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- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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1 December 2011

(54) Title: PROCESSES FOR THE PREPARATION OF LINEZOLID

(57) Abstract: The present invention provides improved processes for the preparation of linezolid, going through a novel intermediate of formula XIa, which avoids the use of sodium azide and formation of bis-linezolid as an impurity. It also provides the process for preparation of linezolid, free of bis-linezolid through benzylamine intermediate (XIII). Also, it provides the process of preparation of linezolid by preparing azide intermediate, which further converts into linezolid in one-pot. Linezolid with high yield and high chemical purity is obtained without the use of tedious, complicated purification steps, such as chromatography or repeated recrystallization.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/000527

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07D263/20
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, CHEM ABS Data, EMBASE, BEILSTEIN Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 688 792 A (BARBACHYN MICHAEL R [US] ET AL) 18 November 1997 (1997-11-18) cited in the application page 5, line 9 - line 14 -----	1-17, 30-38
X	YU DU ET AL: "Synthesis and antibacterial activity of linezolid analogues", BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, PERGAMON, ELSEVIER SCIENCE, GB, vol. 12, no. 6, 25 March 2002 (2002-03-25) , pages 857-859, XP002963251, ISSN: 0960-894X, DOI: DOI:10.1016/S0960-894X(02)00043-4 page 858; figure 1; compound 7e ----- -/--	1-17, 30-38

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

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20/09/2011

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2011/000527

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	D'ANDREA S ET AL: "Synthesis and antibacterial activity of dihydro-1,2-oxazine and 2-pyrazoline oxazolidinones: novel analogs of linezolid", BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, PERGAMON, ELSEVIER SCIENCE, GB, vol. 15, no. 11, 2 June 2005 (2005-06-02), pages 2834-2839, XP025313695, ISSN: 0960-894X, DOI: DOI:10.1016/J.BMCL.2005.03.099 [retrieved on 2005-06-02] scheme 6compounds 19,20 -----	1-17, 30-38
A	BRICKNER S J ET AL: "SYNTHESIS AND ANTIBACTERIAL ACTIVITY OF U-100592 AND U-100766, TWO OXAZOLIDINONE ANTOBACTERIAL AGENTS FOR THE POTENTIAL TREATMENT OF MULTIDRUG-RESISTANT GRAM-POSITIVE BACTERIAL INFECTIONS", JOURNAL OF MEDICINAL CHEMISTRY, AMERICAN CHEMICAL SOCIETY, US, vol. 39, no. 3, 2 February 1996 (1996-02-02), pages 673-679, XP000574381, ISSN: 0022-2623, DOI: DOI:10.1021/JM9509556 cited in the application scheme 1; page 675 -----	1-17, 30-38

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2011/000527

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5688792	A	18-11-1997	NONE

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17, 30-38

processes for preparing linezolid or its intermediates
where compound IXb is converted to the sulfonate salt XIa

2. claims: 18-24

processes for preparing linezolid or its intermediates
where compound IXb is benzylated to compound XIII

3. claims: 25-29

processes for preparing linezolid or its intermediates
where compound IXb is converted to azide X

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2011/000527

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-17, 30-38

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.