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(54) Title: DIAMINOPYRIMIDINE DERIVATIVES AND PROCESSES FOR THE PREPARATION THEREOF

(57) Abstract: The present invention provides a diaminopyrimidine derivative or its pharmaceutically acceptable salt, a process for the preparation thereof, a pharmaceutical composition comprising the same, and a use thereof. The diaminopyrimidine derivative or its pharmaceutically acceptable salt functions as a 5-HT<sub>4</sub> receptor agonist, and therefore can be usefully applied for preventing or treating dysfunction in gastrointestinal motility, one of the gastrointestinal diseases, such as gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony.



## Description

### Title of Invention: DIAMINOPYRIMIDINE DERIVATIVES AND PROCESSES FOR THE PREPARATION THEREOF

#### Technical Field

- [1] The present invention relates to a novel 5-HT<sub>4</sub> receptor agonist, more specifically a novel diaminopyrimidine derivative or its pharmaceutically acceptable salt having an activity as a 5-HT<sub>4</sub> receptor agonist, a process for the preparation thereof, a pharmaceutical composition comprising the same, and a use thereof.

#### Background Art

- [2] Serotonin (5-hydroxytryptamine, 5-HT), one of the neurotransmitters, is broadly distributed throughout human body including both the central nervous system and the peripheral nervous system. Approximately 95% of the human body's total serotonin is found in the gastrointestinal tract, while about 5% thereof is found in the brain. Serotonin receptors are located in intestinal nerves, enterochromaffin cells, intestinal smooth muscle, immune tissues, etc. Serotonin receptor subtypes include 5-HT<sub>1</sub>, 5-HT<sub>2</sub>, 5-HT<sub>3</sub>, 5-HT<sub>4</sub>, 5-HT<sub>5</sub>, 5-HT<sub>6</sub>, and 5-HT<sub>7</sub>. Interactions between these various receptors and serotonin are linked to various physiological functions. Therefore, various researches have been performed for developing therapeutic agents that are capable of interacting with a specific serotonin subtype as a target. The researches include identification of 5-HT<sub>4</sub> receptors and active agents interacting therewith (Langlois and Fischmeister, J. Med. Chem. 2003, 46, 319-344).
- [3] It has been found by the previous literatures that 5-HT<sub>4</sub> receptor agonists are useful for treating an abnormal gastrointestinal motility, i.e., dysfunction in gastrointestinal motility. The abnormal gastrointestinal motility may result in various disorders, for example irritable bowel syndrome (IBS), constipation, dyspepsia, delayed gastric emptying, gastroesophageal reflux disease (GERD), gastroparesis, post-operative ileus, intestinal pseudo-obstruction, drug-induced delayed transit, etc.
- [4] Representative 5-HT<sub>4</sub> receptor agonists disclosed in prior arts include tegaserod (an aminoguanidine derivative, US5,510,353), prucalopride (a benzofuran carboxamide derivative, EP0445862), cisapride (a benzamide derivative, US4,962,115), mosapride (EP0243959), etc. These compounds are known as an agent stimulating gastrointestinal motility.

#### Disclosure of Invention

#### Technical Problem

- [5] The present inventors found that a certain diaminopyrimidine derivative functions as a 5-HT<sub>4</sub> receptor agonist, and therefore can be usefully applied for preventing or

treating dysfunction in gastrointestinal motility.

- [6] Therefore, the present invention provides the above diaminopyrimidine derivative or its pharmaceutically acceptable salt, a process for the preparation thereof, a pharmaceutical composition comprising the same, and a use thereof.

### **Solution to Problem**

- [7] According to an aspect of the present invention, there is provided a use of a diaminopyrimidine derivative or its pharmaceutically acceptable salt for the manufacture of a medicament for preventing or treating a dysfunction in gastrointestinal motility
- [8] According to another aspect of the present invention, there is provided a pharmaceutical composition for preventing or treating a dysfunction in gastrointestinal motility comprising a diaminopyrimidine derivative or its pharmaceutically acceptable salt as an active ingredient.
- [9] According to still another aspect of the present invention, there is provided a diaminopyrimidine derivative or its pharmaceutically acceptable salt.
- [10] According to still another aspect of the present invention, there is provided a process for preparing the diaminopyrimidine derivative or its pharmaceutically acceptable salt.

### **Advantageous Effects of Invention**

- [11] The compound of the present invention, i.e., the diaminopyrimidine derivative or its pharmaceutically acceptable salt, functions as a 5-HT<sub>4</sub> receptor agonist, and therefore can be usefully applied for preventing or treating dysfunction in gastrointestinal motility, one of the gastrointestinal diseases, such as gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony.

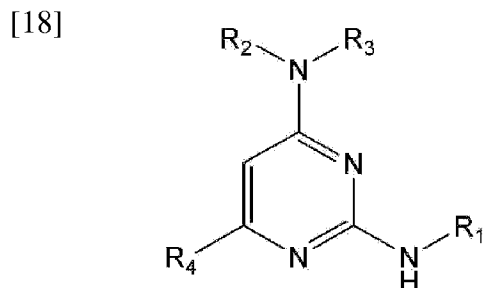
### **Best Mode for Carrying out the Invention**

- [12] As used herein, the term "alkyl" refers to a straight or branched aliphatic hydrocarbon radical. For example, C<sub>1</sub>-C<sub>6</sub> alkyl means a straight or branched aliphatic hydrocarbon having 1 to 6 carbon atoms, such as methyl, ethyl, propyl, *n*-butyl, *n*-pentyl, *n*-hexyl, isopropyl, isobutyl, *sec*-butyl, *tert*-butyl, neopentyl, and isopentyl.
- [13] The term "alkoxy or alkyloxy" refers to a radical formed by substituting the hydrogen atom of a hydroxyl group with an alkyl. For example, C<sub>1</sub>-C<sub>6</sub> alkoxy includes methoxy, ethoxy, propoxy, *n*-butoxy, *n*-pentyloxy, isopropoxy, *sec*-butoxy, *tert*-butoxy, neopentyloxy, and isopentyloxy.
- [14] The term "alkenyl" refers to a straight or branched aliphatic hydrocarbon radical having one or more double bond(s). For example, C<sub>2</sub>-C<sub>6</sub> alkenyl includes ethenyl, propenyl, butenyl, pentenyl, and hexenyl.
- [15] The term "alkynyl" refers to a straight or branched aliphatic hydrocarbon radical

having one or more triple bond(s). For example, C<sub>2</sub>-C<sub>6</sub> alkynyl includes ethynyl, propynyl, butynyl, pentynyl, and hexynyl.

[16] The present invention provides a use of a compound of Formula 1 or its pharmaceutically acceptable salt for the manufacture of a medicament for preventing or treating a dysfunction in gastrointestinal motility:

[17] <Formula 1>



[19] wherein,

[20] R<sub>1</sub> is a phenyl group substituted with one or more substituents selected from the group consisting of hydroxy, amino, halogen, cyano, nitro, hydroxycarbonyl, C<sub>1-5</sub> alkyl (where the C<sub>1-5</sub> alkyl is optionally substituted with one or more halogens), C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, C<sub>1-5</sub> alkoxy (where the C<sub>1-5</sub> alkoxy is optionally substituted with one or more halogens), C<sub>1-5</sub> alkylthio, mono or di-C<sub>1-5</sub> alkylamino, C<sub>1-5</sub> alkylsulfonylamino, C<sub>1-5</sub> alkylcarbonylamino, C<sub>1-5</sub> alkoxy carbonyl, aminosulfonyl, aminocarbonyl, and benzyloxycarbonylamino; or

[21] a heteroaryl group selected from the group consisting of pyridinyl, pyrimidinyl, pyrazinyl, imidazolyl, pyrazolyl, triazolyl, oxazolyl, thiazolyl, furanyl, pyrrolyl, thiophenyl, naphthyl, indanyl, quinolinyl, quinolinonyl, chromenonyl, dihydroindolonyl, isoindoline-1,3-dionyl, dihydrobenzoimidazolonyl, benzoxazolonyl, benzofuranyl, benzothiophenyl, benzo[d][1,3]dioxolyl, dihydrobenzo[1,4]dioxinyl, indolyl, indolinyl, benzimidazolyl, benzoxazolyl, benzothiazolyl, and indazolyl, wherein the heteroaryl group may be optionally substituted with one or more substituents selected from the group consisting of amino, mono or di-C<sub>1-5</sub> alkylamino, cyano, nitro, halogen, C<sub>1-5</sub> alkyl (where the C<sub>1-5</sub> alkyl is optionally substituted with one or more halogen), C<sub>1-5</sub> alkoxy, acetyl, and C<sub>1-5</sub> alkylsulfonyl,

[22] R<sub>2</sub> and R<sub>3</sub> are, independently of each other, a C<sub>1-5</sub> alkyl group optionally substituted with hydroxy or C<sub>1-5</sub> alkoxy, and

[23] R<sub>4</sub> is a C<sub>1-5</sub> alkyl group optionally substituted with phenyl; or a C<sub>2-6</sub> alkenyl group optionally substituted with phenyl or C<sub>3-6</sub> cycloalkyl.

[24]

[25] In the use for the manufacture of a medicament for preventing or treating a dysfunction in gastrointestinal motility according to the present invention, the dysfunction

in gastrointestinal motility includes gastrointestinal diseases, such as gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony. The constipation includes chronic constipation, chronic idiopathic constipation (CIC), opioid-induced constipation (OIC), etc. And also, the dyspepsia includes functional dyspepsia.

[26]

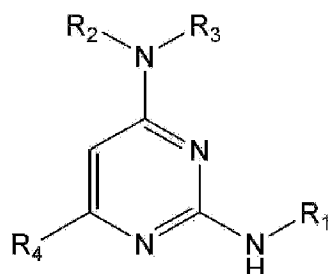
[27] In the use for the manufacture of a medicament for preventing or treating a dysfunction in gastrointestinal motility according to the present invention, the compound or its salt may be the compound of Formula 1 or its pharmaceutically acceptable salt, wherein  $R_2$  and  $R_3$  is an ethyl group.

[28]

[29] The present invention also provides a pharmaceutical composition for preventing or treating a dysfunction in gastrointestinal motility comprising a therapeutically effective amount of a compound of Formula 1 or its pharmaceutically acceptable salt; and a pharmaceutically acceptable carrier:

[30] &lt;Formula 1&gt;

[31]



[32] wherein,

[33]  $R_1$  is a phenyl group substituted with one or more substituents selected from the group consisting of hydroxy, amino, halogen, cyano, nitro, hydroxycarbonyl,  $C_{1-5}$  alkyl (where the  $C_{1-5}$  alkyl is optionally substituted with one or more halogens),  $C_{2-6}$  alkenyl,  $C_{2-6}$  alkynyl,  $C_{1-5}$  alkoxy (where the  $C_{1-5}$  alkoxy is optionally substituted with one or more halogens),  $C_{1-5}$  alkylthio, mono or di- $C_{1-5}$  alkylamino,  $C_{1-5}$  alkylsulfonylamino,  $C_{1-5}$  alkylcarbonylamino,  $C_{1-5}$  alkoxy carbonyl, aminosulfonyl, aminocarbonyl, and benzyloxycarbonylamino; or

[34] a heteroaryl group selected from the group consisting of pyridinyl, pyrimidinyl, pyrazinyl, imidazolyl, pyrazolyl, triazolyl, oxazolyl, thiazolyl, furanyl, pyrrolyl, thiophenyl, naphthyl, indanyl, quinolinyl, quinolinonyl, chromenonyl, dihydroindolonyl, isoindoline-1,3-dionyl, dihydrobenzoimidazolonyl, benzoxazolonyl, benzofuranyl, benzothiophenyl, benzo[d][1,3]dioxolyl, dihydrobenzo[1,4]dioxinyl, indolyl, indolinyl, benzimidazolyl, benzoxazolyl, benzothiazolyl, and indazolyl,

wherein the heteroaryl group may be optionally substituted with one or more substituents selected from the group consisting of amino, mono or di-C<sub>1-5</sub> alkylamino, cyano, nitro, halogen, C<sub>1-5</sub> alkyl (where the C<sub>1-5</sub> alkyl is optionally substituted with one or more halogen), C<sub>1-5</sub> alkoxy, acetyl, and C<sub>1-5</sub> alkylsulfonyl,

[35] R<sub>2</sub> and R<sub>3</sub> are, independently of each other, a C<sub>1-5</sub> alkyl group optionally substituted with hydroxy or C<sub>1-5</sub> alkoxy, and

[36] R<sub>4</sub> is a C<sub>1-5</sub> alkyl group optionally substituted with phenyl; or a C<sub>2-6</sub> alkenyl group optionally substituted with phenyl or C<sub>3-6</sub> cycloalkyl.

[37]

[38] In the pharmaceutical composition according to the present invention, the dysfunction in gastrointestinal motility includes gastrointestinal diseases, such as gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony. The constipation includes chronic constipation, chronic idiopathic constipation (CIC), opioid-induced constipation (OIC), etc. And also, the dyspepsia includes functional dyspepsia.

[39]

[40] In the pharmaceutical composition according to the present invention, the compound or its salt may be the compound of Formula 1 or its pharmaceutically acceptable salt, wherein R<sub>2</sub> and R<sub>3</sub> is an ethyl group.

[41]

[42] The pharmaceutical composition of the present invention may comprise a pharmaceutically acceptable carrier, such as diluents, disintegrants, sweeteners, lubricants, or flavoring agents. The pharmaceutical composition may be formulated to an oral dosage form such as tablets, capsules, powders, granules, suspensions, emulsions, or syrups; or a parenteral dosage form such as injection. The dosage form may be various forms, e.g., dosage forms for single administration or for multiple administrations.

[43] The pharmaceutical composition of the present invention may comprise, for example, a diluent (e.g., lactose, corn starch, etc); a lubricant (e.g., magnesium stearate); an emulsifying agent; a suspending agent; a stabilizer; and/or an isotonic agent. If necessary, the composition further comprises sweeteners and/or flavoring agents.

[44] The composition of the present invention may be administered orally or parenterally, including intravenous, intraperitoneal, subcutaneous, rectal and topical routes of administration. Therefore, the composition of the present invention may be formulated into various forms such as tablets, capsules, aqueous solutions or suspensions. In the case of tablets for oral administration, carriers such as lactose, corn starch, and lubricating agents, e.g. magnesium stearate, are conventionally used. In the case of capsules for oral administration, lactose and/or dried corn starch can be used as a

diluent. When an aqueous suspension is required for oral administration, the active ingredient may be combined with emulsifying and/or suspending agents. If desired, certain sweetening and/or flavoring agents may be used. For intramuscular, intraperitoneal, subcutaneous and intravenous administration, sterile solutions of the active ingredient are usually prepared, and the pH of the solutions should be suitably adjusted and buffered. For intravenous administration, the total concentration of solutes should be controlled in order to render the preparation isotonic. The composition of the present invention may be in the form of an aqueous solution containing pharmaceutically acceptable carriers, e.g., saline having a pH level of 7.4. The solutions may be introduced into a patient's intramuscular blood-stream by local bolus injection.

[45] The compound of Formula 1 or its pharmaceutically acceptable salt may be administered in a therapeutically effective amount ranging from about 0.001 mg/kg to about 10 mg/kg per day to a subject patient. Of course, the dosage may be changed according to the patient's age, weight, susceptibility, symptom, or activity of the compound.

[46]

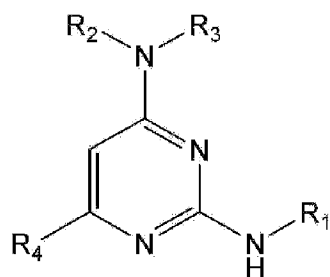
[47] The present invention also provides a method for treating a dysfunction in gastrointestinal motility, such as gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony, in a patient, which comprises administering a therapeutically effective amount of the compound of Formula 1 or its pharmaceutically acceptable salt to the patient in need thereof. The constipation includes chronic constipation, chronic idiopathic constipation (CIC), opioid-induced constipation (OIC), etc. And also, the dyspepsia includes functional dyspepsia.

[48]

[49] The present invention also provides a compound of Formula 1 or its pharmaceutically acceptable salt:

[50] <Formula 1>

[51]



[52] wherein,

- [53]  $R_1$  is a phenyl group substituted with one or more substituents selected from the group consisting of hydroxy, amino, halogen, cyano, nitro, hydroxycarbonyl,  $C_{1-5}$  alkyl (where the  $C_{1-5}$  alkyl is optionally substituted with one or more halogens),  $C_{2-6}$  alkenyl,  $C_{2-6}$  alkynyl,  $C_{1-5}$  alkoxy (where the  $C_{1-5}$  alkoxy is optionally substituted with one or more halogens),  $C_{1-5}$  alkylthio, mono or di- $C_{1-5}$  alkylamino,  $C_{1-5}$  alkylsulfonylamino,  $C_{1-5}$  alkylcarbonylamino,  $C_{1-5}$  alkoxycarbonyl, aminosulfonyl, aminocarbonyl, and benzyloxycarbonylamino; or
- [54] a heteroaryl group selected from the group consisting of pyridinyl, pyrimidinyl, pyrazinyl, imidazolyl, pyrazolyl, triazolyl, oxazolyl, thiazolyl, furanyl, pyrrolyl, thiophenyl, naphthyl, indanyl, quinolinyl, quinolinonyl, chromenonyl, dihydroindolonyl, isoindoline-1,3-dionyl, dihydrobenzoimidazolonyl, benzoxazolonyl, benzofuranyl, benzothiophenyl, benzo[d][1,3]dioxolyl, dihydrobenzo[1,4]dioxinyl, indolyl, indolinyl, benzimidazolyl, benzoxazolyl, benzothiazolyl, and indazolyl, wherein the heteroaryl group may be optionally substituted with one or more substituents selected from the group consisting of amino, mono or di- $C_{1-5}$  alkylamino, cyano, nitro, halogen,  $C_{1-5}$  alkyl (where the  $C_{1-5}$  alkyl is optionally substituted with one or more halogen),  $C_{1-5}$  alkoxy, acetyl, and  $C_{1-5}$  alkylsulfonyl,
- [55]  $R_2$  and  $R_3$  are, independently of each other, a  $C_{2-5}$  alkyl group optionally substituted with hydroxy or  $C_{1-5}$  alkoxy, and
- [56]  $R_4$  is a  $C_{2-5}$  alkyl group optionally substituted with phenyl; or a  $C_{2-6}$  alkenyl group optionally substituted with phenyl or  $C_{3-6}$  cycloalkyl.
- [57]
- [58] Preferably, the compound or its salt may be the compound of Formula 1 or its pharmaceutically acceptable salt, wherein  $R_2$  and  $R_3$  is an ethyl group.
- [59]
- [60] The compound of Formula 1 or its pharmaceutically acceptable salt may have substituents containing asymmetric carbon and therefore be in the form of racemic mixture (RS) or in forms of optical isomers, such as (R) or (S) isomer. The compound of Formula 1 or its pharmaceutically acceptable salt comprises both racemic mixture (RS) and optical isomers such as (R) or (S) isomer. And also, the compound of Formula 1 or its pharmaceutically acceptable salt may be in the form of cis- or trans- geometrical isomer, according to substituents having e.g., the double bond therein. The compound of Formula 1 or its pharmaceutically acceptable salt comprises both cis- and trans- geometrical isomers. And also, the compound of Formula 1 or its pharmaceutically acceptable salt may be in the form of one or more diastereomic isomer(s) or a mixture thereof. The compound of Formula 1 or its pharmaceutically acceptable salt comprises both diastereomic isomer(s) and a mixture thereof.
- [61] The compound of Formula 1 of the present invention may be in a pharmaceutically

acceptable salt form. The salt may be an acid addition salt form, which includes e.g., salts derived from an inorganic acid such as hydrochloric acid, hydrobromic acid, sulfuric acid, sulfonic acid, sulfamic acid, phosphoric acid, or nitric acid; and salts derived from an organic acid such as acetic acid, propionic acid, succinic acid, glycolic acid, stearic acid, citric acid, maleic acid, malonic acid, methanesulfonic acid, ethanesulfonic acid, tartaric acid, hydroxymaleic acid, phenylacetic acid, glutamic acid, benzoic acid, salicylic acid, 2-acetoxybenzoic acid, fumaric acid, toluenesulfonic acid, benzenesulfonic acid, oxalic acid or trifluoroacetic acid. The salt may be prepared by reacting a compound of Formula 1 in the form of free base with a salt-forming inorganic or organic acid in stoichiometric amount or excessive amount, in a suitable solvent or a mixture of two or more solvents.

[62]

[63] In the use, the pharmaceutical composition, the treatment method, and the compound according to the present invention, more preferable compounds include a compound (or its pharmaceutically acceptable salt) selected from the group consisting of:

[64] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methoxyphenyl)-6-propylpyrimidine-2,4-diamine;

[65] *N*<sup>2</sup>-(4-cyanophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[66] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-fluorophenyl)-6-propylpyrimidine-2,4-diamine;

[67] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[3-(methylthio)phenyl]-6-propylpyrimidine-2,4-diamine;

[68] *N*<sup>2</sup>-(3-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[69] *N*<sup>2</sup>-(4-amino-2,5-dichlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[70] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methoxyphenyl)-6-propylpyrimidine-2,4-diamine;

[71] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-methoxyphenyl)-6-propylpyrimidine-2,4-diamine;

[72] 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile;

[73] *N*<sup>2</sup>-(4-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[74] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-nitrophenyl)-6-propylpyrimidine-2,4-diamine;

[75] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-fluoro-5-methylphenyl)-6-propylpyrimidine-2,4-diamine;

[76] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-fluoro-4-methylphenyl)-6-propylpyrimidine-2,4-diamine;

[77] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(5-fluoro-2-methylphenyl)-6-propylpyrimidine-2,4-diamine;

[78] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-fluoro-4-methylphenyl)-6-propylpyrimidine-2,4-diamine;

[79] *N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[80] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[3-methoxy-5-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine;

[81] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(5-methoxy-2-methylphenyl)-6-propylpyrimidine-2,4-diamine;

[82] *N*<sup>2</sup>-(2-chloro-5-methoxyphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[83] *N*<sup>2</sup>-(3-chloro-2-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

[84] 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-3-nitrophenol;

[85] *N*<sup>2</sup>-(5-chloro-2-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

- [86] 4-chloro-3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol;
- [87] *N*<sup>2</sup>-(2-chloro-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [88] *N*<sup>2</sup>-(2-chloro-5-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [89] *N*<sup>2</sup>-(3-chloro-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [90] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[4-(trifluoromethyl)phenyl]pyrimidine-2,4-diamine;
- [91] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[3-(trifluoromethyl)phenyl]pyrimidine-2,4-diamine;
- [92] *N*<sup>2</sup>-(3-bromophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [93] 4-chloro-2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol;
- [94] 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol;
- [95] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[4-(trifluoromethoxy)phenyl]pyrimidine-2,4-diamine;
- [96] *N*<sup>2</sup>-(3,4-difluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [97] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(naphthalen-1-yl)-6-propylpyrimidine-2,4-diamine;
- [98] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyridin-2-yl)pyrimidine-2,4-diamine;
- [99] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyridin-3-yl)pyrimidine-2,4-diamine;
- [100] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyridin-4-yl)pyrimidine-2,4-diamine;
- [101] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyrazin-2-yl)pyrimidine-2,4-diamine;
- [102] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(quinolin-3-yl)pyrimidine-2,4-diamine;
- [103] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyrimidin-4-yl)pyrimidine-2,4-diamine;
- [104] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(2,3,4-trifluorophenyl)pyrimidine-2,4-diamine;
- [105] *N*<sup>2</sup>-(2,6-difluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [106] *N*<sup>2</sup>-(4-chloro-2-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [107] 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-4-methylbenzonitrile;
- [108] 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile;
- [109] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-2-methylphenyl)-6-propylpyrimidine-2,4-diamine;
- [110] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine;
- [111] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-methylpyridin-2-yl)-6-propylpyrimidine-2,4-diamine;
- [112] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[4-(methylthio)phenyl]-6-propylpyrimidine-2,4-diamine;
- [113] *N*<sup>2</sup>-(2,5-difluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [114] *N*<sup>2</sup>-(4-bromophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [115] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(5-methylthiazol-2-yl)-6-propylpyrimidine-2,4-diamine;
- [116] *N*<sup>2</sup>-(5-chloropyridin-2-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [117] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;
- [118] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(6-methoxypyridin-3-yl)-6-propylpyrimidine-2,4-diamine;
- [119] 4-chloro-2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile;
- [120] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(quinolin-8-yl)pyrimidine-2,4-diamine;
- [121] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methylthiazol-2-yl)-6-propylpyrimidine-2,4-diamine;
- [122] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitropyridin-2-yl)-6-propylpyrimidine-2,4-diamine;
- [123] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[6-(trifluoromethyl)pyridin-3-yl]pyrimidine-2,4-diamine;

- [124]  $N^4,N^4$ -diethyl-6-propyl- $N^2$ -(quinolin-6-yl)pyrimidine-2,4-diamine;
- [125]  $N^4,N^4$ -diethyl- $N^2$ -(4-fluoro-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine;
- [126]  $N^2$ -(2,3-dihydrobenzo[*b*][1,4]dioxin-6-yl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [127]  $N^2$ -(benzo[*d*][1,3]dioxol-5-yl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [128]  $N^4,N^4$ -diethyl- $N^2$ -(4-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine;
- [129]  $N^4,N^4$ -diethyl- $N^2$ -(4-methylpyridin-3-yl)-6-propylpyrimidine-2,4-diamine;
- [130] 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]picolinonitrile;
- [131] ethyl 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoate;
- [132] 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-(trifluoromethyl)benzonitrile;
- [133]  $N^4,N^4$ -diethyl-6-propyl- $N^2$ -(4*H*-1,2,4-triazol-4-yl)pyrimidine-2,4-diamine;
- [134]  $N^4,N^4$ -diethyl- $N^2$ -(1*H*-indazol-5-yl)-6-propylpyrimidine-2,4-diamine;
- [135]  $N^4,N^4$ -diethyl- $N^2$ -(1*H*-indazol-6-yl)-6-propylpyrimidine-2,4-diamine;
- [136]  $N^4,N^4$ -diethyl-6-propyl- $N^2$ -[2-(trifluoromethyl)-1*H*-benzo[*d*]imidazol-5-yl]pyrimidine-2,4-diamine;
- [137]  $N^4,N^4$ -diethyl- $N^2$ -(1*H*-indol-5-yl)-6-propylpyrimidine-2,4-diamine;
- [138]  $N^2$ -(benzo[*d*]thiazol-6-yl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [139] 7-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methyl-4*H*-chromen-4-one;
- [140]  $N^4,N^4$ -diethyl- $N^2$ -(2-methylbenzo[*d*]thiazol-5-yl)-6-propylpyrimidine-2,4-diamine;
- [141] 7-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-4-methyl-2*H*-chromen-2-one;
- [142]  $N^4,N^4$ -diethyl- $N^2$ -(1*H*-indol-4-yl)-6-propylpyrimidine-2,4-diamine;
- [143]  $N^4,N^4$ -diethyl- $N^2$ -(2-methoxy-5-nitrophenyl)-6-propylpyrimidine-2,4-diamine;
- [144]  $N^2$ -(2,5-dimethoxyphenyl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [145] 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-nitrophenol;
- [146]  $N^2$ -(2-amino-3-nitrophenyl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [147]  $N^2$ -(4-amino-3-nitrophenyl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [148]  $N^4,N^4$ -diethyl- $N^2$ -[4-nitro-3-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine;
- [149] benzyl 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methoxyphenylcarbamate;
- [150]  $N^4,N^4$ -diethyl-6-propyl- $N^2$ -*m*-tolylpyrimidine-2,4-diamine;
- [151]  $N^2$ -(2,3-dihydro-1*H*-inden-5-yl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [152]  $N^4,N^4$ -diethyl- $N^2$ -(2-methyl-1*H*-indol-5-yl)-6-propylpyrimidine-2,4-diamine;
- [153]  $N^4,N^4$ -diethyl- $N^2$ -[4-fluoro-3-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine;
- [154]  $N^4,N^4$ -diethyl- $N^2$ -(3-ethynylphenyl)-6-propylpyrimidine-2,4-diamine;
- [155]  $N^2$ -(3-amino-2-methylphenyl)- $N^4,N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
- [156] butyl 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-nitrobenzoate;

- [157]  $N^4, N^4$ -diethyl- $N^2$ -(1-methyl-1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;
  - [158]  $N^4, N^4$ -diethyl- $N^2$ -(1-ethyl-1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;
  - [159]  $N^4, N^4$ -diethyl- $N^2$ -(1*H*-indol-7-yl)-6-propylpyrimidine-2,4-diamine;
  - [160]  $N^2$ -(1*H*-benzo[*d*]imidazol-5-yl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
  - [161]  $N^2$ -(2,3-dimethylbenzofuran-5-yl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
  - [162]  $N^4, N^4$ -diethyl- $N^2$ -(1-isobutyl-1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;
  - [163]  $N^2$ -(3-amino-4-fluorophenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
  - [164]  $N^2$ -(3-amino-4-methylphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
  - [165]  $N^4$ -[4-(diethylamino)-6-propylpyrimidin-2-yl]benzene-1,2,4-triamine;
  - [166]  $N^2$ -(3-amino-4-methoxyphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
  - [167] 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoic acid;
  - [168]  $N^4, N^4$ -diethyl- $N^2$ -(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine;
  - [169]  $N^2$ -(4-fluorophenyl)- $N^4, N^4$ -dimethyl-6-propylpyrimidine-2,4-diamine;
  - [170]  $N^2$ -(4-fluorophenyl)- $N^4, N^4$ -dipropyl-6-propylpyrimidine-2,4-diamine;
  - [171]  $N^4$ -butyl- $N^4$ -ethyl- $N^2$ -(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine;
  - [172] 2-{[2-(4-fluorophenylamino)-6-propylpyrimidin-4-yl](methyl)amino}ethanol;
  - [173]  $N^2$ -(4-fluorophenyl)- $N^4, N^4$ -bis(2-methoxyethyl)-6-propylpyrimidine-2,4-diamine;
  - [174]  $N^4$ -ethyl- $N^2$ -(4-fluorophenyl)- $N^4$ -(2-methoxyethyl)-6-propylpyrimidine-2,4-diamine;
  - [175] 2,2'-[2-(4-fluorophenylamino)-6-propylpyrimidin-4-ylazanediyl]diethanol;
  - [176] 6-butyl- $N^4, N^4$ -diethyl- $N^2$ -(4-fluorophenyl)pyrimidine-2,4-diamine;
  - [177]  $N^4, N^4$ ,6-triethyl- $N^2$ -(4-fluorophenyl)pyrimidine-2,4-diamine;
  - [178] 4-(4-diethylamino-6-propylpyrimidin-2-ylamino)phthalonitrile;
  - [179] 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-2-fluorobenzonitrile;
  - [180] *N*-[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenyl]acetamide;
  - [181] 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-2-methylbenzonitrile;
  - [182]
  - [183] \**N*-[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-methoxyphenyl]acetamide;
  - [184] 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methylisoindoline-1,3-dione;
  - [185] *N*-[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenyl]methanesulfonamide;
  - [186] 7-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-trifluoromethyl-2*H*-chromen-2-one;
  - [187] 7-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-methylquinolin-2(1*H*)-one;
  - [188]  $N^2$ -(3-difluoromethoxyphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine;
  - [189]  $N^4, N^4$ -diethyl-6-propyl- $N^2$ -(3-trifluoromethoxyphenyl)pyrimidine-2,4-diamine;
  - [190]  $N^4, N^4$ -diethyl-6-propyl- $N^2$ -*p*-tolylpyrimidine-2,4-diamine;
  - [191] 4-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenol;
  - [192]  $N^2$ -(4-amino-3-trifluoromethylphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine
- ;

- [193] butyl 2-amino-5-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzoate;
- [194] 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzo[d]oxazol-2(3*H*)-one;
- [195] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-methyl-4-nitrophenyl)-6-propylpyrimidine-2,4-diamine;
- [196] 1-[6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-1-yl]ethanone;
- [197] 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-1*H*-benzo[d]imidazol-2(3*H*)-one;
- [198] *N*<sup>2</sup>-(3-dimethylaminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [199] 2-amino-5-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzonitrile;
- [200] 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-2-one;
- [201] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(indolin-6-yl)-6-propylpyrimidine-2,4-diamine;
- [202] 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)-1,1-dimethylindolinium iodide;
- [203] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-methylindolin-6-yl)-6-propylpyrimidine-2,4-diamine;
- [204] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-methylsulfonylindolin-6-yl)-6-propylpyrimidine-2,4-diamine;
- [205] *N*<sup>2</sup>-(4-amino-3-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [206] *N*<sup>2</sup>-(4-dimethylamino-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;
- [207] *N*<sup>4</sup>-(4-diethylamino-6-propylpyrimidin-2-yl)-*N*<sup>1</sup>,*N*<sup>1</sup>-dimethylbenzene-1,2,4-triamine;
- [208] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-methylpyrimidine-2,4-diamine;
- [209] *N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-trimethylpyrimidine-2,4-diamine;
- [210] *N*<sup>4</sup>-butyl-*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,6-dimethylpyrimidine-2,4-diamine;
- [211] *N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diisobutyl-6-methylpyrimidine-2,4-diamine;
- [212] *N*<sup>4</sup>-butyl-*N*<sup>4</sup>-ethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-methylpyrimidine-2,4-diamine;
- [213] *N*<sup>2</sup>-(4-fluorophenyl)-6-methyl-*N*<sup>2</sup>,*N*<sup>2</sup>-dipropylpyrimidine-2,4-diamine;
- [214] *N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diisopropyl-6-methylpyrimidine-2,4-diamine;
- [215] (*E*)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-styrylpyrimidine-2,4-diamine;
- [216] (*E*)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)-6-styrylpyrimidine-2,4-diamine;
- [217] (*E*)-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-styrylpyrimidine-2,4-diamine;
- [218] (*E*)-3-[4-(diethylamino)-6-styrylpyrimidin-2-ylamino]benzonitrile;
- [219] 6-allyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine;
- [220] 3-[4-allyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile;
- [221] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-isobutylpyrimidine-2,4-diamine;
- [222] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-isobutylpyrimidine-2,4-diamine;
- [223] 3-(4-diethylamino-6-isobutylpyrimidin-2-ylamino)benzonitrile;
- [224] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine;
- [225] *N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;
- [226] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine;
- [227] *N*<sup>2</sup>-(3-chloro-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;
- [228] 3-[4-(diethylamino)-6-ethylpyrimidin-2-ylamino]benzonitrile;
- [229] *N*<sup>4</sup>,*N*<sup>4</sup>,6-triethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;
- [230] *N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine;

- [231] 3-[4-(diethylamino)-6-isopropylpyrimidin-2-ylamino]benzonitrile;
- [232] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;
- [233] *N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropylpyrimidine-2,4-diamine;
- [234] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-isopropylpyrimidine-2,4-diamine;
- [235] 3-[4-butyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile;
- [236] 6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;
- [237] 6-butyl-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;
- [238] 3-[4-benzyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile;
- [239] 6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;
- [240] 6-benzyl-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;
- [241] 6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine;
- [242] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-pentylpyrimidine-2,4-diamine;
- [243] *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-phenethylpyrimidine-2,4-diamine;
- [244] *N*<sup>2</sup>-(3-aminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;
- [245] *N*<sup>2</sup>-(3-amino-4-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;
- [246] 3-[4-(diethylamino)-6-phenethylpyrimidin-2-ylamino]benzonitrile;
- [247] *N*<sup>2</sup>-(3-amino-4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;
- [248] *N*<sup>2</sup>-(3-aminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine;
- [249] *N*<sup>2</sup>-(3-amino-4-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine;
- [250] *N*<sup>2</sup>-(3-aminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropylpyrimidine-2,4-diamine;
- [251] *N*<sup>2</sup>-(3-aminophenyl)-6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;
- [252] *N*<sup>2</sup>-(3-amino-4-chlorophenyl)-6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;
- [253] *N*<sup>2</sup>-(3-aminophenyl)-6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;
- [254] *N*<sup>2</sup>-(3-amino-4-chlorophenyl)-6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;
- [255] (*E*)-6-(3-cyclopentylpropen-1-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine; and
- [256] (*E*)-6-(2-cyclopropylvinyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine

[257]

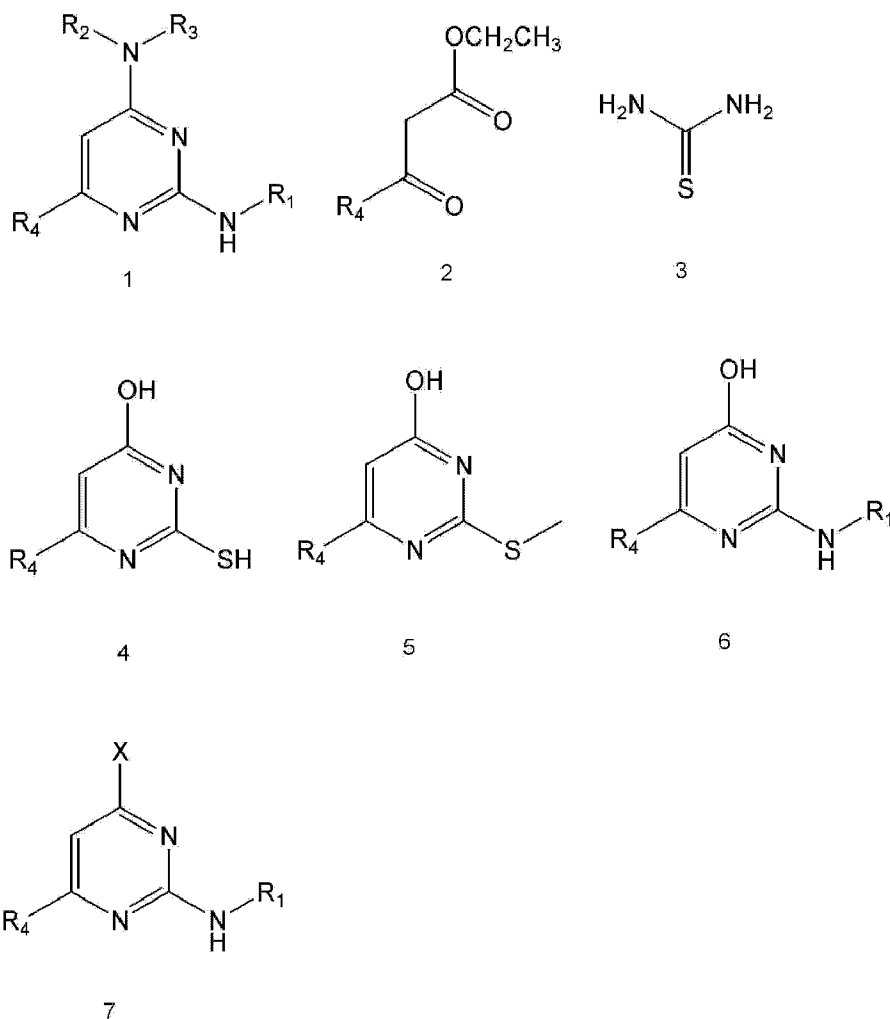
[258] In the use, the pharmaceutical composition, the treatment method, and the compound according to the present invention, still more preferable compounds in terms of pharmacological activity include the compound (or its pharmaceutically acceptable salt) described in Table 2.

[259]

[260] The present invention includes, within its scope, a process for preparing a compound of Formula 1 or its pharmaceutically acceptable salt, which comprises reacting a compound of Formula 2 with a compound of Formula 3 to obtain a compound of Formula 4; performing a methylation of the compound of Formula 4 to obtain a

compound of Formula 5; reacting the compound of Formula 5 with  $R_1-NH_2$  to obtain a compound of Formula 6; performing a halogenation of the compound of Formula 6 to obtain a compound of Formula 7; and reacting the compound of Formula 7 with  $R_2R_3-NH$  to obtain a compound of Formula 1:

[261]



[262] wherein,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are the same as defined in the above; and X is halogen.

[263] The compounds of Formula 2 and 3 are commercially available. The reaction between the compound of Formula 2 and the compound of Formula 3 may be performed in the presence of a base and a solvent. The base may be potassium carbonate, sodium carbonate, etc., and the solvent may be an aqueous solvent such as water. Typically, the reaction may be carried out under heating.

[264] The methylation of the compound of Formula 4 may be carried out using a methylating agent such as iodomethane. The methylation may be performed in the presence of a base and a solvent. The base may be sodium hydroxide, potassium hydroxide, etc and the solvent may be an aqueous solvent such as water. Typically, the methylation may be carried out at room temperature or under heating.

[265] The reaction between the compound of Formula 5 and  $R_1-NH_2$  may be performed in

the absence of a solvent or in the presence of a solvent such as diglyme. The reaction may be carried out at a temperature ranging from 140°C to 180°C.

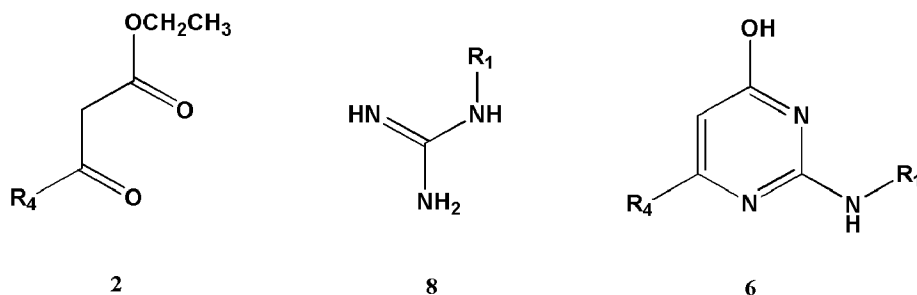
[266] The halogenation of the compound of Formula 6 may be carried out using a halogenating agent such as phosphorus oxychloride. The halogenation may be performed preferably at a temperature of about 100°C or higher. And also, for improving reaction rate and/or yield, the halogenation may be performed in the presence of *N,N*-dimethylaniline or *N,N*-dimethylformamide in a catalytic amount.

[267] The reaction between the compound of Formula 7 and  $R_2R_3-NH$  may be performed in the presence of an organic solvent, such as anhydrous tetrahydrofuran, and alcohol. Typically, the reaction may be carried out under heating. And also, for improving reaction rate and/or yield, the reaction may be performed in the presence of a base such as triethylamine and diisopropylethylamine; or performed under microwave ranging from 300W to 600W.

[268]

[269] The compound of Formula 6 may be also prepared by reacting a compound of Formula 2 with a compound of Formula 8:

[270]



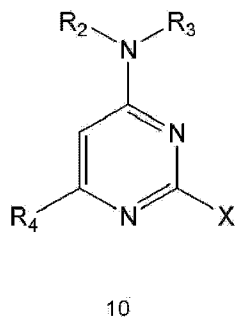
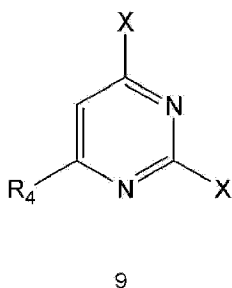
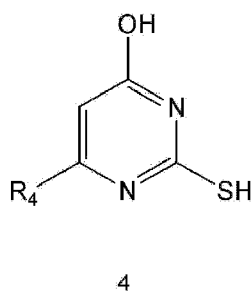
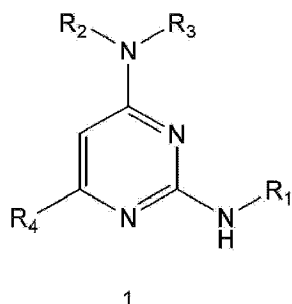
[271] wherein,  $R_1$  and  $R_4$  are the same as defined in the above.

[272] The compound of Formula 8 may be easily prepared by using known methods, e.g., EP0560726. The reaction between the compound of Formula 2 and the compound of Formula 8 may be performed in the presence of a base and a solvent. The base may be sodium methoxide, sodium ethoxide, etc and the solvent may be an alcohol. Typically, the reaction may be carried out under heating.

[273]

[274] The present invention also provides a process for preparing a compound of Formula 1 or its pharmaceutically acceptable salt, which comprises performing a halogenation of a compound of Formula 4 to obtain a compound of Formula 9; reacting the compound of Formula 9 with  $R_2R_3-NH$  to obtain a compound of Formula 10; and reacting the compound of Formula 10 with  $R_1-NH_2$  to obtain a compound of Formula 1:

[275]



[276] wherein,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are the same as defined in the above; and X is halogen.

[277] The halogenation of the compound of Formula 4 may be carried out using a halogenating agent such as phosphorus oxychloride. The halogenation may be performed preferably at a temperature of about 100°C or higher. And also, for improving reaction rate and/or yield, the halogenations may be performed in the presence of *N,N*-dimethylaniline or *N,N*-dimethylformamide in a catalytic amount.

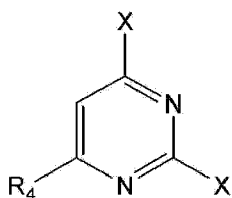
[278] The reaction between the compound of Formula 9 and  $R_2R_3\text{-NH}$  may be performed in the presence of an organic solvent, such as anhydrous tetrahydrofuran, alcohol, chloroform, dichloromethane or *N,N*-dimethylformamide. Typically, the reaction may be carried out at room temperature or under heating. And also, for improving reaction rate and/or yield, the reaction may be performed in the presence of a base such as triethylamine and diisopropylethylamine.

[279] The reaction between the compound of Formula 10 and  $R_1\text{-NH}_2$  may be performed in the presence of an organic solvent such as alcohol, toluene, 1,4-dioxane, and *N,N*-dimethylformamide. The reaction may be carried out under heating. And also, for improving reaction rate and/or yield, the reaction may be performed in the presence of a metallic catalyst (e.g., palladium), a ligand, and a base (e.g., cesium carbonate); or performed under microwave ranging from 300W to 600W.

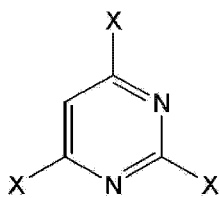
[280]

[281] The compound of Formula 9 may be also prepared by reacting a compound of Formula 11 with  $R_4\text{-Q}$ :

[282]



9



11

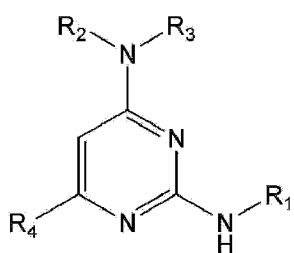
[283] wherein,  $R_4$  and X are the same as defined in the above; and Q is MgX, boronic acid ( $B(OH)_2$ ) or boronic acid pinacol ester.

[284] The compound of Formula 11 is commercially available. The reaction between the compound of Formula 11 and  $R_4$ -Q may be performed in the presence of an organic solvent such as anhydrous tetrahydrofuran, *N*-methylpyrrolidine, and 1,4-dioxane. The reaction may be carried out at room temperature or under heating. And also, the reaction may be performed preferably in the presence of a metallic catalyst (e.g., palladium, iron, etc), a ligand, and a base (e.g., potassium phosphate).

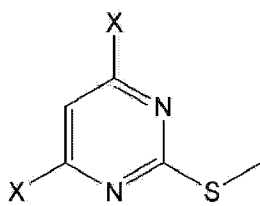
[285]

[286] And also, the present invention provides a process for preparing a compound of Formula 1 or its pharmaceutically acceptable salt, which comprises reacting a compound of Formula 12 with  $R_2R_3$ -NH to obtain a compound of Formula 13; performing a oxidation of the compound of Formula 13 to obtain a compound of Formula 14; reacting the compound of Formula 14 with  $R_1$ -NH<sub>2</sub> to obtain a compound of Formula 15; and reacting the compound of Formula 15 with  $R_4$ -Q to obtain a compound of Formula 1:

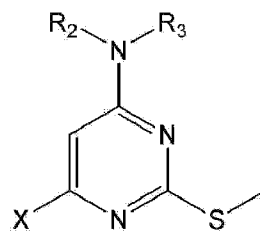
[287]



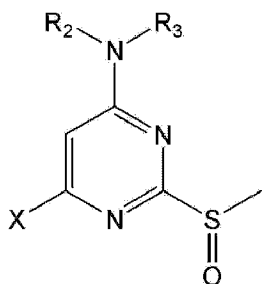
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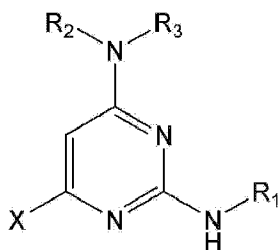
12



13



14



15

[288]

[289] wherein,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are the same as defined in the above; X is halogen; and Q is  $MgX$ , boronic acid ( $B(OH)_2$ ), or boronic acid pinacol ester.

[290] The compound of Formula 12 is commercially available. The reaction between the compound of Formula 12 and  $R_2R_3-NH$  may be performed in the presence of an organic solvent, such as anhydrous tetrahydrofuran. Typically, the reaction may be carried out at room temperature or under heating.

[291] The oxidation of the compound of Formula 13 may be carried out using an organic or inorganic oxidizing agent, such as oxone. The oxidation may be performed in an organic solvent (e.g., alcohol) at low temperature.

[292] The reaction between the compound of Formula 14 and  $R_1-NH_2$  may be performed in the presence of a solvent such as anhydrous toluene and alcohol. Typically, the reaction may be carried out under heating. And also, for improving reaction rate and/or yield, the reaction may be performed under microwave ranging from 300W to 600W.

[293] The reaction between the compound of Formula 15 and  $R_4-Q$  may be performed in the presence of an organic solvent (e.g., anhydrous 1,4-dioxane) at room temperature or under heating. And also, the reaction may be performed preferably in the presence of a metallic catalyst (e.g., palladium, etc), a ligand, and a base (e.g., potassium phosphate). And also, for improving reaction rate and/or yield, the reaction may be performed under microwave ranging from 300W to 600W.

[294]

[295] The following examples and experimental examples are provided for illustration purposes only, and are not intended to limit the scope of the invention.

[296]

[297] Preparation 1. 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine

[298] <Step 1> 2,4-dichloro-6-propylpyrimidine

[299] Phosphorus oxychloride (100 ml) was slowly added to 6-propyl-2-thiouracil (17.7 g, 0.1 mol), which was then refluxed under stirring at 110°C for 24 hours. The reaction mixture was added to an ice water and then neutralized with a saturated aqueous solution of sodium bicarbonate. The reaction mixture was extracted with dichloromethane. The organic layer was dried on anhydrous magnesium sulfate, filtered, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 50/1) to give 10.3 g of the titled compound as a pale yellow oil.

[300]  $^1H$ -NMR(400MHz,  $CDCl_3$ )  $\delta$  7.16(s, 1H), 2.73(t, 2H), 1.78(m, 2H), 0.99(t, 3H)

[301] <Step 2> 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine

[302] 2,4-Dichloro-6-propylpyrimidine (5 g, 26.2 mmol) prepared in Step 1 was dissolved in chloroform (10 ml), and then diethylamine (5.5 ml, 52.3 mmol) was added thereto at

0°C. The reaction mixture was stirred at room temperature overnight and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 5/1) to give 3 g of the titled compound as a pale yellow oil.

[303] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.09(s, 1H), 3.50(m, 4H), 2.52(t, 2H), 1.69(q, 2H), 1.19(t, 6H), 0.96(t, 3H)

[304]

[305] Preparation 2. 1-methyl-1*H*-indol-6-amine

[306] <Step 1> 1-methyl-6-nitro-1*H*-indole

[307] 6-Nitroindole (200 mg, 1.23 mmol) was dissolved in anhydrous *N,N*-dimethylformamide (2 ml), and then 60% sodium hydride (71 mg, 1.85 mmol) and iodomethane (92  $\mu$ l, 1.48mmol) were added thereto at 0°C. The reaction mixture was stirred at room temperature overnight. Water was added to the reaction mixture, which was then extracted with ethyl acetate. The organic layer was washed with brine, dried on anhydrous magnesium sulfate, filtered, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 20/1) to give 210 mg of the titled compound as a pale yellow solid.

[308] <Step 2> 1-methyl-1*H*-indol-6-amine

[309] To 1-methyl-6-nitro-1*H*-indole (210 mg, 1.19 mmol) prepared in Step 1, was added a methanol/water solution (1:1; 5 ml). Iron (25 mg) and ammonium chloride (127 mg, 2.38 mmol) were added to the resulting suspension, which was then refluxed under stirring for 4 hours. After cooling the reaction mixture to room temperature, an aqueous solution of sodium bicarbonate was added to the reaction mixture, which was then stirred for 30 minutes. The reaction mixture was filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure to give 100 mg of the titled compound as a pale yellow oil. The product was used in the subsequent reaction without further purification.

[310]

[311] Preparation 3. 1-ethyl-1*H*-indol-6-amine

[312] The titled compound (150 mg) was prepared in accordance with the same procedures as in Preparation 2, using 6-nitroindole and iodoethane. The product was used in the subsequent reaction without further purification.

[313]

[314] Preparation 4. 7-aminoindole

[315] 7-Nitroindole (200 mg, 1.2 mmol) was dissolved in a mixed solvent of methanol and tetrahydrofuran (2 ml), and then palladium/charcoal (200 mg, 10 wt%) was added thereto. The reaction mixture was stirred at room temperature under hydrogen at-

mosphere (30 bar) for 3 hours and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure to give 150 mg of the titled compound as a pale yellow solid. The product was used in the subsequent reaction without further purification.

[316]

[317] Preparation 5. 1*H*-benzo[*d*]imidazol-5-amine

[318] The titled compound (150 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Preparation 4, using 5-nitro-1*H*-benzo[*d*]imidazole. The product was used in the subsequent reaction without further purification.

[319]

[320] Preparation 6. 2,3-dimethylbenzofuran-5-amine

[321] <Step 1> 3-(4-nitrophenoxy)-butan-2-one

[322] Acetone (16 ml) and 3-chloro-2-butanone (1.75 ml, 17.3 mmol) were added to a mixture of 4-nitrophenol (2 g, 14.4 mmol), potassium carbonate (6 g, 43.2 mmol), and potassium iodide (40 mg), which was then refluxed under stirring for 10 hours. The reaction mixture was cooled to room temperature and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 10/1) to give 2.1 g of the titled compound as a pale yellow oil.

[323] <Step 2> 2,3-dimethyl-5-nitrobenzofuran

[324] 3-(4-Nitrophenoxy)-butan-2-one (2.1 g, 0.01 mol) prepared in Step 1 was dissolved in toluene (20 ml) and then polyphosphoric acid (50 g) was added thereto. The reaction mixture was refluxed under stirring at 100°C for 5 hours and then cooled to room temperature. Water was added to the reaction mixture, which was then extracted with diethyl ether. The organic layer was dried on anhydrous sodium sulfate, filtered, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 5/1) to give 1.8 g of the titled compound as a pale yellow oil.

[325] <Step 3> 2,3-dimethylbenzofuran-5-amine

[326] The titled compound (1.5 g) in the form of pale yellow solid was prepared in accordance with the same procedures as in Preparation 4, using 2,3-dimethyl-5-nitrobenzofuran prepared in Step 2. The product was used in the subsequent reaction without further purification.

[327]

[328] Preparation 7. 4-chloro-*N*-(4-fluorophenyl)-6-propylpyrimidine-2-amine

[329] <Step 1> 2-(methylthio)-6-propylpyrimidin-4(3*H*)-one

[330] A mixture of 6-propyl-2-thiouracil (25.0 g, 0.15 mol), sodium hydroxide (5.9 g, 0.15

mol), iodomethane (10.2 ml, 0.17 mol), and water (300 ml) was stirred at room temperature overnight and then filtered. The resulting solid was dried to give the titled compound (25.0 g) as a white solid. The product was used in the subsequent reaction without further purification.

[331] <Step 2> 2-(4-fluorophenylamino)-6-propylpyrimidin-4(3*H*)-one

[332] A mixture of 2-(methylthio)-6-propylpyrimidin-4(3*H*)-one (3.7 g, 0.02 mol) prepared in Step 1 and 4-fluoroaniline (6.7 g, 0.06 mol) was stirred at 160°C overnight. The reaction mixture was cooled to room temperature, and then ethanol (50 ml) and charcoal (1 g) were added thereto. The reaction mixture was stirred for 1 hour and then filtered. The filtrate was concentrated under reduced pressure. Ethanol (20 ml) was added to the resulting residue, which was then stirred for 1 hour. The resulting precipitate was collected by filtration to give 3 g of the titled compound as a grey solid.

[333] <sup>1</sup>H-NMR(400MHz, CD<sub>3</sub>OD) δ 7.70-7.50(m, 2H), 7.07(t, 2H), 5.75(s, 1H), 2.43(t, 2H), 1.70(q, 2H), 0.98(t, 3H)

[334] <Step 3> 4-chloro-*N*-(4-fluorophenyl)-6-propylpyrimidine-2-amine

[335] 2-(4-Fluorophenylamino)-6-propylpyrimidin-4(3*H*)-one (2.2 g, 8.9 mmol) prepared in Step 2 was added to phosphorus oxychloride (1.5 ml, 16.2 mmol), which was then stirred at 110°C for 5 hours. After cooling the reaction mixture to room temperature, ice water was added to the reaction mixture, which was then basified to pH 9 with sodium hydroxide. The aqueous layer was extracted with ethyl acetate. The resulting organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (ethyl acetate) to give 2.2 g of the titled compound as a yellow solid.

[336] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.65-7.50(m, 2H), 7.03(t, 2H), 6.63(s, 1H), 2.60(t, 2H), 1.75(q, 2H), 0.99(t, 3H)

[337]

[338] Preparation 8. 4-butyl-6-chloro-*N*-(4-fluorophenyl)pyrimidine-2-amine

[339] <Step 1> 6-butyl-2-thioxo-2,3-dihydropyrimidin-4(1*H*)-one

[340] A mixture of thiourea (2.4 g, 31.5 mmol), potassium carbonate (5.5 g, 39.5 mmol), 3-oxoheptanoic acid ethyl ester (6.8 g, 39.5 mmol), and water (4 ml) was stirred at 100°C for 1 hour. After cooling the reaction mixture to room temperature, water (6 ml) and conc. hydrochloric acid (6 ml) were added to the reaction mixture, which was then extracted with ethyl acetate. The organic layer was concentrated under reduced pressure. The resulting residue was washed with *n*-hexane and then filtered. The resulting white solid was dried *in vacuo* to give 1 g of the titled compound. The product was used in the subsequent reaction without further purification.

[341] <Step 2> 6-butyl-2-(methylthio)pyrimidin-4(3*H*)-one

[342] A mixture of 6-butyl-2-thioxo-2,3-dihydropyrimidin-4(1*H*)-one (0.4 g, 2.2 mmol)

prepared in Step 1, sodium hydroxide (0.1 g, 2.2 mmol), iodomethane (0.15 ml, 2.4 mmol), and water (3 ml) was stirred at room temperature overnight and then filtered. The resulting white solid (0.2 g) was dried *in vacuo* and then used in the subsequent reaction without further purification.

[343] <Step 3> 6-butyl-2-(4-fluorophenylamino)pyrimidin-4(3*H*)-one

[344] A mixture of 6-butyl-2-(methylthio)pyrimidin-4(3*H*)-one (0.16 g, 0.81 mmol) prepared in Step 2 and 4-fluoroaniline (0.28 g, 2.5 mmol) was stirred at 160°C overnight. After cooling the reaction mixture to room temperature, ethyl acetate (3 ml) was added thereto. The reaction mixture was stirred for 1 hour and then filtered to give 0.2 g of the titled compound as a white solid.

[345] <sup>1</sup>H-NMR(400MHz, CD<sub>3</sub>OD) δ 7.70-7.50(m, 2H), 7.07(t, 2H), 5.75(s, 1H), 2.46(t, 2H), 1.70-1.60(m, 2H), 1.39(q, 2H), 0.95(t, 3H)

[346] <Step 4> 4-butyl-6-chloro-*N*-(4-fluorophenyl)pyrimidine-2-amine

[347] 6-Butyl-2-(4-fluorophenylamino)pyrimidin-4(3*H*)-one (0.2 g, 0.8 mmol) prepared in Step 3 was added to phosphorus oxychloride (1.5 ml, 16.2 mmol), which was then stirred at 110°C for 5 hours. After cooling the reaction mixture to room temperature, the reaction mixture was added to ice water and then basified to pH 9 with sodium hydroxide. The aqueous layer was extracted with ethyl acetate. The resulting organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (ethyl acetate) to give 0.17 g of the titled compound as a yellow oil.

[348] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.65-7.50(m, 2H), 7.09(brs, 1H), 7.03(t, 2H), 6.63(s, 1H), 2.62(t, 2H), 1.80-1.60(m, 2H), 1.40(q, 2H), 0.95(t, 3H)

[349]

[350] Preparation 9. 4-chloro-6-ethyl-*N*-(4-fluorophenyl)pyrimidine-2-amine

[351] <Step 1> 6-ethyl-2-(4-fluorophenylamino)pyrimidin-4-ol

[352] A mixture of ethylpropionyl acetate (1.03 ml, 7.18 mmol), *N*-(4-fluorophenyl)guanidine (1 g, 6.53 mmol), sodium methoxide (0.39 g, 7.18 mmol), and ethanol (30 ml) was refluxed under stirring overnight. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was dissolved in water, acidified to pH 4 with a 1N hydrochloric acid solution, and then filtered. The resulting white solid (0.82 g) was dried *in vacuo* and then used in the subsequent reaction without further purification.

[353] <Step 2> 4-chloro-6-ethyl-*N*-(4-fluorophenyl)pyrimidine-2-amine

[354] 6-Ethyl-2-(4-fluorophenylamino)-pyrimidin-4-ol (0.82g, 3.52mmol) prepared in Step 1 was added to phosphorus oxychloride (1.5 ml, 16.2 mmol), which was then stirred at 110°C for 1 hour. After cooling the reaction mixture to room temperature, the reaction mixture was added to an ice water and then basified to pH 9 with potassium hydroxide.

The aqueous layer was extracted with dichloromethane. The resulting organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n* - hexane/ethyl acetate = 1/2) to give 432.2 mg of the titled compound as a white solid.

[355] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.18(m, 2H), 7.08(m, 2H), 6.63(s, 1H), 2.61(m, 2H), 1.23(t, 3H)

[356]

[357] Preparation 10. 5-amino-1*H*-benzo[*d*]imidazol-2(3*H*)-one

[358] A mixture of 5-nitro-2-benzimidazolinone (100 mg, 0.56 mmol), palladium/charcoal (10 mg, 10 wt%), and methanol/ethyl acetate (3 ml / 0.5 ml) was stirred at room temperature under hydrogen atmosphere overnight. The reaction mixture was filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 30/1) to give 85 mg of the titled compound as a red solid.

[359] <sup>1</sup>H-NMR(400MHz, CD<sub>3</sub>OD) δ 6.80(d, 1H), 6.52-6.47(m, 2H)

[360]

[361] Preparation 11. *N*<sup>1</sup>,*N*<sup>1</sup>-dimethylbenzene-1,3-diamine

[362] The titled compound in the form of yellow oil was prepared in accordance with the same procedures as in Preparation 10, using *N,N*-dimethyl-3-nitroaniline (Yield: 81 %).

[363] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.00(t, 1H), 6.18(d, 1H), 6.07(m, 2H), 3.55(brs, NH), 2.87(s, 6H)

[364]

[365] Preparation 12. 2,5-diaminobenzonitrile

[366] The titled compound in the form of yellow solid was prepared in accordance with the same procedures as in Preparation 10, using 5-nitroanthranilonitrile (Yield: 98 %).

[367] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.79(d, 1H), 6.72(s, 1H), 6.61(d, 1H), 4.01(brs, NH), 3.45(brs, NH)

[368]

[369] Preparation 13. 6-aminoindolin-2-one

[370] <Step 1> *tert*-butyl 4-fluoro-3-nitrophenylcarbamate

[371] di-*tert*-butyl dicarbonate (3.36 g, 15.4 mmol), pyridine (1.6 ml, 32.0 mmol), and a catalytic amount of 4-dimethylaminopyridine were added at room temperature to a solution of 4-fluoro-3-nitroaniline (2 g, 12.8 mmol) in tetrahydrofuran (50 ml), and then stirred overnight. The reaction mixture was diluted with ethyl acetate, washed with brine, dried on anhydrous sodium sulfate, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n* -

hexane/ethyl acetate = 20/1) to give 3.08 g of the titled compound as a brown oil.

[372]  $^1\text{H-NMR}$ (400MHz,  $\text{CDCl}_3$ )  $\delta$  8.15(m, 1H), 7.63(m, 1H), 7.18(m, 1H), 6.61(brs, NH), 1.53(s, 9H)

[373] <Step 2> dimethyl 2-[4-(*tert*-butoxycarbonylamino)-2-nitrophenyl]malonate

[374] A solution of dimethyl malonate (3.02 ml, 26.4 mmol) in dimethyl sulfoxide (10ml) was added dropwise to a solution of sodium hydride (1.06 g, 26.4 mmol, 60 wt%) in dimethyl sulfoxide (20ml), while maintaining the temperature at 15 ~ 20°C. The reaction mixture was stirred at room temperature for 1 hour. A solution of *tert*-butyl 4-fluoro-3-nitrophenylcarbamate (3.08 g, 12.0 mmol) prepared in Step 1 in dimethyl sulfoxide (10 ml) was added dropwise at room temperature to the reaction mixture, which was then stirred at 80 ~ 90°C for 2 days. The reaction mixture was cooled to room temperature, added to a 1N hydrochloric acid solution, and then extracted with ethyl acetate. The organic layer was washed with water and brine, dried on anhydrous sodium sulfate, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 5/1) to give 2.4 g of the titled compound as a yellow oil.

[375]  $^1\text{H-NMR}$ (400MHz,  $\text{CDCl}_3$ )  $\delta$  8.20(s, 1H), 7.59(d, 1H), 7.38(d, 1H), 6.79(s, 1H), 5.25(s, 1H), 3.79(s, 6H), 1.53(s, 9H)

[376] <Step 3> methyl 2-(4-amino-2-nitrophenyl)acetate

[377] 2N Sodium hydroxide (14 ml, 28 mmol) was added to a solution of dimethyl 2-[4-(*tert*-butoxycarbonylamino)-2-nitrophenyl]malonate (2.35 g, 6.38 mmol) prepared in Step 2 in methanol (12ml), which was then stirred at room temperature overnight. The reaction mixture was concentrated under reduced pressure, acidified to pH 3 with a 6N hydrochloric acid, and then extracted with ethyl acetate. The organic layer was dried on anhydrous sodium sulfate, concentrated under reduced pressure to about 1/4 of the initial volume, refluxed under stirring overnight, and then concentrated under reduced pressure. The resulting pale yellow solid was dissolved in methanol (20 ml) and then conc. sulfuric acid (0.1 ml) was added thereto. The reaction mixture was refluxed under stirring overnight and then stirred at room temperature for 2 days. The reaction mixture was cooled to 0°C, controlled to pH 5 with a 2N sodium hydroxide solution, and then concentrated under reduced pressure. The resulting residue was dissolved in water and then extracted with ethyl acetate. The organic layer was dried on anhydrous sodium sulfate, filtered, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 5/1) to give 0.9 g of the titled compound as a yellow oil.

[378]  $^1\text{H-NMR}$ (400MHz,  $\text{CDCl}_3$ )  $\delta$  7.40(s, 1H), 7.08(d, 1H), 6.84(d, 1H), 3.95(brs, NH), 3.88(s, 2H), 3.70(s, 3H)

[379] <Step 4> 6-aminoindolin-2-one

- [380] Palladium/charcoal (108 mg, 10 wt%) was added to a solution of methyl 2-(4-amino-2-nitrophenyl)acetate (885.9 mg, 4.22 mmol) prepared in Step 3 in methanol (20 ml). The reaction mixture was stirred at room temperature under hydrogen atmosphere overnight and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure. The resulting residue was mixed with a 10 % hydrochloric acid solution (5 ml) and then refluxed under stirring for 3 hours. The reaction mixture was cooled to room temperature, controlled to pH 5 with a 2N sodium hydroxide solution, and then extracted with dichloromethane. The organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n* - hexane/ethyl acetate = 1/1) to give 330 mg of the titled compound as a yellow solid.
- [381] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.39(brs, NH), 6.98(d, 1H), 6.31(d, 1H), 6.22(s, 1H), 3.69(brs, NH), 3.43(s, 2H)
- [382]
- [383] Preparation 14. 4-chloro-*N*-(4-fluorophenyl)-6-methylpyrimidine-2-amine
- [384] <Step 1> 2-(4-fluorophenylamino)-6-methylpyrimidin-4-ol
- [385] The titled compound (8.2 g) was prepared in accordance with the same procedures as in Step 1 of Preparation 9, using ethyl acetoacetate (10 g, 76.8 mmol), *N*-(4-fluorophenyl)guanidine (10.7 g, 69.8 mmol) and sodium methoxide (4.2 g, 7.18 mmol). The product was used in the subsequent step.
- [386] <Step 2> 4-chloro-*N*-(4-fluorophenyl)-6-methylpyrimidine-2-amine
- [387] The titled compound (4.5 g) in the form of white solid was prepared in accordance with the same procedures as in Step 2 of Preparation 9, using 2-(4-fluorophenylamino)-6-methylpyrimidin-4-ol (8.2 g, 37.4 mmol) prepared in Step 1 and phosphorus oxychloride (15.9 ml, 172.0 mmol).
- [388] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.57-7.54(m, 2H), 7.21(brs, 1H), 7.05-7.01(m, 2H), 6.64(s, 1H), 2.39(s, 3H)
- [389]
- [390] Preparation 15. (*E*)-2-chloro-*N,N*-diethyl-6-styrylpyrimidine-4-amine
- [391] <Step 1>(*E*)-2,4-dichloro-6-styrylpyrimidine
- [392] A mixture of 2,4,6-trichloropyrimidine (300 mg, 1.63 mmol), trans-2-phenylvinylboronic acid (242 mg, 1.63 mmol), bis(triphenylphosphine)palladium(II) chloride (34 mg, 0.05 mmol), and potassium phosphate (692 mg, 3.26 mmol) in a mixed solvent of tetrahydrofuran (16 ml) and water (2 ml) was refluxed under stirring for 3 hours. The reaction mixture was cooled to room temperature and then extracted with diethyl ether. The organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue (250 mg) was used in the subsequent reaction without further purification.

[393] <Step 2> (E)-2-chloro-*N,N*-diethyl-6-styrylpyrimidine-4-amine

[394] A solution of (E)-2,4-dichloro-6-styrylpyrimidine (250 mg, 1.0 mmol) prepared in Step 1 and diethylamine (146 mg, 2.0 mmol) in dichloromethane (3.3 ml) was stirred at room temperature overnight and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 20/1) to give 240 mg of the titled compound as a colorless oil.

[395] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.79(d, 1H), 7.56(d, 2H), 7.39-7.26(m, 3H), 6.88(d, 1H), 6.23(s, 1H), 3.53(brs, 4H), 1.26-1.20(m, 6H)

[396]

[397] Preparation 16. 6-allyl-2-chloro-*N,N*-diethylpyrimidine-4-amine

[398] <Step 1> 4-allyl-2,6-dichloropyrimidine

[399] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 15, using 2,4,6-trichloropyrimidine and allyl boronic acid pinacol ester. The product was used in the subsequent reaction without further purification.

[400] <Step 2> 6-allyl-2-chloro-*N,N*-diethylpyrimidine-4-amine

[401] The titled compound was prepared in accordance with the same procedures as in Step 2 of Preparation 15, using 4-allyl-2,6-dichloropyrimidine prepared in Step 1 and diethylamine. The product was used in the subsequent reaction without further purification.

[402]

[403] Preparation 17. 2-chloro-*N,N*-diethyl-6-isobutylpyrimidine-4-amine

[404] <Step 1> 2,4-dichloro-6-isobutylpyrimidine

[405] A 2.0M solution of isobutylmagnesium bromide in diethyl ether (0.53 ml, 1.06 mmol) was added dropwise to a mixture 2,4,6-trichloropyrimidine (220 mg, 1.12 mmol), iron (III) acetylacetonate (22 mg, 0.061 mmol) in a mixed solvent of tetrahydrofuran (11 ml) and *N*-methylpyrrolidone (0.9 ml). The reaction mixture was stirred at room temperature for 3 hours and then a 1N hydrochloric acid solution was added thereto so as to terminate the reaction. The reaction mixture was extracted with diethyl ether. The organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue (120 mg) was used in the subsequent reaction without further purification.

[406] <Step 2> 2-chloro-*N,N*-diethyl-6-isobutylpyrimidine-4-amine

[407] A solution of 2,4-dichloro-6-isobutylpyrimidine (120 mg, 0.59 mmol) prepared in Step 1 and diethylamine (65 mg, 0.89 mmol) in chloroform (2ml) was stirred at room temperature overnight and then extracted with ethyl acetate. The organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 15/1) to give 70 mg of the titled compound as a colorless oil.

- [408] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.07(d, 1H), 3.50(brs, 4H), 2.42-2.40(m, 2H), 2.13-2.05(m, 1H), 1.22-1.17(m, 6H), 0.95-0.92(m, 6H)
- [409]
- [410] Preparation 18. 2-chloro-*N,N*-diethyl-6-phenethylpyrimidine-4-amine
- [411] <Step 1> 2,4-dichloro-6-phenethylpyrimidine
- [412] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 17, using 2,4,6-trichloropyrimidine and 2.0M solution of phenethyl-magnesium bromide in diethyl ether. The product was used in the subsequent reaction without further purification.
- [413] <Step 2> 2-chloro-*N,N*-diethyl-6-phenethylpyrimidine-4-amine
- [414] The titled compound (110 mg) in the form of colorless oil was prepared in accordance with the same procedures as in Step 2 of Preparation 17, using 2,4-dichloro-6-phenethylpyrimidine prepared in Step 1 and diethylamine.
- [415] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.28-7.17(m, 5H), 5.94(s, 1H), 3.43(brs, 4H), 3.01-2.98(m, 2H), 2.87-2.83(m, 2H), 1.12(t, 6H)
- [416]
- [417] Preparation 19. 2-chloro-*N,N*,6-triethylpyrimidine-4-amine
- [418] <Step 1> 2,4-dichloro-6-ethylpyrimidine
- [419] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 17, using 2,4,6-trichloropyrimidine and 1.0M solution of ethyl-magnesium bromide in tetrahydrofuran. The product was used in the subsequent reaction without further purification.
- [420] <Step 2> 2-chloro-*N,N*,6-triethylpyrimidine-4-amine
- [421] The titled compound (145 mg) in the form of colorless oil was prepared in accordance with the same procedures as in Step 2 of Preparation 17, using 2,4-dichloro-6-ethylpyrimidine prepared in Step 1 and diethylamine.
- [422] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.11(s, 1H), 3.49(brs, 4H), 2.61-2.56(m, 2H), 1.26-1.14(m, 9H)
- [423]
- [424] Preparation 20. 2-chloro-*N,N*-diethyl-6-isopropylpyrimidine-4-amine
- [425] <Step 1> 2,4-dichloro-6-isopropylpyrimidine
- [426] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 17, using 2,4,6-trichloropyrimidine and 2.0M solution of isopropyl-magnesium chloride in tetrahydrofuran. The product was used in the subsequent reaction without further purification.
- [427] <Step 2> 2-chloro-*N,N*-diethyl-6-isopropylpyrimidine-4-amine
- [428] The titled compound (75 mg) in the form of colorless oil was prepared in accordance with the same procedures as in Step 2 of Preparation 17, using

2,4-dichloro-6-isopropylpyrimidine prepared in Step 1 and diethylamine.

[429] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.10(s, 1H), 3.50(brs, 4H), 2.83-2.76(m, 1H),  
1.25-1.17(m, 12H)

[430]

[431] Preparation 21. 6-butyl-2-chloro-*N,N*-diethylpyrimidine-4-amine

[432] <Step 1> 4-butyl-2,6-dichloropyrimidine

[433] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 17, using 2,4,6-trichloropyrimidine and 2.0M solution of butyl-magnesium chloride in tetrahydrofuran. The product was used in the subsequent reaction without further purification.

[434] <Step 2> 6-butyl-2-chloro-*N,N*-diethylpyrimidine-4-amine

[435] The titled compound (42 mg) in the form of colorless oil was prepared in accordance with the same procedures as in Step 2 of Preparation 17, using 4-butyl-2,6-dichloropyrimidine prepared in Step 1 and diethylamine.

[436] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.09(s, 1H), 3.49(brs, 4H), 2.56-2.52(m, 2H),  
1.69-1.61(m, 2H), 1.42-1.34(m, 2H), 1.22-1.17(m, 6H), 0.92(t, 3H)

[437]

[438] Preparation 22. 6-benzyl-2-chloro-*N,N*-diethylpyrimidine-4-amine

[439] <Step 1> 4-benzyl-2,6-dichloropyrimidine

[440] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 17, using 2,4,6-trichloropyrimidine and 1.0M solution of benzyl-magnesium bromide in diethyl ether. The product was used in the subsequent reaction without further purification.

[441] <Step 2> 6-benzyl-2-chloro-*N,N*-diethylpyrimidine-4-amine

[442] The titled compound (90 mg) in the form of colorless oil was prepared in accordance with the same procedures as in Step 2 of Preparation 17, using 4-benzyl-2,6-dichloropyrimidine prepared in Step 1 and diethylamine.

[443] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.33-7.22(m, 5H), 5.95(s, 1H), 3.90(s, 2H), 3.41(brs, 4H), 1.11(t, 6H)

[444]

[445] Preparation 23. 2-chloro-*N,N*-diethyl-6-pentylpyrimidine-4-amine

[446] <Step 1> 2,4-dichloro-6-pentylpyrimidine

[447] The titled compound was prepared in accordance with the same procedures as in Step 1 of Preparation 17, using 2,4,6-trichloropyrimidine and 2.0M solution of pentyl-magnesium chloride in tetrahydrofuran. The product was used in the subsequent reaction without further purification.

[448] <Step 2> 2-chloro-*N,N*-diethyl-6-pentylpyrimidine-4-amine

[449] The titled compound was prepared in accordance with the same procedures as in Step

2 of Preparation 17, using 2,4-dichloro-6-pentylpyrimidine prepared in Step 1 and diethylamine. The product was used in the subsequent reaction without further purification.

[450]

[451] Preparation 24. 6-chloro-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine

[452] <Step 1> 6-chloro-*N,N*-diethyl-2-(methylthio)pyrimidine-4-amine

[453] A mixture of 4,6-dichloro-2-(methylthio)pyrimidine (22.2 g, 117 mmol), diethylamine (17.1 g, 234 mmol), and tetrahydrofuran (234 ml) was stirred at room temperature overnight. The resulting precipitate was collected by filtration to give 26 g of the titled compound as a white solid.

[454] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.07(s, 1H), 3.49(brs, 4H), 2.49(s, 3H), 1.19(t, 6H)

[455] <Step 2> 6-chloro-*N,N*-diethyl-2-(methylsulfinyl)pyrimidine-4-amine

[456] A solution of oxone (7.2 g, 47.7 mmol) in water (43ml) was added at 0°C dropwise to a mixture of 6-chloro-*N,N*-diethyl-2-(methylthio)pyrimidine-4-amine (10 g, 43.2 mmol) prepared in Step 1 and methanol (43 ml). The reaction mixture was stirred at room temperature for 1 hour, concentrated under reduced pressure, and then extracted with dichloromethane. The organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 1/1) to give 10 g of the titled compound as a white solid.

[457] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 6.37(s, 1H), 3.73-3.39(m, 4H), 2.89(s, 3H), 1.28-1.21(m, 6H)

[458] <Step 3> 6-chloro-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine

[459] A solution of 6-chloro-*N,N*-diethyl-2-(methylsulfinyl)pyrimidine-4-amine (1 g, 3.79 mmol) prepared in Step 2 and 4-fluoroaniline (463 mg, 4.17 mmol) in toluene (18.9 ml) was reacted in a microwave reactor (300 W) for 1 hour. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 4/1) to give 550 mg of the titled compound as a white solid.

[460] <sup>1</sup>H-NMR(400MHz, CDCl<sub>3</sub>) δ 7.53-7.49(m, 2H), 7.01-6.97(m, 2H), 6.84(brs, 1H), 5.92(s, 1H), 3.47(brs, 4H), 1.21(t, 3H)

[461]

[462] The synthetic method for the compounds (including the salt thereof) of the present invention is described in the following working examples. And also, the compounds of the following working examples and the NMR spectrum data are shown in the subsequent Tables 1-1 to 1-20.

[463]

[464] Example 1

[465] 2-Chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine (40 mg, 0.18 mmol) prepared in Preparation 1 was dissolved in anhydrous *N,N*-dimethylformamide (1 ml) and then 4-methoxyaniline (31  $\mu$ l, 0.27 mmol) was added thereto at room temperature. The reaction mixture was refluxed under stirring at 130°C overnight and then cooled to room temperature. Water was added to the reaction mixture, which was then extracted with ethyl acetate. The organic layer was washed with an aqueous saturated solution of sodium chloride (10 ml), dried on anhydrous magnesium sulfate, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 10/1) to give 6.3 mg of the product as a pale yellow oil.

[466]

[467] Examples 2 to 34

[468] The products of Examples 2 to 34 were prepared in accordance with the same procedures as in Example 1, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1; and 4-aminobenzonitrile, 3-fluoroaniline, 3-(methylthio)aniline, 3-chloroaniline, 2,5-dichloro-1,4-phenylenediamine, *o*-anisidine, 3-methoxyaniline, 3-aminobenzonitrile, 4-chloroaniline, *p*-nitroaniline, 2-fluoro-5-methylaniline, 2-fluoro-4-methylaniline, 5-fluoro-2-methylaniline, 3-fluoro-4-methylaniline, 4-chloro-3-nitroaniline, 3-methoxy-5-(trifluoromethyl)aniline, 5-methoxy-2-methylaniline, 6-chloro-3-methoxyaniline hydrochloride, 3-chloro-2-methylaniline, 2-amino-3-nitrophenol, 5-chloro-2-methylaniline, 3-amino-4-chlorophenol, 2-chloro-4-methylaniline, 2-chloro-5-methylaniline, 2-chloro-4-aminotoluene, 4-(trifluoromethyl)aniline, 3-(trifluoromethyl)aniline, 3-bromoaniline, 2-amino-4-chlorophenol, 3-aminophenol, 4-(trifluoromethoxy)aniline, 3,4-difluoroaniline, or  $\alpha$ -naphthylamine.

[469]

[470] Example 35

[471] 2-Aminopyridine (17 mg, 0.18 mmol) was added to a solution of 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine (40 mg, 0.18 mmol) prepared in Preparation 1, palladium(II) acetate (0.8 mg, 2 mol%), 4,5-bis(diphenylphosphino)-9,9-dimethyl-xanthene (3.1 mg, 3 mol%), and cesium carbonate (117 mg, 0.36 mmol) in anhydrous 1,4-dioxane (1 ml), which was then stirred at microwave (600 W) for 1 hour. The reaction mixture was cooled to room temperature, dispersed in dichloromethane, and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 20/1) to give 7mg of the product as a pale yellow solid.

[472]

[473] Examples 36 to 70

[474] The products of Examples 36 to 70 were prepared in accordance with the same procedures as in Example 35, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1; and 3-aminopyridine, 4-aminopyridine, 2-aminopyrazine, 3-aminoquinoline, 4-aminopyrimidine, 2,3,4-trifluoroaniline, 2,6-difluoroaniline, 4-chloro-2-fluoroaniline, 2-amino-4-methylbenzonitrile, 2-aminobenzonitrile, 4-fluoro-2-methylaniline, 2-methyl-3-nitroaniline, 2-amino-3-picoline, 4-(methylthio)aniline, 2,5-difluoroaniline, 4-bromoaniline, 2-amino-5-methylthiazole, 2-amino-5-chloropyridine, 6-aminoindole, 5-amino-2-methoxypyridine, 2-amino-4-chlorobenzonitrile, 8-aminoquinoline, 2-amino-4-methylthiazole, 2-amino-3-nitropyridine, 5-amino-2-(trifluoromethyl)pyridine, 6-aminoquinoline, 4-fluoro-3-nitroaniline, 1,4-benzodioxan-6-amine, 3,4-(methylenedioxy)aniline, 4-methyl-3-nitroaniline, 3-amino-4-picoline, 5-amino-2-pyridine carbonitrile, 3-aminobenzoic acid ethyl ester, 5-amino-2-cyanobenzotrifluoride, or 4-amino-1,2,4-triazole.

[475]

[476] Example 71

[477] <Step 1> 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile

[478] The titled compound (254 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 35, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 3-aminobenzonitrile.

[479] <Step 2> 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile hydrochloride

[480] 3-[4-(Diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile (100 mg) prepared in Step 1 was dissolved in ethyl acetate (2 ml) and then hydrogen chloride gas was added thereto at 0°C. The reaction mixture was stirred at room temperature for 2 hours and then filtered. The resulting solid was washed with ethyl acetate and then dried under reduced pressure at 40 °C to give 76 mg of the product as a white solid.

[481]

[482] Example 72

[483] The product (77 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 71, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 4-chloro-3-nitroaniline.

[484]

[485] Example 73

[486] A mixture of 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine (30 mg, 0.13 mmol) prepared in Preparation 1, 5-aminoindazole (35 mg, 0.26 mmol), and *n*-butanol (1 ml) was refluxed under stirring overnight. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 20/1) to give 3.9 mg of the product as a pale yellow solid.

[487]

[488] Examples 74 to 95

[489] The products of Examples 74 to 95 were prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1; and 6-aminoindazole, 5-amino-2-(trifluoromethyl)benzimidazole, 5-aminoindole, 6-aminobenzothiazole, 7-amino-2-methyl-4*H*-chromen-4-one, 5-amino-2-methylbenzothiazole dihydrochloride, 7-amino-4-methylcoumarin, 4-aminoindole, 2-methoxy-5-nitroaniline, 2,5-dimethoxyaniline, 4-amino-2-nitrophenol, 3-nitro-1,2-phenylenediamine, 2-nitro-1,4-phenylenediamine, 4-nitro-3-(trifluoromethyl)aniline, (5-amino-2-methoxyphenyl)-carbamic acid benzyl ester, *m*-toluidine, 5-aminoindane, 2-methyl-5-aminoindole, 4-fluoro-3-(trifluoromethyl)aniline, 3-ethynylaniline, 2,6-diaminotoluene, or 4-amino-2-nitrobenzoic acid.

[490]

[491] Example 96

[492] The product (22.4 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 1-methyl-1*H*-indol-6-amine prepared in Preparation 2.

[493]

[494] Example 97

[495] The product (3.8 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 1-ethyl-1*H*-indol-6-amine prepared in Preparation 3.

[496]

[497] Example 98

[498] The product (68.5 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 7-aminoindole prepared in Preparation 4.

[499]

[500] Example 99

[501] The product (31.5 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 1*H*-benzo[*d*]imidazol-5-amine prepared in Preparation 5.

[502]

[503] Example 100

[504] The product (25.8 mg) in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 2,3-dimethylbenzofuran-5-amine prepared in Preparation 6.

[505]

[506] Example 101

[507] <Step 1> *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine

[508] The titled compound (300 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 6-aminoindole.

[509] <Step 2> *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine hydrochloride

[510] The titled compound (295 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Step 2 of Example 71, using *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine in Step 1.

[511]

[512] Example 102

[513] *N*<sup>4</sup>,*N*<sup>4</sup>-Diethyl-*N*<sup>2</sup>-(1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine (30 mg, 0.09 mmol) prepared in Example 54 was dissolved in anhydrous *N,N*-dimethylformamide (1 ml). 60 wt% Sodium hydride (5.4 mg, 0.14 mmol) and 1-iodo-2-methylpropane (16  $\mu$ l, 0.14 mmol) were added at 0°C to the reaction mixture, which was then stirred at room temperature overnight. Water was added to the reaction mixture and then extracted with ethyl acetate. The organic layer was washed with brine, dried on anhydrous magnesium sulfate, filtered, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 20/1) to give 6.0 mg of the product as a white solid.

[514]

[515] Example 103

[516] The product (215 mg) in the form of pale yellow solid was prepared in accordance with the same procedures as in Step 2 of Example 71, using *N*<sup>2</sup>-(1*H*-benzo[*d*]imidazol-5-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine prepared in Example

99.

[517]

[518] Example 104

[519] *N*<sup>4</sup>,*N*<sup>4</sup>-Diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine (20 mg, 0.06 mmol) prepared in Example 62 was dissolved in methanol (2 ml) and then palladium/charcoal (25 mg, 10 wt%) was added thereto. The reaction mixture was stirred at room temperature under hydrogen atmosphere (30 bar) for 3 hours and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (n-hexane/ethyl acetate = 1/1) to give 5.7 mg of the product as a pale yellow oil.

[520]

[521] Example 105

[522] The product (8.0 mg) in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 104, using *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine prepared in Example 65.

[523]

[524] Example 106

[525] The product (5.9 mg) in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 104, using *N*<sup>2</sup>-(4-amino-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine prepared in Example 86.

[526]

[527] Example 107

[528] The product (1.5 mg) in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 104, using benzyl 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methoxyphenylcarbamate prepared in Example 88.

[529]

[530] Example 108

[531] Ethyl 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoate (20 mg, 0.06 mmol) prepared in Example 68 was dissolved in methanol (1 ml) and a 1N sodium hydroxide solution (1 ml) was added thereto. The reaction mixture was stirred at room temperature for 5 hours and then a 1N hydrochloric acid solution (1 ml) was added thereto. The reaction mixture was stirred overnight and the resulting precipitate was collected by filtration to give 7.5 mg of the product as a pale yellow solid.

[532]

[533] Example 109

[534] A solution of 4-chloro-*N*-(4-fluorophenyl)-6-propylpyrimidine-2-amine (20 mg, 0.08 mmol) prepared in Preparation 7 and diethylamine (30 mg, 0.41 mmol) in isopropanol

(0.5 ml) was stirred at 100°C overnight. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 4/1) to give 10.2 mg of the product as a pale yellow solid.

[535]

[536] Examples 110 to 115

[537] The products of Examples 110 to 115 were prepared in accordance with the same procedures as in Example 109, using 4-chloro-*N*-(4-fluorophenyl)-6-propylpyrimidine-2-amine prepared in Preparation 7; and dimethylamine, dipropylamine, *N*-ethylbutylamine, 2-(methylamino)ethanol, bis(2-methoxyethyl)amine, or *N*-(2-methoxyethyl)ethylamine.

[538]

[539] Example 116

[540] A solution of 4-chloro-*N*-(4-fluorophenyl)-6-propylpyrimidine-2-amine (20 mg, 0.08 mmol) prepared in Preparation 7 and diethanolamine (30 mg, 0.29 mmol) in isopropanol (0.5 ml) was stirred at 100°C overnight. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 1/1). The product was dissolved in ethyl acetate (2 ml) and then hydrogen chloride gas was added thereto to give 6.8 mg of the product as a pale yellow solid.

[541]

[542] Example 117

[543] The product in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 109, using 4-butyl-6-chloro-*N*-(4-fluorophenyl)pyrimidine-2-amine prepared in Preparation 8 and diethylamine.

[544]

[545] Example 118

[546] *N*<sup>4</sup>,*N*<sup>4</sup>-Diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine (20 mg, 0.08 mmol) prepared in Example 109 was dissolved in ethyl acetate (1 ml) and then hydrogen chloride gas was added thereto. The reaction mixture was stirred at room temperature for 1 hour and then filtered to give 10 mg of the product as a white solid.

[547]

[548] Example 119

[549] A solution of 4-chloro-6-ethyl-*N*-(4-fluorophenyl)pyrimidine-2-amine (20 mg, 0.08 mmol) prepared in Preparation 9 and diethylamine (9.9  $\mu$ l, 0.10 mmol) in isopropanol (0.5 ml) was stirred at 100°C overnight. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 40/1) to

give 4.2 mg of the product as a pale yellow oil.

[550]

[551] Examples 120 to 137

[552] The products of Examples 120 to 137 were prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1; and 4-aminophthalonitrile, 5-amino-2-fluorobenzonitrile, 3'-aminoacetanilide, 5-amino-2-methylbenzonitrile, 3'-amino-4'-methoxyacetanilide, 4-amino-*N*-methylphthalimide, *N*-(3-aminophenyl)methanesulfonamide, 7-amino-4-(trifluoromethyl)coumarin, 7-amino-4-methylquinolin-2(1*H*)-one, 3-(difluoromethoxy)aniline, 3-(trifluoromethoxy)aniline, *p*-toluidine, 4-aminophenol hydrochloride, 2-(trifluoromethyl)-1,4-phenylenediamine, 5-aminoisatoic anhydride, 6-amino-2-benzoxazolinone, 3-methyl-4-nitroaniline, or 1-acetyl-6-aminoindoline.

[553]

[554] Example 138

[555] The product in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 5-amino-1*H*-benzo[*d*]imidazol-2(3*H*)-one prepared in Preparation 10.

[556]

[557] Example 139

[558] The product in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and *N*<sup>1</sup>,*N*<sup>1</sup>-dimethylbenzene-1,3-diamine prepared in Preparation 11.

[559]

[560] Example 140

[561] The product in the form of pale yellow oil was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 2,5-diaminobenzonitrile prepared in Preparation 12.

[562]

[563] Example 141

[564] <Step 1> 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-2-one

[565] The titled compound (150 mg) in the form of red oil was prepared in accordance with the same procedures as in Example 73, using 2-chloro-*N,N*-diethyl-6-propylpyrimidine-4-amine prepared in Preparation 1 and 6-aminoindolin-2-one prepared in Preparation 13. The product was used in the subsequent step without further purification.

[566] <Step 2> 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-2-one hy-

drochloride

[567] 6-(4-Diethylamino-6-propylpyrimidin-2-ylamino)indolin-2-one (20 mg, 0.05 mmol) prepared in Step 1 was dissolved in ethyl acetate (1 ml) and hydrogen chloride gas was added thereto to give 5 mg of the titled compound as a pale red solid.

[568]

[569] Example 142

[570] A mixture of

1-[6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-1-yl]ethanone (188.1 mg, 0.51 mmol) prepared in Example 137 and a 6N hydrochloric acid (1 ml) was refluxed under stirring for 4 hours. The reaction mixture was cooled to room temperature, basified to pH 9 with a 2N sodium hydroxide solution, and then extracted with dichloromethane. The organic layer was dried on anhydrous sodium sulfate and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 40/1) to give 117.7 mg of the product as a pate brown oil.

[571]

[572] Example 143

[573] Iodomethane (5.5  $\mu\text{l}$ , 0.088 mmol) was added to a mixture of  $N^4, N^4$ -diethyl- $N^2$  - (indolin-6-yl)-6-propylpyrimidine-2,4-diamine (23.9 mg, 0.073 mmol) prepared in Example 142, potassium carbonate (15.2 mg, 0.11 mmol), and  $N, N$  - dimethylformamide (0.3 ml). The reaction mixture was stirred at room temperature for 2 days and iodomethane (5.5  $\mu\text{l}$ , 0.088 mmol) and potassium carbonate (15.2 mg, 0.11 mmol) were added thereto. The reaction mixture was stirred at room temperature overnight and then concentrated under reduced pressure. The resulting residue was dissolved in dichloromethane, washed with water, dried on anhydrous sodium sulfate, and then concentrated under reduced pressure to give 22.7 mg of the product as a pale yellow oil.

[574]

[575] Example 144

[576] Iodomethane (5.4  $\mu\text{l}$ , 0.087 mmol) was added to a mixture of  $N^4, N^4$ -diethyl- $N^2$  - (indolin-6-yl)-6-propylpyrimidine-2,4-diamine (23.5 mg, 0.073 mmol) prepared in Example 142, an catalytic amount of potassium iodide, potassium carbonate (20.9 mg, 0.15 mmol), and  $N, N$ -dimethylformamide (0.3 ml). The reaction mixture was stirred at room temperature overnight and then concentrated under reduced pressure. The resulting residue was dissolved in ethyl acetate, washed with water, dried on anhydrous sodium sulfate, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 70/1) to give 11.3 mg of the product as a pale brown oil.

[577]

[578] Example 145

[579] Methanesulfonyl chloride (6.7  $\mu\text{l}$ , 0.087 mmol) was added to a mixture of  $N^4, N^4$ -diethyl- $N^2$ -(indolin-6-yl)-6-propylpyrimidine-2,4-diamine (23.5 mg, 0.073 mmol) prepared in Example 142, triethylamine (15.1  $\mu\text{l}$ , 0.108 mmol), and dichloromethane (1 ml). The reaction mixture was stirred at room temperature overnight. The reaction mixture was dissolved in dichloromethane, washed with water, dried on anhydrous sodium sulfate, and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 70/1) to give 20.4 mg of the product as a pale yellow oil.

[580]

[581] Example 146

[582] A mixture of  $N^4, N^4$ -diethyl- $N^2$ -(3-methyl-4-nitrophenyl)-6-propylpyrimidine-2,4-diamine (80 mg, 0.23 mmol) prepared in Example 136, palladium/charcoal (10 mg, 10 wt%), and methanol (2 ml) was stirred at room temperature under hydrogen atmosphere for 3 hours and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 50/1) to give 55.4 mg of the product as a pale yellow solid.

[583]

[584] Example 147

[585] A mixture of  $N^4, N^4$ -diethyl- $N^2$ -(4-fluoro-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine (69.5 mg, 0.20 mmol) prepared in Example 62, dimethylamine hydrochloride (49.0 mg, 0.60 mmol), diisopropylethylamine (104.73  $\mu\text{l}$ , 0.60 mmol), and  $N, N$ -dimethylformamide (1 ml) was stirred at 100°C overnight and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 70/1) to give 35.1 mg of the product as a red oil.

[586]

[587] Example 148

[588] The product in the form of yellow oil was prepared in accordance with the same procedures as in Example 146, using  $N^2$ -(4-dimethylamino-3-nitrophenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine prepared in Example 147.

[589]

[590] Example 149

[591] A solution of 4-chloro- $N$ -(4-fluorophenyl)-6-methylpyrimidine-2-amine (30 mg, 0.13 mmol) prepared in Preparation 14, diethylamine (18.4 mg, 0.25 mmol), and diiso-

propylethylamine (65.7  $\mu\text{l}$ , 0.38 mmol) in tetrahydrofuran (1 ml) was stirred at 75°C for 6 hours. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 50/1) to give 20.5 mg of the product as a white solid.

[592]

[593] Examples 150 to 152

[594] The products of Examples 150 to 152 were prepared in accordance with the same procedures as in Example 149, using 4-chloro-*N*-(4-fluorophenyl)-6-methylpyrimidine-2-amine prepared in Preparation 14; and a 2.0M solution of dimethylamine in tetrahydrofuran, *N*-methylbutylamine, or diisobutylamine.

[595]

[596] Example 153

[597] A solution of 4-chloro-*N*-(4-fluorophenyl)-6-methylpyrimidine-2-amine (30 mg, 0.13 mmol) prepared in Preparation 14, *N*-ethylbutylamine (25.5 mg, 0.25 mmol), and diisopropylethylamine (65.7  $\mu\text{l}$ , 0.38 mmol) in isopropanol (1 ml) was reacted in a microwave reactor (300 W) for 2 hours. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (*n*-hexane/ethyl acetate = 4/1) to give 43.9 mg of the product as a colorless oil.

[598]

[599] Examples 154 and 155

[600] The products of Examples 154 and 155 were prepared in accordance with the same procedures as in Example 153, using 4-chloro-*N*-(4-fluorophenyl)-6-methylpyrimidine-2-amine prepared in Preparation 14; and dipropylamine or diisopropylamine.

[601]

[602] Example 156

[603] A solution of (*E*)-2-chloro-*N,N*-diethyl-6-styrylpyrimidine-4-amine (15 mg, 0.05 mmol) prepared in Preparation 15 and 4-fluoroaniline (6.4 mg, 0.06 mmol) in *n*-butanol (0.5 ml) was reacted in a microwave reactor (450 W) for 40 minutes. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 100/1) to give 15.5 mg of the product as a white solid.

[604]

[605] Examples 157 to 159

[606] The products of Examples 157 to 159 were prepared in accordance with the same

procedures as in Example 156, using (*E*)-2-chloro-*N,N*-diethyl-6-styrylpyrimidine-4-amine prepared in Preparation 15; and 3-nitroaniline, 4-chloro-3-nitroaniline, or 3-aminobenzonitrile.

[607]

[608] Examples 160 and 161

[609] The products of Examples 160 and 161 were prepared in accordance with the same procedures as in Example 156, using 6-allyl-2-chloro-*N,N*-diethylpyrimidine-4-amine prepared in Preparation 16; and 4-fluoroaniline or 3-aminobenzonitrile.

[610]

[611] Examples 162 to 164

[612] The products of Examples 162 to 164 were prepared in accordance with the same procedures as in Example 156, using 2-chloro-*N,N*-diethyl-6-isobutylpyrimidine-4-amine prepared in Preparation 17; and 4-fluoroaniline, 4-fluoro-3-nitroaniline, or 3-aminobenzonitrile.

[613]

[614] Examples 165 to 168

[615] The products of Examples 165 to 168 were prepared in accordance with the same procedures as in Example 156, using 2-chloro-*N,N*-diethyl-6-phenethylpyrimidine-4-amine prepared in Preparation 18; and 3-nitroaniline, 4-chloro-3-nitroaniline, 4-fluoro-3-nitroaniline, or 2-chloro-4-aminotoluene.

[616]

[617] Examples 169 to 171

[618] The products of Examples 169 to 171 were prepared in accordance with the same procedures as in Example 156, using 2-chloro-*N,N*,6-triethylpyrimidine-4-amine prepared in Preparation 19; and 3-aminobenzonitrile, 3-nitroaniline, or 4-chloro-3-nitroaniline.

[619]

[620] Examples 172 to 175

[621] The products of Examples 172 to 175 were prepared in accordance with the same procedures as in Example 156, using 2-chloro-*N,N*-diethyl-6-isopropylpyrimidine-4-amine prepared in Preparation 20; and 3-aminobenzonitrile, 3-nitroaniline, 4-chloro-3-nitroaniline, or 4-fluoroaniline.

[622]

[623] Examples 176 to 178

[624] The products of Examples 176 to 178 were prepared in accordance with the same procedures as in Example 156, using 6-butyl-2-chloro-*N,N*-diethylpyrimidine-4-amine prepared in Preparation 21; and 3-aminobenzonitrile, 3-nitroaniline, or 4-chloro-3-nitroaniline.

[625]

[626] Examples 179 to 182

[627] The products of Examples 179 to 182 were prepared in accordance with the same procedures as in Example 156, using 6-benzyl-2-chloro-*N,N*-diethylpyrimidine-4-amine prepared in Preparation 22; and 3-aminobenzonitrile, 3-nitroaniline, 4-chloro-3-nitroaniline, or 4-fluoroaniline.

[628]

[629] Example 183

[630] The product was prepared in accordance with the same procedures as in Example 156, using 2-chloro-*N,N*-diethyl-6-pentylpyrimidine-4-amine prepared in Preparation 23 and 4-fluoroaniline.

[631]

[632] Example 184

[633] A solution of (*E*)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-styrylpyrimidine-2,4-diamine (10 mg, 0.027 mmol) prepared in Example 156 and palladium/charcoal (1 mg, 10 wt%) in methanol (1.0 ml) was stirred at room temperature under hydrogen atmosphere for 1 hour and then filtered through a celite pad. The resulting filtrate was concentrated under reduced pressure to give 9.1 mg of the product as a white solid.

[634]

[635] Example 185

[636] The product was prepared in accordance with the same procedures as in Example 184, using (*E*)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)-6-styrylpyrimidine-2,4-diamine prepared in Example 157.

[637]

[638] Example 186

[639] The product was prepared in accordance with the same procedures as in Example 184, using (*E*)-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-styrylpyrimidine-2,4-diamine prepared in Example 158.

[640]

[641] Example 187

[642] The product was prepared in accordance with the same procedures as in Example 184, using (*E*)-3-[4-(diethylamino)-6-styrylpyrimidin-2-ylamino]benzonitrile prepared in Example 159.

[643]

[644] Example 188

[645] The product was prepared in accordance with the same procedures as in Example 184, using *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine prepared in Example 167.

[646]

[647] Example 189

[648] The product was prepared in accordance with the same procedures as in Example 184, using *N*<sup>4</sup>,*N*<sup>4</sup>,6-triethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine prepared in Example 170.

[649]

[650] Example 190

[651] The product was prepared in accordance with the same procedures as in Example 184, using *N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine prepared in Example 171.

[652]

[653] Example 191

[654] The product was prepared in accordance with the same procedures as in Example 184, using *N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine prepared in Example 173.

[655]

[656] Example 192

[657] The product was prepared in accordance with the same procedures as in Example 184, using 6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine prepared in Example 177.

[658]

[659] Example 193

[660] The product was prepared in accordance with the same procedures as in Example 184, using 6-butyl-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine prepared in Example 178.

[661]

[662] Example 194

[663] The product was prepared in accordance with the same procedures as in Example 184, using 6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine prepared in Example 180.

[664]

[665] Example 195

[666] The product was prepared in accordance with the same procedures as in Example 184, using 6-benzyl-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine prepared in Example 181.

[667]

[668] Example 196

[669] A mixture of 6-chloro-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine (10

mg, 0.033 mmol) prepared in Preparation 24, trans-3-(cyclopentyl)-1-propenylboronic acid (8.6 mg, 0.036 mmol), bis(triphenylphosphine)palladium(II) chloride (1.0 mg, 0.001 mmol), potassium phosphate (14 mg, 0.066 mmol), and 1,4-dioxane (0.3 ml) was reacted in a microwave reactor (550 W) for 30 minutes. The reaction mixture was cooled to room temperature and then concentrated under reduced pressure. The resulting residue was purified with silica gel column chromatography (dichloromethane/methanol = 100/1) to give 15.5 mg of the product as a white solid.

[670]

[671] Example 197

[672] The product was prepared in accordance with the same procedures as in Example 196, using 6-chloro-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine prepared in Preparation 24 and trans-2-cyclopropylvinyl boronic acid.

[673]

[674] The compounds of Examples 1 to 197 and the NMR spectrum data thereof are shown in Tables 1-1 to 1-20 below.

[675]

[676] Table 1-1

[677]

| Example | Compound                                                                                                                                   | NMR Spectrum                                                                                                                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-methoxyphenyl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.52(d, 2H), 6.84(d, 2H), 6.71(brs, 1H), 5.75(s, 1H), 3.79(s, 3H), 3.48(m, 4H), 2.44(m, 2H), 1.72(m, 2H), 1.19(m, 6H), 0.98(t, 3H)                           |
| 2       | <i>N</i> <sup>2</sup> -(4-cyanophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.76(d, 2H), 7.54(d, 2H), 7.11(brs, 1H), 5.86(s, 1H), 3.51(m, 4H), 2.48(m, 2H), 1.71(m, 2H), 1.22(m, 6H), 0.99(t, 3H)                                        |
| 3       | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-fluorophenyl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.86(dd, 1H), 7.18(m, 1H), 7.04(m, 1H), 6.93(brs, 1H), 6.63(m, 1H), 5.81(s, 1H), 3.51(m, 4H), 2.46(m, 2H), 1.73(m, 2H), 1.22(m, 6H), 0.98(t, 3H)             |
| 4       | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -[3-(methylthio)phenyl]-6-propylpyrimidine-2,4-diamine       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.84(s, 1H), 7.25-7.18(m, 2H), 6.84(m, 2H), 5.79(s, 1H), 3.51(m, 4H), 2.49(s, 3H), 2.45(m, 2H), 1.71(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                        |
| 5       | <i>N</i> <sup>2</sup> -(3-chlorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.12(s, 1H), 7.15(m, 2H), 6.91(m, 2H), 5.80(s, 1H), 3.51(m, 4H), 2.46(m, 2H), 1.71(m, 2H), 1.23(m, 6H), 0.99(t, 3H)                                          |
| 6       | <i>N</i> <sup>2</sup> -(4-amino-2,5-dichlorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.62(s, 1H), 7.02(brs, 1H), 6.81(s, 1H), 5.79(s, 1H), 3.83(brs, 2H), 3.50(m, 4H), 2.46(m, 2H), 1.73(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                         |
| 7       | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-methoxyphenyl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.60(d, 1H), 7.47(brs, 1H), 6.96-6.84(m, 3H), 5.77(s, 1H), 3.87(s, 3H), 3.51(m, 4H), 2.47(m, 2H), 1.72(m, 2H), 1.21(m, 6H), 0.99(t, 3H)                      |
| 8       | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-methoxyphenyl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.53(m, 1H), 7.18(m, 1H), 7.03(m, 1H), 6.87(brs, 1H), 6.51(m, 1H), 5.78(s, 1H), 3.81(s, 3H), 3.51(m, 4H), 2.46(m, 2H), 1.71(m, 2H), 1.21(m, 6H), 0.98(t, 3H) |
| 9       | 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile                                                                               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.46(s, 1H), 7.47(d, 1H), 7.33(t, 1H), 7.20(d, 1H), 6.93(s, 1H), 5.84(s, 1H), 3.52(m, 4H), 2.47(m, 2H), 1.71(m, 2H), 1.25(m, 6H), 0.99(t, 3H)                |
| 10      | <i>N</i> <sup>2</sup> -(4-chlorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.57(d, 2H), 7.23(d, 2H), 6.84(brs, 1H), 5.79(s, 1H), 3.50(m, 4H), 2.45(m, 2H), 1.71(m, 2H), 1.20(m, 6H), 0.98(t, 3H)                                        |

[678] Table 1-2

[679]

| Example | Compound                                                                                                                                            | NMR Spectrum                                                                                                                                                                                                  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-nitrophenyl)-6-propylpyrimidine-2,4-diamine                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.17(d, 2H), 7.78(d, 2H), 7.25(brs, 1H), 5.89(s, 1H), 3.52(m, 4H), 2.49(m, 2H), 1.72(m, 2H), 1.23(m, 6H), 0.99(t, 3H)                                        |
| 12      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-fluoro-5-methylphenyl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.46(d, 1H), 7.00(brs, 1H), 6.94-6.89(m, 1H), 6.65(m, 1H), 5.81(s, 1H), 3.52(m, 4H), 2.47(m, 2H), 2.32(s, 3H), 1.72(m, 2H), 1.23(m, 6H), 0.99(t, 3H)         |
| 13      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-fluoro-4-methylphenyl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.41(m, 1H), 6.92-6.85(m, 3H), 5.79(s, 1H), 3.49(m, 4H), 2.48(m, 2H), 2.29(s, 3H), 1.72(m, 2H), 1.20(m, 6H), 0.98(t, 3H)                                     |
| 14      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(5-fluoro-2-methylphenyl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.33(d, 1H), 7.04(m, 1H), 6.65(brs, 1H), 6.56(m, 1H), 5.81(s, 1H), 3.50(m, 4H), 2.47(m, 2H), 2.28(s, 3H), 1.72(m, 2H), 1.22(m, 6H), 0.99(t, 3H)              |
| 15      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-fluoro-4-methylphenyl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.76(d, 1H), 7.04-6.98(m, 2H), 6.86(brs, 1H), 5.78(s, 1H), 3.50(m, 4H), 2.45(m, 2H), 2.21(s, 3H), 1.71(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                      |
| 16      | <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.92(s, 1H), 7.36(d, 1H), 7.29(d, 2H), 7.04(brs, 1H), 5.85(s, 1H), 3.52(m, 4H), 2.47(m, 2H), 1.71(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                           |
| 17      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -[3-methoxy-5-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.85(s, 1H), 7.18(s, 1H), 7.01(brs, 1H), 6.71(s, 1H), 5.82(s, 1H), 3.51(m, 4H), 2.46(m, 2H), 1.71(m, 2H), 1.21(m, 6H), 0.98(t, 3H)                           |
| 18      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(5-methoxy-2-methylphenyl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.09(s, 1H), 7.02(d, 1H), 6.61(brs, 1H), 6.46(d, 1H), 5.79(s, 1H), 3.80(s, 3H), 3.51(m, 4H), 2.47(m, 2H), 2.26(s, 3H), 1.74(m, 2H), 1.19(m, 6H), 0.99(t, 3H) |
| 19      | <i>N</i> <sup>2</sup> -(2-chloro-5-methoxyphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.42(s, 1H), 7.31(brs, 1H), 7.20(d, 1H), 6.43(d, 1H), 5.83(s, 1H), 3.81(s, 3H), 3.52(m, 4H), 2.49(m, 2H), 1.74(m, 2H), 1.20(m, 6H), 0.98(m, 3H)              |
| 20      | <i>N</i> <sup>2</sup> -(3-chloro-2-methylphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.10(d, 1H), 7.10-7.03(m, 2H), 6.59(brs, 1H), 5.79(s, 1H), 3.45(m, 4H), 4.46(m, 2H), 2.38(s, 3H), 1.71(m, 2H), 1.17(m, 6H), 0.99(t, 3H)                      |

[680] Table 1-3

[681]

| Example | Compound                                                                               | NMR Spectrum                                                                                                                                                                                         |
|---------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21      | 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-3-nitrophenol                         | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 9.58(brs, 1H), 7.63(d, 1H), 7.24(d, 1H), 7.04(t, 1H), 5.82(s, 1H), 3.50(m, 4H), 2.49(m, 2H), 1.71(m, 2H), 1.20(m, 6H), 0.97(t, 3H)              |
| 22      | $N^2$ -(5-chloro-2-methylphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine   | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.58(s, 1H), 7.03(d, 1H), 6.86(d, 1H), 6.65(brs, 1H), 5.81(s, 1H), 3.51(m, 4H), 2.47(m, 2H), 2.28(s, 3H), 1.71(m, 2H), 1.23(m, 6H), 0.99(t, 3H) |
| 23      | 4-chloro-3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol                        | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.28(s, 1H), 7.34(brs, 1H), 7.13(d, 1H), 6.70(m, 1H), 5.82(s, 1H), 3.50(m, 4H), 2.48(m, 2H), 1.71(m, 2H), 1.20(m, 6H), 0.95(t, 3H)              |
| 24      | $N^2$ -(2-chloro-4-methylphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine   | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.48(d, 1H), 7.19(brs, 1H), 7.16(s, 1H), 7.02(m, 1H), 5.80(s, 1H), 3.50(m, 4H), 2.47(m, 2H), 2.28(s, 3H), 1.73(m, 2H), 1.19(m, 6H), 0.99(t, 3H) |
| 25      | $N^2$ -(2-chloro-5-methylphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine   | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.54(s, 1H), 7.20(d, 1H), 6.68(m, 1H), 5.82(s, 1H), 3.51(m, 4H), 2.48(m, 2H), 2.33(s, 3H), 1.75(m, 2H), 1.23(m, 6H), 0.99(t, 3H)                |
| 26      | $N^2$ -(3-chloro-4-methylphenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine   | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.08(s, 1H), 7.12-7.06(m, 2H), 6.78(brs, 1H), 5.78(s, 1H), 3.50(m, 4H), 2.45(m, 2H), 2.31(s, 3H), 1.70(m, 2H), 1.23(m, 6H), 0.98(t, 3H)         |
| 27      | $N^4, N^4$ -diethyl-6-propyl- $N^2$ -[4-(trifluoromethyl)phenyl]pyrimidine-2,4-diamine | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 7.75(d, 2H), 7.51(d, 2H), 7.10(brs, 1H), 5.84(s, 1H), 3.51(m, 4H), 2.48(m, 2H), 1.72(m, 2H), 1.23(m, 6H), 0.99(m, 3H)                           |
| 28      | $N^4, N^4$ -diethyl-6-propyl- $N^2$ -[3-(trifluoromethyl)phenyl]pyrimidine-2,4-diamine | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.49(s, 1H), 7.34(m, 2H), 7.19(d, 1H), 7.07(brs, 1H), 5.82(s, 1H), 3.53(m, 4H), 2.47(m, 2H), 1.71(m, 2H), 1.22(m, 6H), 0.98(m, 3H)              |
| 29      | $N^2$ -(3-bromophenyl)- $N^4, N^4$ -diethyl-6-propylpyrimidine-2,4-diamine             | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 8.31(s, 1H), 7.20(d, 1H), 7.12-7.04(m, 2H), 6.87(brs, 1H), 5.80(s, 1H), 3.52(m, 4H), 2.45(m, 2H), 1.71(m, 2H), 1.23(t, 6H), 0.98(t, 3H)         |
| 30      | 4-chloro-2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol                        | $^1\text{H-NMR}$ (400MHz, $\text{CDCl}_3$ ) $\delta$ 7.01-6.90(m, 3H), 6.66(brs, 1H), 5.77(s, 1H), 3.48(m, 4H), 2.48(m, 2H), 1.70(m, 2H), 1.19(t, 6H), 0.96(t, 3H)                                   |

[682] Table 1-4

[683]

| Example | Compound                                                                                                                                   | NMR Spectrum                                                                                                                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 31      | 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol                                                                                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.33(s, 1H), 7.10(m, 2H), 6.51(m, 1H), 5.76(s, 1H), 3.54(m, 4H), 2.53(m, 2H), 1.76(m, 2H), 1.24(t, 6H), 0.99(t, 3H)                                          |
| 32      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -[4-(trifluoromethoxy)phenyl]pyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.66(d, 2H), 7.12(d, 2H), 6.85(brs, 1H), 5.80(s, 1H), 3.50(m, 4H), 2.46(m, 2H), 1.71(m, 2H), 1.21(t, 6H), 0.98(t, 3H)                                        |
| 33      | <i>N</i> <sup>2</sup> -(3,4-difluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine         | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.96(m, 1H), 7.03(m, 1H), 6.98(m, 1H), 6.82(brs, 1H), 5.81(s, 1H), 3.50(m, 4H), 2.46(m, 2H), 1.71(m, 2H), 1.21(t, 6H), 0.98(t, 3H)                           |
| 34      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(naphthalen-1-yl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.35(d, 1H), 8.08(d, 1H), 7.83(d, 1H), 7.54(m, 1H), 7.47(m, 3H), 7.23(brs, 1H), 5.81(s, 1H), 3.43(m, 4H), 2.50(m, 2H), 1.74(m, 2H), 1.14(t, 6H), 1.01(t, 3H) |
| 35      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(pyridin-2-yl)pyrimidine-2,4-diamine               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.43(d, 1H), 8.22(d, 1H), 7.62(t, 1H), 7.53(brs, 1H), 6.83(m, 1H), 5.84(s, 1H), 3.51(m, 4H), 2.49(m, 2H), 1.73(m, 2H), 1.21(t, 6H), 0.99(t, 3H)              |
| 36      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(pyridin-3-yl)pyrimidine-2,4-diamine               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.70(s, 1H), 8.18(d, 1H), 8.13(m, 1H), 7.20(m, 1H), 7.00(brs, 1H), 5.83(s, 1H), 3.50(m, 4H), 2.47(m, 2H), 1.72(m, 2H), 1.21(t, 6H), 0.98(t, 3H)              |
| 37      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(pyridin-4-yl)pyrimidine-2,4-diamine               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.39(d, 2H), 7.58(d, 2H), 7.26(brs, 1H), 5.87(s, 1H), 3.53(m, 4H), 2.49(m, 2H), 1.72(m, 2H), 1.23(t, 6H), 0.99(t, 3H)                                        |
| 38      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(pyrazin-2-yl)pyrimidine-2,4-diamine               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.77(s, 1H), 8.18(s, 1H), 8.12(s, 1H), 7.54(brs, 1H), 5.89(s, 1H), 3.52(m, 4H), 2.50(m, 2H), 1.73(m, 2H), 1.23(t, 6H), 0.99(t, 3H)                           |
| 39      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(quinolin-3-yl)pyrimidine-2,4-diamine              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.89(s, 1H), 8.79(s, 1H), 8.00(d, 1H), 7.70(d, 1H), 7.55-7.48(m, 2H), 5.86(s, 1H), 3.56(m, 4H), 2.51(m, 2H), 1.75(m, 2H), 1.27(t, 6H), 1.01(t, 3H)           |
| 40      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(pyrimidin-4-yl)pyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.78(s, 1H), 8.47(d, 1H), 8.40(d, 1H), 7.82(brs, 1H), 5.91(s, 1H), 3.51(m, 4H), 2.52(m, 2H), 1.75(m, 2H), 1.20(t, 6H), 0.99(t, 3H)                           |

[684] Table 1-5

[685]

| Example | Compound                                                                                                                                | NMR Spectrum                                                                                                                                                                                     |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 41      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(2,3,4-trifluorophenyl)pyrimidine-2,4-diamine   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.27(m, 1H), 6.90(m, 2H), 5.84(s, 1H), 3.48(m, 4H), 2.47(m, 2H), 1.71(m, 2H), 1.18(t, 6H), 0.99(t, 3H)                                          |
| 42      | <i>N</i> <sup>2</sup> -(2,6-difluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.07(m, 1H), 6.90(m, 2H), 6.29(brs, 1H), 5.77(s, 1H), 3.34(m, 4H), 2.44(m, 2H), 1.69(m, 2H), 1.07(t, 6H), 0.97(t, 3H)                           |
| 43      | <i>N</i> <sup>2</sup> -(4-chloro-2-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.57(m, 1H), 7.07(m, 2H), 6.97(brs, 1H), 5.83(s, 1H), 3.49(m, 4H), 2.47(m, 2H), 1.73(m, 2H), 1.21(t, 6H), 0.99(t, 3H)                           |
| 44      | 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-4-methylbenzonitrile                                                                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.60(s, 1H), 7.39(d, 1H), 7.27(m, 1H), 6.76(d, 1H), 5.86(s, 1H), 3.50(m, 4H), 2.49(m, 2H), 1.74(m, 2H), 1.22(t, 6H), 0.99(t, 3H)                |
| 45      | 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile                                                                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.73(d, 1H), 7.50(m, 2H), 7.31(brs, 1H), 6.96(m, 1H), 5.87(s, 1H), 3.49(m, 4H), 2.50(m, 2H), 1.73(m, 2H), 1.20(t, 6H), 0.98(t, 3H)              |
| 46      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluoro-2-methylphenyl)-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.04(m, 1H), 6.86(m, 2H), 6.40(brs, 1H), 5.76(s, 1H), 3.44(m, 4H), 2.50(m, 2H), 2.30(s, 3H), 1.72(m, 2H), 1.16(t, 6H), 0.99(t, 3H)              |
| 47      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.41(d, 1H), 7.43(d, 1H), 7.26(t, 1H), 6.65(brs, 1H), 5.83(s, 1H), 3.45(m, 4H), 2.47(m, 2H), 2.41(s, 3H), 1.71(m, 2H), 1.17(t, 6H), 0.99(t, 3H) |
| 48      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-methylpyridin-2-yl)-6-propylpyrimidine-2,4-diamine    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.23(m, 1H), 7.49(d, 1H), 6.99(m, 1H), 6.86(brs, 1H), 5.79(s, 1H), 3.37(m, 4H), 2.45(m, 2H), 2.31(s, 3H), 1.70(m, 2H), 1.09(t, 6H), 0.96(t, 3H) |
| 49      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -[4-(methylthio)phenyl]-6-propylpyrimidine-2,4-diamine    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58(d, 2H), 7.26(d, 2H), 6.84(brs, 1H), 5.78(s, 1H), 3.50(m, 4H), 2.47-2.43(m, 2H), 2.46(s, 3H), 1.71(m, 2H), 1.20(t, 6H), 0.98(t, 3H)         |
| 50      | <i>N</i> <sup>2</sup> -(2,5-difluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.48(m, 1H), 7.08(brs, 1H), 6.96(m, 1H), 6.52(m, 1H), 5.84(s, 1H), 3.52(m, 4H), 2.48(m, 2H), 1.72(m, 2H), 1.24(t, 6H), 0.98(t, 3H)              |

[686] Table 1-6

[687]

| Example | Compound                                                                                                                                        | NMR Spectrum                                                                                                                                                                                                                 |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 51      | <i>N</i> <sup>2</sup> -(4-bromophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.53(d, 2H), 7.37(d, 2H), 6.82(brs, 1H), 5.79(s, 1H), 3.49(m, 4H), 2.45(m, 2H), 1.73(m, 2H), 1.20(t, 6H), 0.98(t, 3H)                                                       |
| 52      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(5-methylthiazol-2-yl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.06(s, 1H), 5.83(s, 1H), 3.57(brs, 4H), 2.51(m, 2H), 2.37(s, 3H), 1.74(m, 2H), 1.23(t, 6H), 0.98(t, 3H)                                                                    |
| 53      | <i>N</i> <sup>2</sup> -(5-chloropyridin-2-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.44(d, 1H), 8.19(s, 1H), 7.64(brs, 1H), 7.56(d, 1H), 5.85(s, 1H), 3.50(m, 4H), 2.49(m, 2H), 1.74(m, 2H), 1.20(t, 6H), 0.99(t, 3H)                                          |
| 54      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indol-6-yl)-6-propylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.69(brs, 1H), 8.63(s, 1H), 7.80(s, 1H), 7.49(d, 1H), 7.24(d, 1H), 7.18(m, 1H), 6.47(m, 1H), 5.67(s, 1H), 3.53(brs, 4H), 2.52(m, 2H), 1.80(m, 2H), 1.24(t, 6H), 0.98(t, 3H) |
| 55      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(6-methoxypyridin-3-yl)-6-propylpyrimidine-2,4-diamine           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.27(d, 1H), 8.01(m, 1H), 6.70(d, 1H), 6.64(brs, 1H), 5.77(s, 1H), 3.91(s, 3H), 3.47(m, 4H), 2.45(m, 2H), 1.70(m, 2H), 1.18(t, 6H), 0.98(t, 3H)                             |
| 56      | 4-chloro-2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile                                                                           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.98(s, 1H), 7.42(d, 1H), 7.35(brs, 1H), 6.93(d, 1H), 5.89(s, 1H), 3.50(m, 4H), 2.50(m, 2H), 1.75(m, 2H), 1.23(t, 6H), 0.99(t, 3H)                                          |
| 57      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(quinolin-8-yl)pyrimidine-2,4-diamine                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.45(s, 1H), 8.91(d, 1H), 8.80(d, 1H), 8.10(m, 1H), 7.51(t, 1H), 7.41(m, 1H), 7.31(d, 1H), 5.84(s, 1H), 3.57(m, 4H), 2.54(m, 2H), 1.78(m, 2H), 1.26(m, 6H), 1.01(t, 3H)     |
| 58      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-methylthiazol-2-yl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.58(brs, 1H), 6.35(s, 1H), 5.83(s, 1H), 3.56(m, 4H), 2.50(m, 2H), 2.33(s, 3H), 1.74(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                                                       |
| 59      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-nitropyridin-2-yl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.39(brs, 1H), 8.56(d, 1H), 8.43(d, 1H), 6.98(m, 1H), 5.96(s, 1H), 3.48(m, 4H), 2.52(m, 2H), 1.71(m, 2H), 1.17(m, 6H), 0.99(t, 3H)                                          |
| 60      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -[6-(trifluoromethyl)pyridin-3-yl]pyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.80(d, 1H), 8.39(m, 1H), 7.58(d, 1H), 7.45(brs, 1H), 5.89(s, 1H), 3.51(m, 4H), 1.49(m, 2H), 1.72(m, 2H), 1.24(m, 6H), 0.98(t, 3H)                                          |

[688] Table 1-7

[689]

| Example | Compound                                                                                                                                                     | NMR Spectrum                                                                                                                                                                                                               |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 61      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(quinolin-6-yl)pyrimidine-2,4-diamine                                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.74(m, 1H), 8.47(d, 1H), 7.99(m, 2H), 7.67(dd, 1H), 7.32(m, 1H), 7.16(brs, 1H), 5.85(s, 1H), 3.56(m, 4H), 2.50(m, 2H), 1.75(m, 2H), 1.27(m, 6H), 1.01(t, 3H)             |
| 62      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluoro-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.03(s, 1H), 7.39(m, 2H), 7.06(d, 1H), 5.82(s, 1H), 3.56(m, 4H), 2.47(m, 2H), 1.73(m, 2H), 1.24(m, 6H), 0.99(t, 3H)                                                       |
| 63      | <i>N</i> <sup>2</sup> -(2,3-dihydrobenzo[ <i>b</i> ][1,4]dioxin-6-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.39(s, 1H), 6.93(m, 1H), 6.76(m, 2H), 5.74(s, 1H), 4.23(m, 4H), 3.49(m, 4H), 2.44(m, 2H), 1.70(m, 2H), 1.20(m, 6H), 0.97(t, 3H)                                          |
| 64      | <i>N</i> <sup>2</sup> -(benzo[ <i>d</i> ][1,3]dioxol-5-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.50(s, 1H), 6.82(m, 2H), 6.70(m, 1H), 5.91(s, 2H), 5.74(s, 1H), 3.48(m, 4H), 2.44(m, 2H), 1.72(m, 2H), 1.20(m, 6H), 0.98(t, 3H)                                          |
| 65      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.91(s, 1H), 7.31(m, 1H), 7.18(m, 1H), 7.03(brs, 1H), 5.82(s, 1H), 3.54(m, 4H), 2.53(s, 3H), 2.64(m, 2H), 1.71(m, 2H), 1.24(m, 6H), 0.99(t, 3H)                           |
| 66      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-methylpyridin-3-yl)-6-propylpyrimidine-2,4-diamine                         | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.41(s, 1H), 8.14(d, 1H), 7.07(d, 1H), 6.47(brs, 1H), 5.81(s, 1H), 3.47(m, 4H), 2.46(m, 2H), 2.32(s, 3H), 1.69(m, 2H), 1.18(m, 6H), 0.99(t, 3H)                           |
| 67      | 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]picolinonitrile                                                                                              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.78(d, 1H), 8.36(dd, 1H), 7.58(d, 1H), 7.48(brs, 1H), 5.91(s, 1H), 3.51(m, 4H), 2.49(m, 2H), 1.71(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                                       |
| 68      | ethyl 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoate                                                                                               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.52(s, 1H), 7.68(d, 1H), 7.62(d, 1H), 7.31(t, 1H), 7.01(brs, 1H), 5.81(s, 1H), 4.38(m, 2H), 3.52(m, 4H), 2.47(m, 2H), 1.74(m, 2H), 1.38(t, 2H), 1.20(m, 6H), 0.98(t, 3H) |
| 69      | 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-(trifluoromethyl)benzonitrile                                                                             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.65(s, 1H), 7.66(d, 1H), 7.49(d, 1H), 5.90(s, 1H), 3.51(m, 4H), 2.48(m, 2H), 1.73(m, 2H), 1.24(m, 6H), 1.00(t, 3H)                                                       |
| 70      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(4 <i>H</i> -1,2,4-triazol-4-yl)pyrimidine-2,4-diamine               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) d 9.29(s, 1H), 6.02(s, 1H), 3.53(m, 4H), 2.57(m, 2H), 1.75(m, 2H), 1.23(m, 6H), 1.00(t, 3H)                                                                                 |

[690] Table 1-8

[691]

| Example | Compound                                                                                                                                                                       | NMR Spectrum                                                                                                                                                                                                     |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 71      | 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile hydrochloride                                                                                                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 13.69(s, 1H), 11.14(s, 1H), 8.38(s, 1H), 7.65(d, 1H), 7.43(m, 2H), 5.89(s, 1H), 3.74(m, 2H), 3.52(m, 2H), 2.66(m, 2H), 1.88(m, 2H), 1.35(m, 6H), 1.04(m, 3H)    |
| 72      | <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine hydrochloride                           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 11.35(brs, 1H), 8.88(s, 1H), 7.50(m, 2H), 5.89(s, 1H), 3.79(brs, 2H), 3.53(brs, 2H), 2.65(m, 2H), 1.87(m, 2H), 1.32(t, 6H), 1.04(t, 3H)                         |
| 73      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indazol-5-yl)-6-propylpyrimidine-2,4-diamine                                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.07(brs, 1H), 8.24(s, 1H), 7.98(s, 1H), 7.45(d, 1H), 7.38(d, 1H), 6.95(brs, 1H), 5.79(s, 1H), 3.51(m, 4H), 2.48(m, 2H), 1.75(m, 2H), 1.22(m, 6H), 1.00(t, 3H) |
| 74      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indazol-6-yl)-6-propylpyrimidine-2,4-diamine                                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.85(brs, 1H), 8.32(s, 1H), 7.96(s, 1H), 7.53(d, 1H), 7.08(brs, 1H), 7.03(d, 1H), 5.83(s, 1H), 3.55(m, 4H), 2.50(m, 2H), 1.76(m, 2H), 1.25(m, 6H), 1.00(t, 3H)  |
| 75      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -[2-(trifluoromethyl)-1 <i>H</i> -benzo[ <i>d</i> ]imidazol-5-yl]pyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.29(s, 1H), 7.59(m, 2H), 7.24(m, 1H), 7.01(m, 1H), 6.78(m, 1H), 5.34(s, 1H), 3.50(m, 4H), 2.48(m, 2H), 1.72(m, 2H), 1.22(m, 6H), 0.96(t, 3H)                   |
| 76      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indol-5-yl)-6-propylpyrimidine-2,4-diamine                                         | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.93(brs, 1H), 8.98(brs, 1H), 7.89(s, 1H), 7.30(m, 1H), 7.20(m, 2H), 6.42(s, 1H), 5.71(s, 1H), 3.49(m, 4H), 2.54(m, 2H), 1.78(m, 2H), 1.22(m, 6H), 0.98(t, 3H)  |
| 77      | <i>N</i> <sup>2</sup> -(benzo[ <i>d</i> ]thiazol-6-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine                                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.37(brs, 1H), 8.91(s, 1H), 8.42(s, 1H), 8.03(d, 1H), 7.73(d, 1H), 7.30(m, 1H), 5.86(s, 1H), 3.60(m, 4H), 2.62(m, 2H), 1.84(m, 2H), 1.27(m, 6H), 1.03(t, 3H)   |
| 78      | 7-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methyl-4 <i>H</i> -chromen-4-one                                                                                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.21(d, 1H), 8.03(d, 1H), 7.27(m, 2H), 6.09(s, 1H), 5.88(s, 1H), 3.55(m, 4H), 2.50(m, 2H), 2.35(s, 3H), 1.73(m, 2H), 1.25(m, 6H), 1.00(t, 3H)                   |
| 79      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-methylbenzo[ <i>d</i> ]thiazol-5-yl)-6-propylpyrimidine-2,4-diamine                          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.27(brs, 1H), 8.42(d, 1H), 7.71(d, 1H), 7.49(d, 1H), 5.84(s, 1H), 3.60(m, 4H), 2.82(s, 3H), 2.61(m, 2H), 1.84(m, 2H), 1.28(m, 6H), 1.03(t, 3H)                |
| 80      | 7-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-4-methyl-2 <i>H</i> -chromen-2-one                                                                                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.50(brs, 1H), 8.08(s, 1H), 7.51(d, 1H), 7.32(m, 1H), 6.17(s, 1H), 5.94(s, 1H), 3.70(m, 4H), 2.64(m, 2H), 2.42(s, 3H), 1.84(m, 2H), 1.34(m, 6H), 1.03(t, 3H)   |

[692] Table 1-9

[693]

| Example | Compound                                                                                                                                           | NMR Spectrum                                                                                                                                                                                                     |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 81      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indol-4-yl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.42(brs, 1H), 9.02(s, 1H), 7.83(d, 1H), 7.17(m, 1H), 7.10(m, 2H), 6.88(brs, 1H), 5.75(s, 1H), 3.51(m, 4H), 2.54(m, 2H), 1.78(m, 2H), 1.20(m, 6H), 0.97(t, 3H)  |
| 82      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-methoxy-5-nitrophenyl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.68(s, 1H), 7.85(m, 1H), 7.55(brs, 1H), 6.86(d, 1H), 5.84(s, 1H), 3.99(s, 3H), 3.60(brs, 4H), 2.49(m, 2H), 1.73(m, 2H), 1.26(m, 6H), 1.00(t, 3H)               |
| 83      | <i>N</i> <sup>2</sup> -(2,5-dimethoxyphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.85(b, 1H), 7.81(s, 1H), 6.81(m, 1H), 6.58(m, 1H), 5.80(s, 1H), 3.91(s, 3H), 3.76(s, 3H), 3.70-3.50(m, 4H), 2.68(m, 2H), 1.87(m, 2H), 1.27(m, 6H), 1.02(m, 3H) |
| 84      | 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-nitrophenol                                                                                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.00(s, 1H), 7.44(d, 1H), 7.07(d, 1H), 5.82(s, 1H), 3.57(m, 4H), 2.50(m, 2H), 1.75(m, 2H), 1.25(m, 6H), 1.00(t, 3H)                                             |
| 85      | <i>N</i> <sup>2</sup> -(2-amino-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.03(d, 1H), 7.60(d, 1H), 6.68(m, 1H), 6.38(brs, 2H), 5.81(s, 1H), 3.39(m, 4H), 2.52(m, 2H), 1.77(m, 2H), 1.12(m, 6H), 1.0(t, 3H)                               |
| 86      | <i>N</i> <sup>2</sup> -(4-amino-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.54(brs, 1H), 8.93(s, 1H), 7.37(d, 1H), 6.85(d, 1H), 6.16(s, 2H), 5.81(s, 1H), 3.73(brs, 4H), 2.62(m, 2H), 1.85(m, 2H), 1.31(m, 6H), 1.03(t, 3H)              |
| 87      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -[4-nitro-3-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.63(s, 1H), 8.00(d, 1H), 7.57(d, 1H), 7.40(brs, 1H), 5.91(s, 1H), 3.53(m, 4H), 2.49(m, 2H), 1.72(m, 2H), 1.23(m, 6H), 0.99(t, 3H)                              |
| 88      | benzyl 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methoxyphenylcarbamate                                                                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.43-7.34(m, 6H), 7.29(m, 1H), 6.78(d, 1H), 5.74(s, 1H), 5.19(s, 2H), 3.82(s, 3H), 3.49(m, 4H), 2.47(m, 2H), 1.73(m, 2H), 1.17(m, 6H), 0.99(t, 3H)              |
| 89      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> - <i>m</i> -tolylpyrimidine-2,4-diamine                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.40(brs, 1H), 7.56(s, 1H), 7.39(d, 1H), 7.19(m, 1H), 6.83(d, 1H), 5.78(s, 1H), 3.53(brs, 4H), 2.53(m, 2H), 2.33(s, 3H), 1.78(m, 2H), 1.25(m, 6H), 0.99(t, 3H)  |
| 90      | <i>N</i> <sup>2</sup> -(2,3-dihydro-1 <i>H</i> -inden-5-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.35(brs, 1H), 7.59(s, 1H), 7.33(m, 1H), 7.12(m, 2H), 5.76(s, 1H), 3.52(brs, 4H), 2.88(m, 4H), 2.52(m, 2H), 2.07(m, 2H), 1.78(m, 2H), 1.23(m, 6H), 1.00(t, 3H)  |

[694] Table 1-10

[695]

| Example | Compound                                                                                                                                           | NMR Spectrum                                                                                                                                                                                                                            |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 91      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(2-methyl-1 <i>H</i> -indol-5-yl)-6-propylpyrimidine-2,4-diamine    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.85(brs, 1H), 8.06(s, 1H), 7.84(s, 1H), 7.26(s, 2H), 6.13(s, 1H), 5.73(s, 1H), 3.51(m, 4H), 2.53(m, 2H), 2.42(s, 3H), 1.78(m, 2H), 1.21(m, 6H), 1.00(t, 3H)                           |
| 92      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -[4-fluoro-3-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.49(brs, 1H), 8.36(m, 1H), 7.45(m, 1H), 7.10(t, 1H), 5.83(s, 3H), 3.54(m, 4H), 2.52(m, 2H), 1.76(m, 2H), 1.23(m, 6H), 1.00(t, 3H)                                                     |
| 93      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-ethynylphenyl)-6-propylpyrimidine-2,4-diamine                    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.04(s, 1H), 7.92(brs, 1H), 7.45(d, 1H), 7.22(m, 1H), 7.11(m, 1H), 5.80(s, 1H), 3.52(m, 4H), 3.03(s, 1H), 2.50(m, 2H), 1.74(m, 2H), 1.24(m, 6H), 0.99(t, 3H)                           |
| 94      | <i>N</i> <sup>2</sup> -(3-amino-2-methylphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.46(d, 1H), 6.98(t, 1H), 6.45(d, 1H), 5.75(s, 1H), 3.58(brs, 2H), 3.43(m, 4H), 2.46(m, 2H), 2.12(s, 3H), 1.71(m, 2H), 1.14(m, 6H), 0.99(t, 3H)                                        |
| 95      | butyl 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-nitrobenzoate                                                                             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.76(s, 1H), 7.73(d, 1H), 7.31(d, 1H), 7.23(brs, 1H), 5.88(s, 1H), 4.28(m, 2H), 3.51(brs, 4H), 2.47(m, 2H), 1.73(m, 4H), 1.40(m, 2H), 1.23(m, 6H), 0.97(m, 6H)                         |
| 96      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1-methyl-1 <i>H</i> -indol-6-yl)-6-propylpyrimidine-2,4-diamine    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.91(brs, 1H), 7.91(s, 1H), 7.50(d, 1H), 7.15(d, 1H), 6.98(d, 1H), 6.42(d, 1H), 5.75(d, 1H), 3.74(s, 3H), 3.56(m, 4H), 2.55(m, 2H), 1.80(m, 2H), 1.25(m, 6H), 1.01(t, 3H)              |
| 97      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1-ethyl-1 <i>H</i> -indol-6-yl)-6-propylpyrimidine-2,4-diamine     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.21(s, 1H), 7.46(d, 1H), 7.01(m, 1H), 6.79(brs, 1H), 6.90(d, 1H), 6.41(d, 1H), 5.77(s, 1H), 4.15(m, 2H), 3.56(m, 4H), 2.47(m, 2H), 1.76(m, 2H), 1.46(t, 3H), 1.23(m, 6H), 1.00(t, 3H) |
| 98      | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indol-7-yl)-6-propylpyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.60(brs, 1H), 10.44(brs, 1H), 7.74(d, 1H), 7.40(d, 1H), 7.04(t, 1H), 6.51(m, 1H), 5.75(s, 1H), 3.48(m, 4H), 2.55(m, 2H), 1.79(m, 2H), 1.21(m, 6H), 0.98(t, 3H)                       |
| 99      | <i>N</i> <sup>2</sup> -(1 <i>H</i> -benzo[d]imidazol-5-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.33(brs, 1H), 8.25(brs, 1H), 8.12(s, 1H), 7.53(d, 1H), 7.26(m, 1H), 5.75(s, 1H), 3.45(m, 4H), 2.49(m, 2H), 1.73(m, 2H), 1.15(m, 6H), 0.96(t, 3H)                                      |
| 100     | <i>N</i> <sup>2</sup> -(2,3-dimethylbenzofuran-5-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine        | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.81(brs, 1H), 7.77(s, 1H), 7.34-7.25(m, 2H), 5.78(s, 1H), 3.56(m, 4H), 2.60(m, 2H), 2.36(s, 3H), 2.11(s, 3H), 1.86(m, 2H), 1.25(m, 6H), 1.02(t, 3H)                                   |

[696] Table 1-11

[697]

| Example | Compound                                                                                                                                                                 | NMR Spectrum                                                                                                                                                                                                                                             |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 101     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1 <i>H</i> -indol-6-yl)-6-propylpyrimidine-2,4-diamine hydrochloride                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 13.13(brs, 1H), 10.23(s, 1H), 9.00(brs, 1H), 7.74(s, 1H), 7.50(d, 1H), 7.30(m, 2H), 7.19(s, 1H), 6.46(s, 1H), 5.69(s, 1H), 3.67(m, 2H), 3.40(m, 2H), 2.53(m, 2H), 1.81(m, 4H), 1.26(t, 6H), 0.99(t, 3H) |
| 102     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1-isobutyl-1 <i>H</i> -indol-6-yl)-6-propylpyrimidine-2,4-diamine                        | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.16(s, 1H), 7.46(d, 1H), 6.97(m, 1H), 6.91(m, 2H), 6.40(s, 1H), 5.77(s, 1H), 3.87(d, 2H), 3.54(m, 4H), 2.47(m, 2H), 2.24(m, 1H), 1.76(m, 2H), 1.23(m, 6H), 1.01(m, 3H), 0.92(m, 6H)                    |
| 103     | <i>N</i> <sup>2</sup> -(1 <i>H</i> -benzo[ <i>d</i> ]imidazol-5-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine hydrochloride | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.42(s, 1H), 8.25(s, 1H), 7.88(d, 1H), 7.75(dd, 1H), 6.42(s, 1H), 3.74(m, 2H), 3.63(m, 2H), 2.68(m, 2H), 1.80(m, 2H), 1.27(m, 6H), 1.06(t, 3H)                                                          |
| 104     | <i>N</i> <sup>2</sup> -(3-amino-4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine                                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.31(dd, 1H), 6.88(m, 1H), 6.83(m, 1H), 6.76(brs, 1H), 5.77(s, 1H), 3.66(brs, 2H), 3.49(m, 4H), 2.44(m, 2H), 1.70(m, 2H), 1.21(m, 6H), 0.98(t, 3H)                                                      |
| 105     | <i>N</i> <sup>2</sup> -(3-amino-4-methylphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine                                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.22(s, 1H), 6.93(d, 1H), 6.86(d, 1H), 6.77(brs, 1H), 5.75(s, 1H), 3.54(brs, 2H), 3.50(m, 4H), 2.44(m, 2H), 2.12(s, 3H), 1.70(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                                          |
| 106     | <i>N</i> <sup>4</sup> -[4-(diethylamino)-6-propylpyrimidin-2-yl]benzene-1,2,4-triamine                                                                                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.17(s, 1H), 6.87(d, 1H), 6.63(d, 1H), 5.73(s, 1H), 3.50(m, 4H), 3.44(brs, 2H), 3.17(brs, 2H), 2.45(m, 2H), 1.72(m, 2H), 1.21(m, 6H), 0.98(t, 3H)                                                       |
| 107     | <i>N</i> <sup>2</sup> -(3-amino-4-methoxyphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine                                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.12(s, 1H), 6.95(d, 1H), 6.70(d, 1H), 5.73(s, 1H), 3.83(s, 3H), 3.51(m, 4H), 2.50(m, 2H), 1.76(m, 2H), 1.23(m, 6H), 0.99(t, 3H)                                                                        |
| 108     | 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoic acid hydrochloride                                                                                               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 13.59(brs, 1H), 10.77(s, 1H), 8.76(s, 1H), 7.85(d, 1H), 7.67(d, 1H), 7.42(t, 1H), 5.85(s, 1H), 3.80(m, 2H), 3.49(m, 2H), 2.66(t, 2H), 1.87(m, 2H), 1.30(m, 6H), 1.04(t, 3H)                             |
| 109     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine                                           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.97(t, 2H), 5.78(s, 1H), 3.60-3.40(m, 4H), 2.46(t, 2H), 1.71(q, 2H), 1.20(t, 6H), 0.98(t, 3H)                                                                                        |
| 110     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -dimethyl-6-propylpyrimidine-2,4-diamine                                          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.98(t, 2H), 5.82(s, 1H), 3.09(s, 6H), 2.47(t, 2H), 1.72(q, 2H), 0.98(t, 3H)                                                                                                          |

[698] Table 1-12

[699]

| Example | Compound                                                                                                                                      | NMR Spectrum                                                                                                                                                                                                    |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 111     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -dipropyl-6-propylpyrimidine-2,4-diamine               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.96(t, 2H), 5.75(s, 1H), 3.50-3.30(m, 4H), 2.44(t, 2H), 1.80-1.50(m, 6H), 1.05-0.90(m, 9H)                                                  |
| 112     | <i>N</i> <sup>4</sup> -butyl- <i>N</i> <sup>4</sup> -ethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.96(t, 2H), 5.76(s, 1H), 3.60-3.40(m, 4H), 2.45(t, 2H), 1.80-1.50(m, 4H), 1.37(q, 2H), 1.18(t, 3H), 1.05-0.90(m, 6H)                        |
| 113     | 2-[[2-(4-fluorophenylamino)-6-propylpyrimidin-4-yl](methyl)amino]ethanol                                                                      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 7.00(t, 2H), 6.72(brs, 1H), 5.85(s, 1H), 3.84(t, 2H), 3.74(t, 2H), 3.09(s, 3H), 2.48(t, 2H), 1.73(q, 2H), 0.99(t, 3H)                        |
| 114     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -bis(2-methoxyethyl)-6-propylpyrimidine-2,4-diamine    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.97(t, 2H), 6.82(brs, 1H), 5.87(s, 1H), 3.70(brs, 4H), 3.57(t, 4H), 3.35(s, 6H), 2.45(t, 2H), 1.71(q, 2H), 0.98(t, 3H)                      |
| 115     | <i>N</i> <sup>4</sup> -ethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> -(2-methoxyethyl)-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.96(t, 2H), 6.83(brs, 1H), 5.82(s, 1H), 3.70-3.60(m, 2H), 3.60-3.40(m, 4H), 3.36(s, 3H), 2.46(t, 2H), 1.71(q, 2H), 1.18(t, 3H), 0.88(t, 3H) |
| 116     | 2,2'-[2-(4-fluorophenylamino)-6-propylpyrimidin-4-ylazanediy]diethanol hydrochloride                                                          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.55-7.45(m, 2H), 6.99(t, 2H), 6.11(s, 1H), 4.00-3.50(m, 8H), 2.41(t, 2H), 1.71(q, 2H), 0.93(t, 3H)                                                            |
| 117     | 6-butyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)pyrimidine-2,4-diamine                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.50(m, 2H), 6.96(t, 2H), 6.77(brs, 1H), 5.78(s, 1H), 3.48(q, 4H), 2.47(t, 2H), 1.66(q, 2H), 1.40(q, 2H), 1.19(t, 6H), 0.94(t, 3H)                        |
| 118     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine hydrochloride  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.55(brs, 1H), 7.65-7.55(m, 2H), 7.02(t, 2H), 5.81(s, 1H), 3.65(q, 2H), 3.50-3.40(m, 2H), 2.64(t, 2H), 1.87(q, 2H), 1.30-1.15(m, 6H), 1.03(t, 3H)             |
| 119     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> ,6-triethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)pyrimidine-2,4-diamine                      | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 7.43(m, 2H), 7.20(t, 2H), 6.38(s, 1H), 3.71(m, 4H), 2.61(m, 2H), 1.74(m, 2H), 1.65(m, 4H), 1.25(t, 3H)                                                         |
| 120     | 4-(4-diethylamino-6-propylpyrimidin-2-ylamino)phthalonitrile                                                                                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.67(s, 1H), 7.63(d, 1H), 7.55(d, 1H), 7.45(brs, NH), 5.92(s, 1H), 3.53(m, 4H), 2.49(t, 2H), 1.73(m, 2H), 1.25(m, 6H), 0.99(t, 3H)                             |

[700] Table 1-13

[701]

| Example | Compound                                                                                                                                 | NMR Spectrum                                                                                                                                                                                                               |
|---------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 121     | 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-2-fluorobenzonitrile                                                                      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.35(m, 1H), 7.52(m, 1H), 7.10(m, 1H), 5.85(s, 1H), 3.54(m, 4H), 2.53(m, 2H), 1.74(m, 2H), 1.26(m, 6H), 0.99(t, 3H)                                                       |
| 122     | <i>N</i> -[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenyl]acetamide                                                                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.65(brs, NH), 8.32(s, 1H), 7.84(s, NH), 7.34(m, 1H), 7.22(m, 1H), 7.14(m, 1H), 5.74(s, 1H), 3.57(m, 4H), 2.51(t, 2H), 2.20(s, 3H), 1.77(q, 2H), 1.23(t, 6H), 1.00(t, 3H) |
| 123     | 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-2-methylbenzonitrile                                                                      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.26(s, 1H), 7.56(d, 1H), 7.31(d, 1H), 6.11(s, 1H), 3.58(m, 4H), 2.53(m, 2H), 2.46(s, 3H), 1.73(m, 2H), 1.22(m, 6H), 1.01(t, 3H)                                          |
| 124     | <i>N</i> -[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-methoxyphenyl]acetamide                                                      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.70(s, 1H), 6.90(m, 2H), 5.94(s, 1H), 3.91(s, 3H), 3.58(m, 4H), 2.45(m, 2H), 2.06(s, 3H), 1.70(m, 2H), 1.20(m, 6H), 0.98(m, 3H)                                          |
| 125     | 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methylisoindoline-1,3-dione                                                           | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 8.59(s, 1H), 7.75(d, 1H), 7.67(d, 1H), 6.04(s, 1H), 3.59(m, 4H), 3.09(s, 3H), 2.50(t, 2H), 1.73(m, 2H), 1.25(t, 5H), 0.99(t, 3H)                                          |
| 126     | <i>N</i> -[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenyl]methanesulfonamide                                                       | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 7.62(s, 1H), 7.38(d, 1H), 7.27(t, 1H), 6.90(d, 1H), 6.12(s, 1H), 3.62(m, 4H), 3.00(s, 3H), 2.54(t, 2H), 1.75(m, 2H), 1.21(t, 6H), 1.01(t, 3H)                             |
| 127     | 7-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-trifluoromethyl-2 <i>H</i> -chromen-2-one                                               | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 8.32(s, 1H), 7.58(d, 1H), 7.45(d, 1H), 6.63(s, 1H), 6.08(s, 1H), 3.61(m, 4H), 3.52(t, 2H), 1.74(m, 2H), 1.26(t, 6H), 1.00(t, 3H)                                          |
| 128     | 7-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-methylquinolin-2(1 <i>H</i> )-one                                                       | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 7.76(s, 1H), 7.66(d, 1H), 7.62(d, 1H), 6.32(s, 1H), 6.00(s, 1H), 3.59(m, 4H), 2.50(m, 2H+3H), 1.74(m, 2H), 1.21(m, 6H), 1.00(t, 3H)                                       |
| 129     | <i>N</i> <sup>2</sup> -(3-difluoromethoxyphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.6(brs, NH), 7.81(s, 1H), 7.28(m, 2H), 6.85(d, 1H), 6.50(dd, 1H), 5.82(s, 1H), 3.60(m, 4H), 2.51(t, 2H), 1.83(m, 2H), 1.28(t, 6H), 1.02(t, 3H)                          |
| 130     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> -(3-trifluoromethoxyphenyl)pyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.05(s, 1H), 7.91(brs, NH), 7.23-7.19(m, 2H), 6.82(d, 1H), 5.81(s, 1H), 3.54(m, 4H), 2.49(t, 2H), 1.72(m, 2H), 1.23(t, 6H), 0.99(t, 3H)                                   |

[702] Table 1-14

[703]

| Example | Compound                                                                                                                                        | NMR Spectrum                                                                                                                                                                                                                 |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 131     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propyl- <i>N</i> <sup>2</sup> - <i>p</i> -tolylpyrimidine-2,4-diamine                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.30(brs, NH), 7.51(d, 2H), 7.10(d, 2H), 5.76(s, 1H), 3.56(m, 4H), 2.58(t, 2H), 2.32(s, 3H), 1.82(m, 2H), 1.26(t, 6H), 1.02(t, 3H)                                         |
| 132     | 4-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenol                                                                                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.29(brs, NH), 7.21(d, 2H), 6.85(d, 2H), 5.74(s, 1H), 3.47(m, 4H), 2.55(t, 2H), 1.79(m, 2H), 1.18(m, 6H), 0.98(t, 3H)                                                       |
| 133     | <i>N</i> <sup>2</sup> -(4-amino-3-trifluoromethylphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.24(brs, NH), 8.07(s, 1H), 7.30(m, 1H), 6.71(d, 1H), 5.76(s, 1H), 4.10(s, 2H), 3.54(m, 4H), 2.59(m, 2H), 1.82(m, 2H), 1.24(m, 6H), 1.01(m, 3H)                            |
| 134     | butyl 2-amino-5-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzoate                                                                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.83(brs, NH), 8.12(s, 1H), 7.48(d, 1H), 6.65(d, 1H), 5.73(s, 1H), 5.57(brs, NH), 4.27(t, 2H), 3.51(m, 4H), 2.52(t, 2H), 1.73(m, 4H), 1.44(m, 2H), 1.17(m, 6H), 0.95(m, 6H) |
| 135     | 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzo[d]oxazol-2(3 <i>H</i> )-one                                                                 | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.23(brs, NH), 7.76(s, 1H), 7.10-7.02(m, 2H), 5.82(s, 1H), 3.57(m, 4H), 2.63(m, 2H), 1.86(m, 2H), 1.26(m, 6H), 1.02(m, 3H)                                                 |
| 136     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-methyl-4-nitrophenyl)-6-propylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.09(d, 1H), 7.76(brs, NH), 7.72(s, 1H), 7.56(d, 1H), 5.88(s, 1H), 3.55(m, 4H), 2.65(s, 3H), 2.51(t, 2H), 1.74(m, 2H), 1.25(m, 6H), 0.98(t, 3H)                             |
| 137     | 1-[6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-1-yl]ethanone                                                                          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.69(brs, NH), 8.75(s, 1H), 7.09(m, 2H), 5.79(s, 1H), 4.06(m, 2H), 3.64(m, 4H), 3.14(t, 2H), 2.58(t, 2H), 2.20(s, 3H), 1.82(m, 2H), 1.22(m, 6H), 1.01(t, 3H)                |
| 138     | 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-1 <i>H</i> -benzo[d]imidazol-2(3 <i>H</i> )-one                                                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.34(s, 1H), 7.07(m, 2H), 6.23(s, 1H), 3.62(m, 4H), 2.58(t, 2H), 1.75(m, 2H), 1.22(m, 6H), 1.03(t, 3H)                                                                      |
| 139     | <i>N</i> <sup>2</sup> -(3-dimethylaminophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.22(s, 1H), 7.13(m, 2H), 6.90(d, 1H), 6.40(d, 1H), 5.76(s, 1H), 3.53(m, 4H), 2.95(s, 6H), 2.46(t, 2H), 1.72(m, 2H), 1.20(m, 6H), 0.96(t, 3H)                               |
| 140     | 2-amino-5-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzonitrile                                                                              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.25(brs, NH), 7.99(s, 1H), 7.35(d, 1H), 6.72(d, 1H), 5.79(s, 1H), 4.36(s, NH), 3.56(m, 4H), 2.59(t, 2H), 1.82(m, 2H), 1.28(m, 6H), 1.02(t, 3H)                            |

[704] Table 1-15

[705]

| Example | Compound                                                                                                                                      | NMR Spectrum                                                                                                                                                                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 141     | 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-2-one hydrochloride                                                                     | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 7.26(d, 1H), 7.19(s, 1H), 7.06(d, 1H), 6.30(s, 1H), 3.64(m, 4H), 3.52(s, 2H), 3.61(m, 2H), 1.76(m, 2H), 1.24(t, 6H), 1.04(t, 3H)                                          |
| 142     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(indolin-6-yl)-6-propylpyrimidine-2,4-diamine                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.21(s, 1H), 6.98(d, 1H), 6.89(s, 1H), 6.82(d, 1H), 5.74(s, 1H), 3.72(brs, NH), 3.52(m, 6H), 2.97(t, 2H), 2.44(t, 2H), 1.70(m, 2H), 1.20(m, 6H), 0.98(t, 3H)              |
| 143     | 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)-1,1-dimethylindolinium iodide                                                                  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.53(s, 1H), 7.38(d, 1H), 7.29(d, 2H), 5.87(s, 1H), 4.64(t, 2H), 3.82(s, 6H), 3.51(m, 4H), 3.39(t, 2H), 2.48(t, 2H), 1.72(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                |
| 144     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1-methylindolin-6-yl)-6-propylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.67(brs, NH), 7.15(s, 1H), 6.95(d, 1H), 6.69(d, 1H), 5.75(s, 1H), 3.54(m, 4H), 3.30(t, 2H), 2.89(t, 2H), 2.76(s, 3H), 2.48(t, 2H), 1.73(m, 2H), 1.22(t, 6H), 0.99(t, 3H) |
| 145     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(1-methylsulfonylindolin-6-yl)-6-propylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 10.58(brs, NH), 8.10(s, 1H), 7.10(m, 2H), 5.76(s, 1H), 3.99(t, 2H), 3.59(m, 4H), 3.08(t, 2H), 2.85(s, 3H), 2.56(t, 2H), 1.77(m, 2H), 1.23(t, 6H), 1.01(t, 3H)             |
| 146     | <i>N</i> <sup>2</sup> -(4-amino-3-methylphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine        | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.28(brs, NH), 7.33(s, 1H), 7.25(d, 1H), 6.61(d, 1H), 5.73(s, 1H), 3.52(m, 4H+NH), 2.55(t, 2H), 2.15(s, 3H), 1.83(m, 2H), 1.23(m, 6H), 0.99(t, 3H)                        |
| 147     | <i>N</i> <sup>2</sup> -(4-dimethylamino-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-propylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CD <sub>3</sub> OD) δ 8.58(s, 1H), 7.45(d, 1H), 7.17(d, 1H), 5.95(s, 1H), 3.57(m, 4H), 2.78(s, 6H), 2.46(t, 2H), 1.73(m, 2H), 1.20(m, 6H), 0.98(t, 3H)                                          |
| 148     | <i>N</i> <sup>4</sup> -(4-diethylamino-6-propylpyrimidin-2-yl)- <i>N</i> <sup>1</sup> , <i>N</i> <sup>1</sup> -dimethylbenzene-1,2,4-triamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.22(s, 1H), 6.91(m, 2H+NH), 5.74(s, 1H), 3.97(brs, NH), 3.52(m, 4H), 2.44(t, 2H), 1.70(m, 2H), 1.22(m, 6H), 0.98(t, 3H)                                                  |
| 149     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-methylpyrimidine-2,4-diamine                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58-7.53(m, 2H), 7.00-6.94(m, 2H), 6.80(s, 1H), 5.79(s, 1H), 3.50-3.47(m, 4H), 2.25(s, 3H), 1.18(t, 6H)                                                                  |
| 150     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> ,6-trimethylpyrimidine-2,4-diamine                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58-7.55(m, 2H), 7.00-6.96(m, 2H), 6.83(brs, 1H), 5.83(s, 1H), 3.08(s, 6H), 2.26(s, 3H)                                                                                  |

[706] Table 1-16

[707]

| Example | Compound                                                                                                                                             | NMR Spectrum                                                                                                                                                                                  |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 151     | <i>N</i> <sup>4</sup> -butyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> ,6-dimethylpyrimidine-2,4-diamine                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58-7.54(m, 2H), 7.00-6.94(m, 3H), 5.79(s, 1H), 3.48(brs, 2H), 3.03(s, 3H), 2.25(s, 3H), 1.60-1.54(m, 2H), 1.38-1.33(m, 2H), 0.96(t, 3H)    |
| 152     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diisobutyl-6-methylpyrimidine-2,4-diamine                    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.57-7.53(m, 2H), 6.99-6.93(m, 3H), 5.77(s, 1H), 3.28(brs, 4H), 2.23(s, 3H), 2.17-2.08(m, 2H), 0.88(d, 12H)                                  |
| 153     | <i>N</i> <sup>4</sup> -butyl- <i>N</i> <sup>4</sup> -ethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-methylpyrimidine-2,4-diamine                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.57-7.53(m, 2H), 6.98-6.91(m, 3H), 5.77(s, 1H), 3.47-3.41(m, 4H), 2.24(s, 3H), 1.63-1.56(m, 2H), 1.39-1.34(m, 2H), 1.18(t, 3H), 0.96(t, 3H) |
| 154     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-methyl- <i>N</i> <sup>2</sup> , <i>N</i> <sup>2</sup> -dipropylpyrimidine-2,4-diamine                      | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.57-7.53(m, 2H), 7.01(brs, 1H), 6.99-6.94(m, 2H), 5.76(s, 1H), 3.36(brs, 4H), 2.24(s, 3H), 1.68-1.58(m, 4H), 0.94(t, 6H)                    |
| 155     | <i>N</i> <sup>2</sup> -(4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diisopropyl-6-methylpyrimidine-2,4-diamine                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.57-7.53(m, 2H), 7.01-6.95(m, 2H), 6.81(brs, 1H), 5.69(s, 1H), 4.55(brs, 1H), 3.94(brs, 1H), 2.24(s, 3H), 1.22(d, 12H)                      |
| 156     | ( <i>E</i> )- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-styrylpyrimidine-2,4-diamine         | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.70(d, 1H), 7.63-7.56(m, 4H), 7.39-7.26(m, 3H), 7.00(dd, 2H), 6.89(d, 1H), 6.79(brs, 1H), 5.97(s, 1H), 3.53(d, 4H), 1.23(t, 6H)             |
| 157     | ( <i>E</i> )- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-nitrophenyl)-6-styrylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.37(s, 1H), 7.86-7.78(m, 2H), 7.62-7.26(m, 8H), 6.91(d, 1H), 6.03(s, 1H), 3.58(brs, 4H), 1.27(t, 6H)                                        |
| 158     | ( <i>E</i> )- <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-styrylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.04(s, 1H), 7.89(brs, 1H), 7.80(d, 1H), 7.59-7.56(m, 2H), 7.39-7.26(m, 5H), 6.87(d, 1H), 6.02(s, 1H), 3.55(brs, 4H), 1.27(t, 6H)            |
| 159     | ( <i>E</i> )-3-[4-(diethylamino)-6-styrylpyrimidin-2-ylamino]benzonitrile                                                                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.38(s, 1H), 8.06(d, 1H), 7.67-7.58(m, 3H), 7.44-7.27(m, 5H), 6.79(d, 1H), 6.08(s, 1H), 3.60(brs, 4H), 1.34(t, 6H)                           |
| 160     | 6-allyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)pyrimidine-2,4-diamine                       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58-7.54(m, 2H), 6.99-6.94 (m, 2H), 6.85(brs, 1H), 6.06-5.99(m, 1H), 5.79(s, 1H), 5.21-5.14(m, 2H), 3.48(m, 4H), 3.26(d, 2H), 1.19(t, 6H)   |

[708] Table 1-17

[709]

| Example | Compound                                                                                                                                   | NMR Spectrum                                                                                                                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 161     | 3-[4-allyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile                                                                                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.45(s, 1H), 7.47(dd, 1H), 7.31(dd, 1H), 7.20(d, 2H), 6.05-5.95(m, 1H), 5.86(s, 1H), 5.22-5.15(m, 2H), 3.52(brs, 4H), 3.28(d, 2H), 1.24(t, 6H)               |
| 162     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-isobutylpyrimidine-2,4-diamine           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58-7.55(m, 2H), 6.99-6.94(m, 2H), 6.87(brs, 1H), 5.75(s, 1H), 3.51-3.46(m, 4H), 2.34(d, 2H), 2.13-2.06(m, 1H), 1.20(t, 6H), 0.96(d, 6H)                    |
| 163     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluoro-3-nitrophenyl)-6-isobutylpyrimidine-2,4-diamine   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.02(dd, 1H), 7.40-7.36(m, 1H), 7.17-7.12(m, 2H), 5.82(s, 1H), 3.53(brs, 4H), 2.35(d, 2H), 2.13-2.05(m, 1H), 1.23(t, 6H), 0.96(d, 6H)                        |
| 164     | 3-(4-diethylamino-6-isobutylpyrimidin-2-ylamino)benzonitrile                                                                               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.45(dd, 1H), 7.49-7.46(m, 1H), 7.32(dd, 1H), 7.20(dd, 1H), 7.02(brs, 1H), 5.81(s, 1H), 3.51(d, 4H), 2.36(d, 2H), 2.11-2.06(m, 1H), 1.25(t, 6H), 0.96(d, 6H) |
| 165     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.19(d, 1H), 7.91(brs, 1H), 7.81(d, 1H), 7.50(d, 1H), 7.39(m, 1H), 7.30-7.17(m, 5H), 5.75(s, 1H), 3.54(brs, 4H), 3.06(dd, 2H), 2.84(dd, 2H), 1.21(t, 6H)     |
| 166     | <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-phenethylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.92(d, 1H), 7.38-7.17(m, 8H), 5.76(s, 1H), 3.48(brs, 4H), 3.01(dd, 2H), 2.80(dd, 2H), 1.18(t, 6H)                                                           |
| 167     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluoro-3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine  | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.02(dd, 1H), 7.78(brs, 1H), 7.45-7.42(m, 1H), 7.30-7.13(m, 6H), 5.75(s, 1H), 3.51(brs, 4H), 3.04(dd, 2H), 2.82(dd, 2H), 1.19(t, 6H)                         |
| 168     | <i>N</i> <sup>2</sup> -(3-chloro-4-methylphenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-phenethylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.14(brs, 1H), 8.05(s, 1H), 7.30-7.10(m, 7 H), 5.66(s, 1H), 3.48(brs, 4H), 3.06(dd, 2H), 2.84(dd, 2H), 2.32(s, 3H), 1.19(t, 6H)                              |
| 169     | 3-[4-(diethylamino)-6-ethylpyrimidin-2-ylamino]benzonitrile                                                                                | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.45(d, 1H), 7.49(d, 1H), 7.32(m, 1H), 7.20(d, 1H), 7.10(brs, 1H), 5.85(d, 1H), 3.53(m, 4H), 2.54(m, 2H), 1.29-1.23 (m, 9H)                                  |
| 170     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> ,6-triethyl- <i>N</i> <sup>2</sup> -(3-nitrophenyl)pyrimidine-2,4-diamine                    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.19(d, 1H), 8.09(brs, 1H), 7.81(dd, 1H), 7.50(d, 1H), 7.39(dd, 1H), 5.86(s, 1H), 3.59(brs, 4H), 2.58(m, 1H), 1.32-1.25(m, 9H)                               |

[710] Table 1-18

[711]

| Example | Compound                                                                                                                                  | NMR Spectrum                                                                                                                                                                                                                  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 171     | <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> ,6-triethylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.89(d, 1H), 7.39-7.32(m, 2H), 7.17-7.12(m, 2H), 5.87(s, 1H), 3.54(brs, 4H), 2.54(m, 2H), 1.29-1.23(m, 9H)                                                                   |
| 172     | 3-[4-(diethylamino)-6-isopropylpyrimidin-2-ylamino]benzonitrile                                                                           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.44(d, 1H), 8.01(brs, 1H), 7.54(d, 1H), 7.34(dd, 1H), 7.24(m, 1H), 5.86(s, 1H), 3.55(m, 4H), 2.82-2.75(m, 1H), 1.31-1.25(m, 12H)                                            |
| 173     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-isopropyl- <i>N</i> <sup>2</sup> -(3-nitrophenyl)pyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.45(brs, 1H), 9.16(dd, 1H), 7.86(dd, 1H), 7.59(dd, 1H), 7.43(dd, 1H), 5.90(s, 1H), 3.66(dd, 4H), 2.90-2.83(m, 1H), 1.40-1.28(m, 12H)                                        |
| 174     | <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-isopropylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.44(brs, 1H), 8.89(s, 1H), 7.42(s, 2H), 5.88(s, 1H), 3.58(brs, 4H), 2.87-2.81(m, 1H), 1.35-1.25(m, 12H)                                                                     |
| 175     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-isopropylpyrimidine-2,4-diamine         | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.57(m, 2H), 6.99-6.95(m, 2H), 5.79(s, 1H), 3.53-3.48(m, 4H), 2.79-2.72(m, 1H), 1.28(d, 6H), 1.21(t, 6H)                                                                |
| 176     | 3-[4-butyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile                                                                               | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.45(s, 1H), 7.48(d, 1H), 7.32(dd, 1H), 7.20(d, 1H), 7.06(brs, 1H), 5.84(s, 1H), 3.52(m, 4H), 2.50(dd, 2H), 1.71-1.64(m, 2H), 1.43-1.37(m, 2H), 1.23(m, 6H), 0.95(t, 3H)     |
| 177     | 6-butyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-nitrophenyl)pyrimidine-2,4-diamine             | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.19(s, 1H), 7.77(dd, 1H), 7.45(dd, 1H), 7.37(dd, 1H), 7.17(brs, 1H), 5.85(s, 1H), 3.56(brs, 4H), 2.50(dd, 2H), 1.72-1.65(m, 2H), 1.44-1.36(m, 2H), 1.25(m, 6H), 0.95(t, 3H) |
| 178     | 6-butyl- <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethylpyrimidine-2,4-diamine    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.91(d, 1H), 7.36(d, 1H), 7.28(dd, 1H), 7.13(brs, 1H), 5.85(s, 1H), 3.51(brs, 4H), 2.49(dd, 2H), 1.71-1.63(m, 2H), 1.42-1.37(m, 2H), 1.22(m, 6H), 0.95(t, 3H)                |
| 179     | 3-[4-benzyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile                                                                              | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.41(s, 1H), 7.46-7.19(m, 9H), 5.80(s, 1H), 3.84(s, 2H), 3.47(brs, 4H), 1.20(t, 6H)                                                                                          |
| 180     | 6-benzyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(3-nitrophenyl)pyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 9.13(d, 1H), 7.79(d, 1H), 7.78(brs, 1H), 7.46(dd, 1H), 7.38-7.24(m, 7 H), 5.80(s, 1H), 3.86(s, 2H), 3.53(brs, 4H), 1.21(t, 6H)                                               |

[712] Table 1-19

[713]

| Example | Compound                                                                                                                                  | NMR Spectrum                                                                                                                                                                                                   |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 181     | 6-benzyl- <i>N</i> <sup>2</sup> -(4-chloro-3-nitrophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethylpyrimidine-2,4-diamine   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.84(d, 1H), 7.34-7.21(m, 8H), 5.82(s, 1H), 3.84(s, 2H), 3.47(brs, 4H), 1.18(t, 6H)                                                                           |
| 182     | 6-benzyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)pyrimidine-2,4-diamine           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.55-7.51(m, 2H), 7.31-7.22(m, 5H), 6.97-6.93(m, 2H), 6.87(brs, 1H), 5.72(s, 1H), 3.43(brs, 4H), 1.14(t, 6H)                                                  |
| 183     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-pentylpyrimidine-2,4-diamine            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.58-7.55(m, 2H), 6.99-6.94(m, 2H), 6.75(brs, 1H), 5.77(s, 1H), 3.51-3.46(m, 4H), 2.46(dd, 2H), 1.70-1.66(m, 2H), 1.37-1.33(m, 2H), 1.19(dd, 6H), 0.91(t, 3H) |
| 184     | <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)-6-phenethylpyrimidine-2,4-diamine         | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.59-7.56(m, 3H), 7.30-7.21(m, 5H), 6.99(dd, 2H), 5.67(s, 1H), 3.45(m, 4H), 3.05(dd, 2H), 2.82(dd, 2H), 1.16(t, 6H)                                           |
| 185     | <i>N</i> <sup>2</sup> -(3-aminophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-phenethylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.67(brs, 1H), 7.30-7.18(m, 6H), 7.06(dd, 1H), 6.98(d, 1H), 6.34(d, 1H), 5.66(s, 1H), 3.62(brs, 2H), 3.48(m, 4H), 3.05(dd, 2H), 2.82(dd, 2H), 1.18(t, 6H)     |
| 186     | <i>N</i> <sup>2</sup> -(3-amino-4-chlorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-phenethylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.34-7.17(m, 7 H), 7.11(d, 1H), 6.91-6.86(m, 1H), 5.69(s, 1H), 3.96(brs, 2H), 3.46(brs, 4H), 3.01(dd, 2H), 2.78(dd, 2H), 1.17(t, 6H)                          |
| 187     | 3-[4-(diethylamino)-6-phenethylpyrimidin-2-ylamino]benzonitrile                                                                           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.45(s, 1H), 7.51(d, 1H), 7.35-7.17(m, 7 H), 7.07(brs, 1H), 5.75(s, 1H), 3.49(brs, 4H), 3.02(dd, 2H), 2.81(dd, 2H), 1.20(t, 6H)                               |
| 188     | <i>N</i> <sup>2</sup> -(3-amino-4-fluorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-phenethylpyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.30-7.18(m, 6H), 7.44(brs, 1H), 6.88-6.84(m, 2H), 5.68(s, 1H), 3.66(brs, 2H), 3.46(m, 4H), 3.02(dd, 2H), 2.79(dd, 2H), 1.17(t, 6H)                           |
| 189     | <i>N</i> <sup>2</sup> -(3-aminophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> ,6-triethylpyrimidine-2,4-diamine                   | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.25(d, 1H), 7.06(brs, 1H), 7.05(d, 1H), 6.93(d, 1H), 6.32(dd, 1H), 5.78(s, 1H), 3.61(brs 2H), 3.52(brs, 4H), 2.52(m, 2H), 1.28-1.15(m, 9H)                   |
| 190     | <i>N</i> <sup>2</sup> -(3-amino-4-chlorophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> ,6-triethylpyrimidine-2,4-diamine          | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.36(d, 1H), 7.10(d, 1H), 6.85(dd, 1H), 6.76(brs, 1H), 5.79(s, 1H), 3.95(brs 2H), 3.50(dd, 4H), 2.51(m, 2H), 1.27-1.20(m, 9H)                                 |

[714] Table 1-20

[715]

| Example | Compound                                                                                                                                                         | NMR Spectrum                                                                                                                                                                                                                              |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 191     | <i>N</i> <sup>2</sup> -(3-aminophenyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl-6-isopropylpyrimidine-2,4-diamine                                 | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 8.79(brs, 1H), 7.10-7.05(m, 1H), 6.37(dd, 1H), 6.78(s, 1H), 3.65(brs, 2H), 3.55(brs, 4H), 2.84-2.80(m, 1H), 1.34-1.23(m, 12H)                                                            |
| 192     | <i>N</i> <sup>2</sup> -(3-aminophenyl)-6-butyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethylpyrimidine-2,4-diamine                                     | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.25(s, 1H), 7.04(dd, 1H), 6.93(brs, 1H), 6.91(d, 1H), 6.30(d, 1H), 5.76(s, 1H), 3.59(brs 2H), 3.51(brs, 4H), 2.47(dd, 2H), 1.69-1.63(m, 2H), 1.43-1.37(m, 2H), 1.22(t, 6H), 0.95(t, 3H) |
| 193     | <i>N</i> <sup>2</sup> -(3-amino-4-chlorophenyl)-6-butyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethylpyrimidine-2,4-diamine                            | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.35(d, 1H), 7.10(d, 1H), 6.85(dd, 1H), 6.28(brs, 1H), 5.78(s, 1H), 3.95(brs 2H), 3.50(m, 4H), 2.47(dd, 2H), 1.68-1.62(m, 2H), 1.43-1.37(m, 2H), 1.22(t, 6H), 0.95(t, 3H)                |
| 194     | <i>N</i> <sup>2</sup> -(3-aminophenyl)-6-benzyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethylpyrimidine-2,4-diamine                                    | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.32-7.20(m, 6H), 7.03(dd, 1H), 6.98(brs, 1H), 6.86(d, 1H), 6.30(d, 1H), 5.71(s, 1H), 3.84(s, 2H), 3.58(brs 2H), 3.45(brs, 4H), 1.17(t, 6H)                                              |
| 195     | <i>N</i> <sup>2</sup> -(3-amino-4-chlorophenyl)-6-benzyl- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethylpyrimidine-2,4-diamine                           | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.34-7.23(m, 6H), 7.07(d, 1H), 6.78(d, 1H), 6.75(brs, 1H), 5.74(s, 1H), 3.91(brs, 2H), 3.83(s, 2H), 3.45(m, 4H), 2.51(m, 2H), 1.15(t, 6H)                                                |
| 196     | ( <i>E</i> )-6-(3-cyclopentylpropen-1-yl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)pyrimidine-2,4-diamine | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.60-7.56(m, 2H), 6.99-6.95(m, 2H), 6.90-6.84(m, 1H), 6.19(d, 1H), 5.80(s, 1H), 3.52-3.47(m, 4H), 2.24(dd, 2H), 1.98-1.57(m, 9H), 1.19(t, 6H)                                            |
| 197     | ( <i>E</i> )-6-(2-cyclopropylvinyl)- <i>N</i> <sup>4</sup> , <i>N</i> <sup>4</sup> -diethyl- <i>N</i> <sup>2</sup> -(4-fluorophenyl)pyrimidine-2,4-diamine       | <sup>1</sup> H-NMR(400MHz, CDCl <sub>3</sub> ) δ 7.57-7.54(m, 2H), 6.98-6.94(m, 2H), 6.40-6.26(m, 2H), 5.76(s, 1H), 3.51-3.46(m, 4H), 1.60-1.56(m, 1H), 1.19(t, 6H) 0.90-0.85(m, 2H), 0.69-0.65(m, 2H)                                    |

[716]

[717] Test Example 1: Evaluation of agonistic activity in CHO-K1 cells expressing human 5-HT<sub>4(a)</sub>

[718] As CHO-K1 cells stably expressing human 5-HT<sub>4(a)</sub>, we used the GeneBLAzer HTR4-CRE-bla CHO-K1 cells (Invitrogen Corp.). The cells were cultured, under the condition of 37 °C and 5 % CO<sub>2</sub>, in a DMEM supplemented with 10 % fetal bovine serum (FBS), 25 mM HEPES (pH7.4), 600 µg/ml hygromycin B, 0.1 mM non-essential amino acids, 100 unit/ml penicillin and 100 µg/ml streptomycin. Subcultures were performed three times per one week, each being at less than 80% confluence. At the previous day before treating test compounds, the cells were collected using 0.5% trypsin/EDTA and then diluted with a DMEM supplemented with 1 % FBS, 25 mM HEPES, and 0.1 mM non-essential amino acids into 3.125 x 10<sup>5</sup> cells/ml. 32 µl of the diluted cells were added into 384-well plate (10<sup>4</sup> cells per well) and then incubated overnight. After the overnight culture, 8 µl of the medium having 1% of DMSO was added into the cell-free control well and the non-stimulating control well, respectively.

8  $\mu\text{l}$  of the respective test compound dilutions (which had been prepared by diluting by 100-times with the medium as mentioned in the above) having 1% of DMSO were added to the respective remaining wells. After being cultured in the incubator for 5 hours, the wells of the 384-plate were treated with the substrate solution (8  $\mu\text{l}$  per well) prepared according to the vendor's instruction (i.e., Invitrogen's instruction), and then incubated in the dark room for additional two hours. Agonistic activities on 5-HT<sub>4</sub> receptor were evaluated, on the basis of fluorescence values of the cleavage-products by beta-lactamase. After exciting to 410 nm of wavelength using a fluorescence detector (Genios Pro), we measured the fluorescence values at two emission wavelengths (first wavelength: 465 nm, second wavelength: 535 nm). Data were analyzed on the basis of the ratio of fluorescence intensities of each well at the respective wavelengths. Each EC<sub>50</sub> value was calculated by non-linear regression analysis using the "GraphPad Prism" program, based on the activities according to 8-different concentrations of the test compounds. The results are shown in Table 2 below.

[719] Table 2

[Table 2]

| Example | EC <sub>50</sub> (nM) | Example | EC <sub>50</sub> (nM) |
|---------|-----------------------|---------|-----------------------|
| 9       | 0.24                  | 147     | 0.22                  |
| 16      | 0.31                  | 161     | 0.35                  |
| 54      | 0.04                  | 163     | 0.4                   |
| 65      | 0.11                  | 164     | 0.43                  |
| 72      | 0.34                  | 169     | 0.45                  |
| 86      | 0.029                 | 171     | 0.48                  |
| 99      | 0.11                  | 176     | 0.12                  |
| 101     | 0.071                 | 178     | 0.32                  |
| 104     | 0.039                 | 179     | 0.16                  |
| 105     | 0.19                  | 180     | 0.3                   |
| 107     | 0.38                  | 181     | 0.38                  |
| 121     | 0.136                 | 190     | 0.031                 |
| 123     | 0.076                 | 193     | 0.03                  |
| 133     | 0.2                   | 194     | 0.22                  |
| 140     | 0.076                 | 195     | 0.092                 |
| 142     | 0.22                  |         |                       |

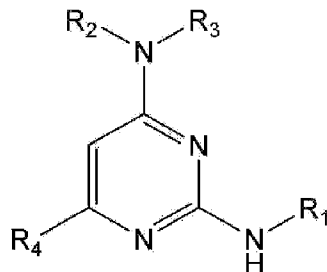
[720] As shown in Table 2, the compounds of the present invention have excellent activities as a 5-HT<sub>4</sub> receptor agonist, and therefore they can be usefully applied for preventing or treating the dysfunction in gastrointestinal motility.

## Claims

[Claim 1]

A use of a compound of Formula 1 or its pharmaceutically acceptable salt for the manufacture of a medicament for preventing or treating a dysfunction in gastrointestinal motility:

<Formula 1>



wherein,

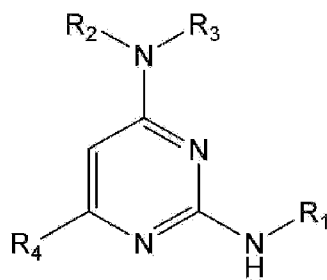
R<sub>1</sub> is a phenyl group substituted with one or more substituents selected from the group consisting of hydroxy, amino, halogen, cyano, nitro, hydroxycarbonyl, C<sub>1-5</sub> alkyl (where the C<sub>1-5</sub> alkyl is optionally substituted with one or more halogens), C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, C<sub>1-5</sub> alkoxy (where the C<sub>1-5</sub> alkoxy is optionally substituted with one or more halogens), C<sub>1-5</sub> alkylthio, mono or di-C<sub>1-5</sub> alkylamino, C<sub>1-5</sub> alkylsulfonylamino, C<sub>1-5</sub> alkylcarbonylamino, C<sub>1-5</sub> alkoxycarbonyl, aminosulfonyl, aminocarbonyl, and benzyloxycarbonylamino; or a heteroaryl group selected from the group consisting of pyridinyl, pyrimidinyl, pyrazinyl, imidazolyl, pyrazolyl, triazolyl, oxazolyl, thiazolyl, furanyl, pyrrolyl, thiophenyl, naphthyl, indanyl, quinolinyl, quinolinonyl, chromenonyl, dihydroindolonyl, isoindoline-1,3-dionyl, dihydrobenzoimidazolonyl, benzoxazolonyl, benzofuranyl, benzothiofophenyl, benzo[d][1,3]dioxolyl, dihydrobenzo[1,4]dioxinyl, indolyl, indolinyl, benzimidazolyl, benzoxazolyl, benzothiazolyl, and indazolyl, wherein the heteroaryl group may be optionally substituted with one or more substituents selected from the group consisting of amino, mono or di-C<sub>1-5</sub> alkylamino, cyano, nitro, halogen, C<sub>1-5</sub> alkyl (where the C<sub>1-5</sub> alkyl is optionally substituted with one or more halogen), C<sub>1-5</sub> alkoxy, acetyl, and C<sub>1-5</sub> alkylsulfonyl,

R<sub>2</sub> and R<sub>3</sub> are, independently of each other, a C<sub>1-5</sub> alkyl group optionally substituted with hydroxy or C<sub>1-5</sub> alkoxy, and

R<sub>4</sub> is a C<sub>1-5</sub> alkyl group optionally substituted with phenyl; or a C<sub>2-6</sub> alkenyl group optionally substituted with phenyl or C<sub>3-6</sub> cycloalkyl.

- [Claim 2] The use of the compound of Formula 1 or its pharmaceutically acceptable salt according to claim 1, wherein  $R_2$  and  $R_3$  is an ethyl group.
- [Claim 3] The use of the compound of Formula 1 or its pharmaceutically acceptable salt according to claim 1 or 2, wherein the dysfunction in gastrointestinal motility is gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony.
- [Claim 4] A pharmaceutical composition for preventing or treating a dysfunction in gastrointestinal motility comprising a therapeutically effective amount of a compound of Formula 1 or its pharmaceutically acceptable salt; and a pharmaceutically acceptable carrier:

<Formula 1>



wherein,

$R_1$  is a phenyl group substituted with one or more substituents selected from the group consisting of hydroxy, amino, halogen, cyano, nitro, hydroxycarbonyl,  $C_{1-5}$  alkyl (where the  $C_{1-5}$  alkyl is optionally substituted with one or more halogens),  $C_{2-6}$  alkenyl,  $C_{2-6}$  alkynyl,  $C_{1-5}$  alkoxy (where the  $C_{1-5}$  alkoxy is optionally substituted with one or more halogens),  $C_{1-5}$  alkylthio, mono or di- $C_{1-5}$  alkylamino,  $C_{1-5}$  alkylsulfonylamino,  $C_{1-5}$  alkylcarbonylamino,  $C_{1-5}$  alkoxycarbonyl, aminosulfonyl, aminocarbonyl, and benzyloxycarbonylamino; or a heteroaryl group selected from the group consisting of pyridinyl, pyrimidinyl, pyrazinyl, imidazolyl, pyrazolyl, triazolyl, oxazolyl, thiazolyl, furanyl, pyrrolyl, thiophenyl, naphthyl, indanyl, quinolinyl, quinolinonyl, chromenonyl, dihydroindolonyl, isoindoline-1,3-dionyl, dihydrobenzoimidazolonyl, benzoxazolonyl, benzofuranyl, benzothioiophenyl, benzo[d][1,3]dioxolyl, dihydrobenzo[1,4]dioxinyl, indolyl, indolinyl, benzimidazolyl, benzoxazolyl, benzothiazolyl, and indazolyl, wherein the heteroaryl group may be optionally substituted with one or more substituents selected from the group consisting of amino, mono or

di- $C_{1-5}$  alkylamino, cyano, nitro, halogen,  $C_{1-5}$  alkyl (where the  $C_{1-5}$  alkyl is optionally substituted with one or more halogen),  $C_{1-5}$  alkoxy, acetyl, and  $C_{1-5}$  alkylsulfonyl,

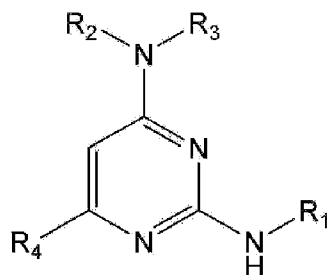
$R_2$  and  $R_3$  are, independently of each other, a  $C_{1-5}$  alkyl group optionally substituted with hydroxy or  $C_{1-5}$  alkoxy, and

$R_4$  is a  $C_{1-5}$  alkyl group optionally substituted with phenyl; or a  $C_{2-6}$  alkenyl group optionally substituted with phenyl or  $C_{3-6}$  cycloalkyl.

[Claim 5] The pharmaceutical composition of claim 4, wherein  $R_2$  and  $R_3$  is an ethyl group.

[Claim 6] The pharmaceutical composition of claim 4 or 5, wherein the dysfunction in gastrointestinal motility is gastroesophageal reflux disease (GERD), constipation, irritable bowel syndrome (IBS), dyspepsia, post-operative ileus, delayed gastric emptying, gastroparesis, intestinal pseudo-obstruction, drug-induced delayed transit, or diabetic gastric atony.

[Claim 7] A compound of Formula 1 or its pharmaceutically acceptable salt:  
<Formula 1>



wherein,

$R_1$  is a phenyl group substituted with one or more substituents selected from the group consisting of hydroxy, amino, halogen, cyano, nitro, hydroxycarbonyl,  $C_{1-5}$  alkyl (where the  $C_{1-5}$  alkyl is optionally substituted with one or more halogens),  $C_{2-6}$  alkenyl,  $C_{2-6}$  alkynyl,  $C_{1-5}$  alkoxy (where the  $C_{1-5}$  alkoxy is optionally substituted with one or more halogens),  $C_{1-5}$  alkylthio, mono or di- $C_{1-5}$  alkylamino,  $C_{1-5}$  alkylsulfonylamino,  $C_{1-5}$  alkylcarbonylamino,  $C_{1-5}$  alkoxy carbonyl, aminosulfonyl, aminocarbonyl, and benzyloxycarbonylamino; or a heteroaryl group selected from the group consisting of pyridinyl, pyrimidinyl, pyrazinyl, imidazolyl, pyrazolyl, triazolyl, oxazolyl, thiazolyl, furanyl, pyrrolyl, thiophenyl, naphthyl, indanyl, quinolinyl, quinolinonyl, chromenonyl, dihydroindolonyl, isoindoline-1,3-dionyl, dihydrobenzoimidazolonyl, benzoxazolonyl, benzofuranyl, benzoth-

iophenyl, benzo[*d*][1,3]dioxolyl, dihydrobenzo[1,4]dioxinyl, indolyl, indolinyl, benzimidazolyl, benzoxazolyl, benzothiazolyl, and indazolyl, wherein the heteroaryl group may be optionally substituted with one or more substituents selected from the group consisting of amino, mono or di-C<sub>1-5</sub> alkylamino, cyano, nitro, halogen, C<sub>1-5</sub> alkyl (where the C<sub>1-5</sub> alkyl is optionally substituted with one or more halogen), C<sub>1-5</sub> alkoxy, acetyl, and C<sub>1-5</sub> alkylsulfonyl,

R<sub>2</sub> and R<sub>3</sub> are, independently of each other, a C<sub>2-5</sub> alkyl group optionally substituted with hydroxy or C<sub>1-5</sub> alkoxy, and

R<sub>4</sub> is a C<sub>2-5</sub> alkyl group optionally substituted with phenyl; or a C<sub>2-6</sub> alkenyl group optionally substituted with phenyl or C<sub>3-6</sub> cycloalkyl.

[Claim 8] The compound or its pharmaceutically acceptable salt of claim 7, wherein R<sub>2</sub> and R<sub>3</sub> is an ethyl group.

[Claim 9] A compound or its pharmaceutically acceptable salt, which is selected from the group consisting of:

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methoxyphenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(4-cyanophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-fluorophenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[3-(methylthio)phenyl]-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(3-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(4-amino-2,5-dichlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methoxyphenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-methoxyphenyl)-6-propylpyrimidine-2,4-diamine;

3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile;

*N*<sup>2</sup>-(4-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-nitrophenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-fluoro-5-methylphenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-fluoro-4-methylphenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(5-fluoro-2-methylphenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-fluoro-4-methylphenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[3-methoxy-5-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(5-methoxy-2-methylphenyl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(2-chloro-5-methoxyphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-chloro-2-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-3-nitrophenol;  
*N*<sup>2</sup>-(5-chloro-2-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
4-chloro-3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol;  
*N*<sup>2</sup>-(2-chloro-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(2-chloro-5-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-chloro-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[4-(trifluoromethyl)phenyl]pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[3-(trifluoromethyl)phenyl]pyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-bromophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
4-chloro-2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol;  
3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]phenol;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[4-(trifluoromethoxy)phenyl]pyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3,4-difluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(naphthalen-1-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyridin-2-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyridin-3-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyridin-4-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyrazin-2-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(quinolin-3-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(pyrimidin-4-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(2,3,4-trifluorophenyl)pyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(2,6-difluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(4-chloro-2-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-4-methylbenzonitrile;  
 2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-2-methylphenyl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-methylpyridin-2-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[4-(methylthio)phenyl]-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(2,5-difluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-bromophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(5-methylthiazol-2-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(5-chloropyridin-2-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(6-methoxypyridin-3-yl)-6-propylpyrimidine-2,4-diamine;  
 4-chloro-2-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzonitrile;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(quinolin-8-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methylthiazol-2-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitropyridin-2-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[6-(trifluoromethyl)pyridin-3-yl]pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(quinolin-6-yl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(2,3-dihydrobenzo[*b*][1,4]dioxin-6-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(benzo[*d*][1,3]dioxol-5-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methyl-3-nitrophenyl)-6-propylpyrimidine-2,4-dia

mine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-methylpyridin-3-yl)-6-propylpyrimidine-2,4-diamine;

5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]picolinonitrile;

ethyl 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoate;

4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-(trifluoromethyl)benzonitrile;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(4*H*-1,2,4-triazol-4-yl)pyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indazol-5-yl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indazol-6-yl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-[2-(trifluoromethyl)-1*H*-benzo[*d*]imidazol-5-yl]pyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-5-yl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(benzo[*d*]thiazol-6-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

7-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methyl-4*H*-chromen-4-one;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methylbenzo[*d*]thiazol-5-yl)-6-propylpyrimidine-2,4-diamine;

7-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-4-methyl-2*H*-chromen-2-one;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-4-yl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methoxy-5-nitrophenyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(2,5-dimethoxyphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-nitrophenol;

*N*<sup>2</sup>-(2-amino-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(4-amino-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[4-nitro-3-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine;

benzyl

5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methoxyphenylcarbamate;

*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-*m*-tolylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(2,3-dihydro-1*H*-inden-5-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(2-methyl-1*H*-indol-5-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-[4-fluoro-3-(trifluoromethyl)phenyl]-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-ethynylphenyl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-amino-2-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
 butyl  
 4-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-nitrobenzoate;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-methyl-1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-ethyl-1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1*H*-indol-7-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(1*H*-benzo[*d*]imidazol-5-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(2,3-dimethylbenzofuran-5-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-isobutyl-1*H*-indol-6-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-amino-4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-amino-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>-[4-(diethylamino)-6-propylpyrimidin-2-yl]benzene-1,2,4-triamine;  
*N*<sup>2</sup>-(3-amino-4-methoxyphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
 3-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]benzoic acid;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-dimethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-dipropyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>-butyl-*N*<sup>4</sup>-ethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-propylpyrimidine-2,4-diamine;  
 2-{[2-(4-fluorophenylamino)-6-propylpyrimidin-4-yl](methylamino)}ethanol;  
*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-bis(2-methoxyethyl)-6-propylpyrimidine-2,4-diamine;

*N*<sup>4</sup>-ethyl-*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>-(2-methoxyethyl)-6-propylpyrimidine-2,4-diamine;  
 2,2'-[2-(4-fluorophenylamino)-6-propylpyrimidin-4-ylazanediyl]diethanol;  
 6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine;  
 4-(4-diethylamino-6-propylpyrimidin-2-ylamino)phthalonitrile;  
 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-2-fluorobenzonitrile;  
*N*-[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenyl]acetamide;  
 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-2-methylbenzonitrile;  
 \**N*-[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-methoxyphenyl]acetamide;  
 5-[4-(diethylamino)-6-propylpyrimidin-2-ylamino]-2-methylisoindolin-1,3-dione;  
*N*-[3-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenyl]methanesulfonamide;  
 7-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-trifluoromethyl-2*H*-chromen-2-one;  
 7-(4-diethylamino-6-propylpyrimidin-2-ylamino)-4-methylquinolin-2(1*H*)-one;  
*N*<sup>2</sup>-(3-difluoromethoxyphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-(3-trifluoromethoxyphenyl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propyl-*N*<sup>2</sup>-*p*-tolylpyrimidine-2,4-diamine;  
 4-(4-diethylamino-6-propylpyrimidin-2-ylamino)phenol;  
*N*<sup>2</sup>-(4-amino-3-trifluoromethylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
 butyl  
 2-amino-5-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzoate;  
 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzo[*d*]oxazol-2(3*H*)-one;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-methyl-4-nitrophenyl)-6-propylpyrimidine-2,4-diamine;  
 1-[6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-1-yl]ethanone;  
 5-(4-diethylamino-6-propylpyrimidin-2-ylamino)-1*H*-benzo[*d*]imidazol-2(3*H*)-one;

*N*<sup>2</sup>-(3-dimethylaminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
 2-amino-5-(4-diethylamino-6-propylpyrimidin-2-ylamino)benzonitrile;  
 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)indolin-2-one;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(indolin-6-yl)-6-propylpyrimidine-2,4-diamine;  
 6-(4-diethylamino-6-propylpyrimidin-2-ylamino)-1,1-dimethylindolinium iodide;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-methylindolin-6-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(1-methylsulfonylindolin-6-yl)-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-amino-3-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-dimethylamino-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-propylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>-(4-diethylamino-6-propylpyrimidin-2-yl)-*N*<sup>1</sup>,*N*<sup>1</sup>-dimethylbenzene-1,2,4-triamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-methylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-trimethylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>-butyl-*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,6-dimethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diisobutyl-6-methylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>-butyl-*N*<sup>4</sup>-ethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-methylpyrimidine-2,4-diamine;  
 ;  
*N*<sup>2</sup>-(4-fluorophenyl)-6-methyl-*N*<sup>2</sup>,*N*<sup>2</sup>-dipropylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diisopropyl-6-methylpyrimidine-2,4-diamine;  
 ;  
 (*E*)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-styrylpyrimidine-2,4-diamine;  
 (*E*)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)-6-styrylpyrimidine-2,4-diamine;  
 (*E*)-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-styrylpyrimidine-2,4-diamine;  
 ;  
 (*E*)-3-[4-(diethylamino)-6-styrylpyrimidin-2-ylamino]benzonitrile;  
 6-allyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine;  
 3-[4-allyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-isobutylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-isobutylpyrimidine-2,4-diamine;  
 ;  
 3-(4-diethylamino-6-isobutylpyrimidin-2-ylamino)benzonitrile;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine;

*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluoro-3-nitrophenyl)-6-phenethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-chloro-4-methylphenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;  
3-[4-(diethylamino)-6-ethylpyrimidin-2-ylamino]benzonitrile;  
*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine;  
3-[4-(diethylamino)-6-isopropylpyrimidin-2-ylamino]benzonitrile;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-isopropylpyrimidine-2,4-diamine;  
3-[4-butyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile;  
6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;  
6-butyl-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;  
3-[4-benzyl-6-(diethylamino)pyrimidin-2-ylamino]benzonitrile;  
6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(3-nitrophenyl)pyrimidine-2,4-diamine;  
6-benzyl-*N*<sup>2</sup>-(4-chloro-3-nitrophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;  
6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-pentylpyrimidine-2,4-diamine;  
*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)-6-phenethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-aminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-amino-4-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;  
3-[4-(diethylamino)-6-phenethylpyrimidin-2-ylamino]benzonitrile;  
*N*<sup>2</sup>-(3-amino-4-fluorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-phenethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-aminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-amino-4-chlorophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>,6-triethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-aminophenyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-6-isopropylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-aminophenyl)-6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-amino-4-chlorophenyl)-6-butyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;  
*N*<sup>2</sup>-(3-aminophenyl)-6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;

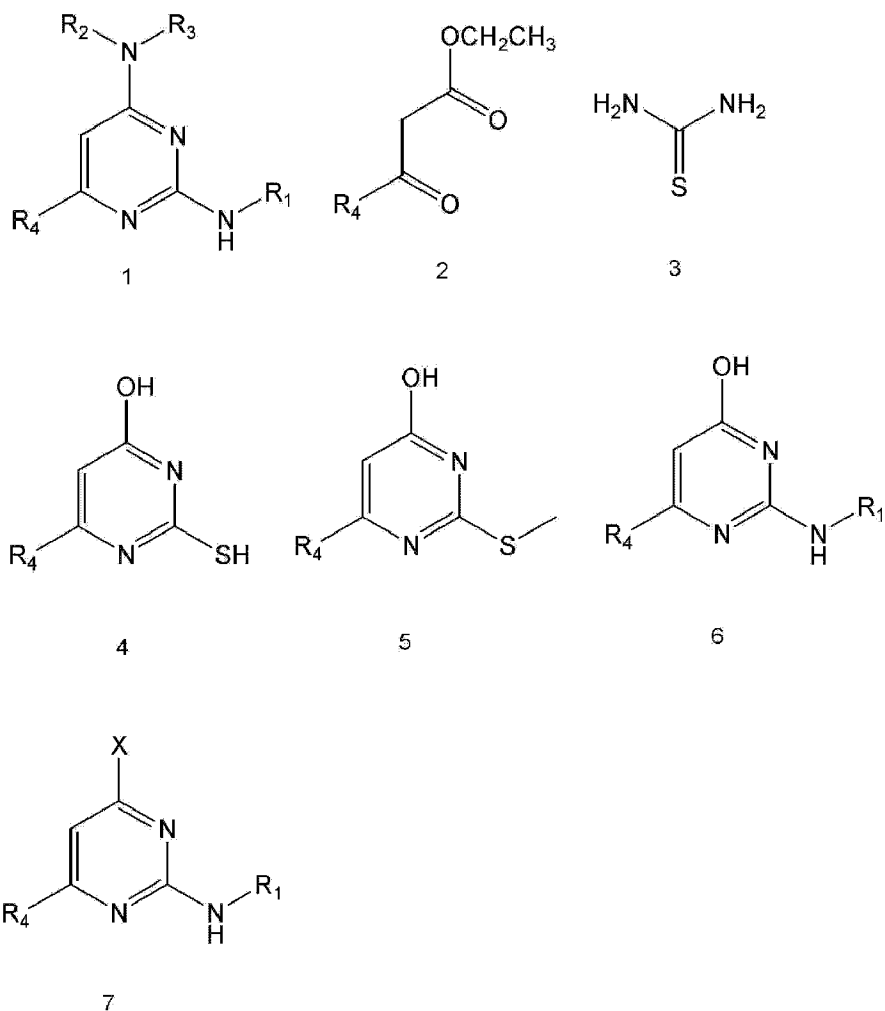
*N*<sup>2</sup>-(3-amino-4-chlorophenyl)-6-benzyl-*N*<sup>4</sup>,*N*<sup>4</sup>-diethylpyrimidine-2,4-diamine;

(*E*)-6-(3-cyclopentylpropen-1-yl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine; and

(*E*)-6-(2-cyclopropylvinyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-diethyl-*N*<sup>2</sup>-(4-fluorophenyl)pyrimidine-2,4-diamine.

[Claim 10]

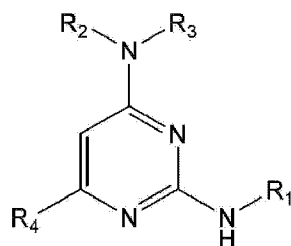
A process for preparing a compound of Formula 1 or its pharmaceutically acceptable salt, which comprises  
reacting a compound of Formula 2 with a compound of Formula 3 to obtain a compound of Formula 4;  
performing a methylation of the compound of Formula 4 to obtain a compound of Formula 5;  
reacting the compound of Formula 5 with R<sub>1</sub>-NH<sub>2</sub> to obtain a compound of Formula 6;  
performing a halogenation of the compound of Formula 6 to obtain a compound of Formula 7; and  
reacting the compound of Formula 7 with R<sub>2</sub>R<sub>3</sub>-NH to obtain a compound of Formula 1:



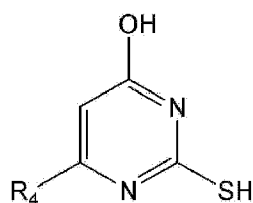
wherein,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are the same as defined in claim 7; and  $X$  is halogen.

[Claim 11]

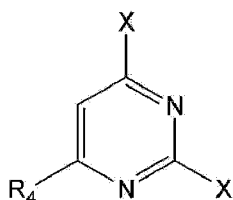
A process for preparing a compound of Formula 1 or its pharmaceutically acceptable salt, which comprises  
 performing a halogenation of a compound of Formula 4 to obtain a compound of Formula 9;  
 reacting the compound of Formula 9 with  $R_2R_3-NH$  to obtain a compound of Formula 10; and  
 reacting the compound of Formula 10 with  $R_1-NH_2$  to obtain a compound of Formula 1:



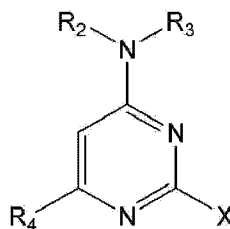
1



4



9



10

wherein,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are the same as defined in claim 7; and X is halogen.

[Claim 12]

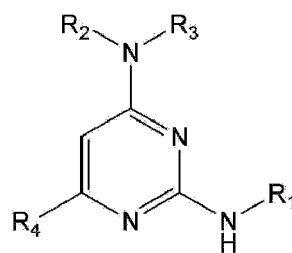
A process for preparing a compound of Formula 1 or its pharmaceutically acceptable salt, which comprises

reacting a compound of Formula 12 with  $R_2R_3-NH$  to obtain a compound of Formula 13;

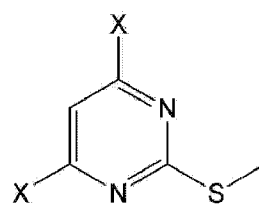
performing an oxidation of the compound of Formula 13 to obtain a compound of Formula 14;

reacting the compound of Formula 14 with  $R_1-NH_2$  to obtain a compound of Formula 15; and

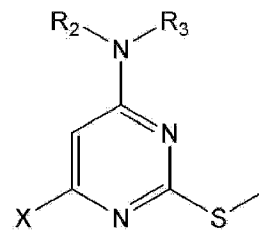
reacting the compound of Formula 15 with  $R_4-Q$  to obtain a compound of Formula 1:



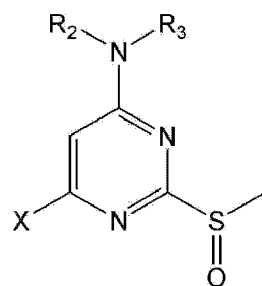
1



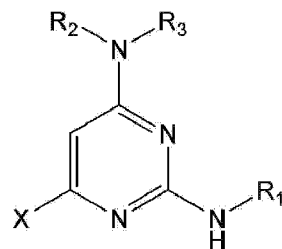
12



13



14



15

wherein,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are the same as defined in claim 7;  $X$  is halogen; and  $Q$  is  $MgX$ , boronic acid ( $B(OH)_2$ ), or boronic acid pinacol ester.