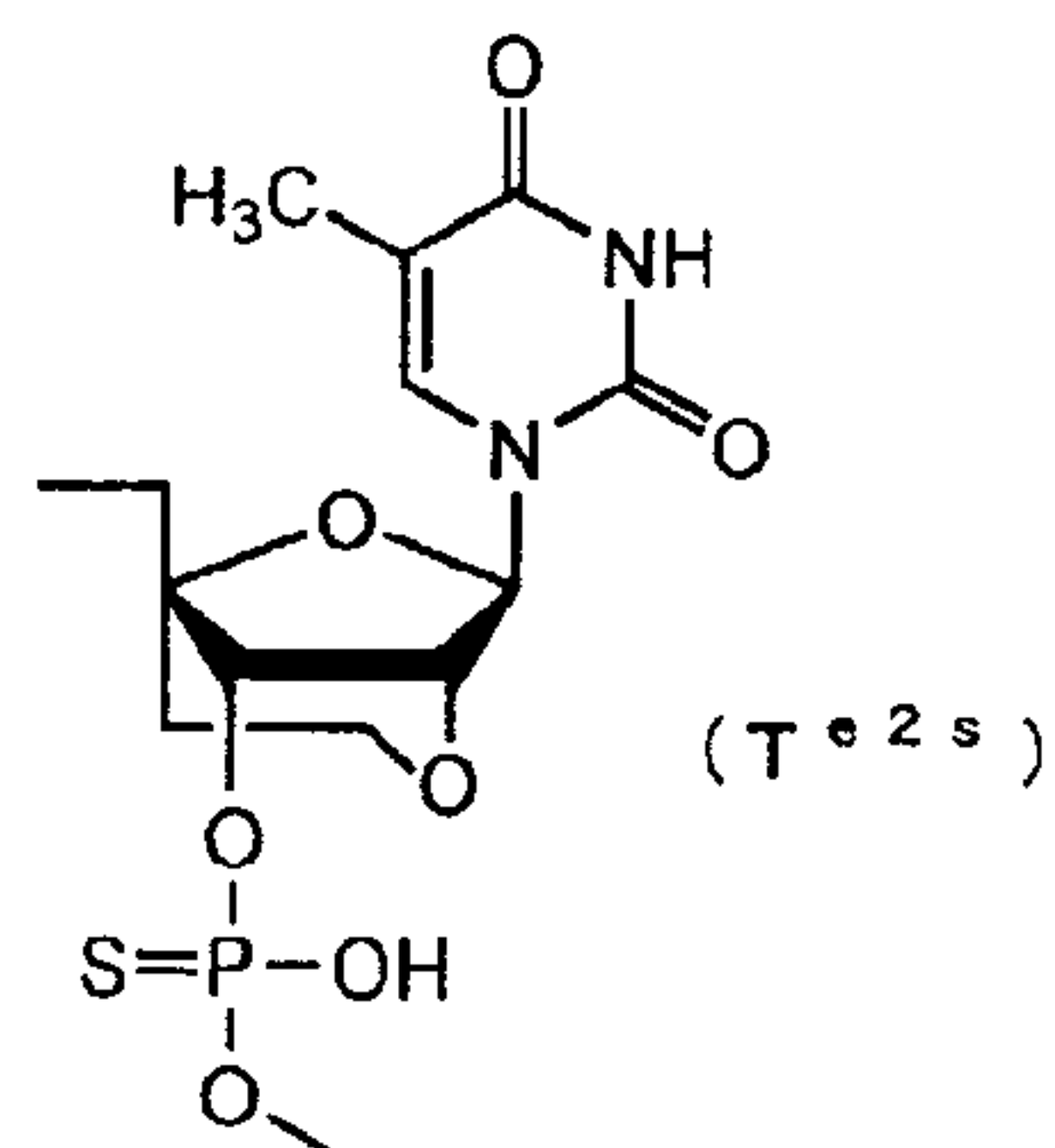
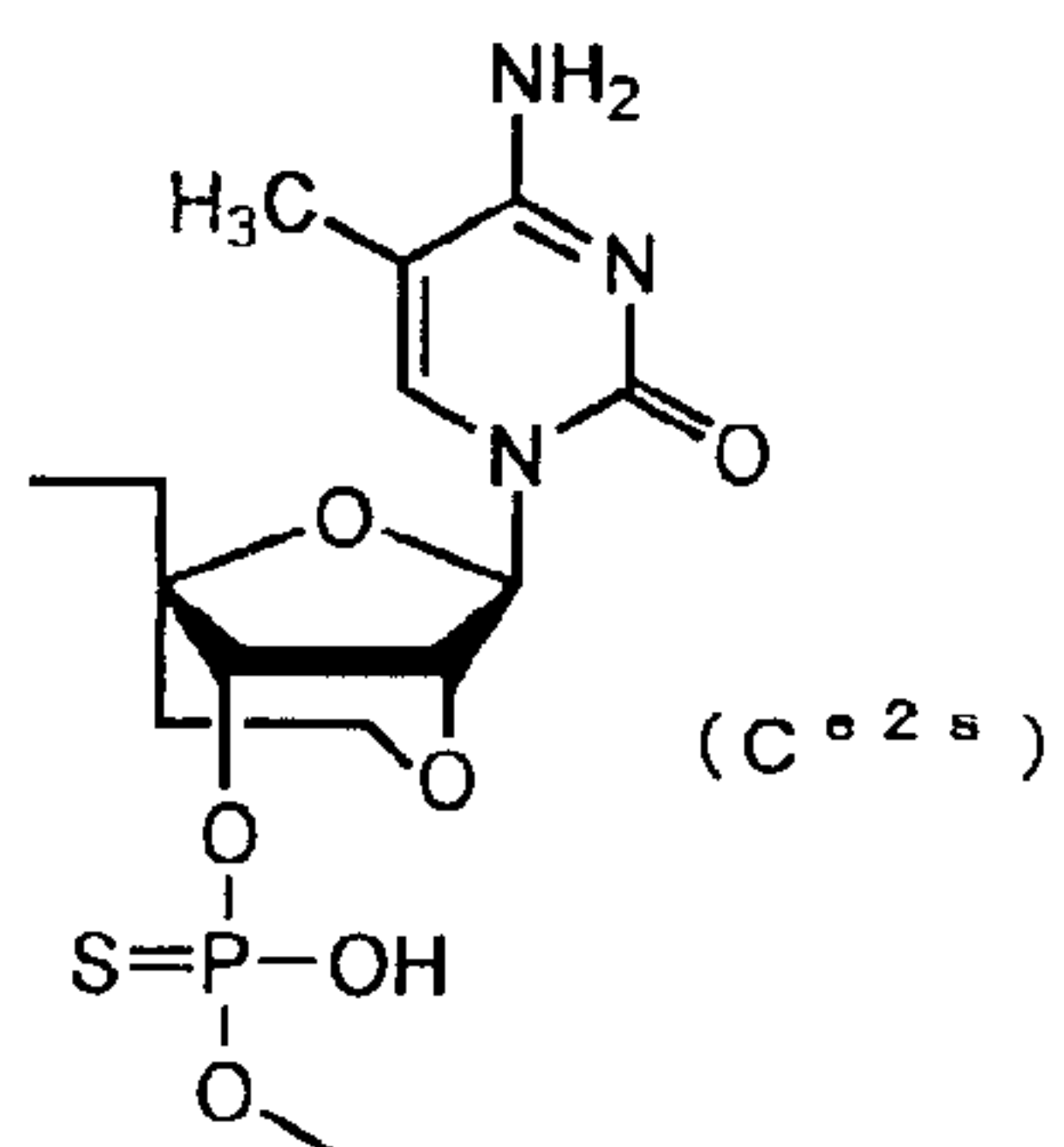
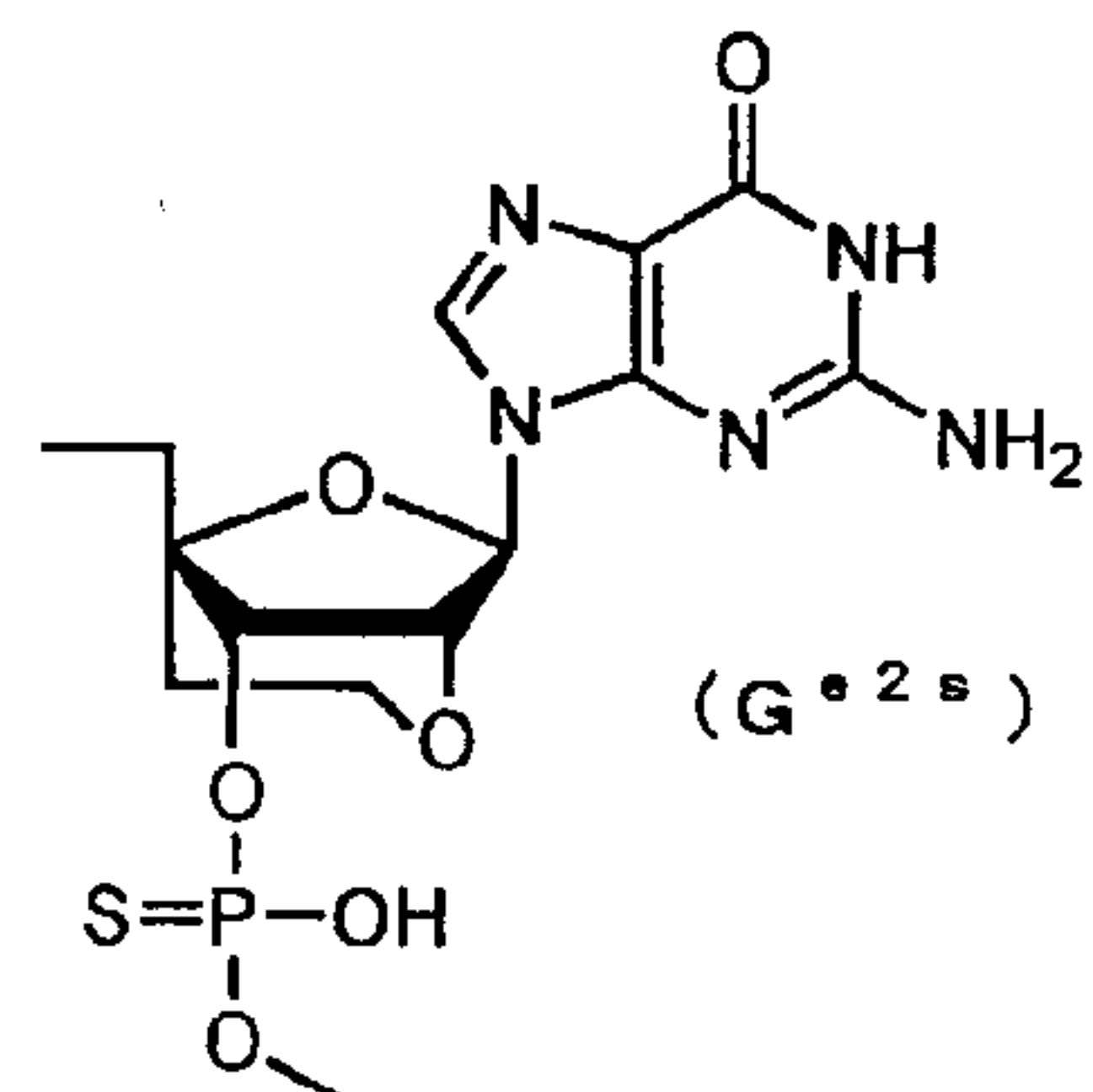
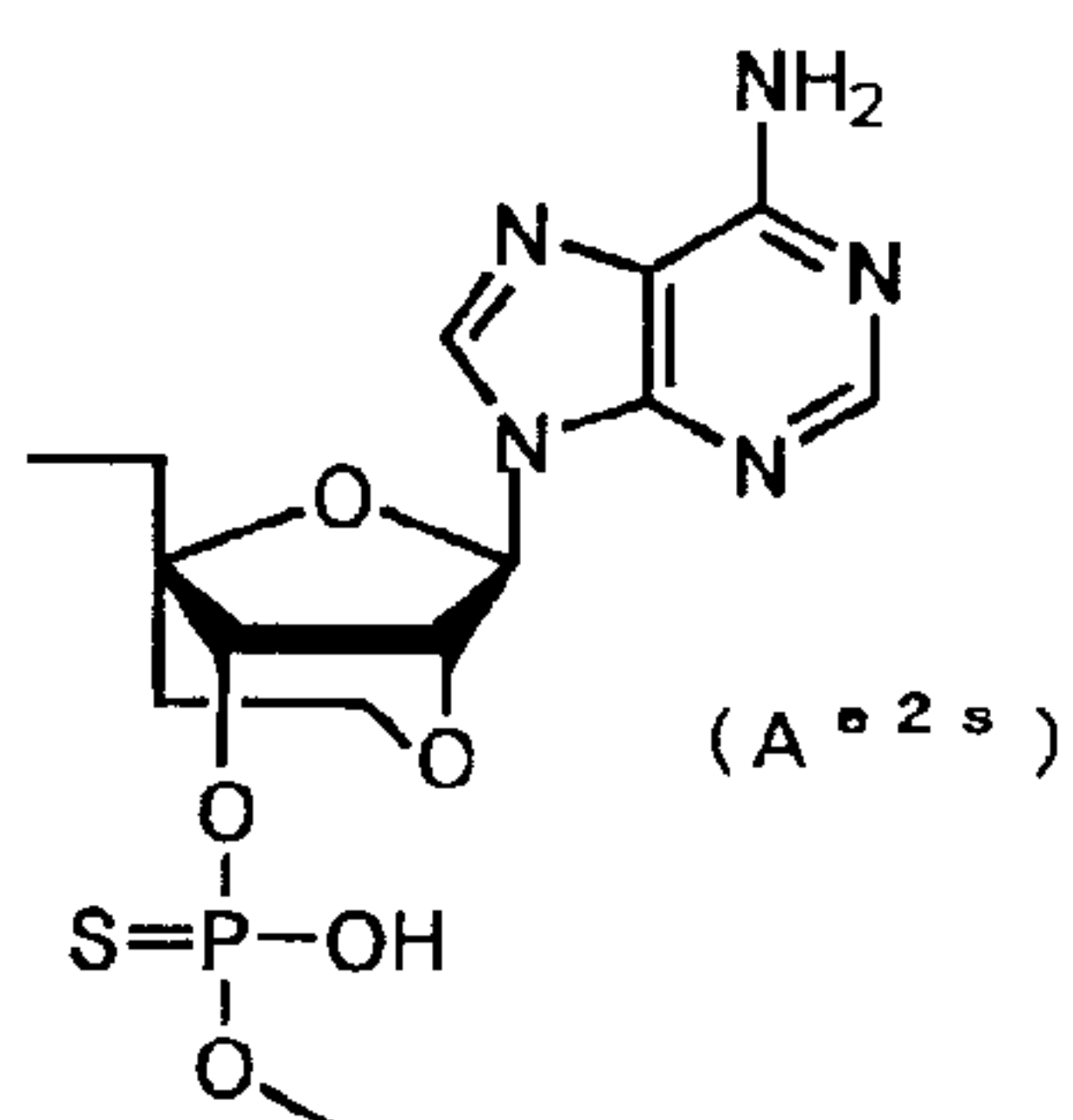
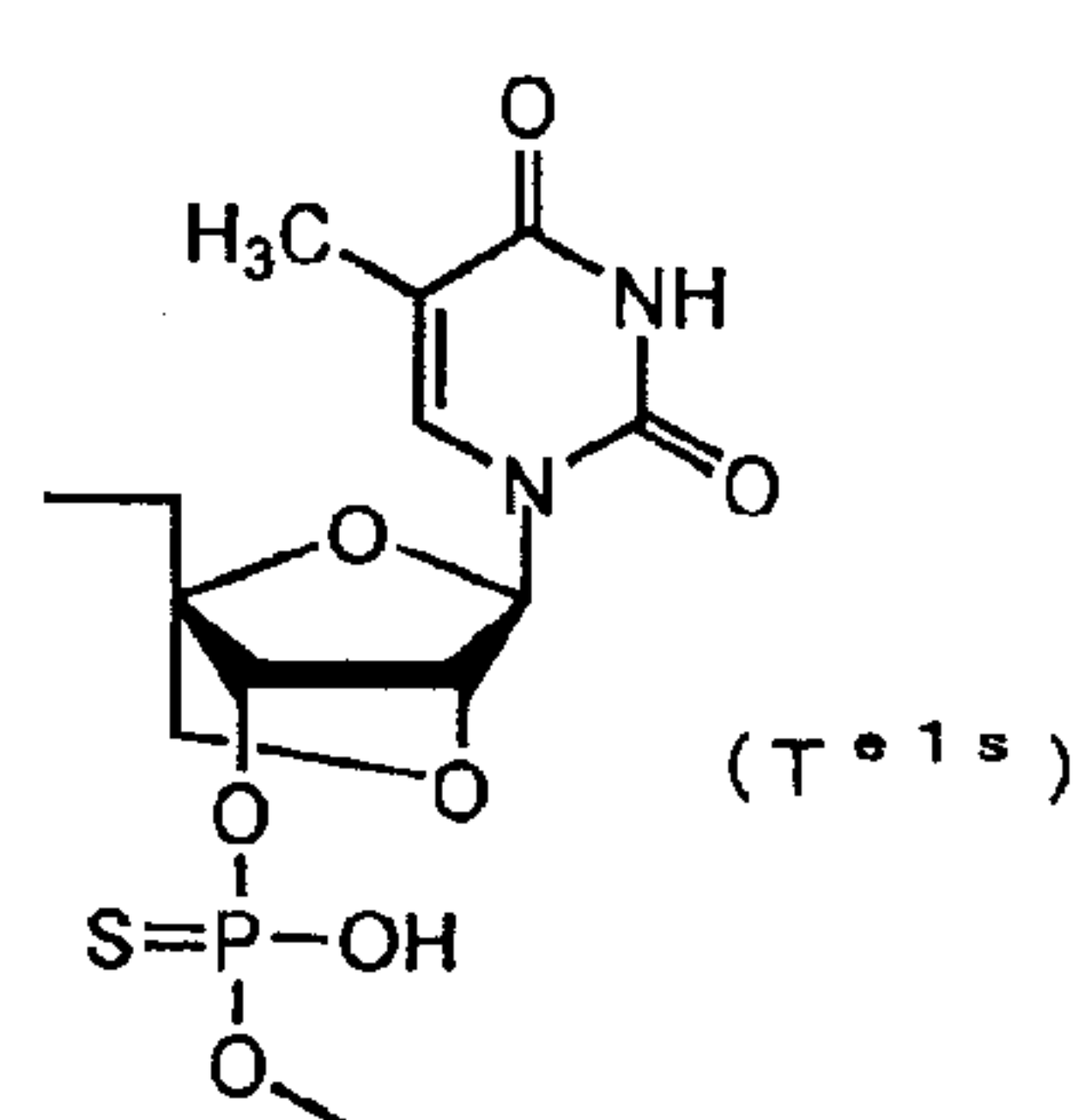
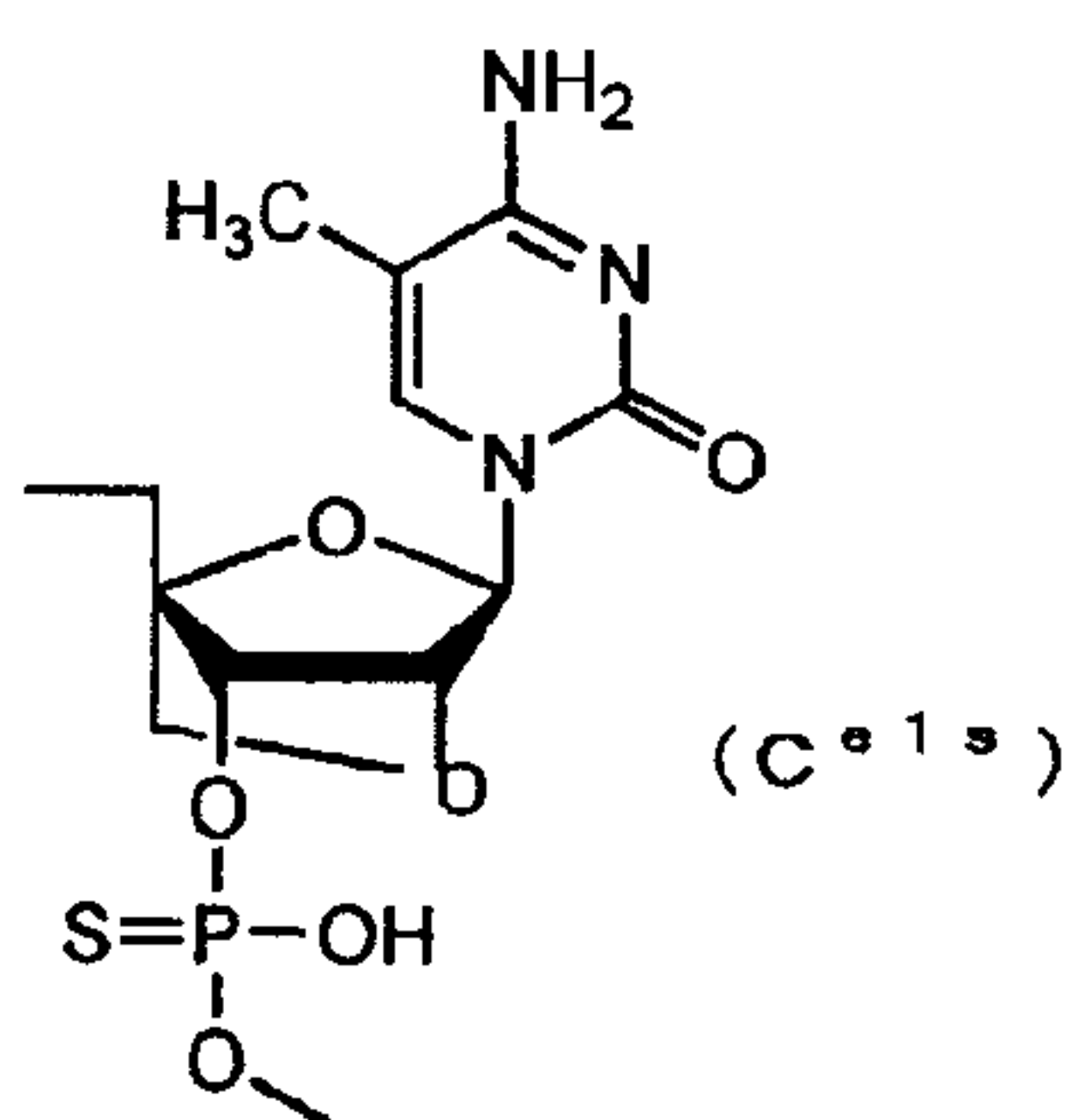
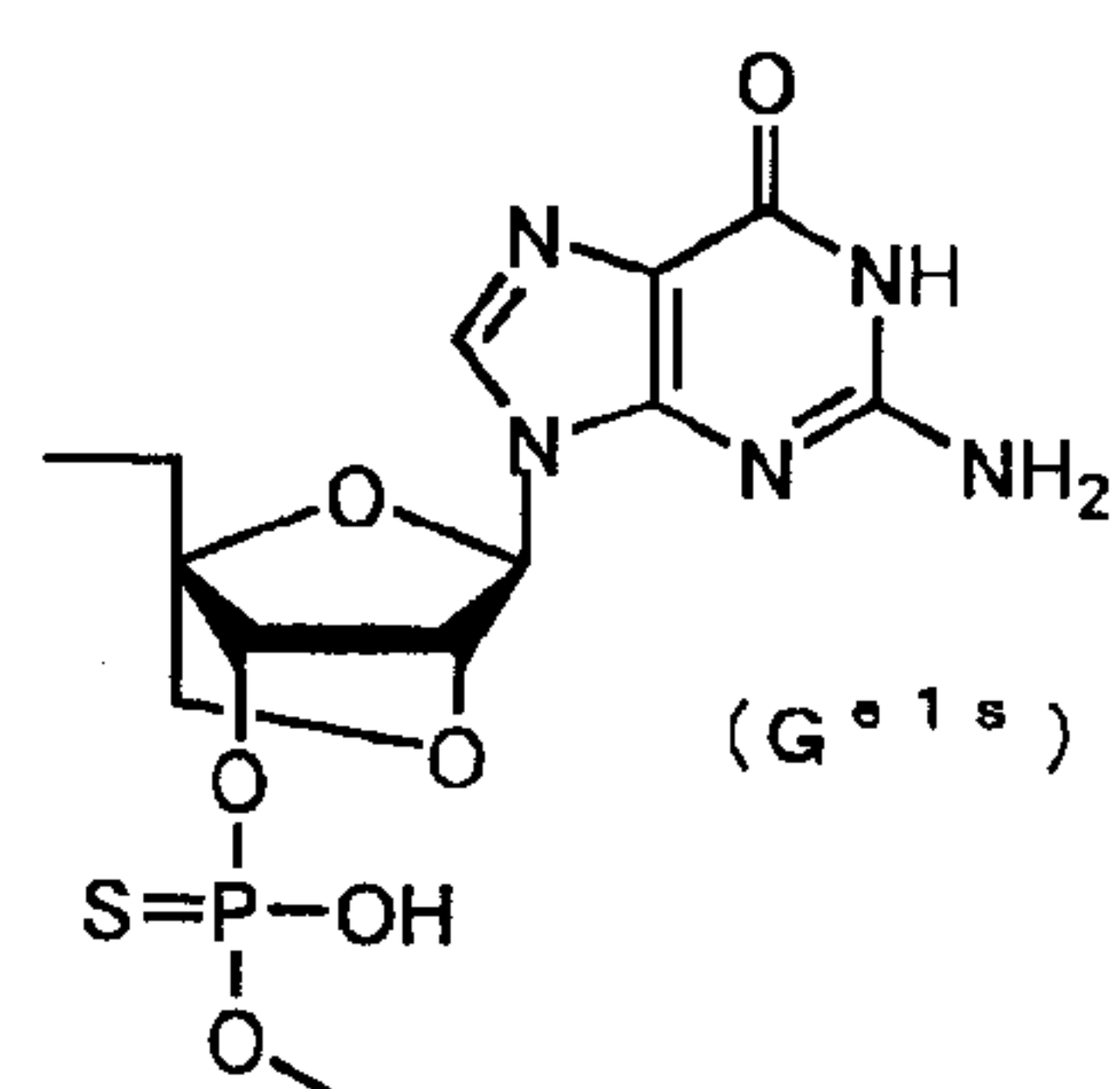
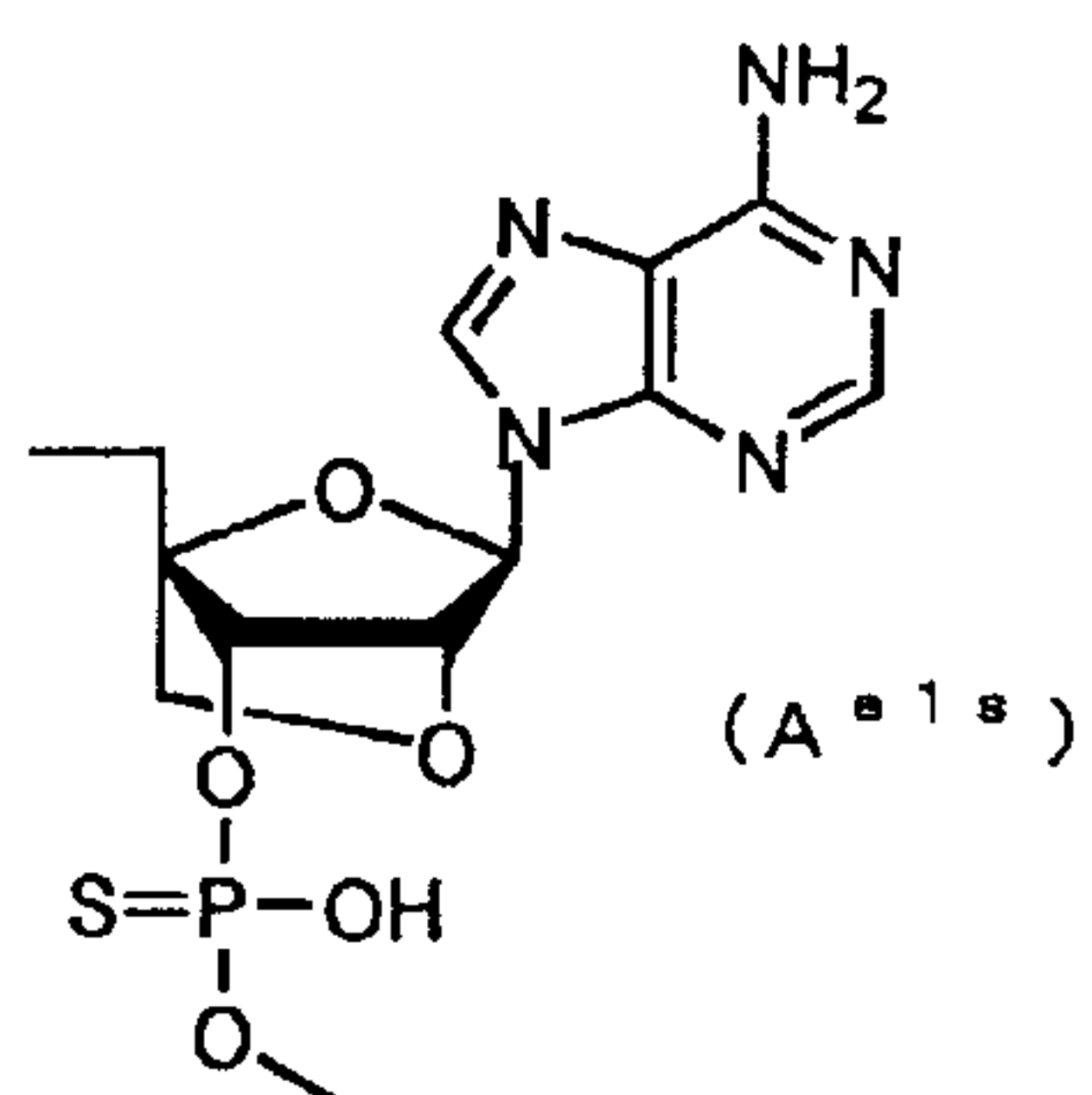
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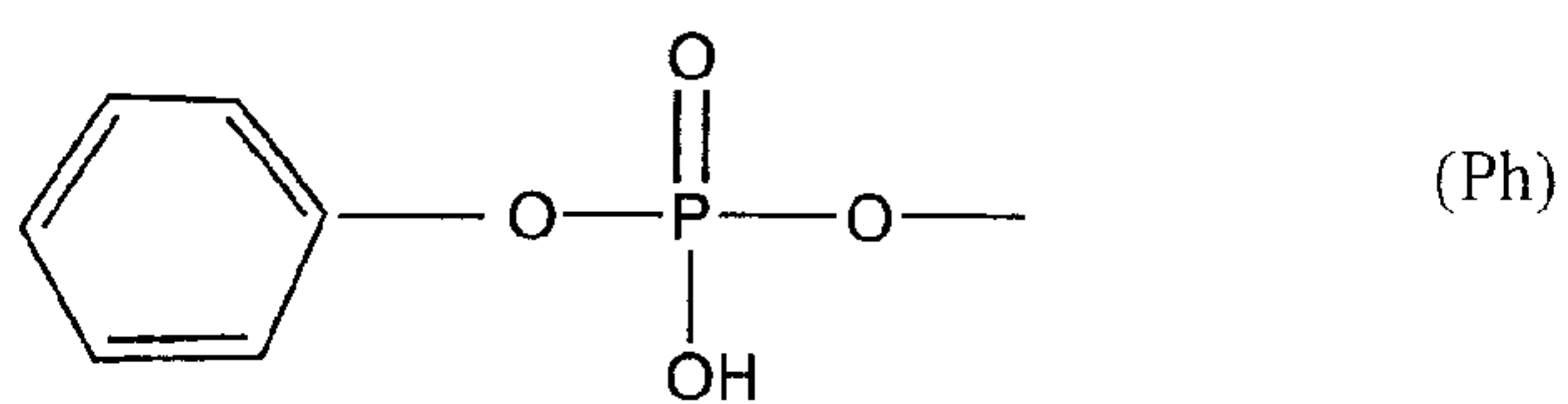
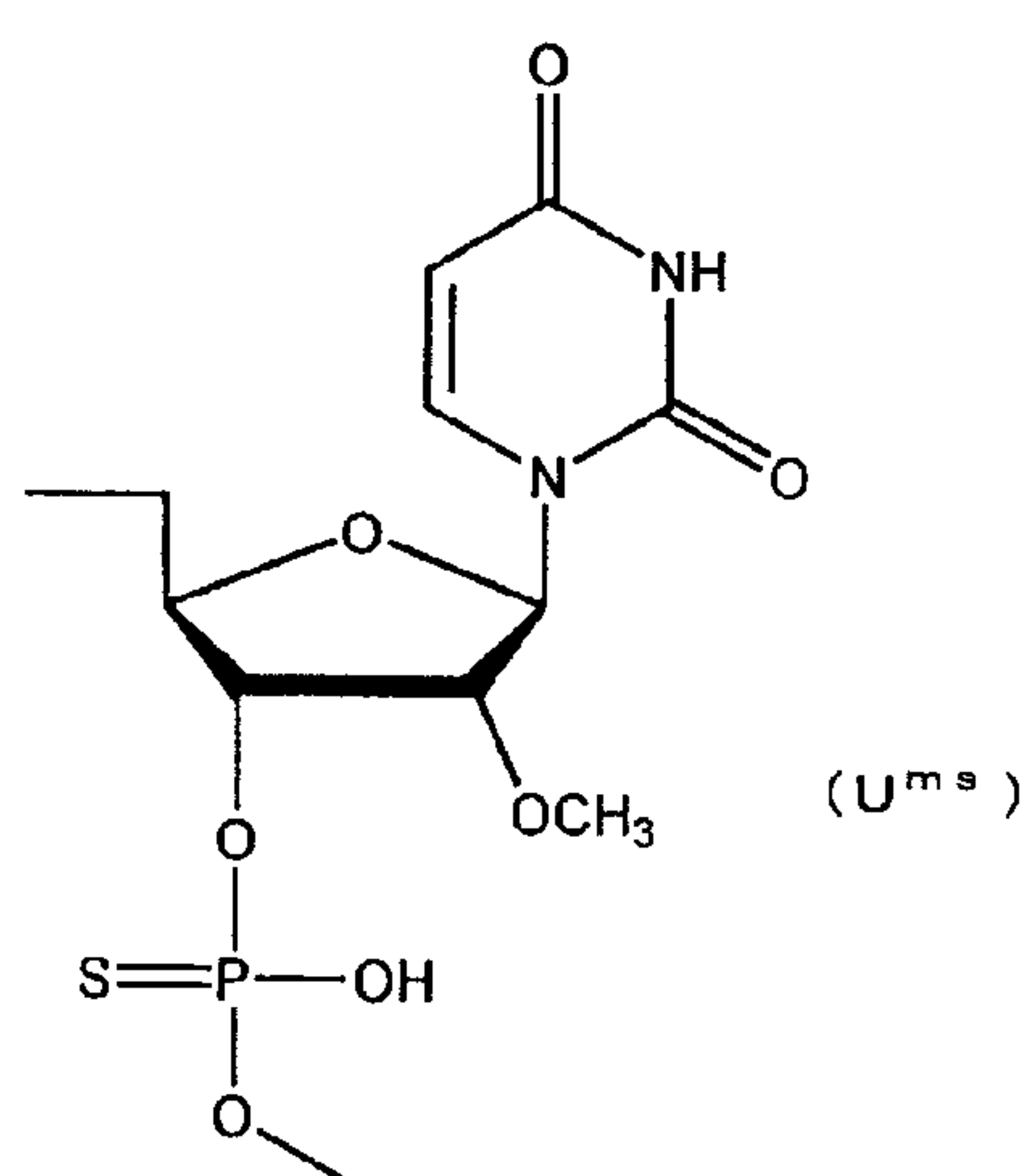
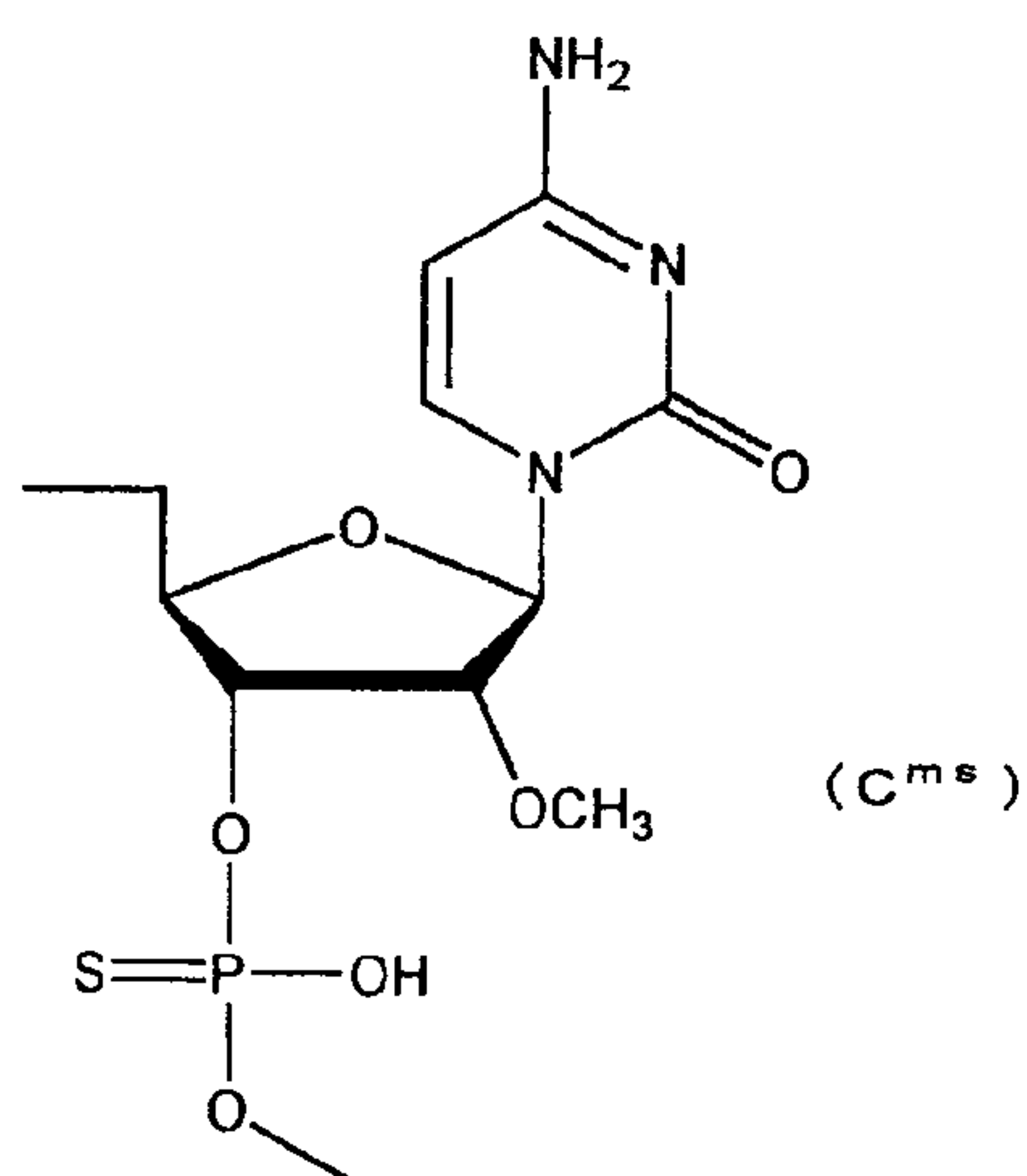
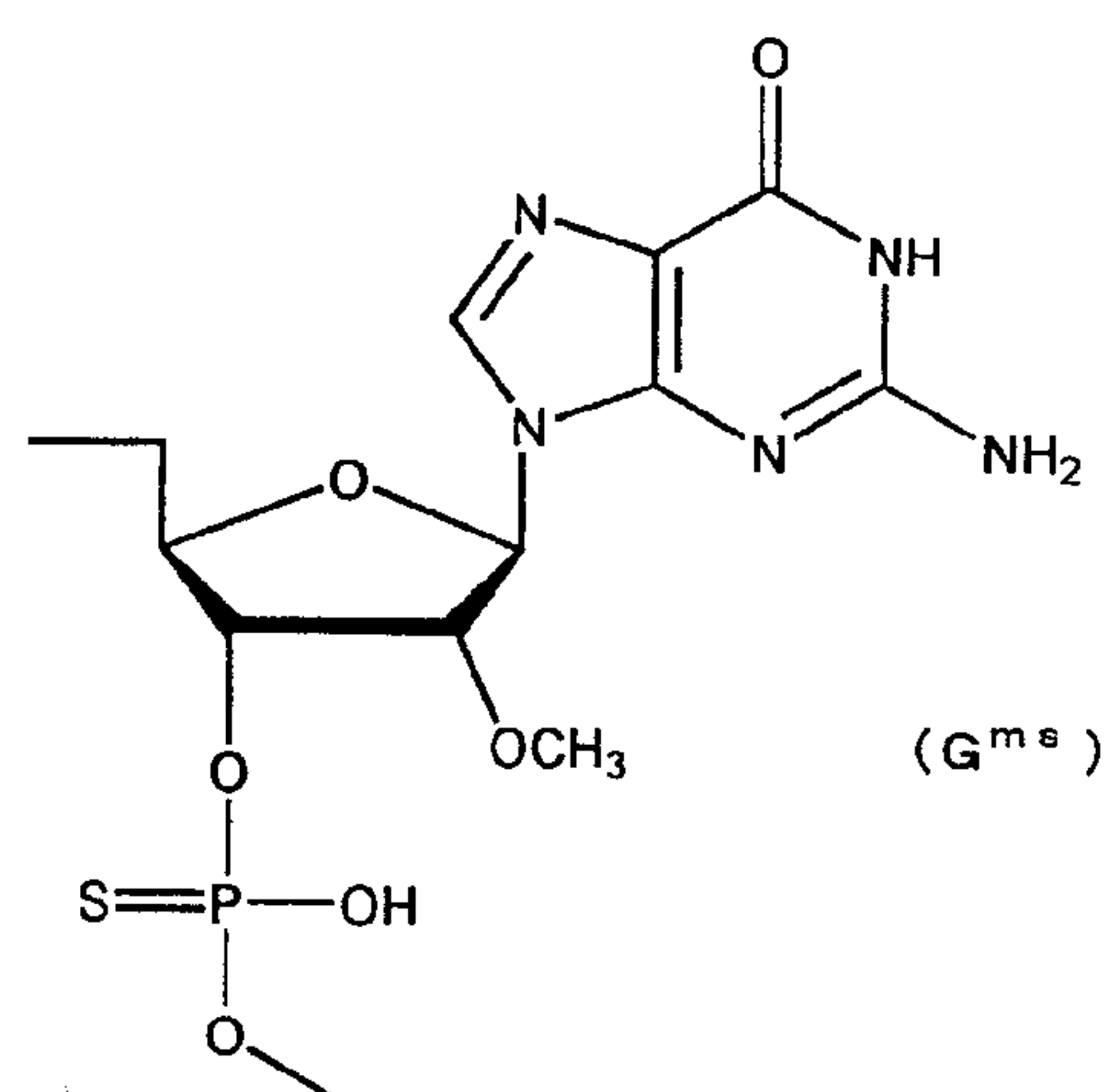
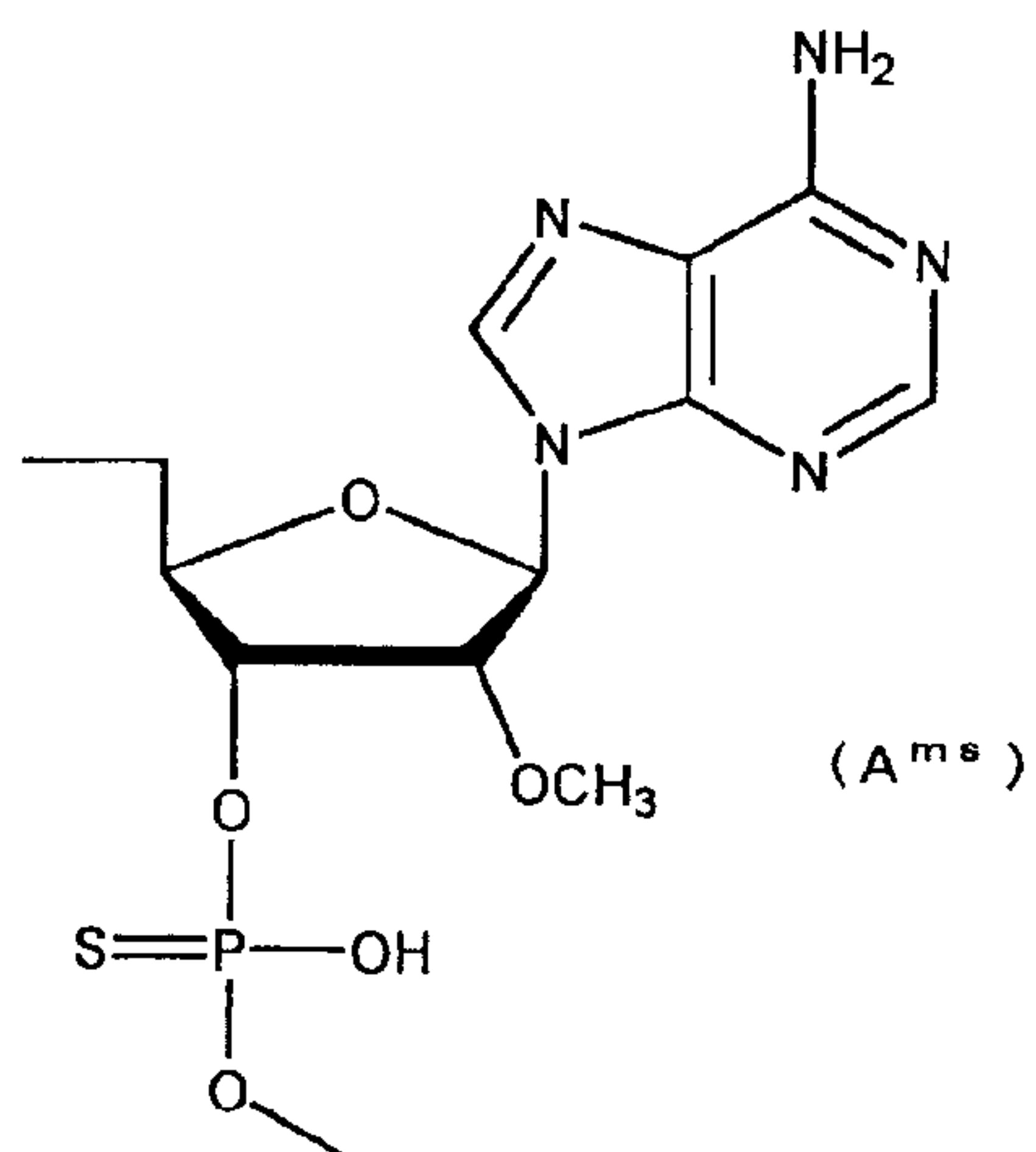
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The term “pharmacologically acceptable salt thereof” used in the present specification refers to salts of the oligonucleotide of the invention (e.g. oligonucleotide having the nucleotide sequence as shown in any one of SEQ ID NOS: 1-6, 10-22, 30-78, 87 or 88) or salts of those compounds represented by general formulas (I), (I') to (VII') and (I'') to (XXI''). Examples of such salts include metal salts such as alkali metal salts (e.g. sodium salts, potassium salts, lithium salts), alkaline earth metal salts (e.g. calcium salts, magnesium salts), aluminium salts, iron salts, zinc salts, copper salts, nickel salts, cobalt salts and the like; amine salts such as inorganic salts (e.g. ammonium salts), organic salts [e.g. t-octylamine salts, dibenzylamine salts, morpholine salts, glucosamine salts, phenylglycine alkyl ester salts, ethylenediamine salts, N-methylglucamine salts, guanidine salts, diethylamine salts, triethylamine salts, dicyclohexylamine salts; N',N'-dibenzylethylenediamine salts, chloroprocaine salts, procaine salts, diethanolamine salts, N-benzyl-phenethylamine salts, piperazine salts, tetramethylammonium salts, tris(hydroxymethyl)aminomethane salts] and the like; inorganic acid salts such as halogenated hydroacid salts (e.g. hydrofluorates, hydrochlorides, hydrobromates, hydriodates), nitrates, perchlorates, sulfates, phosphates and the like; organic acid salts such as lower alkane sulfonates (e.g. methanesulfonates, trifluoromethanesulfonates, ethanesulfonates), aryl sulfonates (e.g. benzensulfonates, p-toluenesulfonates), acetates, malates, fumarates, succinates, citrates, tartrates, oxalates, maleates and the like; and amino acid salts (e.g. glycine salts, lysine salts, arginine salts, ornithine salts, glutamates, aspartates). These salts may be prepared according to known methods.

It should be noted that compounds represented by general formulas (I), (I') to (VII') and (I'') to (XXI'') may occur as hydrates and that such hydrates are also included in the present invention.

The oligonucleotide of the invention, the compounds represented by general formulas (I), (I') to (VII') and (I'') to (XXI'') (hereinafter, referred to as the “compound of the invention”) and pharmacologically acceptable salts thereof are effective as pharmaceuticals for treating muscular dystrophy.

The compound of the invention may be synthesized based on the method described in the literature (Nucleic Acids Research, 12: 4539 (1984)) using a commercial synthesizer (e.g. PerkinElmer Model 392 employing the phosphoroamidite method). As to the

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phosphoroamidite reagents used in the synthesis, commercial reagents are available for natural nucleosides and 2'-O-methylnucleosides (i.e. 2'-O-methylguanosine, 2'-O-methyladenosine, 2'-O-methylcytosine and 2'-O-methyluridine). As to 2'-O-alkyl-guanosine, -adenosine, -cytosine and -uridine where the alkyl group has 2-6
5 carbon atoms, they may be synthesized or purchased as described below.

2'-O-aminoethyl-guanosine, -adenosine, -cytosine and -uridine may be synthesized according to Blommers et al., *Biochemistry* (1998), 37: 17714-17725.

2'-O-propyl-guanosine, -adenosine, -cytosine and -uridine may be synthesized according to Lesnik, E.A. et al., *Biochemistry* (1993), 32: 7832-7838.

10 2'-O-allyl-guanosine, -adenosine, -cytosine and -uridine are commercially available.

2'-O-methoxyethyl-guanosine, -adenosine, -cytosine and -uridine may be synthesized according to U.S. Patent No. 6261840 or Martin, P., *Helv. Chim. Acta.* (1995) 78: 486-504.

15. 2'-O-butyl-guanosine, -adenosine, -cytosine and -uridine may be synthesized according to Lesnik, E.A. et al., *Biochemistry* (1993), 32: 7832-7838.

2'-O-pentyl-guanosine, -adenosine, -cytosine and -uridine may be synthesized according to Lesnik, E.A. et al., *Biochemistry* (1993), 32: 7832-7838.

20 2'-O-propargyl-guanosine, -adenosine, -cytosine and -uridine are commercially available.

2'-O,4'-C-methylene-guanosine, -adenosine, 5-methyl-cytosine and -thymidine may be synthesized according to the method described in WO99/14226. 2'-O,4'-C-alkylene-guanosine and -adenosine where the alkylene group has 2-5 carbon atoms, 5-methyl-cytosine and -thymidine may be synthesized according to the method
25 described in WO00/47599.

In the thioation of phosphate groups, thioate derivatives may be obtained based on the methods described in *Tetrahedron Letters*, 32, 3005 (1991) and *J. Am. Chem. Soc.*, 112, 1253 (1990), using sulfur and a reagent such as tetraethylthiuram disulfide (TETD; Applied Biosystems) or Beaucage reagent (Glen Research) which reacts with a trivalent phosphate
30 to form a thioate.

With respect to the controlled pore glass (DPG) used in the synthesizer, use of a modified CPG (described in Example 12b of Japanese Unexamined Patent Publication No.

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H7-87982) allows synthesis of oligonucleotides to which 2-hydroxyethylphosphate group is attached at the 3' end. Further, use of 3'-amino-Modifier C3 CPG, 3'-amino-Modifier C7 CPG, Glyceryl CPG (Glen Research), 3'-specer C3 SynBase CPG 1000 or 3'-specer C9 SynBase CPG 1000 (Link Technologies) allows synthesis of oligonucleotides to which a
 5 hydroxyalkylphosphate group or aminoalkylphosphate group is attached at the 3' end.

The compounds of the present invention and pharmacologically acceptable salts thereof have an effect of inducing skipping of exon 19, 41, 45, 46, 44, 50, 55, 51 or 53 of the dystrophin gene. The compounds of the invention represented by general formulas (I), (I') to (VII') and (I'') to (XXI'') and pharmacologically acceptable salts thereof have high
 10 binding strength to RNA and high resistance to nuclease. Therefore, the compounds of the invention and pharmacologically acceptable salts thereof are useful as pharmaceuticals for treating muscular dystrophy.

When the compound of the invention or a pharmacologically acceptable salt thereof is used as a therapeutic for muscular dystrophy, the compound or a
 15 pharmacologically acceptable salt or ester thereof may be administered by itself. Alternatively, the compound or a pharmacologically acceptable salt or ester thereof may be mixed with appropriate pharmacologically acceptable excipients or diluents, prepared into tablets, capsules, granules, powders, syrups, etc. and administered orally; or prepared into injections, suppositories, patches, external medicines, etc. and administered parenterally.

20 These formulations may be prepared by well-known methods using additives such as excipients [organic excipients e.g. sugar derivatives (such as lactose, white sugar, glucose, mannitol and sorbitol), starch derivatives (such as corn starch, potato starch, α starch and dextrin), cellulose derivatives (such as crystalline cellulose), gum arabic, dextran, pullulan and the like; and inorganic excipients e.g. silicate derivatives (such as light silicic acid
 25 anhydride, synthetic aluminium silicate, calcium silicate and magnesium aluminate metasilicate), phosphates (such as calcium hydrogenphosphate), carbonates (such as calcium carbonate), sulfates (such as calcium sulfate) and the like], lubricants (e.g. metal salts of stearic acid such as stearic acid, calcium stearate, and magnesium stearate; talc; colloidal silica; waxes such as bees wax and spermaceti; boric acid; adipic acid; sulfates
 30 such as sodium sulfate; glycol; fumaric acid; sodium benzoate; DL leucine; lauryl sulfates such as sodium lauryl sulfate and magnesium lauryl sulfate; silicic acid materials such as silicic acid anhydride and silicic acid hydrate; above-mentioned starch derivatives), binders

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(e.g. hydroxypropylcellulose, hydroxypropylmethylcellulose, polyvinylpyrrolidone, macrogol, compounds enumerated above as excipients), disintegrants (e.g. cellulose derivatives such as low-substituted hydroxypropylcellulose, carboxymethylcellulose, calcium carboxymethylcellulose, internally crosslinked sodium carboxymethylcellulose; 5 chemically modifies starches/celluloses such as carboxymethyl starch, sodium carboxymethyl starch, crosslinked polyvinylpyrrolidone), emulsifiers (e.g. colloidal clay such as bentonite, Veegum; metal hydroxides such as magnesium hydroxide, aluminium hydroxide; anionic surfactants such as sodium lauryl sulfate, calcium stearate; cation surfactants such as benzalkonium chloride; nonionic surfactants such as polyoxyethylene 10 alkyl ethers, polyoxyethylene sorbitan fatty acid esters, sucrose fatty acid ester), stabilizers (e.g. paraoxybenzoic acid esters such as methyl paraben, propyl paraben; alcohols such as chlorobutanol, benzyl alcohol, phenylethyl alcohol; benzalkonium chloride; phenols such as phenol, cresol; thimerosal; dehydroacetic acid; sorbic acid), flavoring/aromatic agents (e.g. conventionally used sweeteners, acidifiers, aromatics, etc.) or diluents.

15 The therapeutic agent of the present invention comprises preferably 0.05-5 μ moles/ml of the compound of the invention or a pharmacologically acceptable salt thereof, 0.02-10% w/v of carbohydrates or polyhydric alcohols, and 0.01-0.4% w/v of pharmacologically acceptable surfactants. More preferable range for the content of the compound of the invention or a pharmacologically acceptable salt thereof is 20 0.1-1 μ moles/ml.

For the above carbohydrates, monosaccharides and/or disaccharides are especially preferable. Examples of these carbohydrates and polyhydric alcohols include, but are not limited to, glucose, galactose, mannose, lactose, maltose, mannitol and sorbitol. These may be used alone or in combination.

25 Preferable examples of surfactants include, but are not limited to, polyoxyethylene sorbitan mono- to tri-esters, alkyl phenyl polyoxyethylene, sodium taurocholate, sodium cholate and polyhydric alcohol esters. Especially preferable are polyoxyethylene sorbitan mono- to tri-esters, where especially preferable esters are oleates, laurates, stearates and palmitates. These surfactants may be used alone or in combination.

30 More preferably, the therapeutic agent of the invention comprises 0.03-0.09 M of pharmacologically acceptable neutral salt, e.g. sodium chloride, potassium chloride and/or calcium chloride.

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Still more preferably, the therapeutic agent of the invention may comprise 0.002-0.05 M of pharmacologically acceptable buffer. Examples of preferable buffers include sodium citrate, sodium glycinate, sodium phosphate and tris(hydroxymethyl)aminomethane. These buffers may be used alone or in combination.

5 The above-described therapeutic agent of the invention may be supplied in the state of solution. However, considering the storing of the therapeutic agent for some period of time, usually, it is preferable to lyophilize the therapeutic agent for the purpose of stabilizing the antisense oligonucleotide and thereby preventing the lowering of its therapeutic effect. The lyophilized therapeutic agent may be reconstructed with a
10 dissolving liquid (e.g. distilled water for injection) at the time of use, and used in the state of solution. Thus, the therapeutic agent of the invention encompasses such a lyophilized therapeutic agent to be reconstructed with a dissolving liquid at the time of use so that individual components fall under specific concentration ranges. In order to enhance the solubility of the lyophilized product, the therapeutic agent may further contain albumin or
15 amino acids such as glycine.

When the compound of the invention or a pharmacologically acceptable salt thereof is administered to humans, for example, the compound or salt may be administered orally or intravenously at a dose of about 0.1-100 mg/kg body weight per day, preferably 1-50 mg/kg body weight per day for adult patients once a day or divided into several
20 portions. The dose and the number of times of administration may be appropriately changed depending on the type of disease, conditions, the age of the patient, the route of administration, etc.

Administration of the compound of the invention or a pharmacologically acceptable salt thereof to DMD patients may be performed, for example, as described below.
25 Briefly, the compound of the invention or a pharmacologically acceptable salt thereof may be prepared by methods well-known to those skilled in the art, sterilized by conventional methods and then formulated into, for example, an injection solution with a concentration of 1200 µg/ml. This solution is, for example, drip-fed to the patient intravenously in the form of infusion so that the antisense oligonucleotide is administered to the patient at a dose of,
30 for example, 20 mg/kg body weight. Such administration may be repeated, for example, 4 times at intervals of 2 weeks. Then, while confirming the therapeutic effect using indicators such as expression of dystrophin protein in muscle biopsy tissues, serum creatine

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kinase levels and clinical symptoms, this treatment is repeated appropriately. If therapeutic effect is recognized and yet no definite side effect is observed, this treatment is continued; in principle, the administration is continued throughout life time.

The present specification includes the contents disclosed in the specifications
 5 and/or drawings of the Japanese Patent Applications No. 2002-340857 and No. 2003-204381 based on which the present application claims priority.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a photograph of electrophoresis showing the results of amplification of
 10 exons 17-20 by RT-PCR using RNAs extracted from muscular cells transfected with the compound of Example 1 (AO1) and from untreated muscular cells.

Fig. 2 a photograph of electrophoresis showing the results of amplification of
 exons 17-20 by RT-PCR using RNAs extracted from muscular cells transfected with any
 one of the compounds of Examples 1-7 (AO1, AO14, AO15, AO16, AO18, AO19 and
 15 AO25), 13 (AO17) and 14 (AO24) and from untreated muscular cells.

Fig. 3 a photograph of electrophoresis showing the results of amplification of
 exons 17-20 by RT-PCR using RNAs extracted from muscular cells transfected with any
 one of the compounds of Examples 5 (AO18) and 8-12 (AO50, AO51, AO52, AO53 and
 AO54) and from untreated muscular cells.

Fig. 4 shows the effects of the compounds of Examples 15-19 (AO20, AO26,
 20 AO55, AO56 and AO57) on exon 41 skipping.

Fig. 5 shows the effects of the compounds of Examples 17-25 (AO55, AO56,
 AO57, AO76, AO77, AO78, AO79, AO80 and AO81) on exon 41 skipping.

Fig. 6 shows the effects of the compounds of Examples 26-29 (AO33, AO85,
 25 AO86 and AO87) on exon 45 skipping.

Fig. 7 shows the effects of the compounds of Examples 32-35 (AO23, AO27,
 AO28 and AO29) on exon 46 skipping.

Fig. 8 shows the effects of the compounds of Examples 33 and 36 (AO27 and
 AO48) on exon 46 skipping.

Fig. 9 shows the effects of the compounds of Examples 31, 33 and 34 and the
 30 compounds of Reference Examples 1-3 (AO2, AO27 and AO28; hAON4, hAON6 and hAON8) on exon 46 skipping.

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Fig. 10 shows the effects of the compounds of Examples 42-47 (AO100, AO102, AO103, AO104, AO105 and AO106) on exon 44 skipping.

Fig. 11 shows the effects of the compounds of Examples 42, 62, 63, 47, 64, 46 and 65 (AO100, AO124, AO125, AO106, AO126, AO105 and AO127) on exon 44 skipping.

5 Fig. 12 shows the effects of the compounds of Examples 48-53 (AO108, AO109, AO110, AO111, AO112 and AO113) on exon 50 skipping.

Fig. 13 shows the effects of the compounds of Examples 49, 51, 52 and 66 (AO109, AO111, AO112 and AO128) on exon 50 skipping.

10 Fig. 14 shows the effects of the compounds of Examples 68-71 (AO3, AO4, AO5 and AO6) on exon 51 skipping.

Fig. 15 shows the effects of the compounds of Examples 72-74 (AO8, AO9 and AO10) on exon 51 skipping.

Fig. 16 shows the effect of the compound of Example 75 (AO37) on exon 51 skipping.

15 Fig. 17 shows the effects of the compounds of Examples 76-78 (AO39, AO43 and AO58) on exon 51 skipping.

Fig. 18 shows the effects of the compounds of Examples 79-86 (AO64, AO65, AO66, AO67, AO69, AO70, AO71 and AO72) on exon 53 skipping.

20 Fig. 19 shows the effects of the compounds of Examples 87-90 (AO95, AO96, AO97 and AO98) on exon 53 skipping.

Fig. 20 shows the effects of the compounds of Examples 54-61 (AO114, AO115, AO116, AO118, AO119, AO120, AO122 and AO123) on exon 55 skipping.

Fig. 21 shows the effects of the compounds of Examples 54, 55 and 67 (AO114, AO115 and AO129) on exon 55 skipping.

25 Fig. 22 shows the effects of the compounds of Examples 33, 37, 38, 39, 40 and 41 (AO27, AO89, AO90, AO91, AO92 and AO93) on exon 46 skipping.

BEST MODES FOR CARRYING OUT THE INVENTION

30 Hereinbelow, the present invention will be described specifically with reference to the following Examples. These Examples are provided only for the purpose of illustration, and they are not intended to limit the present invention.

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(EXAMPLE 1)

Synthesis

of

HO-G^{e2p}-C^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-
G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂OH (AO1)

5 The subject compound was synthesized with an automated nucleic acid synthesizer (PerkinElmer ABI model 394 DNA/RNA synthesizer) at a 40 nmol scale. The concentrations of solvents, reagents and phosphoroamidites at individual synthesis cycles were the same as used in the synthesis of natural oligonucleotides. The solvents, reagents and phosphoroamidites of 2'-O-methylnucleoside (adenosine form: product No. 27-1822-41; guanosine form: product No. 27-1826-41; cytidine form: product No. 27-1823-02; uridine form: product No. 27-1825-42) were products from Amersham Pharmacia. As non-natural phosphoroamidites, those compounds disclosed in Example 14 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-6-N-benzoyladenine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), Example 27 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-2-N-isobutylguanosine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), Example 22 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-4-N-benzoyl-5-methylcytidine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), and Example 9 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-5-methyluridine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite) of Japanese Unexamined Patent Publication No. 2000-297097 were used. The subject compound was synthesized on a modified control pore glass (CPG) (disclosed in Example 12b of Japanese Unexamined Patent Publication No. H7-87982) as a solid support. However, the time period for condensation of amidites was 15 min.

25 The protected oligonucleotide analogue having the sequence of interest was treated with concentrated aqueous ammonia to thereby cut out the oligomer from the support and, at the same time, remove the protective cyanoethyl groups on phosphorus atoms and the protective groups on nucleic acid bases. The solvent was distilled off under reduced pressure, and the resultant residue was purified by reversed phase HPLC [Shimadzu model 30 LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The

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fraction eluted at 6.06 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 9.61 min. (0.393 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm)

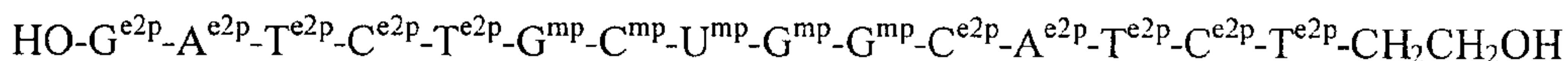
The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 10628.04; measured value: 10626.86).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2571-2607 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 2)

Synthesis

of



(AO14)

The compound of Example 2 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.64 min was collected. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm)]; solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 4.58 min. (0.806 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm)

The compound was identified by negative ion ESI mass spectrometric analysis

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(calculated value: 5281.60; measured value: 5281.40).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2592 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

5

(EXAMPLE 3)

Synthesis

of

HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{e2p}-
A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-CH₂CH₂OH (AO15)

10

The compound of Example 3 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.47 min was collected. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.38 min. (15.05
20 A₂₆₀ units) (λ_{max} (H₂O) = 259 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 7609.08; measured value: 7609.43).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2571-2592 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

25

(EXAMPLE 4)

Synthesis

of

HO-G^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{mp}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-
30 A^{mp}-G^{e2p}-CH₂CH₂OH (AO16)

The compound of Example 4 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by

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reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 55% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.23 min was collected.

5 When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 6.34 min. (6.13 A₂₆₀ units) (λ_{max} (H₂O) = 259.4 nm)

10 The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6968.69; measured value: 6969.14).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2573-2592 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

15

(EXAMPLE 5)

Synthesis of
HO-A^{mp}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-T^{e2p}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{e2p}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-
T^{e2p}-CH₂CH₂OH (AO18)

20 The compound of Example 5 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 5.39 min was collected.
25 When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 5.22 min. (6.88
30 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6623.48; measured value: 6623.68).

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The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

5 (EXAMPLE 6)

Synthesis

of

HO-G^{e2p}-C^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-A^{mp}-U^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-
G^{e2p}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH (AO19)

The compound of Example 6 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 5.10 min was collected. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.07 min. (6.98 A₂₆₀ units) (λ_{max} (H₂O) = 259 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 8300.57; measured value: 8300.14).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2601 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

25

(EXAMPLE 7)

Synthesis

of

HO-A^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-T^{e2p}-
C^{e2p}-T^{e2p}-CH₂CH₂OH (AO25)

30

The compound of Example 7 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by

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reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 4.71 min was collected.

5 When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 8.75 min. (5.26 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm)

10 The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6787.68; measured value: 6786.90).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

15

(EXAMPLE 8)

Synthesis of

HO-A^{ms}-G^{e2s}-C^{e2s}-T^{e2s}-G^{e2s}-A^{ms}-T^{e2s}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{e2s}-C^{e2s}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-

20 CH₂CH₂OH (AO50)

The compound of Example 5 having a sequence of interest was synthesized in the same manner as in Example 1 except for using a program for 1 μmol scale [installed in the automated nucleic acid synthesizer (PerkinElmer ABI model 394 DNA/RNA synthesizer)]. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed
 25 solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 55%
 30 (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 10.57 min was collected. When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate

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buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20→ 80% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 7.38 min. (49.06 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm)

The compound was identified by negative ion ESI mass spectrometric analysis
5 (calculated value: 6928.74; measured value: 6928.73).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

10 (EXAMPLE 9)

Synthesis

of

HO-A^{ms}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{ms}-T^{e2p}-C^{ms}-U^{ms}-G^{ms}-C^{ms}-U^{ms}-G^{ms}-G^{e2p}-C^{e2p}-A^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH (AO51)

The compound of Example 5 having a sequence of interest was synthesized in the
15 same manner as in Example 8 using a program for 1 μmol scale. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted
20 at 5.20 min was collected. When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20→ 80% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 4.48 min. (30.78 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm)

25 The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6768.08; measured value: 6768.06).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

30

(EXAMPLE 10)

Synthesis

of

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HO-A^{mp}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-G^{mp}-C^{e2p}-A^{mp}-T^{e2p}-C^{e2p}-
T^{e2p}-CH₂CH₂OH (AO52)

The compound of Example 5 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 5.32 min was collected. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 25% → 100% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 8.51 min. (1.67 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6691.60; measured value: 6691.37).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

20 (EXAMPLE 11)

Synthesis

of

HO-A^{ms}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-G^{ms}-C^{e2s}-A^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-
CH₂CH₂OH (AO53)

The compound of Example 5 having a sequence of interest was synthesized in the same manner as in Example 8 using a program for 1 μmol scale. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 50% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 10.59 min was collected. When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20→ 80%

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(10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 6.61 min. (36.63 A₂₆₀ units) (λ_{max} (H₂O) = 263 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6996.86; measured value: 6996.80).

5 The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 12)

10 Synthesis of
 HO-A^{ms}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-G^{ms}-C^{e2p}-T^{e2p}-G^{ms}-G^{ms}-C^{e2p}-A^{ms}-T^{e2p}-C^{e2p}-
 T^{e2p}-CH₂CH₂OH (AO54)

The compound of Example 5 having a sequence of interest was synthesized in the same manner as in Example 8 using a program for 1 μ mol scale. After deprotection, the
 15 resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% $\rightarrow$ 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 5.02 min was collected. When analyzed by ion exchange HPLC [column: Tosoh
 20 TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20 $\rightarrow$ 80% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 4.51 min. (44.20 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm)

The compound was identified by negative ion ESI mass spectrometric analysis
 25 (calculated value: 6820.13; measured value: 6820.12).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2578-2596 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

30 (EXAMPLE 13)

Synthesis of
 HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-G^{mp}-C^{mp}-A^{mp}-U^{mp}-C^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-

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CH₂CH₂OH (AO17)

The compound of Example 13 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 8.32 min was collected. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.14 min. (5.91 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6280.24; measured value: 6279.98).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 2575-2592 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 14)

Synthesis of
HO-G^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-U^{e2p}-G^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH
(AO24)

The compound of Example 14 having a sequence of interest was synthesized in the same manner as in Example 1. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 55% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.80 min was collected. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 8.89 min. (11.30

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A₂₆₀ units) (λ_{max} (H₂O) = 261 nm)

The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5369.71; measured value: 5369.20).

The nucleotide sequence of the subject compound is complementary to the
 5 nucleotides Nos. 2578-2592 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 15)

Synthesis of

10 HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-A^{mp}-G^{mp}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-G^{mp}-A^{mp}-A^{mp}-A^{mp}-C^{mp}-U^{mp}-
 G^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-CH₂CH₂OH (AO20) (SEQ ID NO: 10)

The subject compound was synthesized with an automated nucleic acid synthesizer (PerkinElmer ABI model 394 DNA/RNA synthesizer) using a 40 nmol DNA program. The concentrations of solvents, reagents and phosphoroamidites at individual synthesis
 15 cycles were the same as used in the synthesis of natural oligonucleotides. The solvents, reagents and phosphoroamidites of 2'-O-methylnucleoside (adenosine form: product No. 27-1822-41; guanosine form: product No. 27-1826-41; citydine form: product No. 27-1823-02; uridine form: product No. 27-1825-42) were products from Amersham Pharmacia. As non-natural phosphoroamidites, those compounds disclosed in Example 28
 20 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-6-N-benzoyl-adenosine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), Example 41 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-N-isobutyl-guanosine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), Example 36 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-4-N-benzoyl-5-methylcitydine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), and Example 23
 25 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-5-methyluridine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite) of Japanese Unexamined Patent Publication No. 2000-297097 were used. The subject compound was synthesized using approx. 0.25 μ mol of a modified control pore glass (CPG) (disclosed in Example 12b of Japanese Unexamined
 30 Patent Publication No. H7-87982) as a solid support. However, the time period for condensation of amidites was 15 min.

The protected oligonucleotide analogue having the sequence of interest was treated

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with concentrated aqueous ammonia to thereby cut out the oligomer from the support and, at the same time, remove the protective cyanoethyl groups on phosphorus atoms and the protective groups on nucleic acid bases. The solvent was distilled off under reduced pressure, and the resultant residue was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 55% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.29 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (0.473 A₂₆₀ units) (λ_{max} (H₂O) = 259 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 10% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.62 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 7980.34).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6133-6155 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 16)

Synthesis of
 HO-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-T^{e2p}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-G^{mp}-A^{mp}-A^{mp}-A^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-CH₂CH₂OH (AO26) (SEQ ID NO: 10)

The compound of Example 16 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile

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B%: 10% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 9.76 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (7.93 A₂₆₀ units) (λ_{max} (H₂O) = 259 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 70% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.03 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 8094.48; measured value: 8093.74).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6133-6155 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 17)

Synthesis

of

20 HO-A^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-C^{mp}-A^{mp}-A^{mp}-A^{mp}-U^{mp}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-CH₂CH₂OH (AO55) (SEQ ID NO: 11)

The compound of Example 17 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 38% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 9.00 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (9.50

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A_{260} units) ($\lambda_{\max}$ (H₂O) = 259 nm). When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr; gradient: solution B 10→40% (10 min, linear gradient); 60°C; 2 ml/min], the subject compound was eluted at 6.14 min.

- 5 The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6350.31; measured value: 6350.07).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6125-6142 of dystrophin cDNA (Gene Bank accession No. NM_10 004006.1).

(EXAMPLE 18)

Synthesis of

- 15 HO-T^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-G^{e2p}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-A^{mp}-A^{mp}-A^{mp}-A^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-A^{e2p}-CH₂CH₂OH (AO56) (SEQ ID NO: 12)

- The compound of Example 18 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; 20 column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 38% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.44 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to 25 remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (11.15 A_{260} units) ($\lambda_{\max}$ (H₂O) = 260 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M 30 aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 6.38 min. The compound was identified by negative ion ESI

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mass spectrometric analysis (calculated value: 6254.21; measured value: 6254.15).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6136-6153 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 19)

Synthesis of

HO-G^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-A^{e2p}-A^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH (AO57) (SEQ ID NO: 13)

The compound of Example 19 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 38% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 8.06 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (9.60 A₂₆₀ units) (λ_{max} (H₂O) = 258 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 5.73 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6328.29; measured value: 6327.91).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6144-6161 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

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(EXAMPLE 20)

Synthesis

of

HO-T^{e2p}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-A^{mp}-A^{mp}-A^{mp}-A^{mp}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-
CH₂CH₂OH (AO76) (SEQ ID NO: 12)

5 The compound of Example 20 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile
10 B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.30 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4
15 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (13.64 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA
20 B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 8.67 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6312.34; measured value: 6312.06).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6136-6153 of dystrophin cDNA (Gene Bank accession No. NM_ 25 004006.1).

(EXAMPLE 21)

Synthesis

of

HO-T^{e2p}-T^{e2p}-G^{ms}-A^{ms}-G^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-A^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{e2p}-T^{e2p}-G^{ms}-A^{ms}-
30 CH₂CH₂OH (AO77) (SEQ ID NO: 12)

The compound of Example 21 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with

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a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.81 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (5.26 A₂₆₀ units) (λ_{max} (H₂O) = 262 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 10.0 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6456.94; measured value: 6456.59).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6136-6153 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 22)

Synthesis of
 HO-T^{e2s}-T^{e2s}-G^{ms}-A^{ms}-G^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-C^{e2s}-A^{ms}-A^{ms}-A^{ms}-A^{ms}-C^{e2s}-T^{e2s}-G^{ms}-A^{ms}-
 CH₂CH₂OH (AO78) (SEQ ID NO: 12)

The compound of Example 22 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-H₂O. After deprotection, the resultant product was purified by reversed

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phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.75 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (15.04 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 10.2 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6601.53; measured value: 6601.11).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6136-6153 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 23)

Synthesis of
 HO-G^{mp}-T^{e2p}-G^{mp}-C^{e2p}-A^{mp}-A^{mp}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-G^{mp}-A^{mp}-G^{mp}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-CH₂CH₂OH (AO79) (SEQ ID NO: 13)

The compound of Example 23 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 5.95 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to

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remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (11.73 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 6.52 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6344.33; measured value: 6344.28).

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The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6144-6161 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

15 (EXAMPLE 24)

Synthesis of
 HO-G^{ms}-T^{e2p}-G^{ms}-C^{e2p}-A^{ms}-A^{ms}-A^{ms}-G^{ms}-T^{e2p}-T^{e2p}-G^{ms}-A^{ms}-G^{ms}-T^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-
 CH₂CH₂OH (AO80) (SEQ ID NO: 13)

The compound of Example 24 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.55 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (15.27 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm). When analyzed by

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reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 8.71 min. The compound was
 5 identified by negative ion ESI mass spectrometric analysis (calculated value: 6488.93; measured value: 6489.03).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6144-6161 of dystrophin cDNA (Gene Bank accession No. NM_
 10 004006.1).

(EXAMPLE 25)

Synthesis of

HO-G^{ms}-T^{e2s}-G^{ms}-C^{e2s}-A^{ms}-A^{ms}-A^{ms}-G^{ms}-T^{e2s}-T^{e2s}-G^{ms}-A^{ms}-G^{ms}-T^{e2s}-C^{e2s}-T^{e2s}-T^{e2s}-C^{e2s}-
 15 CH₂CH₂OH (AO81) (SEQ ID NO: 13)

The compound of Example 25 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 mixture) for 15 min, instead of the oxidation
 20 step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.10 min was collected. After the solvent was distilled
 25 off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (17.01 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm). When analyzed by
 30 reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2

ml/min; 254 nm], the subject compound was eluted at 9.12 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6633.53; measured value: 6633.51).

(EXAMPLE 26)

The compound of Example 26 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.36 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (12.70 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.92 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5250.59; measured value: 5250.61).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6696-6710 of dystrophin cDNA (Gene Bank accession No. NM

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004006.1).

(EXAMPLE 27)

Synthesis

of

5 HO-C^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-C^{mp}-C^{e2p}-C^{e2p}-A^{mp}-A^{mp}-T^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-A^{mp}-U^{mp}-C^{e2p}-C^{e2p}-CH₂CH₂OH (AO85) (SEQ ID NO: 15)

The compound of Example 27 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; 10 column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 5.32 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to 15 remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (7.93 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M 20 aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 5.63 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6263.34; measured value: 6263.40).

25 The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6691-6708 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 28)

30 Synthesis

of

HO-C^{e2p}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-U^{mp}-G^{mp}-C^{e2p}-C^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-C^{e2p}-A^{mp}-A^{mp}-CH₂CH₂OH (AO86) (SEQ ID NO: 16)

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The compound of Example 28 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.10 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (9.01 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 80% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 6.27 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6304.35; measured value: 6304.47).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6699-6716 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 29)

Synthesis

of

25 HO-T^{e2p}-G^{mp}-T^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-C^{e2p}-A^{mp}-A^{mp}-C^{e2p}-A^{mp}-G^{mp}-T^{e2p}-T^{e2p}-T^{e2p}-G^{mp}-CH₂CH₂OH (AO87) (SEQ ID NO: 17)

The compound of Example 29 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at

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5.63 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4
 5 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (8.65 A_{260} units) ($\lambda_{\max}$ (H₂O) = 259 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA
 10 B%: 20% → 80% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 6.06 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6331.33; measured value: 6331.14).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6710-6727 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).
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(EXAMPLE 30)

Synthesis of

HO-C^{e2s}-G^{ms}-C^{e2s}-T^{e2s}-G^{ms}-C^{ms}-C^{e2s}-C^{e2s}-A^{ms}-A^{ms}-T^{e2s}-G^{ms}-C^{e2s}-C^{e2s}-A^{ms}-U^{ms}-C^{e2s}-C^{e2s}-
 20 CH₂CH₂OH (AO88) (SEQ ID NO: 15)

The compound of Example 30 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 mixture) for 15 min, instead of the oxidation
 25 step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.57 min was collected. After the solvent was distilled
 30 off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC

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(Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (12.02 A₂₆₀ units) (λ_{max} (H₂O) = 262 nm). When analyzed by ion exchange [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr; gradient: solution B 20→60% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 7.11 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6552.54; measured value: 6553.12).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6691-6708 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 31)

Synthesis of

15 HO-G^{e2p}-C^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-U^{mp}-C^{mp}-U^{mp}-U^{mp}-U^{mp}-U^{mp}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-CH₂CH₂OH (AO2) (SEQ ID NO: 18)

The compound of Example 31 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.13 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (3.91 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 10% → 50% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 9.95 min. The compound was identified by negative ion ESI

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mass spectrometric analysis (calculated value: 6859.54; measured value: 6858.95).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6973-6992 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 32)

Synthesis of

HO-C^{mp}-U^{mp}-U^{mp}-U^{mp}-U^{mp}-A^{e2p}-G^{e2p}-T^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-C^{e2p}-T^{e2p}-U^{mp}-
 10 U^{mp}-U^{mp}-C^{mp}-C^{mp}-CH₂CH₂OH (AO23) (SEQ ID NO: 19)

The compound of Example 32 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile
 15 B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.60 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was
 20 dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (3.56 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA
 25 B%: 15% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 9.31 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 7496.97; measured value: 7496.53).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6965-6986 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

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(EXAMPLE 33)

Synthesis

of

HO-C^{e2p}-T^{e2p}-G^{e2p}-C^{e2p}-T^{e2p}-U^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{mp}-C^{e2p}-A^{e2p}-A^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH
(AO27) (SEQ ID NO: 21)

5 The compound of Example 33 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile
10 B%: 10% → 55% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.76 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4
15 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (6.29 A₂₆₀ units) (λ_{max} (H₂O) = 265 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA
B%: 15% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject
20 compound was eluted at 6.27 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5160.54; measured value: 5159.90).

 The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6935 of dystrophin cDNA (Gene Bank accession No. NM_
25 004006.1).

(EXAMPLE 34)

Synthesis

of

HO-G^{e2p}-T^{e2p}-T^{e2p}-A^{e2p}-T^{e2p}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-U^{mp}-C^{mp}-C^{mp}-U^{mp}-C^{mp}-C^{e2p}-A^{e2p}-A^{e2p}-
30 C^{e2p}-C^{e2p}-CH₂CH₂OH (AO28) (SEQ ID NO: 22)

 The compound of Example 34 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the

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resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.04 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (5.83 A₂₆₀ units) (λ_{max} (H₂O) = 263 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.16 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6808.57; measured value: 6809.21).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6940 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 35)

Synthesis of
 HO-C^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-A^{mp}-G^{mp}-U^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-G^{mp}-C^{mp}-U^{mp}-C^{mp}-U^{mp}-T^{e2p}-
 T^{e2p}-T^{e2p}-C^{e2p}-C^{e2p}-CH₂CH₂OH (AO29) (SEQ ID NO: 19)

The compound of Example 35 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.34 min was collected. (1.83 A₂₆₀ units) (λ_{max} (H₂O) = 261 nm) After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution

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was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest. When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 65% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 7.45 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 7501.00; measured value: 7500.93).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6965-6986 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 36)

Synthesis of
HO-T^{e2p}-T^{e2p}-T^{e2p}-T^{e2p}-C^{e2p}-C^{mp}-A^{mp}-G^{mp}-G^{mp}-U^{mp}-U^{mp}-C^{mp}-A^{mp}-A^{e2p}-G^{e2p}-T^{e2p}-G^{e2p}-G^{e2p}-CH₂CH₂OH (AO48) (SEQ ID NO: 20)

The compound of Example 36 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.55 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (19.88 A₂₆₀ units) (λ_{max} (H₂O) = 259 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M

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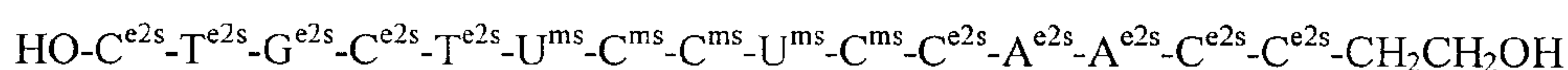
aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 60% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 8.72 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6291.22; measured value: 6290.99).

5

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6953-6970 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

10 (EXAMPLE 37)

Synthesis of



(AO89) (SEQ ID NO: 21)

The compound of Example 37 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.56 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (5.42 A₂₆₀ units) (λ_{max} (H₂O) = 267 nm). When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20 → 60% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 6.10 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5401.54; measured value: 5401.12).

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The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6935 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

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(EXAMPLE 38)

Synthesis

of

$$\text{HO-C}^{\text{e2p}}\text{-U}^{\text{mp}}\text{-G}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-U}^{\text{mp}}\text{-U}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-U}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-A}^{\text{mp}}\text{-A}^{\text{mp}}\text{-C}^{\text{e2p}}\text{-C}^{\text{e2p}}\text{-CH}_2\text{CH}_2\text{OH}$$

(AO90) (SEQ ID NO: 21)

10

The compound of Example 38 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 38% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.05 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4

15 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (11.86 A₂₆₀ units) (λ_{max} (H₂O) = 266 nm). When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 5 → 25% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 8.50 min.

20 The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5150.55; measured value: 5150.69).

25

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6935 of dystrophin cDNA (Gene Bank accession No. NM_

30 004006.1).

(EXAMPLE 39)

79861-7D

Synthesis

of

HO-C^{e2s}-U^{ms}-G^{ms}-C^{e2s}-U^{ms}-U^{ms}-C^{e2s}-C^{e2s}-U^{ms}-C^{e2s}-C^{e2s}-A^{ms}-A^{ms}-C^{e2s}-C^{e2s}-CH₂CH₂OH
(AO91) (SEQ ID NO: 21)

The compound of Example 39 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-H₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 46% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.21 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (10.77 A₂₆₀ units) (λ_{max} (H₂O) = 266 nm). When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20 → 60% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 6.12 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5391.55; measured value: 5391.76).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6935 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 40)

Synthesis

of

HO-C^{e2p}-T^{e2p}-G^{mp}-C^{e2p}-T^{e2p}-U^{mp}-C^{mp}-C^{e2p}-U^{mp}-C^{mp}-C^{e2p}-A^{mp}-A^{mp}-C^{e2p}-C^{e2p}-CH₂CH₂OH
(AO92) (SEQ ID NO: 21)

The compound of Example 40 having a sequence of interest was synthesized in the

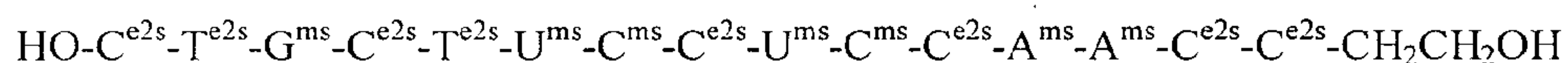
79861-7D

same manner as the compound of Example 15 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 38% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.48 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (10.64 A₂₆₀ units) (λ_{max} (H₂O) = 266 nm). When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile; solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 5 → 25% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 5.71 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5150.55; measured value: 5150.62).

The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6935 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 41)

Synthesis of



(AO93) (SEQ ID NO: 21)

The compound of Example 41 having a sequence of interest was synthesized in the same manner as the compound of Example 15 was synthesized. However, the portion with a phosphorothioate bond was sulfurized by treating with a mixed solution of 0.02 M xanthane hydride/acetonitrile-pyridine (9:1 v/v mixture) for 15 min, instead of the oxidation step with iodine-II₂O. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA),

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pH 7.0; solution B: acetonitrile B%: 10% → 46% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 7.22 min was collected. (12.77 A₂₆₀ units) (λ_{max} (H₂O) = 267 nm)

After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution
 5 was added to the residue, which was then left for 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest. When analyzed by ion exchange HPLC [column: Tosoh TSK-gel DEAE-5PW (7.5 x 75 mm); solution A: 20% acetonitrile;
 10 solution B: 20% acetonitrile, 67 mM phosphate buffer (pH 6.8), 1.5 M KBr, gradient: solution B 20 → 60% (10 min, linear gradient); 40°C; 2 ml/min], the subject compound was eluted at 6.42 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 5391.55; measured value: 5391.64).

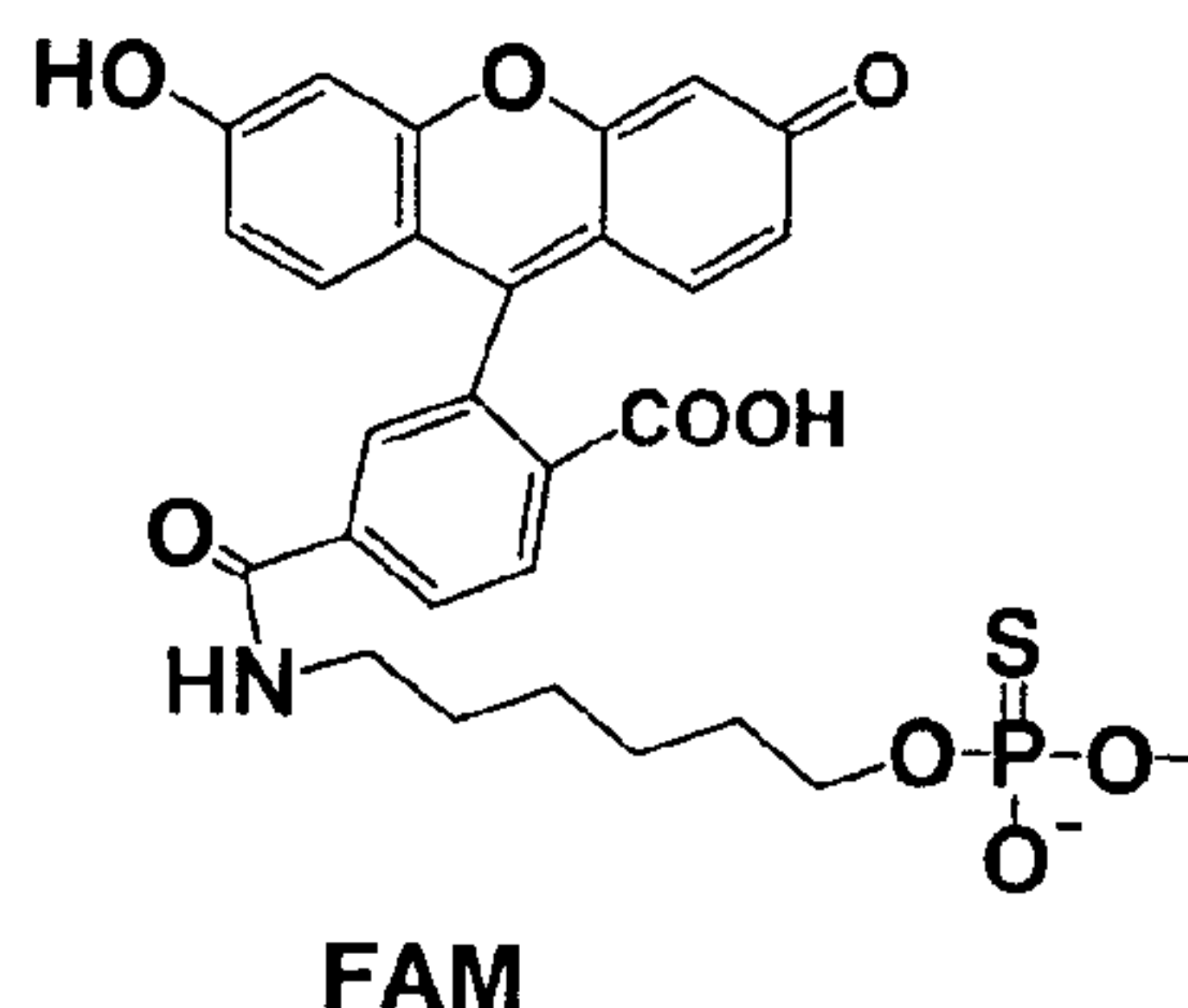
15 The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6921-6935 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(REFERENCE EXAMPLE 1) Synthesis of hAON4

20 hAON4 [FAM-CUG CUU CCU CCA ACC (SEQ ID NO: 23); all the nucleotides are 2'-O-methylnucleotide and linked with each other by a phosphorothioate bond] which is disclosed in a document (van Deutekom, J.C.T. et al. (2001) Hum. Mol. Genet. 10, 1547-1554) and known as an oligonucleotide that induces exon 46 skipping was synthesized according to the above document.

25 FAM is a fluorescence group with the following structure.

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(REFERENCE EXAMPLE 2) Synthesis of hAON6

hAON6 [FAM-GUU AUC UGC UUC CUC CAA CC (SEQ ID NO: 24); all the
 5 nucleotides are 2'-O-methylnucleotide and linked with each other by a phosphorothioate
 bond] which is disclosed in a document (van Deutekom, J.C.T. et al. (2001) Hum. Mol.
 Genet. 10, 1547-1554) and known as an oligonucleotide that induces exon 46 skipping was
 synthesized according to the above document.

10 (REFERENCE EXAMPLE 3)

hAON8 [FAM-GCU UUU CUU UUA GUU GCU GC (SEQ ID NO: 25); all the
 nucleotides are 2'-O-methylnucleotide and linked with each other by a phosphorothioate
 bond] which is disclosed in a document (van Deutekom, J.C.T. et al. (2001) Hum. Mol.
 Genet. 10, 1547-1554) and known as an oligonucleotide that induces exon 46 skipping was
 15 synthesized according to the above document.

(EXAMPLE 42)

Synthesis

of

HO-G^{mp}-A^{e2p}-A^{mp}-A^{mp}-A^{mp}-C^{e2p}-G^{mp}-C^{e2p}-C^{e2p}-G^{mp}-C^{mp}-C^{e2p}-A^{mp}-T^{e2p}-U^{mp}-U^{mp}-C^{e2p}-T^{e2p}-20 CH₂CH₂OH (AO100)

The subject compound was synthesized with an automated nucleic acid synthesizer
 (PerkinElmer ABI model 394 DNA/RNA synthesizer) at a 40 nmol scale. The
 concentrations of solvents, reagents and phosphoroamidites at individual synthesis cycles
 were the same as used in the synthesis of natural oligonucleotides. The solvents, reagents
 25 and phosphoroamidites of 2'-O-methylnucleoside (adenosine form: product No.
 27-1822-41; guanosine form: product No. 27-1826-41; cytidine form: product No.

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- 27-1823-02; uridine form: product No. 27-1825-42) were products from Amersham Pharmacia. As non-natural phosphoroamidites, those compounds disclosed in Example 55 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-6-N-benzoyladenine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), Example 68
- 5 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-N-isobutylguanosine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), Example 63
- (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-4-N-benzoyl-5-methylcytosine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite), and Example 50
- 10 (5'-O-dimethoxytrityl-2'-O,4'-C-ethylene-5-methyluridine-3'-O-(2-cyanoethyl N,N-diisopropyl)phosphoroamidite) of Japanese Unexamined Patent Publication No. 2000-297097 were used. The subject compound was synthesized on a modified control pore glass (CPG) (disclosed in Example 12b of Japanese Unexamined Patent Publication No. H7-87982) as a solid support. However, the time period for condensation of amidites was 15 min.
- 15 The protected oligonucleotide analogue having the sequence of interest was treated with concentrated aqueous ammonia to thereby cut out the oligomer from the support and, at the same time, remove the protective cyanoethyl groups on phosphorus atoms and the protective groups on nucleic acid bases. The solvent was distilled off under reduced pressure, and the resultant residue was purified by reversed phase HPLC [Shimadzu model
- 20 LC-10VP; column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.55 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for
- 25 20 min to remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (1.40 A₂₆₀ units) (λ_{max} (H₂O) = 264 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5%
- 30 acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 20% → 100% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 5.40 min. The compound was identified by

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negative ion ESI mass spectrometric analysis (calculated value: 6246.28; measured value: 6245.68).

The nucleotide sequence of the subject compound is complementary to the
 5 nucleotides Nos. 6555-6572 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

(EXAMPLE 43)

Synthesis

of

10 HO-C^{e2p}-T^{e2p}-G^{mp}-U^{mp}-T^{e2p}-A^{mp}-G^{mp}-C^{e2p}-C^{mp}-A^{mp}-C^{e2p}-T^{e2p}-G^{mp}-A^{mp}-T^{e2p}-T^{e2p}-A^{mp}-A^{mp}-
 CH₂CH₂OH (AO102)

The compound of Example 43 having a sequence of interest was synthesized in the same manner as the compound of Example 42 was synthesized. After deprotection, the resultant product was purified by reversed phase HPLC [Shimadzu model LC-10VP;
 15 column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M aqueous triethylamine acetate (TEAA), pH 7.0; solution B: acetonitrile B%: 10% → 45% (8 min, linear gradient); 60°C; 2 ml/min; 254 nm]. The fraction eluted at 6.76 min was collected. After the solvent was distilled off under reduced pressure, 80% aqueous acetic acid solution was added to the residue, which was then left for 20 min to
 20 remove the DMTr group. After distilling off the solvent, the resultant residue was dissolved in 0.5 ml of water and filtered with Ultrafree-MC (Millipore: product No. UFC4 OHV 25). The solvent was distilled off to thereby obtain the compound of interest (14.2 A₂₆₀ units) (λ_{max} (H₂O) = 260 nm). When analyzed by reversed phase HPLC [column: Merck, Chromolith Performance RP-18e (4.6 x 100 mm); solution A: 5% acetonitrile, 0.1 M
 25 aqueous triethylamine acetate (TEAA), pH 7.0; solution B: 25% acetonitrile, 0.1 M TEAA B%: 15% → 100% (10 min, linear gradient); 60°C; 2 ml/min; 254 nm], the subject compound was eluted at 6.42 min. The compound was identified by negative ion ESI mass spectrometric analysis (calculated value: 6262.27; measured value: 6261.87).

30 The nucleotide sequence of the subject compound is complementary to the nucleotides Nos. 6591-6608 of dystrophin cDNA (Gene Bank accession No. NM_004006.1).

DEMANDES OU BREVETS VOLUMINEUX

**LA PRÉSENTE PARTIE DE CETTE DEMANDE OU CE BREVETS
COMPREND PLUS D'UN TOME.**

CECI EST LE TOME __1__ DE __2__

NOTE: Pour les tomes additionels, veuillez contacter le Bureau Canadien des Brevets.

JUMBO APPLICATIONS / PATENTS

**THIS SECTION OF THE APPLICATION / PATENT CONTAINS MORE
THAN ONE VOLUME.**

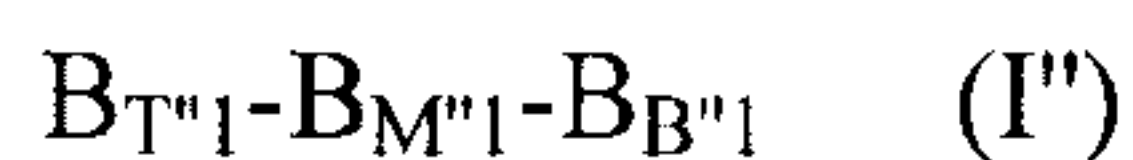
THIS IS VOLUME __1__ OF __2__

NOTE: For additional volumes please contact the Canadian Patent Office.

CLAIMS:

1. A compound for use in inducing skipping of exon 44 of the dystrophin gene, which is an oligonucleotide having at least one 2'-O, 4'-C-alkylenated sugar, and which is an oligonucleotide having the nucleotide sequence as shown in any one of SEQ ID NOS: 30-39
- 5 or a pharmaceutically acceptable salt thereof; or a compound represented by any one of the general formulae (I''), (II''), and (III'') or a pharmaceutically acceptable salt thereof;

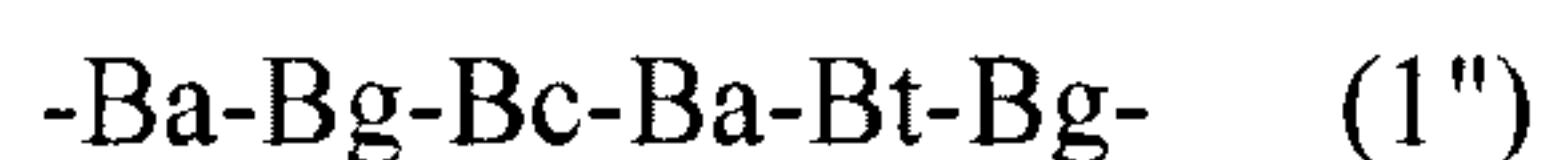
wherein said general formulae are defined as follows:



where $B_{T''1}$ is a group represented by any one of the following (1a'') to (1m''):

- 10 (1a'')HO-,
 (1b'')HO-Bt-,
 (1c'')HO-Bt-Bt-,
 (1d'')HO-Bt-Bt-Bt-,
 (1e'')HO-Ba-Bt-Bt-Bt-,
 15 (1f'')HO-Bt-Ba-Bt-Bt-Bt-,
 (1g'')HO-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1h'')HO-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1i'')HO-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1j'')HO-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 20 (1k'')HO-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,
 (1l'')HO-Bc-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-, or
 (1m'')HO-Bc-Bc-Ba-Bt-Bt-Bt-Bg-Bt-Ba-Bt-Bt-Bt-,

$B_{M''1}$ is a group represented by the following formula (1''):

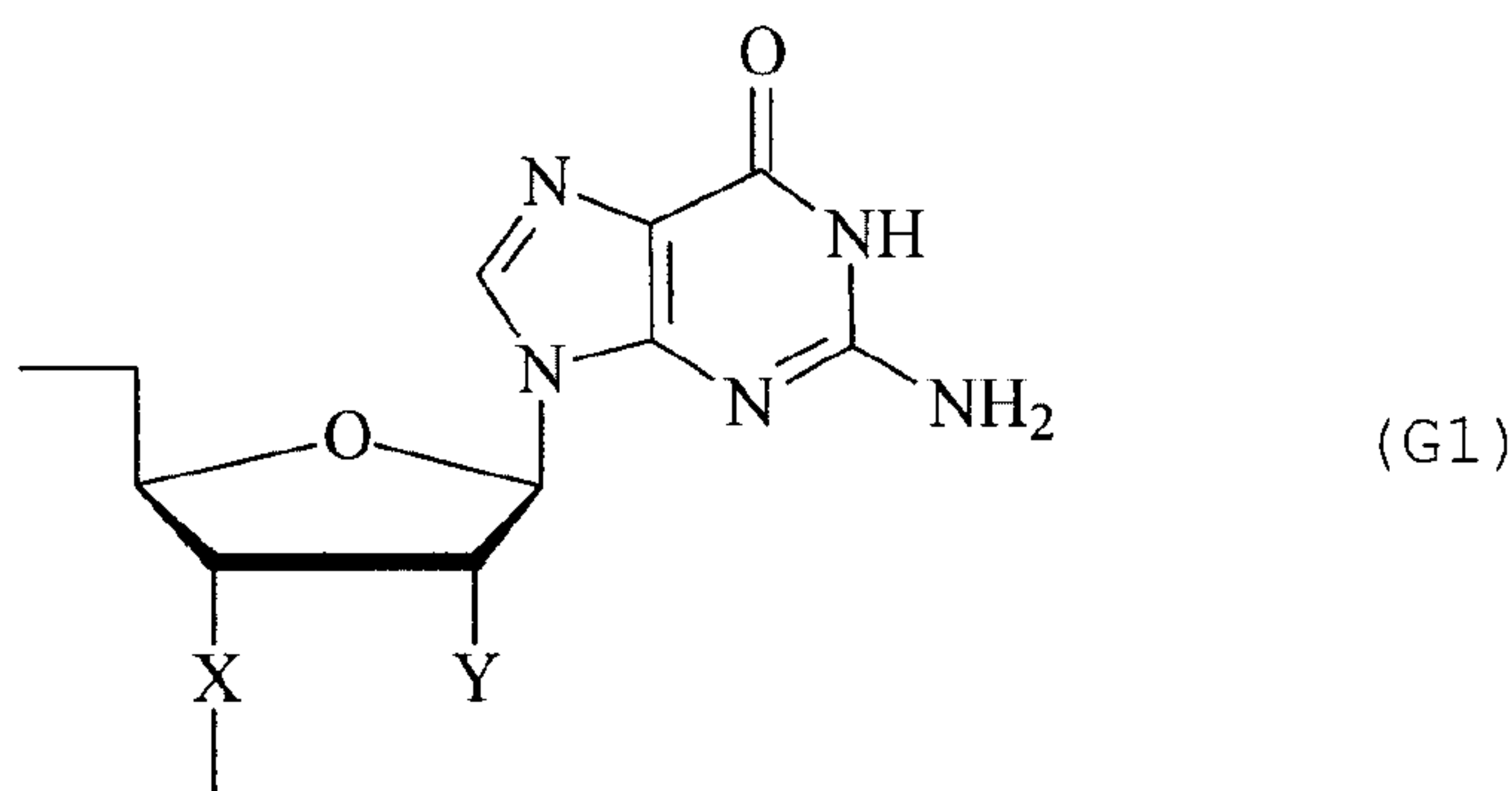


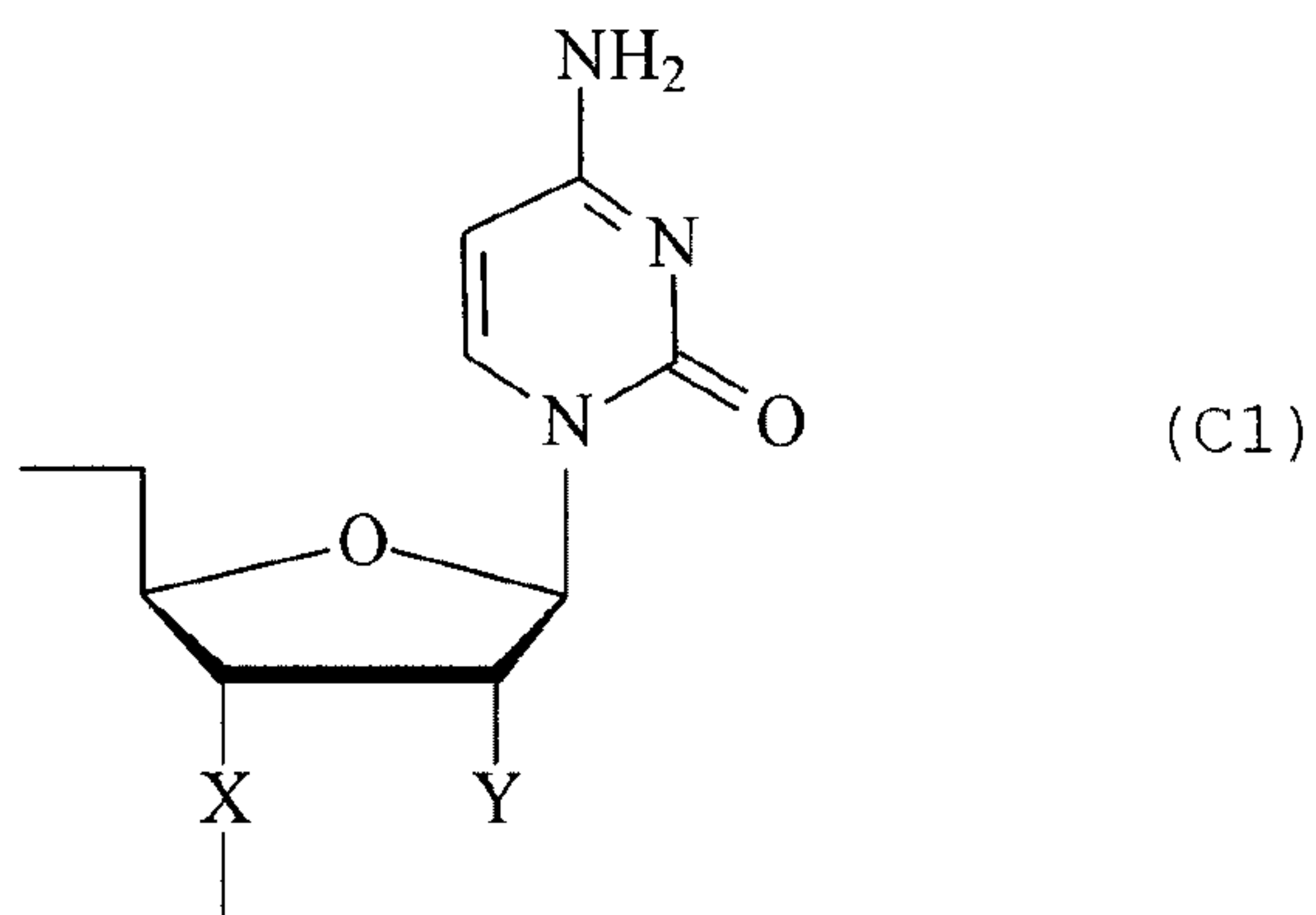
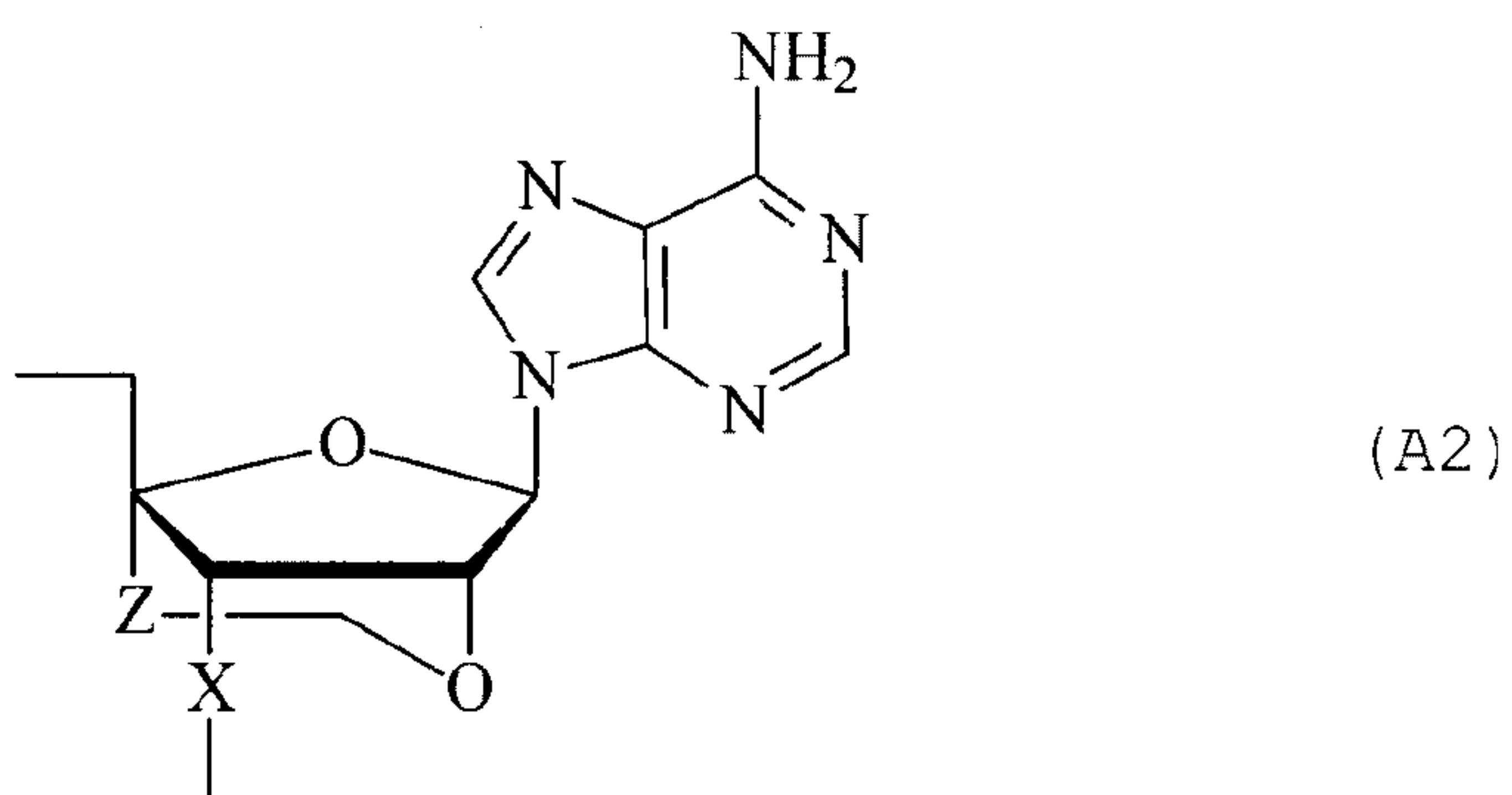
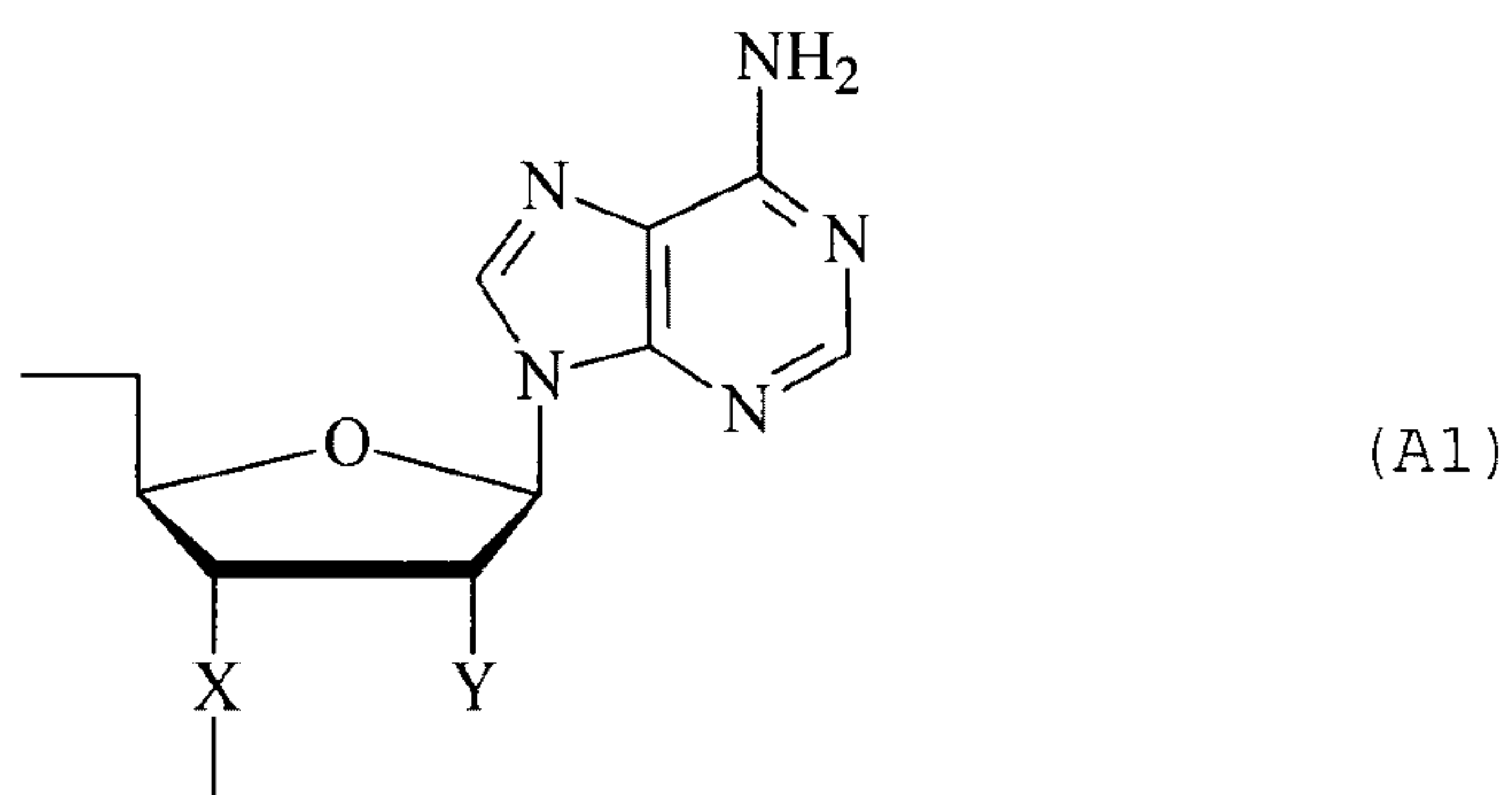
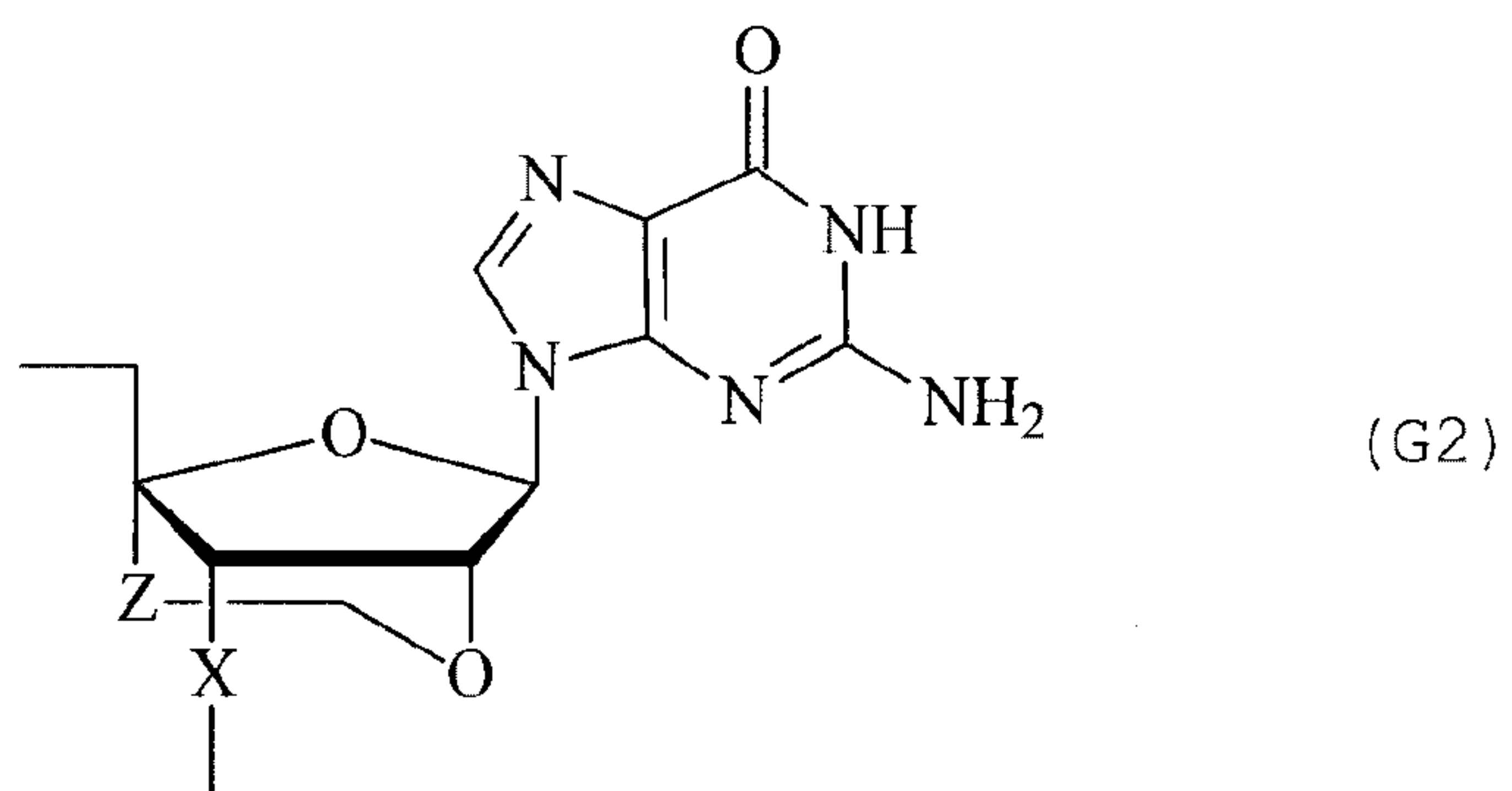
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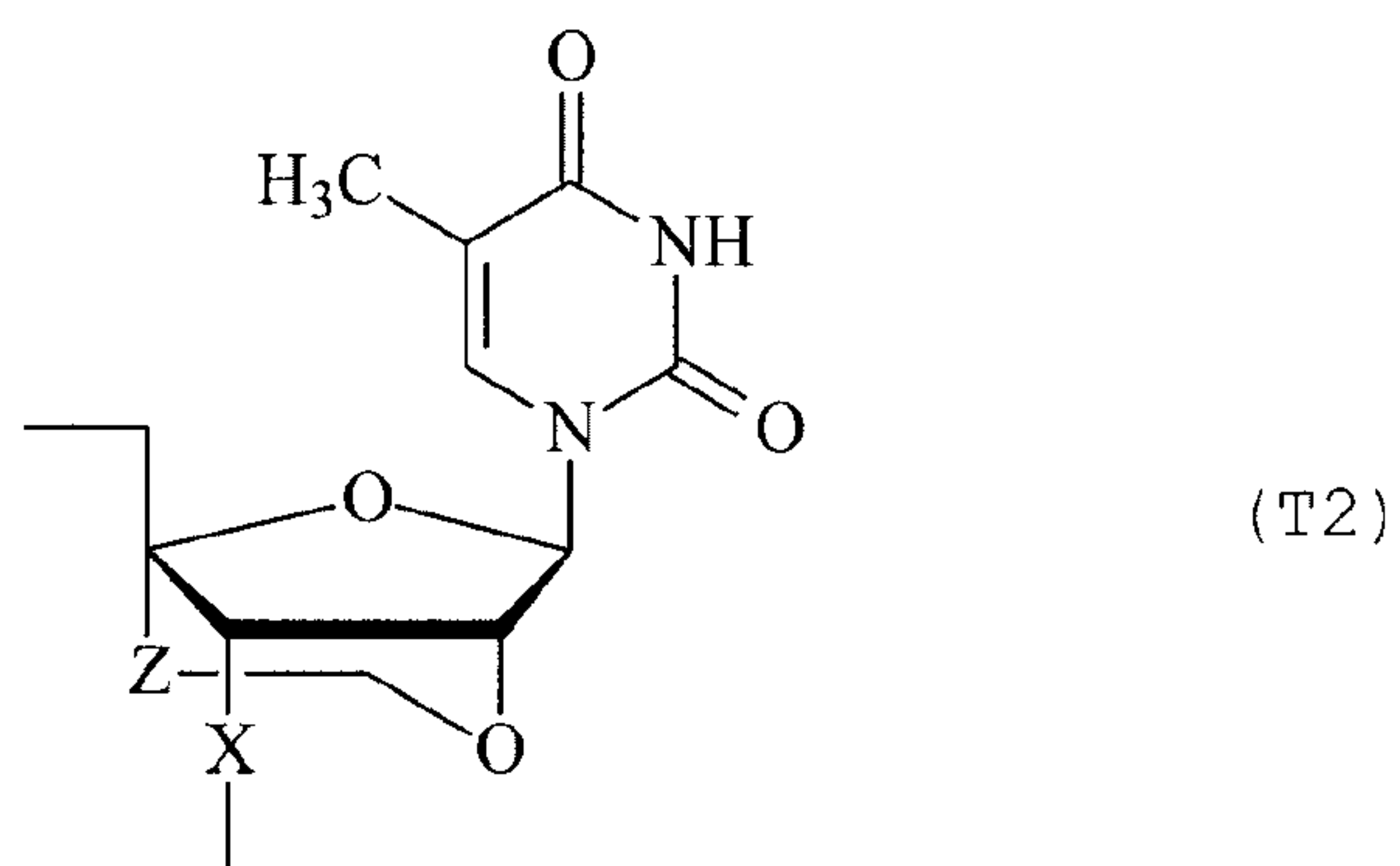
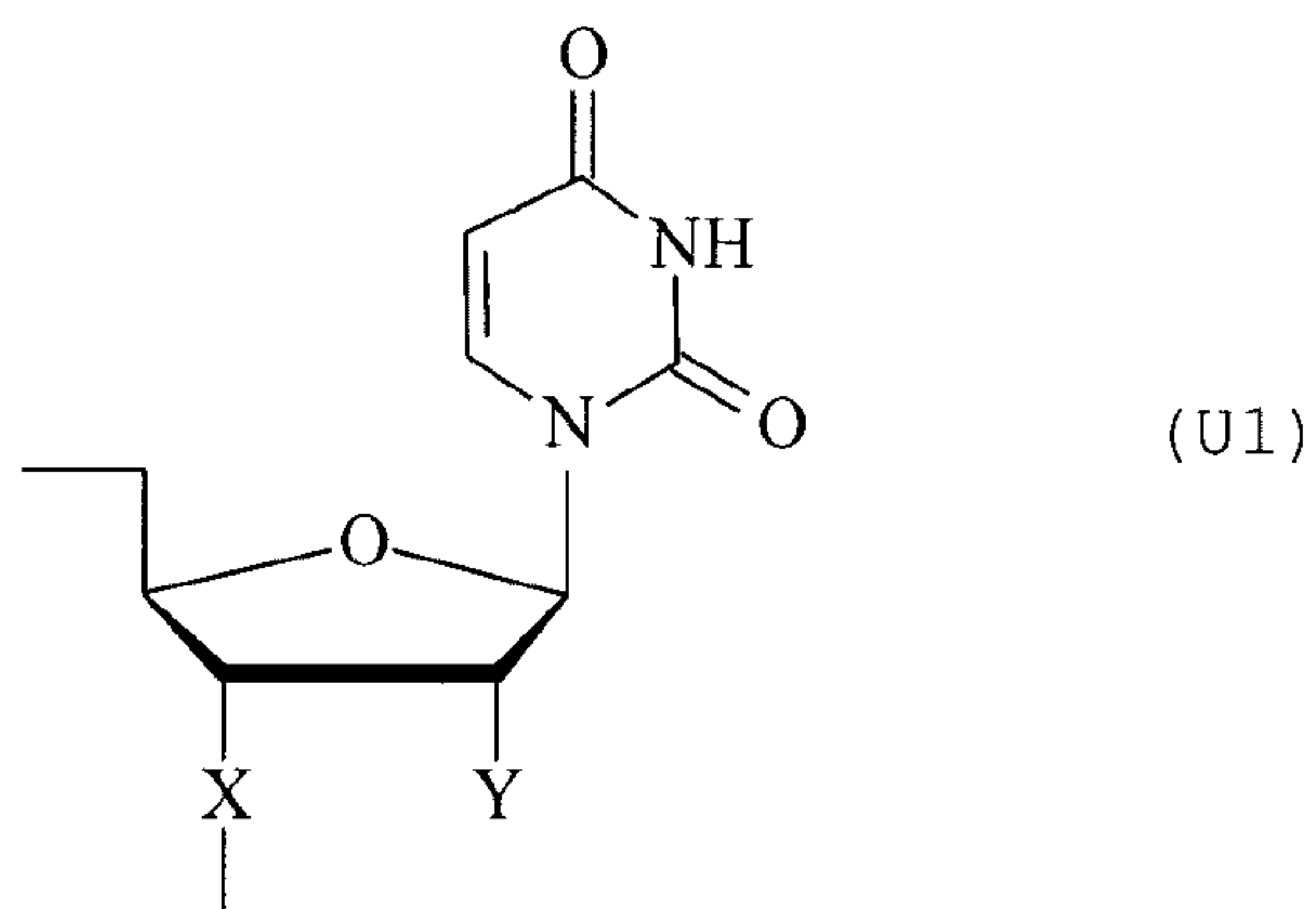
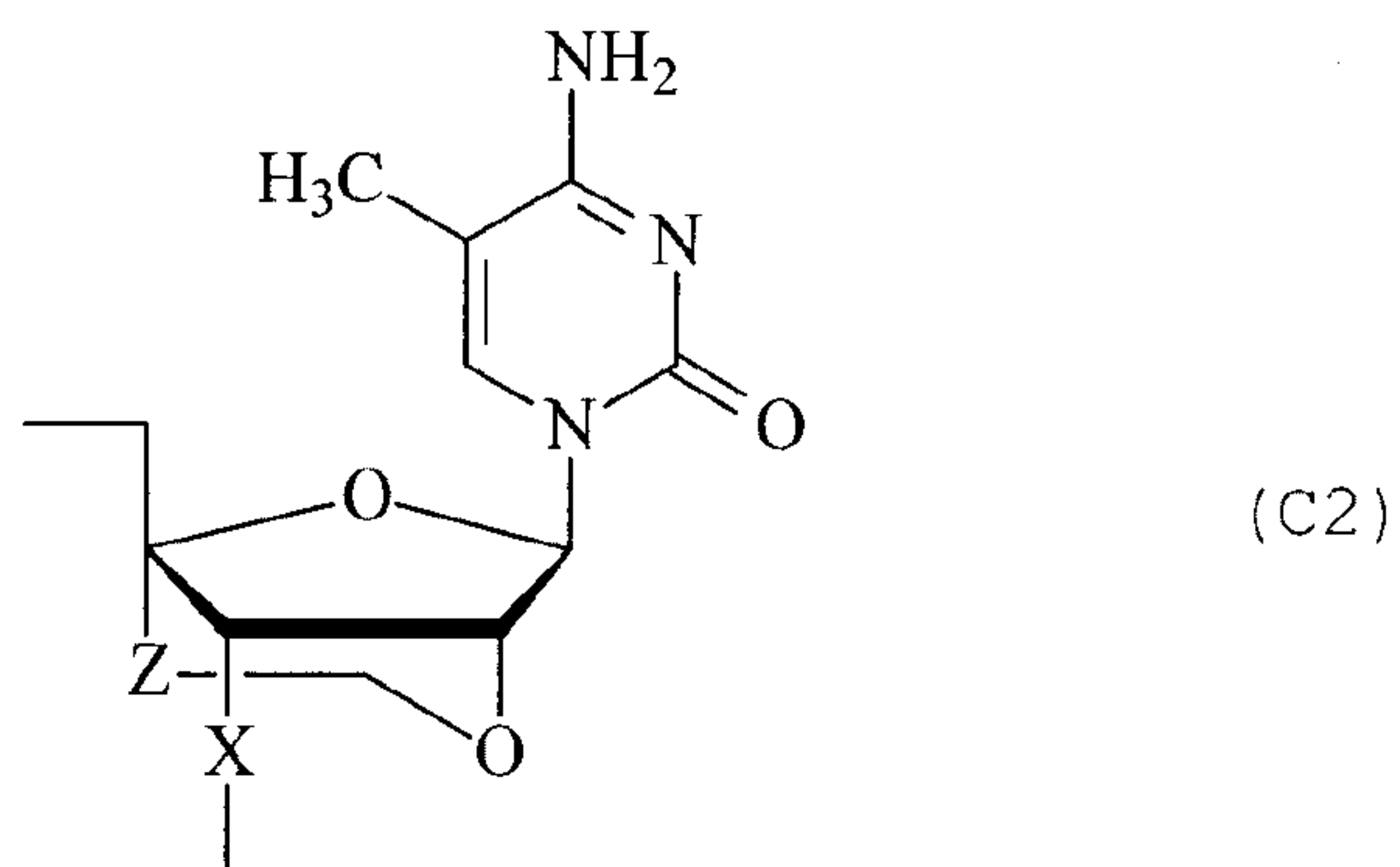
B_{B''1} is a group represented by any one of the following (101a'') to (101m''):

- (101a'')-CH₂CH₂OH,
 (101b'')-Bt-CH₂CH₂OH,
 (101c'')-Bt-Bt-CH₂CH₂OH,
 5 (101d'')-Bt-Bt-Bc-CH₂CH₂OH,
 (101e'')-Bt-Bt-Bc-Bc-CH₂CH₂OH,
 (101f'')-Bt-Bt-Bc-Bc-Bc-CH₂CH₂OH,
 (101g'')-Bt-Bt-Bc-Bc-Bc-Ba-CH₂CH₂OH,
 (101h'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-CH₂CH₂OH,
 10 (101i'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-CH₂CH₂OH,
 (101j'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-CH₂CH₂OH,
 (101k'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-CH₂CH₂OH,
 (101l'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-Bt-CH₂CH₂OH, or
 (101m'')-Bt-Bt-Bc-Bc-Bc-Ba-Ba-Bt-Bt-Bc-Bt-Bc-CH₂CH₂OH,

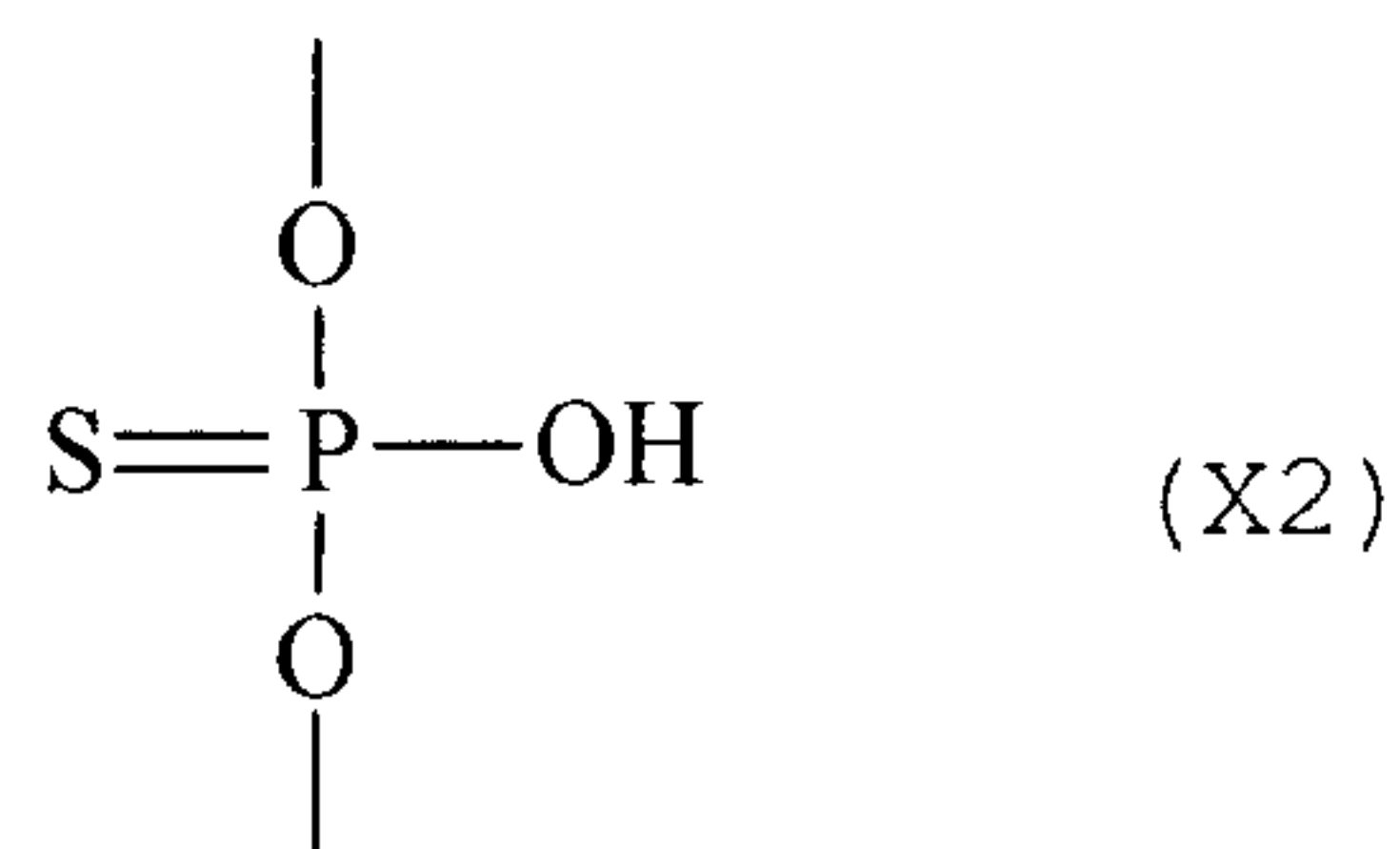
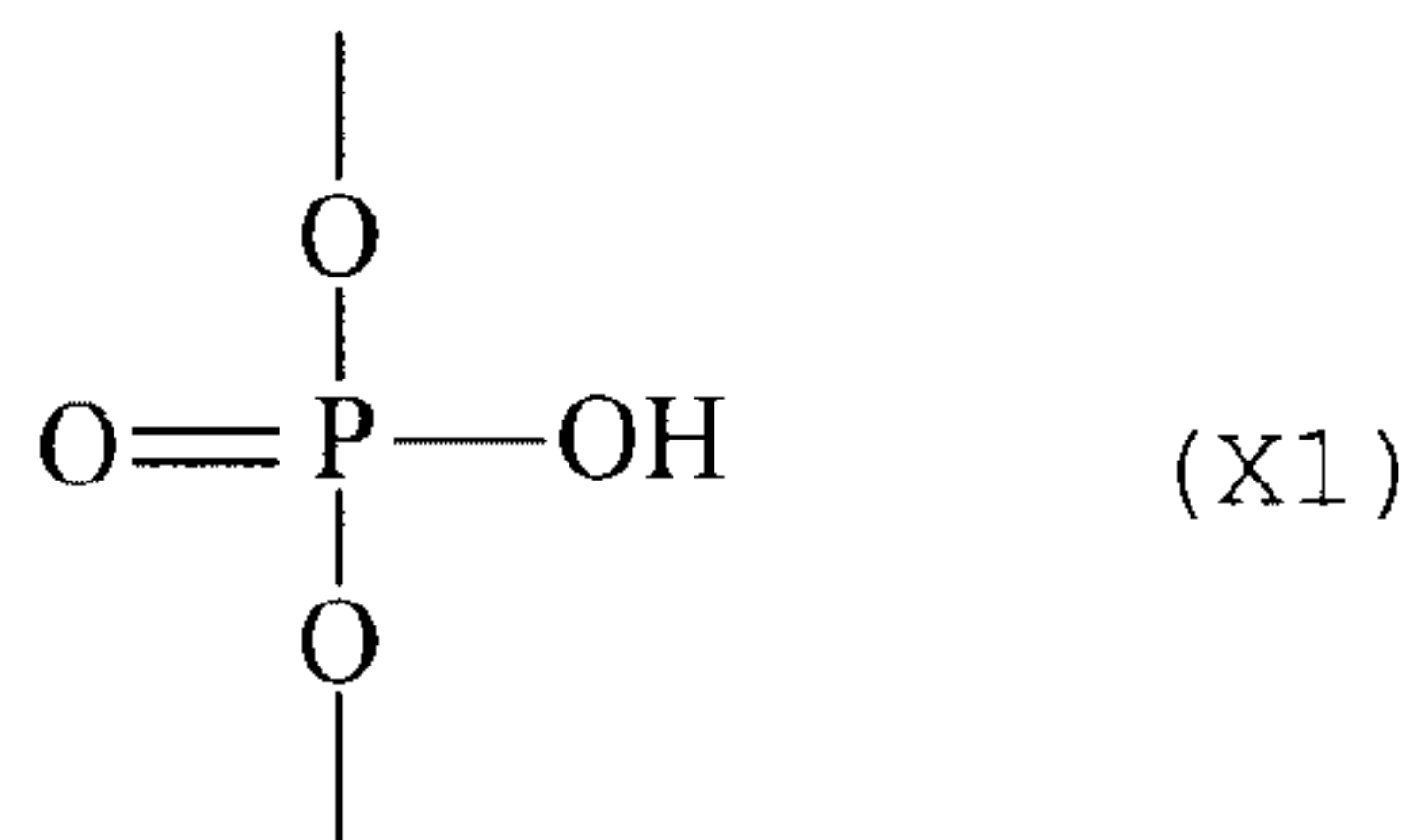
- 15 where Bg is a group represented by the following formula (G1) or (G2); Ba is a group represented by the following formula (A1) or (A2); Bc is a group represented by the following formula (C1) or (C2); and Bt is a group represented by the following formula (U1) or (T2):





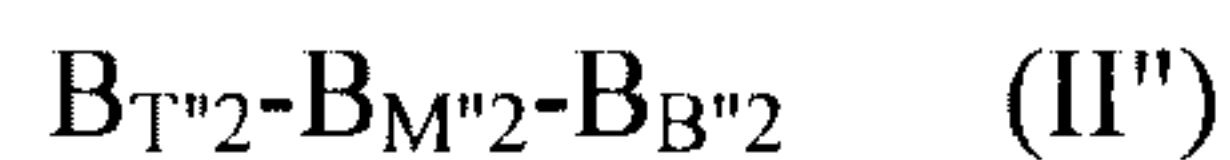


where X is individually and independently a group represented by the following formula (X1)
 5 or (X2):



Y is individually and independently a hydrogen atom, a hydroxyl group or an alkoxy group with 1-6 carbon atoms; and Z is individually and independently a single bond or an alkylene group with 1-5 carbon atoms;

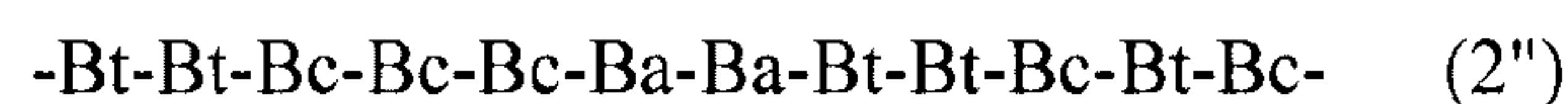
provided that at least one of the nucleosides constituting the compound represented by formula (I'') has 2''-O,4''-C-alkylene group;



where $\text{B}_{\text{T}''2}$ is a group represented by any one of the following (2a'') to (2g''):

- 10 (2a'')HO-,
 (2b'')HO-Bg-,
 (2c'')HO-Bt-Bg-,
 (2d'')HO-Ba-Bt-Bg-,
 (2e'')HO-Bc-Ba-Bt-Bg-,
 15 (2f'')HO-Bg-Bc-Ba-Bt-Bg-, or
 (2g'')HO-Ba-Bg-Bc-Ba-Bt-Bg-,

$\text{B}_{\text{M}''2}$ is a group represented by the following formula (2''):



B_{B''2} is a group represented by any one of the following (102a'') to (102g''):

- (102a'')-CH₂CH₂OH,
 (102b'')-Ba-CH₂CH₂OH,
 (102c'')-Ba-Bg-CH₂CH₂OH,
 5 (102d'')-Ba-Bg-Bg-CH₂CH₂OH,
 (102e'')-Ba-Bg-Bg-Ba-CH₂CH₂OH,
 (102f'')-Ba-Bg-Bg-Ba-Ba-CH₂CH₂OH, or
 (102g'')-Ba-Bg-Bg-Ba-Ba-Bt-CH₂CH₂OH,

where Bg, Ba, Bt and Bc are as defined above;

- 10 provided that at least one of the nucleosides constituting the compound represented by formula (II'') has 2''-O,4''-C-alkylene group;



where B_{T''3} is a group represented by any one of the following (3a'') to (3m''):

- (3a'')HO-,
 15 (3b'')HO-Bc-,
 (3c'')HO-Ba-Bc-,
 (3d'')HO-Ba-Ba-Bc-,
 (3e'')HO-Ba-Ba-Ba-Bc-,
 (3f'')HO-Ba-Ba-Ba-Ba-Bc-,
 20 (3g'')HO-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3h'')HO-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3i'')HO-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3j'')HO-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 (3k'')HO-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-,
 25 (3l'')HO-Ba-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-, or
 (3m'')HO-Bc-Ba-Bt-Ba-Ba-Bt-Bg-Ba-Ba-Ba-Ba-Bc-

B_{M''3} is a group represented by the following formula (3''):



B_{B''3} is a group represented by any one of the following (103a'') to (103m''):

- (103a'')-CH₂CH₂OH,
- (103b'')-Ba-CH₂CH₂OH,
- 5 (103c'')-Ba-Bt-CH₂CH₂OH,
- (103d'')-Ba-Bt-Bt-CH₂CH₂OH,
- (103e'')-Ba-Bt-Bt-Bt-CH₂CH₂OH,
- (103f'')-Ba-Bt-Bt-Bt-Bc-CH₂CH₂OH,
- (103g'')-Ba-Bt-Bt-Bt-Bc-Bt-CH₂CH₂OH,
- 10 (103h'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-CH₂CH₂OH,
- (103i'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-CH₂CH₂OH,
- (103j'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-CH₂CH₂OH,
- (103k'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-CH₂CH₂OH,
- (103l'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-Ba-CH₂CH₂OH, or
- 15 (103m'')-Ba-Bt-Bt-Bt-Bc-Bt-Bc-Ba-Ba-Bc-Ba-Bg-CH₂CH₂OH

where Bg, Ba, Bt and Bc are as defined above;

provided that at least one of the nucleosides constituting the compound represented by formula (III'') has 2''-O,4''-C-alkylene group.

- 2. The compound according to claim 1 or a pharmacologically acceptable salt
- 20 thereof, wherein at least one of the sugars and/or the phosphates constituting the oligonucleotide is modified.
- 3. The compound according to claim 2 or a pharmacologically acceptable salt thereof, wherein the sugar constituting the oligonucleotide is D-ribofuranose and the modification of the sugar is 2'-O-alkylation and/or 2'-O,4'-C-alkylenation of the D-ribofuranose.
- 25 4. The compound according to claim 2 or 3 or a pharmacologically acceptable salt thereof, wherein the modification of the phosphate is thioation of the phosphate group.

5. A therapeutic agent for muscular dystrophy, comprising:

the compound as defined in any one of claims 1 to 4 or a pharmacologically acceptable salt thereof, and

a pharmaceutically acceptable carrier.
- 5 6. The therapeutic agent according to claim 5, whose target of treatment is those patients in which the total number of the amino acids in the open reading frame of the dystrophin gene will be a multiple of 3 when exon 44 of the dystrophin gene has been skipped.
7. The therapeutic agent according to claim 5, for treating muscular dystrophy.
- 10 8. A use of the compound as defined in any one of claims 1 to 4 for treating muscular dystrophy.
9. The use according to claim 8 wherein the target of treatment is those patients in which the total number of the amino acids in the open reading frame of the dystrophin gene will be a multiple of 3 when exon 44 of the dystrophin gene has been skipped.
- 15 10. The therapeutic agent according to claim 7 wherein the muscular dystrophy is Duchenne muscular dystrophy.
11. The use according to claim 8, wherein the muscular dystrophy is Duchenne muscular dystrophy.

FIG. 1

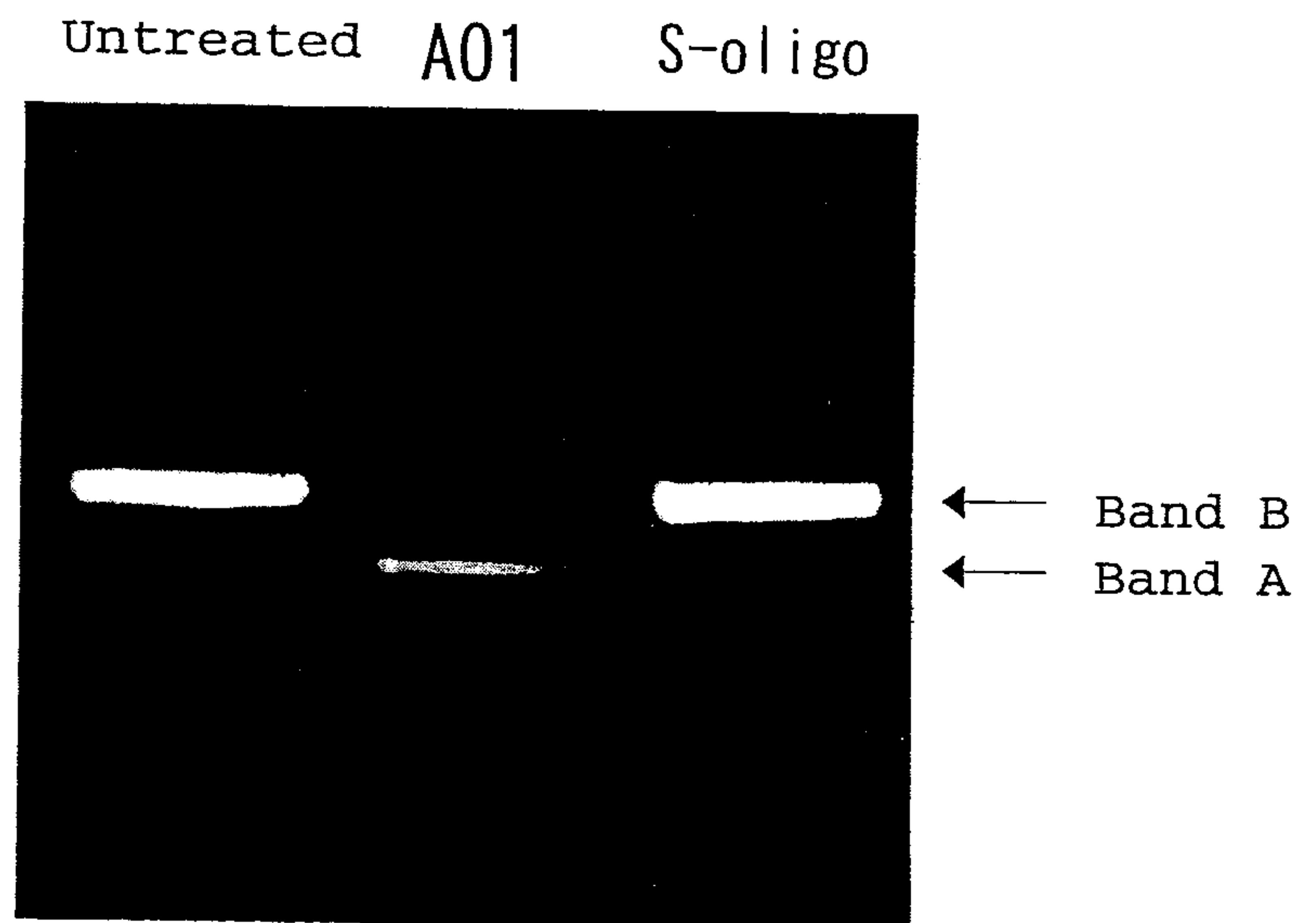


FIG. 2

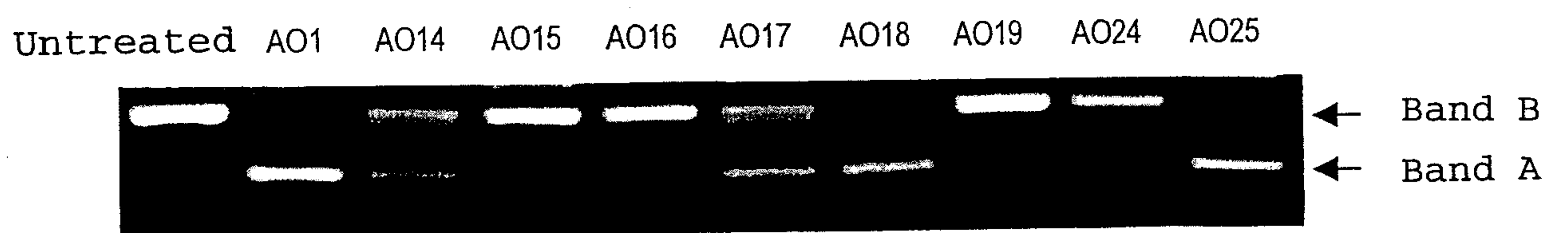


FIG. 3

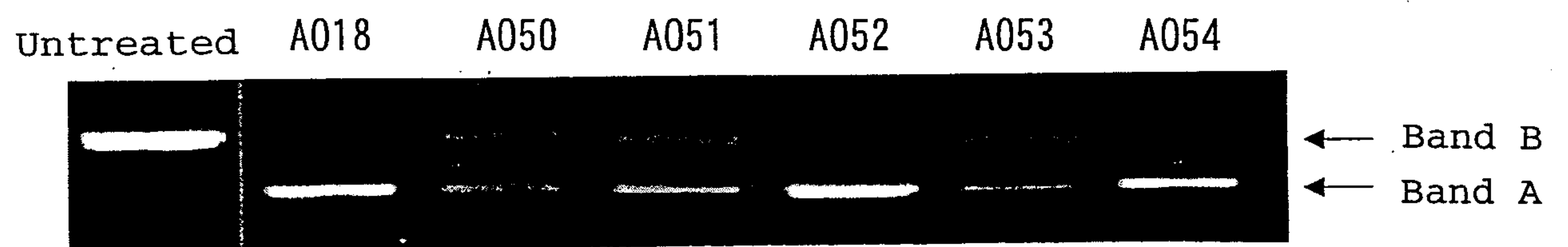


FIG. 4

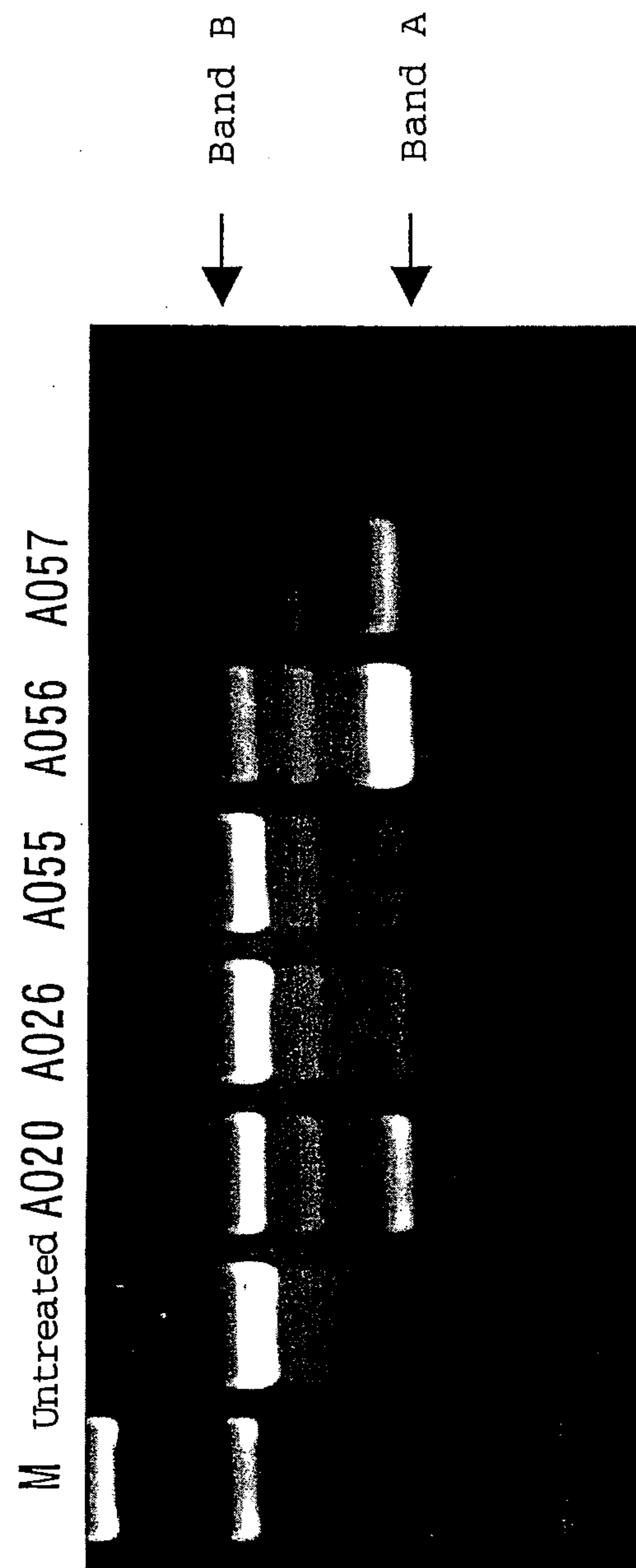


FIG. 5

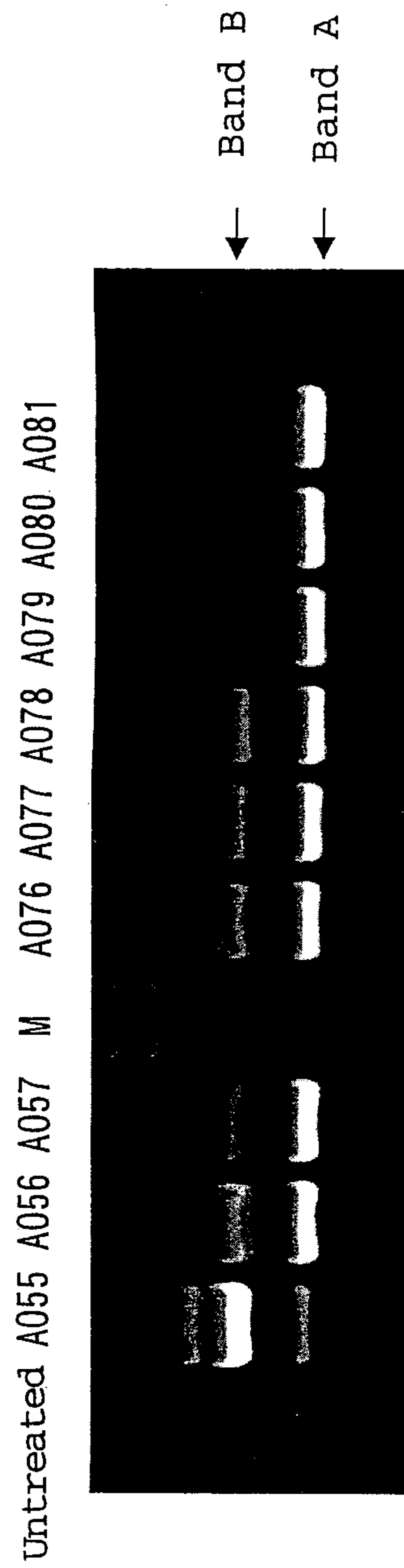


FIG. 6

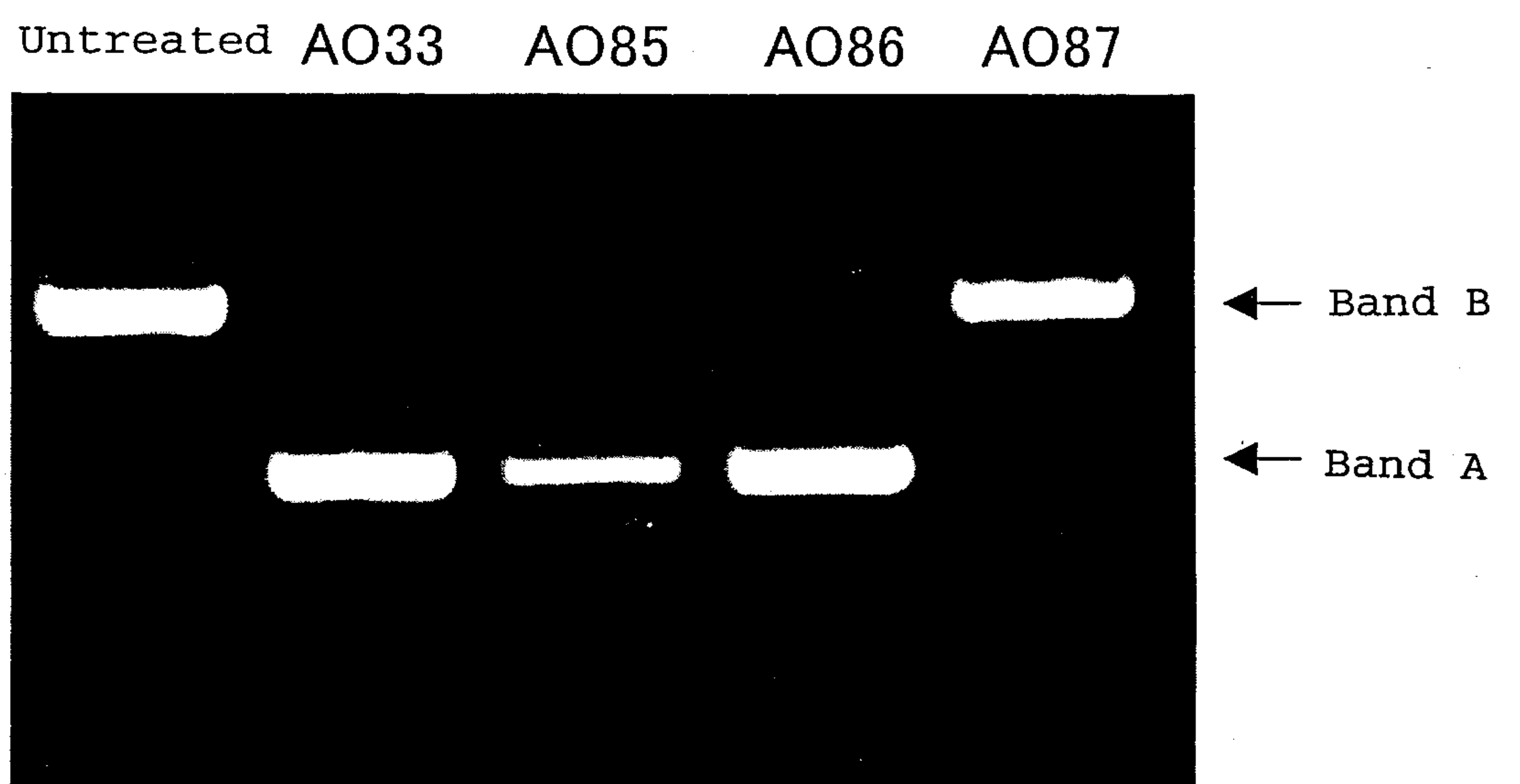


FIG. 7



FIG. 8

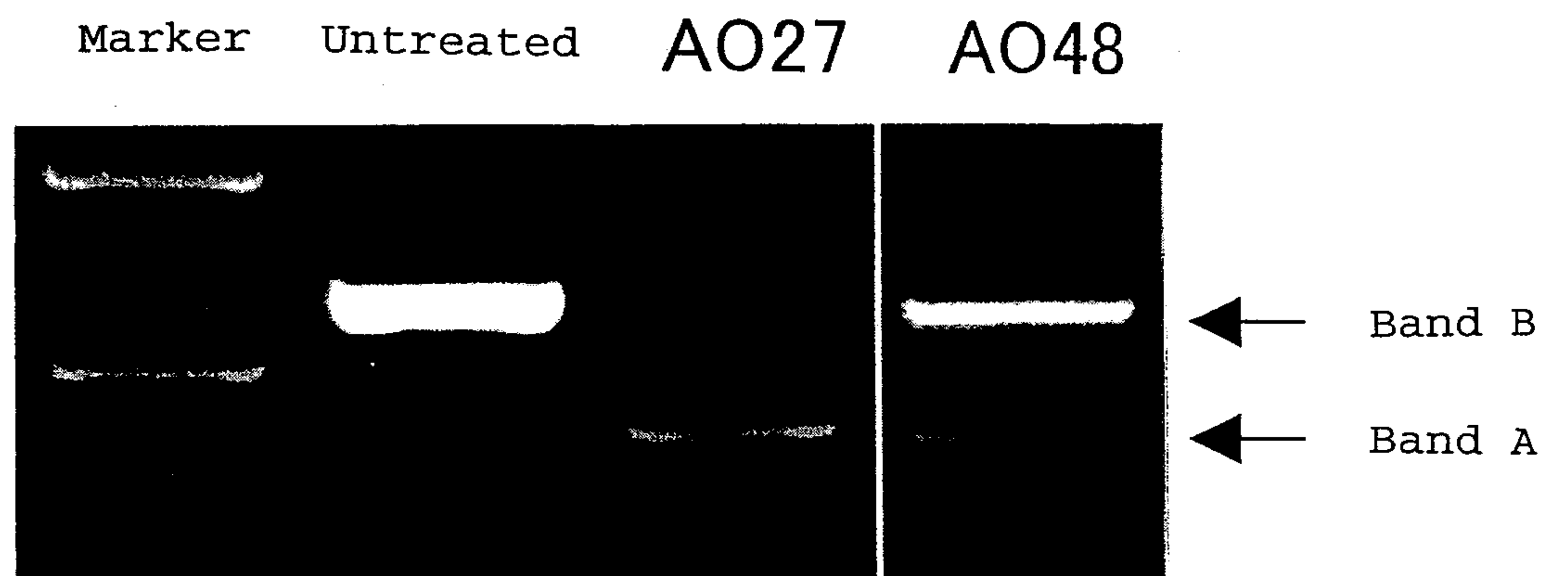


FIG. 9

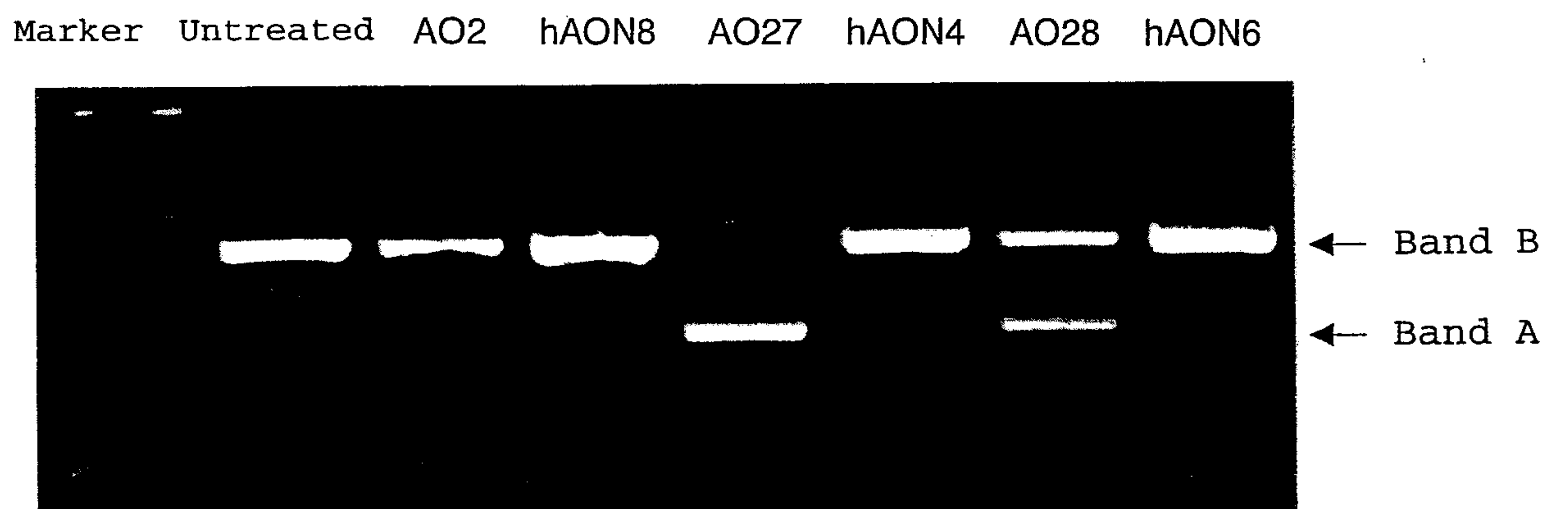


FIG. 10

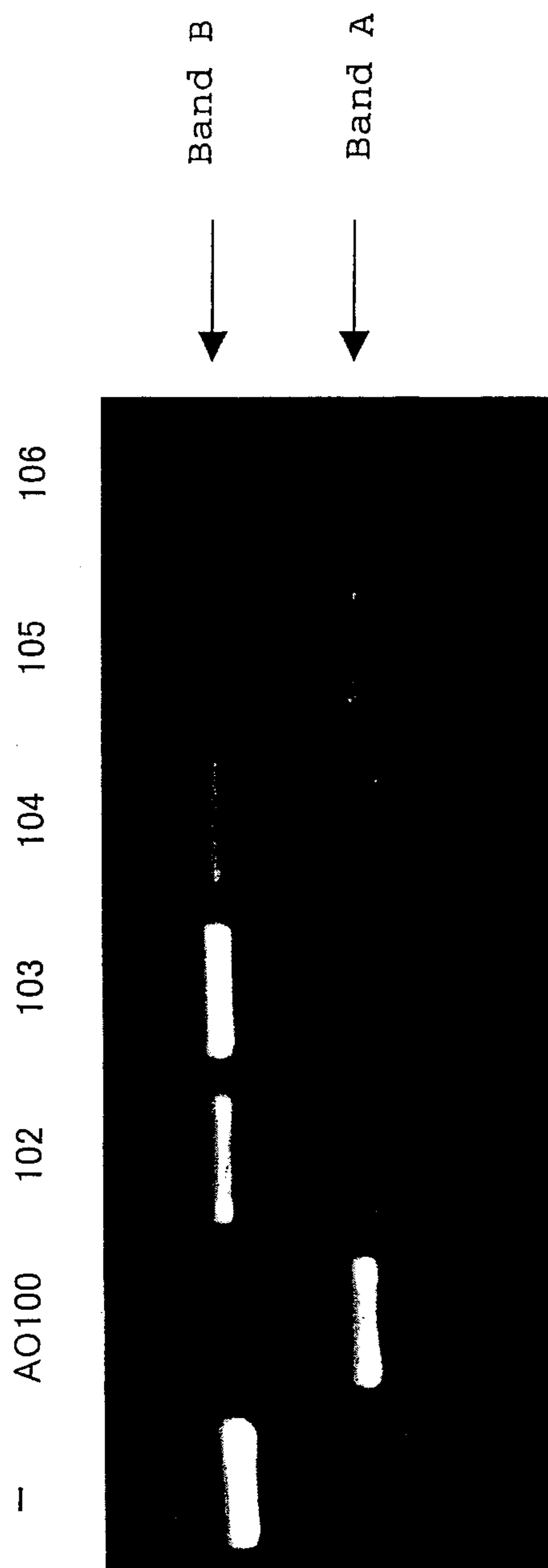


FIG. 11

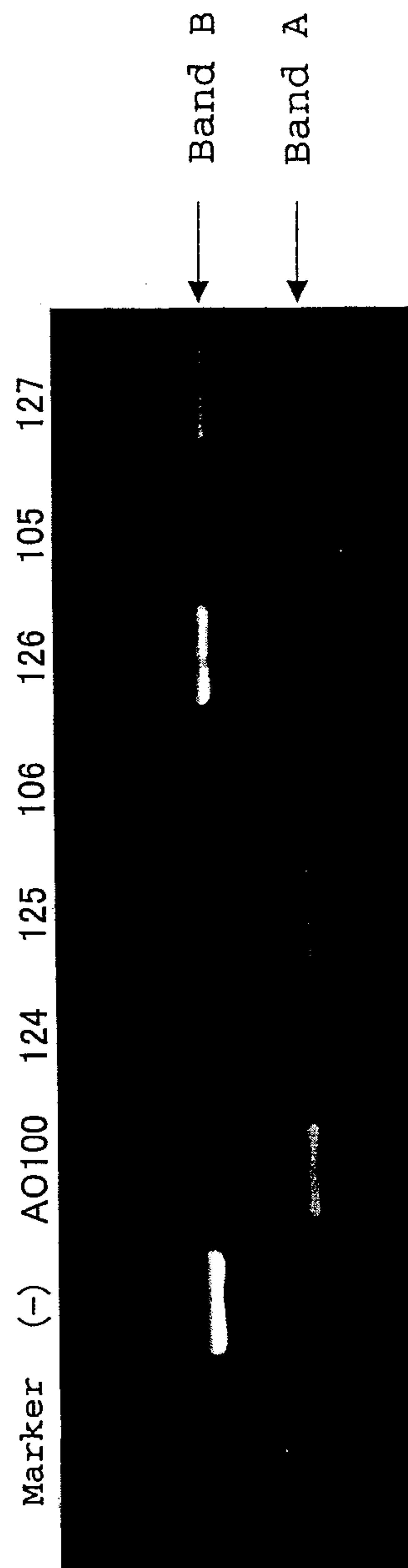


FIG. 12

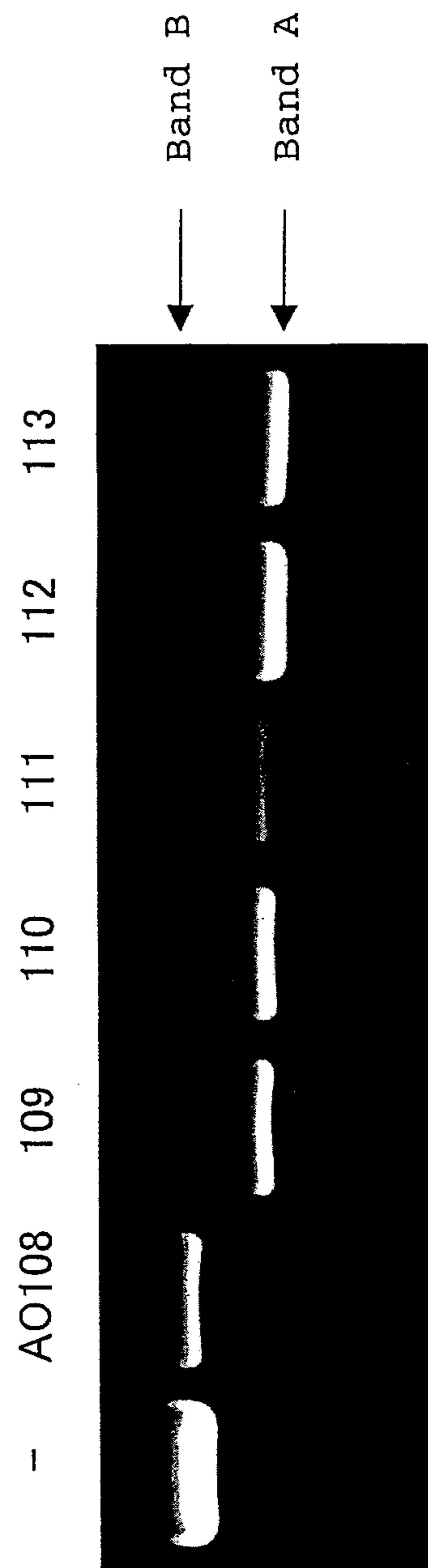


FIG. 13



FIG. 14

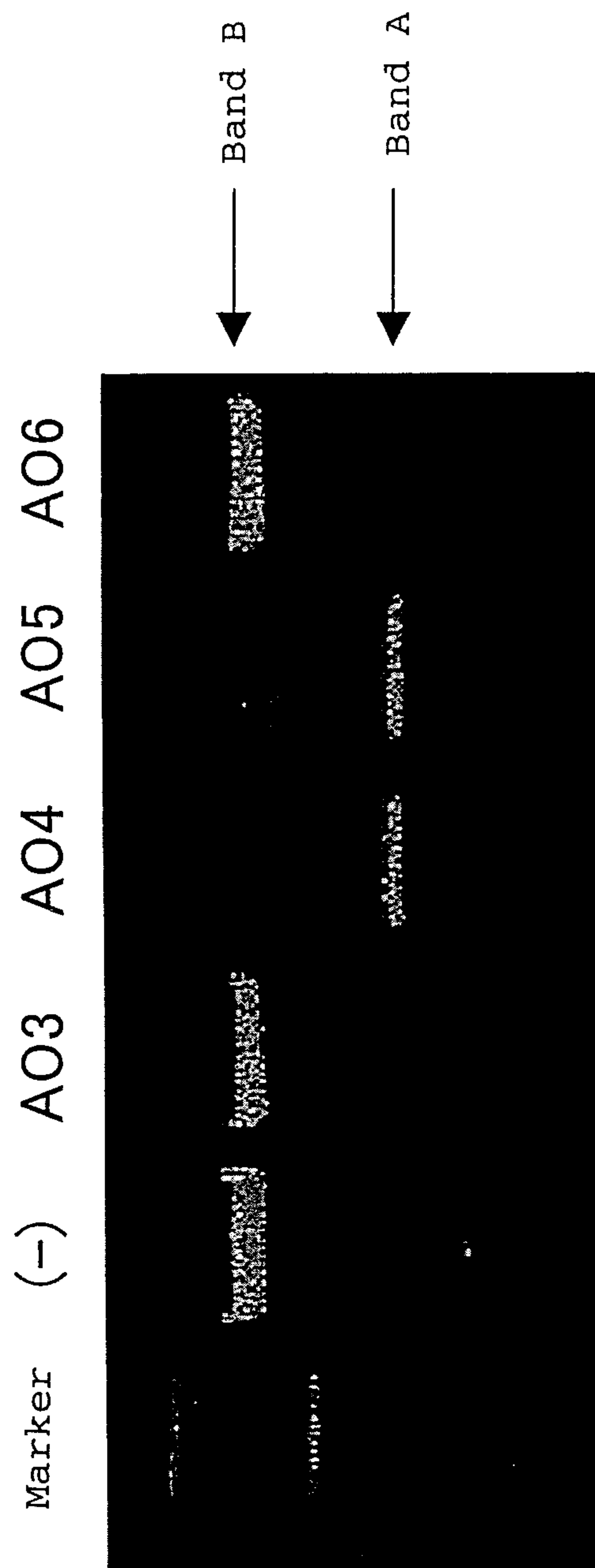


FIG.15

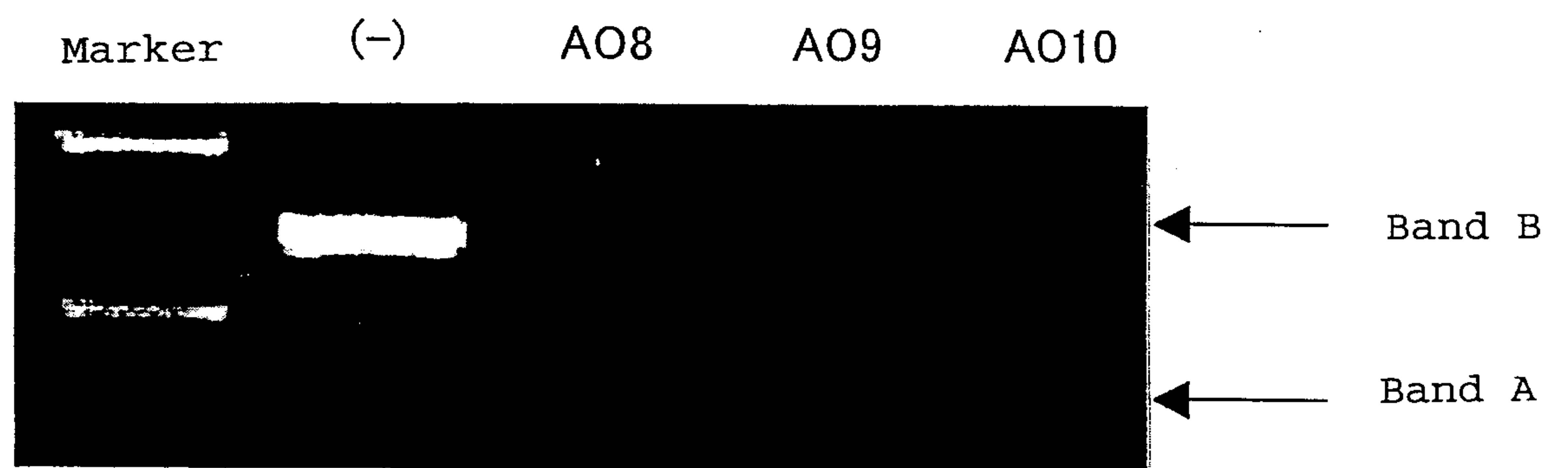


FIG.16

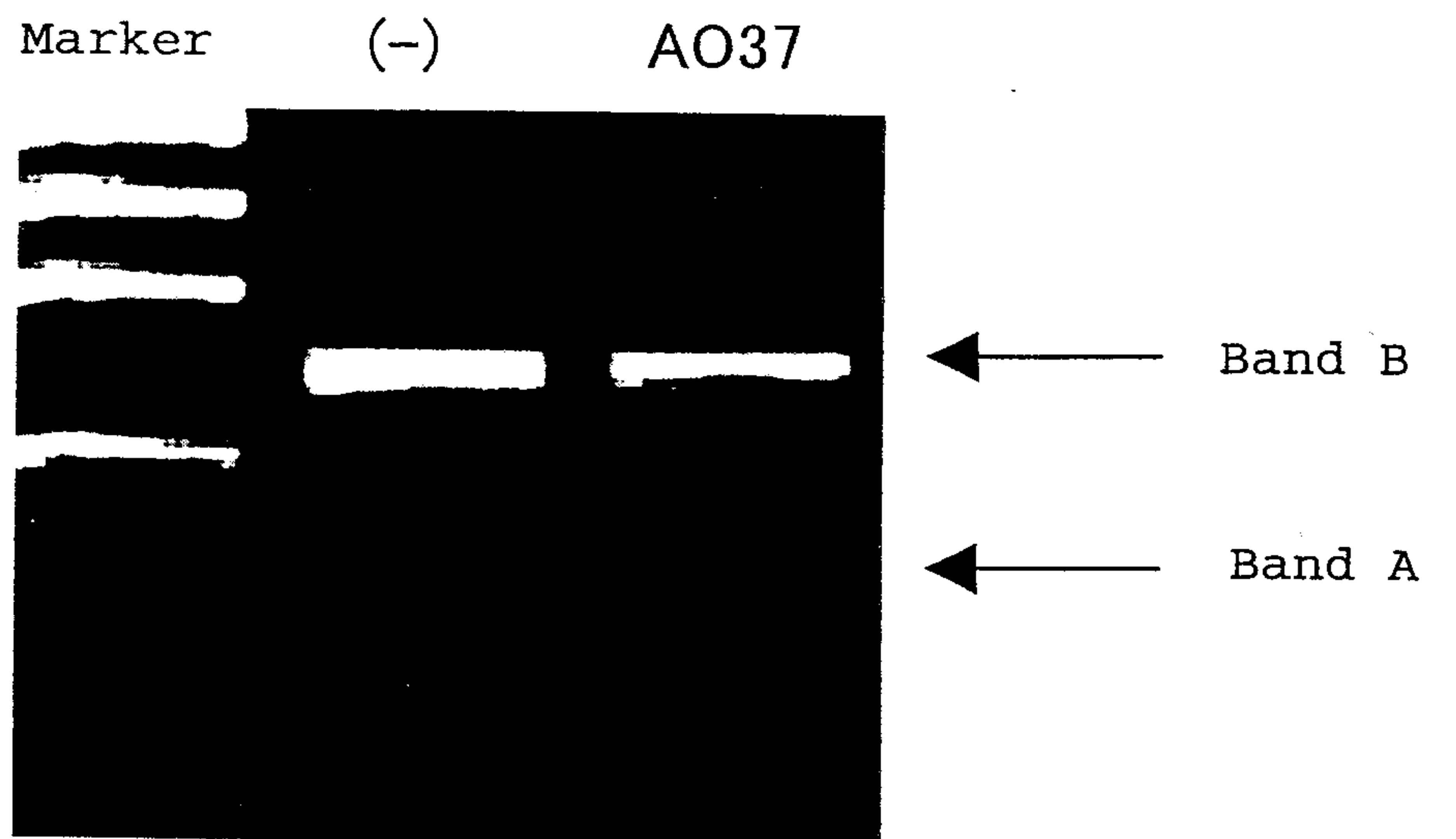


FIG. 17

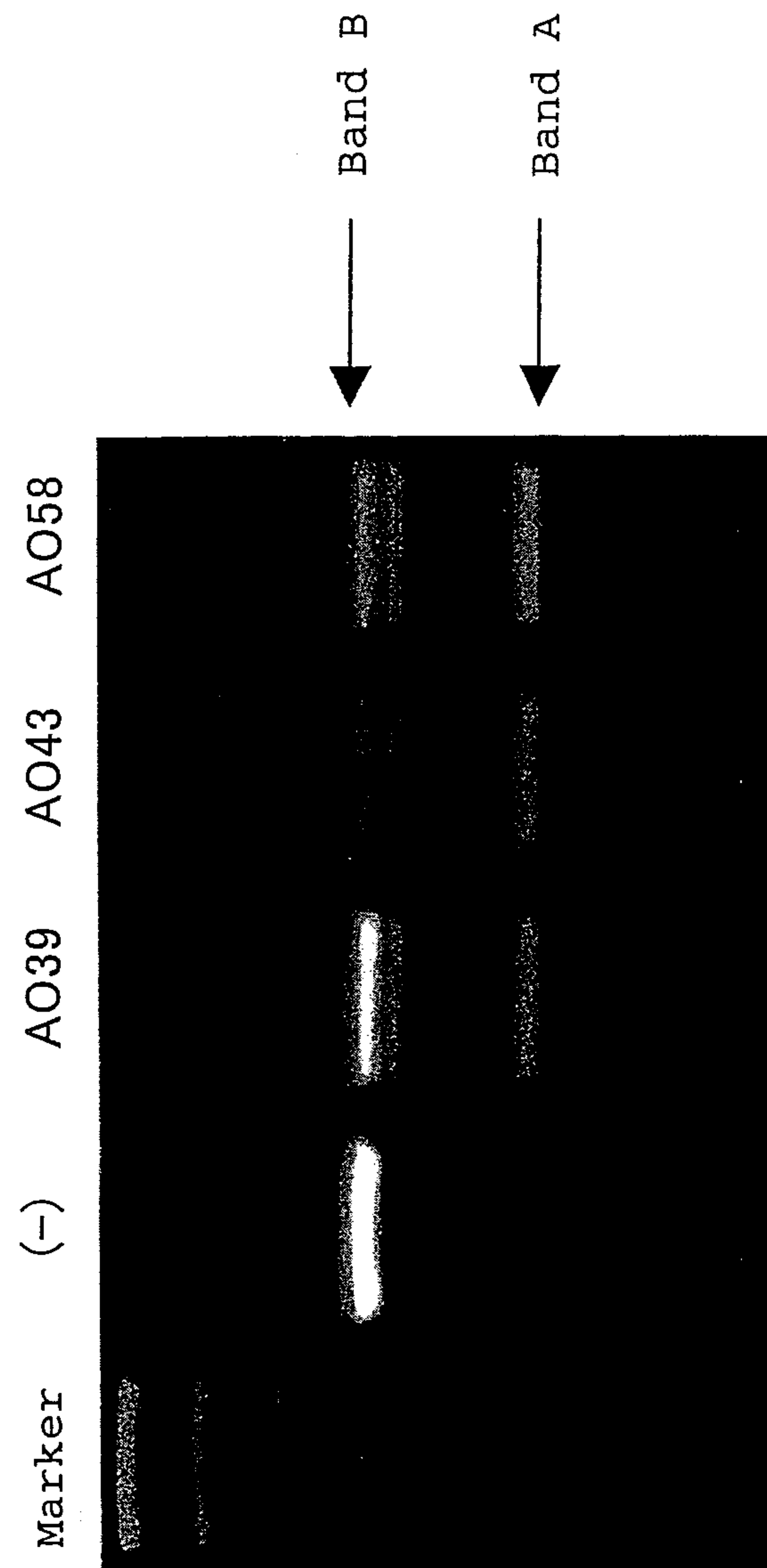


FIG.18



FIG.19

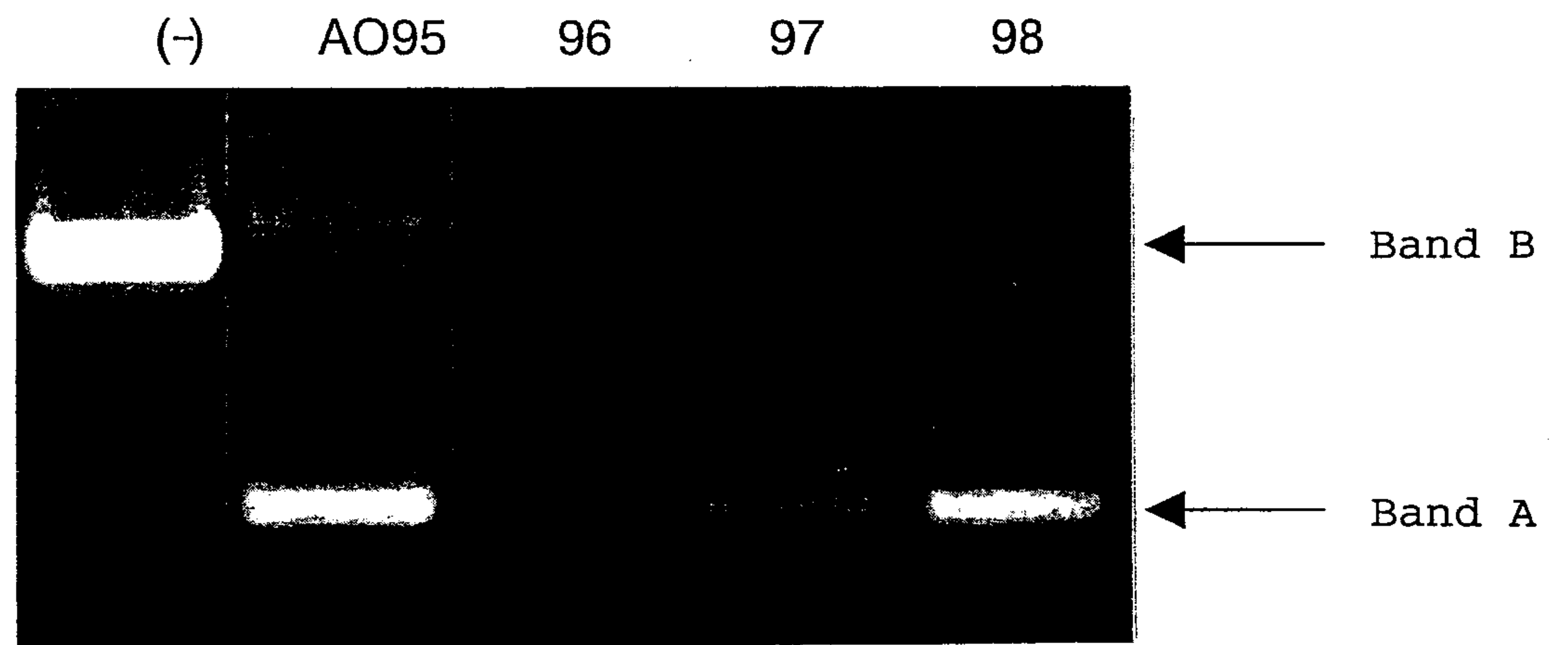


FIG. 20

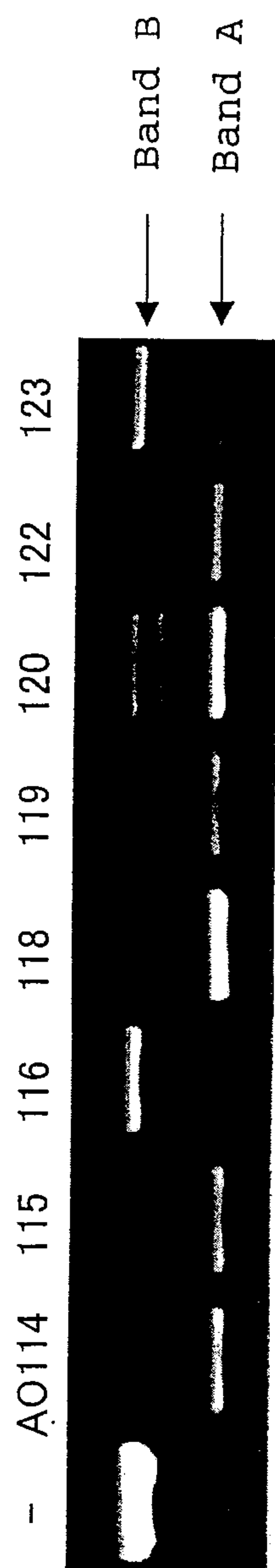


FIG. 21

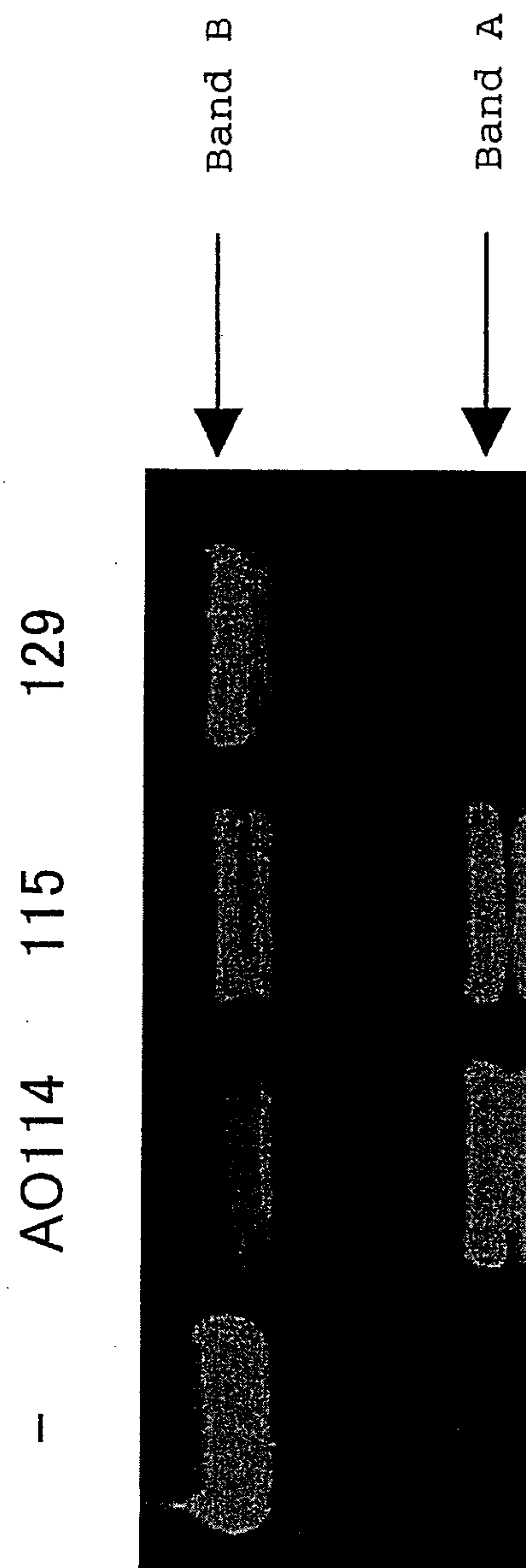
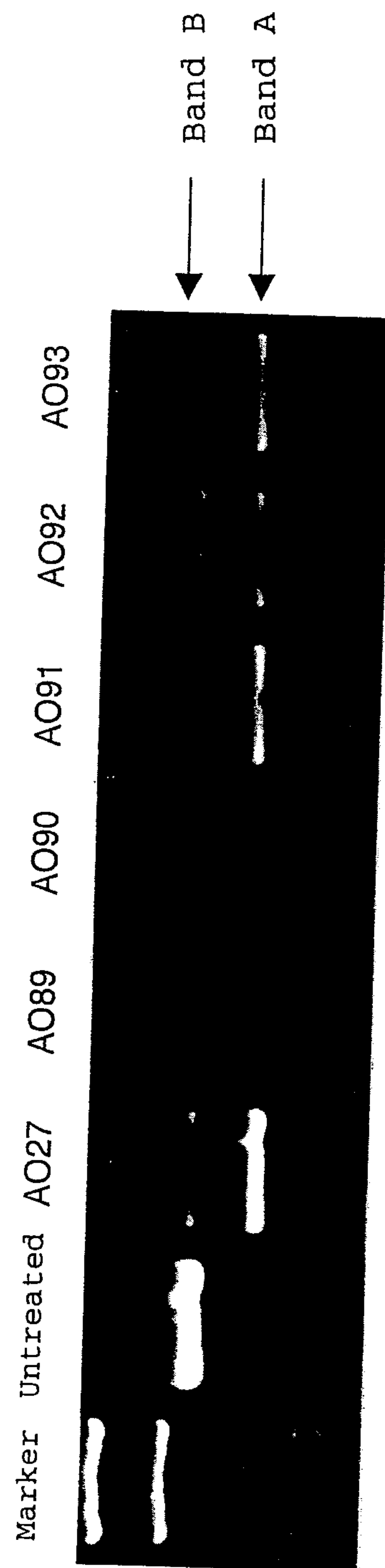


FIG. 22



Untreated

A01

S-oligo



← Band B

← Band A