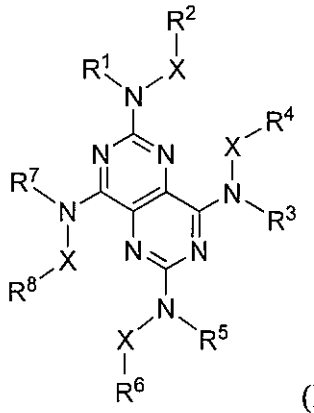
CLAIMS

1. A compound or salt thereof selected from the group consisting of:



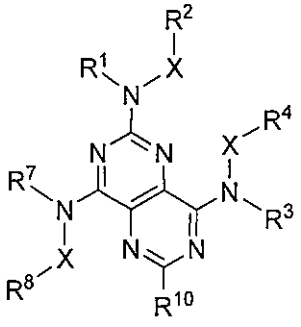
a compound of formula (I): (I), wherein in formula (I):

R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O; and,

each occurrence of R^9 is independently alkyl or substituted alkyl;



a compound of formula (II): (II), wherein in formula (II):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl,

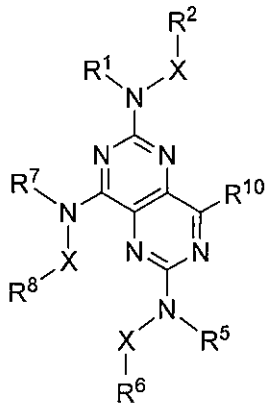
substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl, or substituted alkyl;

R^{10} is H, halogen, CN, amidino, amido, carboxy, carboxamido, hydrazino, OH, alkyl or substituted alkyl, alkoxy or substituted alkoxy, or thioalkoxy or substituted thioalkoxy; and,



a compound of formula (III): (III), wherein in formula (III):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl; and

R^{10} is H, halogen, CN, amidino, amido, carboxy, carboxamido, hydrazino, OH, alkyl

or substituted alkyl, alkoxy or substituted alkoxy, or thioalkoxy or substituted thioalkoxy;

and any combinations thereof.

2. The compound of claim 1, wherein the compound is selected from the group consisting of:

N^2,N^6-Dimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^6,N^8-Tetra-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*i*-propyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dimethyl-N^4-*n*-propyl-N^8-prop-2-ynyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-(N-methoxy(N-methyl)amino)-N^4,N^8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidine;

N-(6-Chloro-4,8-*bis*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-O,N-dimethyl-hydroxylamine;

N^2,N^6-Bis-(N-Methoxy(N-methyl)amino)-N^4,N^8-bis-n-propylamino-pyrimido[5,4-d] pyrimidine hydrochloride;

N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

O,N-Dimethyl-N-(6-methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidin-2-yl)-hydroxylamine;

N^4,N^8-Dimethyl-N^2,N^6-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Trimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-methyl-N^4,N^8-di-*n*-propylpyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2-Diethyl-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-(4,8-Bis-*n*-propylamino-6-methylamino-pyrimido[5,4-d]pyrimidin-2-yl-amino)-ethanol;

N^2-(2-Methoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl- pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(2-Isopropoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^8-Methyl-N^4,N^6-di-*n*-propyl-N^2-(3,3,3-trifluoropropyl)-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(morpholin-4-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-pyrrolidin-1-yl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-methoxy-piperidin-1-yl)-pyrimido[5,4,-d]pyrimidine-2,4,8-triamine;

N^2-(3-Chloro-2-methyl-benzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(3,4-Dichlorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(4-Fluorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2,N^4,N^8-Tetramethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2-Diallyl-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-methyl-amino]-ethanol;

N^2-(2-Isopropoxy-ethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[N-(2-Dimethylamino-ethyl)-N-methyl]amino-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-4,6,8-triamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-(2-hydroxy-ethyl)-amino]-ethanol;

N^2,N^2-Bis-(2-methoxyethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-(4-Oxo-piperidin-1-yl)-N^4,N^8-dimethyl-N^2-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-(3-Trifluoromethyl-piperidin-1-yl)-N^4,N^8-dimethyl-6-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-6-*n*-Propylamino-N^4,N^8-dimethyl-2-(1,1-dioxo-thiomorpholin-4-yl)-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-*n*-Propyl-N^4,N^8-dimethyl-6-(4,4-difluoro-piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^6,N^8-Tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diisobutyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diallyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-Chloro-6-(N,N'-dimethyl-hydrazino)-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

6-(N,N'-Dimethyl-hydrazino)-N^2,N^2,N^4,N^8-tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-6-propoxy-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-propylsulfanyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Benzyloxy-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ol;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(aminomethyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Carbamoyl-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carboxylic acid;

N-(*n*-Propyl)-[4,8-bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl]-amidine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-*n*-Butyl-N^2-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methoxy-N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^2,N^4,N^6,N^8-Tetraethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

2,6-Dichloro-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

N^4,N^8-Diethyl-N^2,N^6-Di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-ethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^6-Diethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dicyclopropyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6,N^6-Tetramethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^4,N^8-Diallyl-N^2,N^6-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^8-Triallyl-6-[4-(4-fluorobenzyl)-piperazin-1-yl]-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Chloro-N^2,N^4,N^8-triallyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^8-Triallyl-6-{4-[bis-(4-fluorophenyl)-methyl]-piperazin-1-yl}-pyrimido[5,4-d] pyrimidine-2,4,8-triamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid tert-butyl ester;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid;

N-*n*-Propyl-[2-(4,8-bis-methylamino-6-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)]-acetamide;

(6-Chloro-4,8-bis-methylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid ethyl ester;

a salt or solvate thereof, and any combinations thereof.

3. The compound of claim 1, wherein the salt is selected from the group consisting of sulfate, hydrogen sulfate, hemisulfate, chloride, bromide, iodide, nitrate, carbonate, phosphate, hydrogen phosphate, dihydrogen phosphate, formate, acetate, propionate, succinate, glycolate, gluconate, lactate, malate, tartrate, citrate, ascorbate, glucuronate, maleate, fumarate, pyruvate, aspartate, glutamate, benzoate, anthranilate, 4-hydroxybenzoate, phenylacetate, mandelate, pamoate, methanesulfonate, ethanesulfonate, benzenesulfonate, pantothenate, trifluoromethanesulfonate, 2-hydroxyethanesulfonate, *p*-toluenesulfonate, sulfanilate, cyclohexylaminosulfonate, stearate, alginate, β-hydroxybutyrate, salicylate, galactarate, galacturonate, saccharin, saccharate, glycerophosphonate, and any combinations thereof.

4. A pharmaceutical composition comprising the compound of claim 1 and at least one pharmaceutically acceptable carrier.

5. The composition of claim 4, further comprising at least one agent

selected from the group consisting of doxapram and enantiomers thereof, acetazolamide, almitrine, theophylline, caffeine, methylprogesterone and related compounds, sedatives that increase arousal threshold in sleep disordered breathing patients, benzodiazepine receptor agonists, orexin antagonists, tricyclic antidepressants, serotonergic modulators, adenosine and adenosine receptor and nucleoside transporter modulators, cannabinoids, orexins, melatonin agonists, ampakines, sodium oxybate, modafinil, armodafinil, and inhaled therapeutics.

6. The composition of claim 5, wherein the compound and the agent are physically mixed in the composition.

7. The composition of claim 5, wherein the compound and the agent are physically separated in the composition.

8. The composition of claim 4, further comprising at least one agent known to cause changes in breathing control.

9. The composition in claim 8, wherein the at least one agent is selected from the group consisting of opioid narcotics, benzodiazepines, sedatives, sleeping aids, hypnotics, propofol, and any combinations thereof.

10. The composition of claim 8, wherein the compound and the agent are physically mixed in the composition.

11. The composition of claim 8, wherein the compound and the agent are physically separated in the composition.

12. The composition of claim 4, wherein the composition allows for modified delivery of the compound following oral administration to a subject.

13. The composition of claim 12, wherein the composition minimizes delivery of the compound to the stomach of the subject and maximizes delivery of the compound to the intestine of the subject.

14. The composition of claim 12, wherein the composition includes an enteric coating.

15. The composition of claim 12, wherein the compound is contained in a pharmaceutically suitable capsule.

16. The composition of claim 15, wherein the capsule contains granules or powder of the compound, or an admixture of the compound with an excipient.

17. The composition of claim 16, wherein the excipient comprises a binder, disintegrant, diluent, buffer, lubricant, glidant, antioxidant, antimicrobial preservative, colorant, or flavorant.

18. The composition of claim 16, wherein the capsule is enterically coated but the granules or powders of the compound are not enterically coated.

19. The composition of claim 16, wherein the granules or powders of the compound are coated with an enteric coating before being placed into the capsule.

20. The composition of claim 19, wherein the granules or powders of the compound are coated with a multiplicity of enteric coatings, as to provide delivery of drug to different regions of the intestine of the subject.

21. The composition of claim 16, wherein at least a portion of the granules or powders of the compound are enterically coated.

22. The composition of claim 21, wherein the capsule is coated with an enteric coating that is different from the enteric coating that coats the granules or powders of the compound.

23. The composition of claim 12, wherein the compound is coated onto a base particle, whereby a core comprising the drug as a coating over the base particle is formed.

24. The composition of claim 23, wherein the base particle is not enterically coated and the composition is contained in a pharmaceutically acceptable capsule that is enterically coated.

25. The composition of claim 23, wherein the core is coated with an enteric coating, thereby forming an enterically coated bead.

26. The composition of claim 25, wherein the enterically coated bead is contained in a pharmaceutically acceptable capsule.

27. The composition of claim 26, wherein the capsule contains beads coated with a multiplicity of enteric coatings, so that the capsule provides delivery of the compound to different regions of the intestine of the subject.

28. The composition of claim 16, further wherein the contents of the capsule are dissolved or suspended in a pharmaceutically acceptable liquid as to provide a liquid-filled capsule.

29. The composition of claim 28, wherein the capsule is enterically coated but the liquid formulation contained within does not comprise an enteric coating.

30. The composition of claim 28, wherein the granules or powders of the compound are enterically coated.

31. The composition of claim 30, wherein the granules or powders of the compound are coated with a multiplicity of enteric coatings, as to provide delivery of drug to different regions of the intestine of the subject.

32. The composition of claim 30, wherein the enteric coating applied to the capsule differs from the enteric coating applied to any of the granules or powders of the compound.

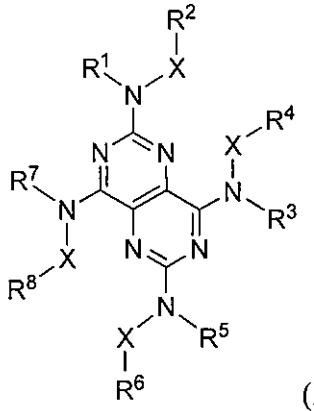
33. The composition of claim 15, wherein the compound is coated onto a

base particle to form a core comprising the compound as a coating over the base particle, wherein the core is suspended in a pharmaceutically acceptable liquid, and wherein the suspended core is placed in a capsule.

34. The composition of claim 33, wherein the capsule is enterically coated but the core is not enterically coated.

35. The composition of claim 33, wherein the capsule and the core are enterically coated.

36. An effective amount of a pharmaceutical composition comprising at least one pharmaceutically acceptable carrier and at least one compound or salt thereof selected from the group consisting of:



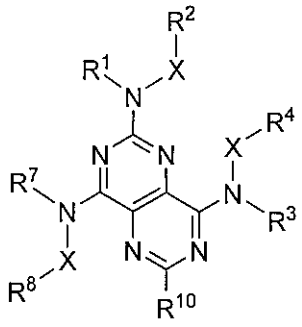
a compound of formula (I): (I), wherein in formula (I):

R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O; and,

each occurrence of R^9 is independently alkyl or substituted alkyl;

a compound of formula (II):  (II), wherein in formula (II):

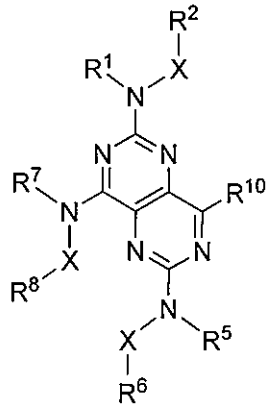
R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl;

R^{10} is H, halogen, CN, amidino, amido, carboxy, carboxamido, hydrazino, OH, alkyl or substituted alkyl, alkoxy or substituted alkoxy, or thioalkoxy or substituted thioalkoxy; and,

a compound of formula (III):  (III), wherein in formula (III):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted

heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl; and

R^{10} is H, halogen, CN, amidino, amido, carboxy, carboxamido, hydrazino, OH, alkyl or substituted alkyl, alkoxy or substituted alkoxy, or thioalkoxy or substituted thioalkoxy;

for use in preventing or treating a breathing control disorder or disease in a subject in need thereof.

37. The pharmaceutical composition of claim 36, wherein the breathing control disorder or disease is selected from the group consisting of respiratory depression, sleep apnea, apnea of prematurity, obesity-hypoventilation syndrome, primary alveolar hypoventilation syndrome, dyspnea, altitude sickness, hypoxia, hypercapnia, chronic obstructive pulmonary disease (COPD), sudden infant death syndrome (SIDS), congenital central hypoventilation syndrome, Alzheimer's disease, Parkinson's disease, stroke, Duchenne muscular dystrophy, and brain and spinal cord traumatic injury.

38. The pharmaceutical composition of claim 37, wherein the respiratory depression is caused by an anesthetic, a sedative, a sleeping aid, an anxiolytic agent, a hypnotic agent, alcohol or a narcotic.

39. The pharmaceutical composition of claim 36, wherein the subject is to be further administered at least one additional agent useful for treating the breathing disorder or disease.

40. The pharmaceutical composition of claim 39, wherein the at least one additional agent is selected from the group consisting of doxapram and enantiomers thereof, acetazolamide, almitrine, theophylline, caffeine, methylprogesterone and related compounds,

sedatives that increase arousal threshold in sleep disordered breathing patients, benzodiazepine receptor agonists, orexin antagonists, tricyclic antidepressants, serotonergic modulators, adenosine and adenosine receptor and nucleoside transporter modulators, cannabinoids, orexins, melatonin agonists, ampakines, sodium oxybate, modafinil, armodafinil, and inhaled therapeutics.

41. The pharmaceutical composition of claim 39, wherein the compound and the agent are to be separately administered to the subject.

42. The pharmaceutical composition of claim 39, wherein the compound and the agent are to be co-administered to the subject, further wherein the compound and the agent are physically mixed or physically separated prior to being administered to the subject.

43. The pharmaceutical composition of claim 36, wherein the subject is to be further administered at least one additional therapeutic agent known to change normal breathing control in the subject.

44. The pharmaceutical composition of claim 43, wherein at least one additional agent is selected from the group consisting of opioid narcotics, benzo-diazepines, sedatives, sleeping aids, hypnotics, propofol, and any combinations thereof.

45. The pharmaceutical composition of claim 36, wherein the composition is to be administered in conjunction with the use of a mechanical ventilation device or positive airway pressure device on the subject.

46. The pharmaceutical composition of claim 36, wherein the subject is a mammal or bird.

47. The pharmaceutical composition of claim 46, wherein the mammal is a human.

48. The pharmaceutical composition of claim 36, wherein the composition is to be administered to the subject by a nasal, inhalational, topical, oral, buccal, rectal,

pleural, peritoneal, vaginal, intramuscular, subcutaneous, transdermal, epidural, intratracheal, otic, intraocular, intrathecal or intravenous route.

49. The pharmaceutical composition of claim 48, wherein the composition is to be orally administered to the subject.

50. The pharmaceutical composition of claim 36, wherein the at least one compound is selected from the group consisting of:

N^2,N^6-Dimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^6,N^8-Tetra-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*i*-propyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dimethyl-N^4-*n*-propyl-N^8-prop-2-ynyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-(N-methoxy(N-methyl)amino)-N^4,N^8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidine;

N-(6-Chloro-4,8-*bis*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-O,N-dimethyl-hydroxylamine;

N^2,N^6-Bis-(N-Methoxy(N-methyl)amino)-N^4,N^8-bis-n-propylamino-pyrimido[5,4-d] pyrimidine hydrochloride;

N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

O,N-Dimethyl-N-(6-methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidin-2-yl)-hydroxylamine;

N^4,N^8-Dimethyl-N^2,N^6-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Trimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-methyl-N^4,N^8-di-*n*-propylpyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2-Diethyl-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-(4,8-Bis-*n*-propylamino-6-methylamino-pyrimido[5,4-d]pyrimidin-2-yl-amino)-ethanol;

N^2-(2-Methoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl- pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(2-Isopropoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^8-Methyl-N^4,N^6-di-*n*-propyl-N^2-(3,3,3-trifluoropropyl)-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(morpholin-4-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-pyrrolidin-1-yl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-methoxy-piperidin-1-yl)-pyrimido[5,4,-d]pyrimidine-2,4,8-triamine;

N^2-(3-Chloro-2-methyl-benzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(3,4-Dichlorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(4-Fluorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2,N^4,N^8-Tetramethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2-Diallyl-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-methyl-amino]-ethanol;

N^2-(2-Isopropoxy-ethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[N-(2-Dimethylamino-ethyl)-N-methyl]amino-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-4,6,8-triamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-(2-hydroxy-ethyl)-amino]-ethanol;

N^2,N^2-Bis-(2-methoxyethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-(4-Oxo-piperidin-1-yl)-N^4,N^8-dimethyl-N^2-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-(3-Trifluoromethyl-piperidin-1-yl)-N^4,N^8-dimethyl-6-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-6-*n*-Propylamino-N^4,N^8-dimethyl-2-(1,1-dioxo-thiomorpholin-4-yl)-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-*n*-Propyl-N^4,N^8-dimethyl-6-(4,4-difluoro-piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^6,N^8-Tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diisobutyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diallyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-Chloro-6-(N,N'-dimethyl-hydrazino)-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

6-(N,N'-Dimethyl-hydrazino)-N^2,N^2,N^4,N^8-tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-6-propoxy-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-propylsulfanyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Benzyloxy-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ol;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(aminomethyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Carbamoyl-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carboxylic acid;

N-(*n*-Propyl)-[4,8-bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl]-amidine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-*n*-Butyl-N^2-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methoxy-N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^2,N^4,N^6,N^8-Tetraethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

2,6-Dichloro-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

N^4,N^8-Diethyl-N^2,N^6-Di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-ethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^6-Diethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dicyclopropyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6,N^6-Tetramethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^4,N^8-Diallyl-N^2,N^6-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^8-Triallyl-6-[4-(4-fluorobenzyl)-piperazin-1-yl]-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Chloro-N^2,N^4,N^8-triallyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^8-Triallyl-6-{4-[bis-(4-fluorophenyl)-methyl]-piperazin-1-yl}-pyrimido[5,4-d] pyrimidine-2,4,8-triamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid tert-butyl ester;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid;

N-*n*-Propyl-[2-(4,8-bis-methylamino-6-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)]-acetamide;

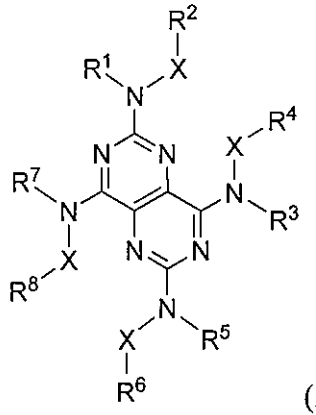
(6-Chloro-4,8-bis-methylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid ethyl ester;

a salt thereof, and any combinations thereof.

51. The pharmaceutical composition of claim 36, wherein the salt is selected from the group consisting of sulfate, hydrogen sulfate, chloride, bromide, iodide, nitrate, carbonate, phosphate, hydrogen phosphate, dihydrogen phosphate, formate, acetate, propionate, succinate, glycolate, gluconate, lactate, malate, tartrate, citrate, ascorbate, glucuronate, maleate, fumarate, pyruvate, aspartate, glutamate, benzoate, anthranilate, 4-hydroxybenzoate, phenylacetate, mandelate, pamoate, methanesulfonate, ethanesulfonate, benzenesulfonate, pantothenate, trifluoromethanesulfonate, 2-hydroxyethanesulfonate, *p*-toluenesulfonate, sulfanilate, cyclohexylaminosulfonate, stearate, alginate, β-hydroxy-butyrate, salicylate, galactarate, galacturonate, saccharin, saccharate, and glycerol-phosphonate.

52. An effective amount of a pharmaceutical composition comprising at least one pharmaceutically acceptable carrier and at least one compound or salt thereof

selected from the group consisting of:

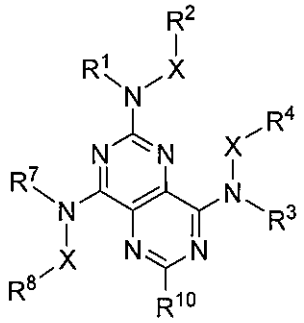
a compound of formula (I):  (I), wherein in formula (I):

R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O; and,

each occurrence of R^9 is independently alkyl or substituted alkyl;

a compound of formula (II):  (II), wherein in formula (II):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

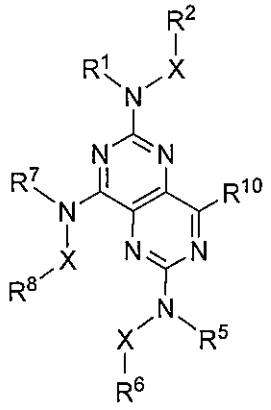
or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl;

R^{10} is H, halogen, cyano, alkyl, substituted alkyl, alkoxy or substituted alkoxy; and,

a compound of formula (III):



(III), wherein in formula (III):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl; and

R^{10} is H, halogen, cyano, alkyl, substituted alkyl, alkoxy or substituted alkoxy; for use in preventing destabilization or stabilizing breathing rhythm in a subject in need thereof.

53. The pharmaceutical composition of claim 52, wherein the

destabilization is associated with a breathing control disorder or disease selected from the group consisting of respiratory depression, sleep apnea, apnea of prematurity, obesity-hypoventilation syndrome, primary alveolar hypoventilation syndrome, dyspnea, altitude sickness, hypoxia, hypercapnia, chronic obstructive pulmonary disease (COPD), sudden infant death syndrome (SIDS), congenital central hypoventilation syndrome, Alzheimer's disease, Parkinson's disease, stroke, Duchenne muscular dystrophy, and brain and spinal cord traumatic injury.

54. The pharmaceutical composition of claim 53, wherein the respiratory depression is caused by an anesthetic, a sedative, a sleeping aid, an anxiolytic agent, a hypnotic agent, alcohol or a narcotic.

55. The pharmaceutical composition of claim 52, wherein the subject is to be further administered at least one additional agent useful for treating the breathing disorder or disease.

56. The pharmaceutical composition of claim 55, wherein the at least one additional agent is selected from the group consisting of doxapram and enantiomers thereof, acetazolamide, almitrine, theophylline, caffeine, methylprogesterone and related compounds, sedatives that increase arousal threshold in sleep disordered breathing patients, benzodiazepine receptor agonists, orexin antagonists, tricyclic antidepressants, serotonergic modulators, adenosine and adenosine receptor and nucleoside transporter modulators, cannabinoids, orexins, melatonin agonists, ampakines, sodium oxybate, modafinil, armodafinil, and inhaled therapeutics.

57. The pharmaceutical composition of claim 55, wherein the compound and the agent are to be separately administered to the subject.

58. The pharmaceutical composition of claim 55, wherein the compound and the agent are to be co-administered to the subject, further wherein the compound and the agent are physically mixed or physically separated prior to being administered to the subject.

59. The pharmaceutical composition of claim 52, wherein the subject is to

be further administered at least one additional therapeutic agent known to change normal breathing control in the subject

60. The pharmaceutical composition of claim 59, wherein at least one additional agent is selected from the group consisting of opioid narcotics, benzo-diazepines, sedatives, sleeping aids, hypnotics, propofol, and any combinations thereof.

61. The pharmaceutical composition of claim 52, wherein the composition is to be administered in conjunction with the use of a mechanical ventilation device or positive airway pressure device on the subject.

62. The pharmaceutical composition of claim 52, wherein the subject is a mammal or bird.

63. The pharmaceutical composition of claim 62, wherein the mammal is a human.

64. The pharmaceutical composition of claim 52, wherein the composition is to be administered to the subject by a nasal, inhalational, topical, oral, buccal, rectal, pleural, peritoneal, vaginal, intramuscular, subcutaneous, transdermal, epidural, intratracheal, otic, intraocular, intrathecal or intravenous route.

65. The pharmaceutical composition of claim 64, wherein the composition is to be orally administered to the subject.

66. The pharmaceutical composition of claim 52, wherein the at least one compound is selected from the group consisting of:
N^2,N^6-Dimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;
N^2,N^4,N^6,N^8-Tetra-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;
N^2,N^6-Di-*n*-butyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;
N^2,N^6-Di-*i*-propyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;
N^2,N^6-Dimethyl-N^4-*n*-propyl-N^8-prop-2-ynyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;
N^2,N^6-Bis-(N-methoxy(N-methyl)amino)-N^4,N^8-bis-*n*-propylamino-pyrimido[5,4-d]

pyrimidine;

N-(6-Chloro-4,8-*bis*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-O,N-dimethyl-hydroxylamine;

N^2,N^6-Bis-(N-Methoxy(N-methyl)amino)-N^4,N^8-bis-n-propylamino-pyrimido[5,4-d] pyrimidine hydrochloride;

N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

O,N-Dimethyl-N-(6-methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidin-2-yl)-hydroxylamine;

N^4,N^8-Dimethyl-N^2,N^6-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Trimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-methyl-N^4,N^8-di-*n*-propylpyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2-Diethyl-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-(4,8-Bis-*n*-propylamino-6-methylamino-pyrimido[5,4-d]pyrimidin-2-yl-amino)-ethanol;

N^2-(2-Methoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl- pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(2-Isopropoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^8-Methyl-N^4,N^6-di-*n*-propyl-N^2-(3,3,3-trifluoropropyl)-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(morpholin-4-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-pyrrolidin-1-yl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-methoxy-piperidin-1-yl)-pyrimido[5,4,-d]pyrimidine-2,4,8-triamine;

N^2-(3-Chloro-2-methyl-benzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(3,4-Dichlorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(4-Fluorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2,N^4,N^8-Tetramethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2-Diallyl-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-methyl-amino]-ethanol;

N^2-(2-Isopropoxy-ethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[N-(2-Dimethylamino-ethyl)-N-methyl]amino-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-4,6,8-triamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-(2-hydroxy-ethyl)-amino]-ethanol;

N^2,N^2-Bis-(2-methoxyethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-(4-Oxo-piperidin-1-yl)-N^4,N^8-dimethyl-N^2-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-(3-Trifluoromethyl-piperidin-1-yl)-N^4,N^8-dimethyl-6-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-6-*n*-Propylamino-N^4,N^8-dimethyl-2-(1,1-dioxo-thiomorpholin-4-yl)-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-*n*-Propyl-N^4,N^8-dimethyl-6-(4,4-difluoro-piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^6,N^8-Tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diisobutyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diallyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-Chloro-6-(N,N'-dimethyl-hydrazino)-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

6-(N,N'-Dimethyl-hydrazino)-N^2,N^2,N^4,N^8-tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-6-propoxy-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-propylsulfanyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Benzyloxy-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ol;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(aminomethyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Carbamoyl-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carboxylic acid;

N-(*n*-Propyl)-[4,8-bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl]-amidine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-*n*-Butyl-N^2-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methoxy-N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^2,N^4,N^6,N^8-Tetraethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

2,6-Dichloro-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

N^4,N^8-Diethyl-N^2,N^6-Di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-ethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^6-Diethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dicyclopropyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6,N^6-Tetramethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^4,N^8-Diallyl-N^2,N^6-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^8-Triallyl-6-[4-(4-fluorobenzyl)-piperazin-1-yl]-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Chloro-N^2,N^4,N^8-triallyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^8-Triallyl-6-{4-[bis-(4-fluorophenyl)-methyl]-piperazin-1-yl}-pyrimido[5,4-d] pyrimidine-2,4,8-triamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid tert-butyl ester;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid;

N-*n*-Propyl-[2-(4,8-bis-methylamino-6-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)]-acetamide;

(6-Chloro-4,8-bis-methylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid ethyl ester;

a salt thereof, and any combinations thereof.

67. The pharmaceutical composition of claim 52, wherein the salt is selected from the group consisting of sulfate, hydrogen sulfate, chloride, bromide, iodide, nitrate, carbonate, phosphate, hydrogen phosphate, dihydrogen phosphate, formate, acetate, propionate, succinate, glycolate, gluconate, lactate, malate, tartrate, citrate, ascorbate, glucuronate, maleate, fumarate, pyruvate, aspartate, glutamate, benzoate, anthranilate, 4-hydroxybenzoate, phenylacetate, mandelate, pamoate, methanesulfonate, ethanesulfonate, benzenesulfonate, pantothenate, trifluoromethanesulfonate, 2-hydroxyethanesulfonate, *p*-toluenesulfonate, sulfanilate, cyclohexylaminosulfonate, stearate, alginate, β-hydroxy-butyrate, salicylate, galactarate, galacturonate, saccharin, saccharate, and glycerol-phosphonate.

68. The compound of claim 1, wherein the compound is N^2-N^6-bis-cyclopropylmethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine and wherein the X-ray powder diffraction spectrum of the compound comprises 2Θ values (in degrees) of about 8.12, 9.59, 12.60, 15.02, 16.33, 17.40, 18.98, 20.68, 21.72, 22.28, 23.98, 25.24, and 26.70.

69. A method of preparing N^2-N^6-bis-cyclopropylmethyl N^4, N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine (**84**), comprising reacting 2,6-dichloro-N^4,N^8-dimethyl-pyrimido[5,4-*d*]pyrimidine-4,8-diamine and cyclopropylmethylamine in a solvent.

70. The method of claim 69, wherein the reaction is run under heating and wherein (**84**) precipitates from the solvent once the reaction system is cooled to room temperature.

71. The method of claim 69, wherein the solvent comprises *n*-butanol.

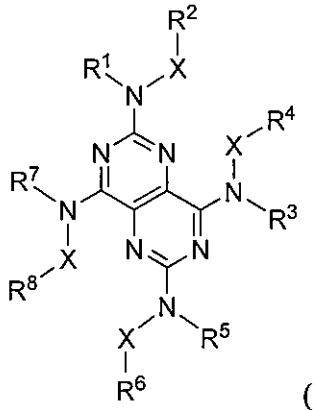
72. The method of claim 70, wherein the precipitated (**84**) is recrystallized from *n*-butanol.

73. The method of claim 72, wherein the recrystallized (**84**) has a X-ray powder diffraction spectrum comprising 2Θ values (in degrees) of about 8.12, 9.59, 12.60, 15.02, 16.33, 17.40, 18.98, 20.68, 21.72, 22.28, 23.98, 25.24, and 26.70.

74. The method of claim 69, wherein the 2,6-dichloro-N^4,N^8-dimethyl-pyrimido[5,4-*d*]pyrimidine-4,8-diamine is prepared by reacting 2,4,6,8-tetrachloro-pyrimido[5,4-*d*]pyrimidine and methylamine in a solvent.

75. The method of claim 74, wherein the ratio of equivalents of 2,4,6,8-tetrachloro-pyrimido[5,4-d]pyrimidine to methylamine is about 1 : 4.5.

76. The use of at least one pharmaceutically acceptable carrier and at least one compound or salt thereof selected from the group consisting of:



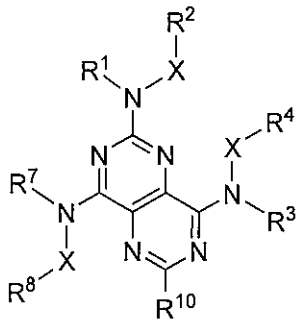
a compound of formula (I): (I), wherein in formula (I):

R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O; and,

each occurrence of R^9 is independently alkyl or substituted alkyl;

a compound of formula (II):  (II), wherein in formula (II):

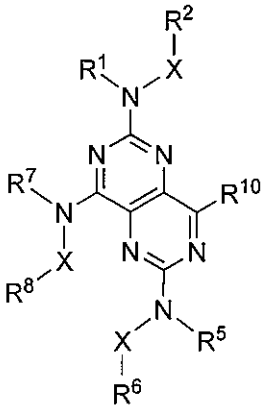
R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl;

R^{10} is H, halogen, CN, amidino, amido, carboxy, carboxamido, hydrazino, OH, alkyl or substituted alkyl, alkoxy or substituted alkoxy, or thioalkoxy or substituted thioalkoxy; and,

a compound of formula (III):  (III), wherein in formula (III):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl,

substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl; and

R^{10} is H, halogen, CN, amidino, amido, carboxy, carboxamido, hydrazino, OH, alkyl or substituted alkyl, alkoxy or substituted alkoxy, or thioalkoxy or substituted thioalkoxy;

in the manufacture of an effective amount of a pharmaceutical composition for the prevention or the treatment of a breathing control disorder or disease in a subject in need thereof, wherein the breathing control disorder or disease is selected from the group consisting of respiratory depression, sleep apnea, apnea of prematurity, obesity-hypoventilation syndrome, primary alveolar hypoventilation syndrome, dyspnea, altitude sickness, hypoxia, hypercapnia, chronic obstructive pulmonary disease (COPD), sudden infant death syndrome (SIDS), congenital central hypoventilation syndrome, Alzheimer's disease, Parkinson's disease, stroke, Duchenne muscular dystrophy, and brain and spinal cord traumatic injury.

77. The use of claim 76, wherein the respiratory depression is caused by an anesthetic, a sedative, a sleeping aid, an anxiolytic agent, a hypnotic agent, alcohol or a narcotic.

78. The use of claim 76, wherein the subject is to be further administered at least one additional agent useful for treating the breathing disorder or disease.

79. The use of claim 78, wherein the at least one additional agent is selected from the group consisting of doxapram and enantiomers thereof, acetazolamide, almitrine, theophylline, caffeine, methylprogesterone and related compounds, sedatives that

increase arousal threshold in sleep disordered breathing patients, benzodiazepine receptor agonists, orexin antagonists, tricyclic antidepressants, serotonergic modulators, adenosine and adenosine receptor and nucleoside transporter modulators, cannabinoids, orexins, melatonin agonists, ampakines, sodium oxybate, modafinil, armodafinil, and inhaled therapeutics.

80. The use of claim 78, wherein the compound and the agent are to be separately administered to the subject.

81. The use of claim 78, wherein the compound and the agent are to be co-administered to the subject, further wherein the compound and the agent are physically mixed or physically separated prior to being administered to the subject.

82. The use of claim 76, wherein the subject is to be further administered at least one additional therapeutic agent known to change normal breathing control in the subject.

83. The use of claim 82, wherein at least one additional agent is selected from the group consisting of opioid narcotics, benzodiazepines, sedatives, sleeping aids, hypnotics, propofol, and any combinations thereof.

84. The use of claim 76, wherein the composition is to be administered in conjunction with the use of a mechanical ventilation device or positive airway pressure device on the subject.

85. The use of claim 76, wherein the subject is a mammal or bird.

86. The use of claim 85, wherein the mammal is a human.

87. The use of claim 76, wherein the composition is to be administered to the subject by a nasal, inhalational, topical, oral, buccal, rectal, pleural, peritoneal, vaginal, intramuscular, subcutaneous, transdermal, epidural, intratracheal, otic, intraocular, intrathecal or intravenous route.

88. The use of claim 87, wherein the composition is to be orally administered to the subject.

89. The use of claim 76, wherein the at least one compound is selected from the group consisting of:

N^2,N^6-Dimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^6,N^8-Tetra-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*i*-propyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dimethyl-N^4-*n*-propyl-N^8-prop-2-ynyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-(N-methoxy(N-methyl)amino)-N^4,N^8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidine;

N-(6-Chloro-4,8-*bis*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-O,N-dimethyl-hydroxylamine;

N^2,N^6-Bis-(N-Methoxy(N-methyl)amino)-N^4,N^8-bis-n-propylamino-pyrimido[5,4-d] pyrimidine hydrochloride;

N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

O,N-Dimethyl-N-(6-methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidin-2-yl)-hydroxylamine;

N^4,N^8-Dimethyl-N^2,N^6-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Trimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-methyl-N^4,N^8-di-*n*-propylpyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2-Diethyl-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-(4,8-Bis-*n*-propylamino-6-methylamino-pyrimido[5,4-d]pyrimidin-2-yl-amino)-ethanol;

N^2-(2-Methoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl- pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(2-Isopropoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^8-Methyl-N^4,N^6-di-*n*-propyl-N^2-(3,3,3-trifluoropropyl)-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(morpholin-4-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-pyrrolidin-1-yl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-methoxy-piperidin-1-yl)-pyrimido[5,4,-d]pyrimidine-2,4,8-triamine;

N^2-(3-Chloro-2-methyl-benzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(3,4-Dichlorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(4-Fluorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2,N^4,N^8-Tetramethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2-Diallyl-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-methyl-amino]-ethanol;

N^2-(2-Isopropoxy-ethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[N-(2-Dimethylamino-ethyl)-N-methyl]amino-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-4,6,8-triamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-(2-hydroxy-ethyl)-amino]-ethanol;

N^2,N^2-Bis-(2-methoxyethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-(4-Oxo-piperidin-1-yl)-N^4,N^8-dimethyl-N^2-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-(3-Trifluoromethyl-piperidin-1-yl)-N^4,N^8-dimethyl-6-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-6-*n*-Propylamino-N^4,N^8-dimethyl-2-(1,1-dioxo-thiomorpholin-4-yl)-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-*n*-Propyl-N^4,N^8-dimethyl-6-(4,4-difluoro-piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^6,N^8-Tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diisobutyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diallyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-Chloro-6-(N,N'-dimethyl-hydrazino)-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

6-(N,N'-Dimethyl-hydrazino)-N^2,N^2,N^4,N^8-tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-6-propoxy-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-propylsulfanyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Benzyloxy-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ol;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(aminomethyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Carbamoyl-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carboxylic acid;

N-(*n*-Propyl)-[4,8-bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl]-amidine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-*n*-Butyl-N^2-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methoxy-N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^2,N^4,N^6,N^8-Tetraethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

2,6-Dichloro-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

N^4,N^8-Diethyl-N^2,N^6-Di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-ethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^6-Diethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dicyclopropyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-

tetraamine;

N^2,N^2,N^6,N^6-Tetramethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^4,N^8-Diallyl-N^2,N^6-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^8-Triallyl-6-[4-(4-fluorobenzyl)-piperazin-1-yl]-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Chloro-N^2,N^4,N^8-triallyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^8-Triallyl-6-{4-[bis-(4-fluorophenyl)-methyl]-piperazin-1-yl}-pyrimido[5,4-d] pyrimidine-2,4,8-triamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid tert-butyl ester;

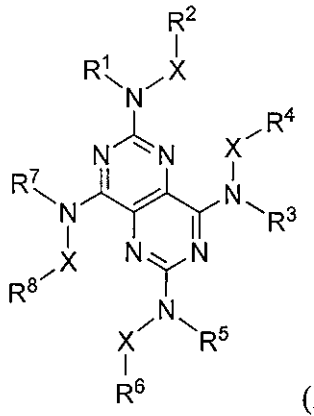
(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid;

N-*n*-Propyl-[2-(4,8-bis-methylamino-6-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)]-acetamide;

(6-Chloro-4,8-bis-methylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid ethyl ester; a salt thereof, and any combinations thereof.

90. The use of claim 76, wherein the salt is selected from the group consisting of sulfate, hydrogen sulfate, chloride, bromide, iodide, nitrate, carbonate, phosphate, hydrogen phosphate, dihydrogen phosphate, formate, acetate, propionate, succinate, glycolate, gluconate, lactate, malate, tartrate, citrate, ascorbate, glucuronate, maleate, fumarate, pyruvate, aspartate, glutamate, benzoate, anthranilate, 4-hydroxybenzoate, phenylacetate, mandelate, pamoate, methanesulfonate, ethanesulfonate, benzenesulfonate, pantothenate, trifluoromethanesulfonate, 2-hydroxyethanesulfonate, *p*-toluenesulfonate, sulfanilate, cyclohexylaminosulfonate, stearate, alginate, β-hydroxybutyrate, salicylate, galactarate, galacturonate, saccharin, saccharate, and glycerol-phosphonate.

91. The use of at least one pharmaceutically acceptable carrier and at least one compound or salt thereof selected from the group consisting of:

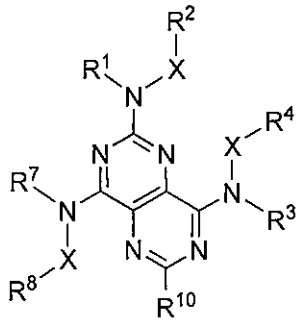
a compound of formula (I):  (I), wherein in formula (I):

R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O; and,

each occurrence of R^9 is independently alkyl or substituted alkyl;

a compound of formula (II):  (II), wherein in formula (II):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

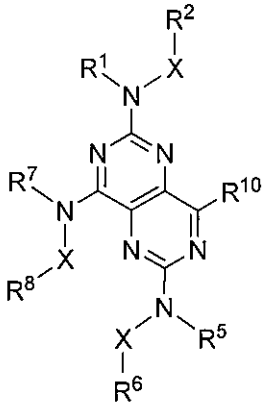
or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a

biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl;

R^{10} is H, halogen, cyano, alkyl, substituted alkyl, alkoxy or substituted alkoxy; and,

a compound of formula (III):  (III), wherein in formula (III):

R^1, R^2, R^3, R^4, R^7 and R^8 are independently H, alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, phenyl, substituted phenyl, phenylalkyl, substituted phenylalkyl, aryl, substituted aryl, arylalkyl, substituted arylalkyl, heteroarylalkyl, substituted heteroarylalkyl, heteroaryl or substituted heteroaryl;

or R^1 and R^2, R^3 and R^4, R^5 and R^6, or R^7 and R^8 independently combine as to form a biradical selected from the group consisting of 3-hydroxy-pentane-1,5-diyl, 6-hydroxy-cycloheptane-1,4-diyl, propane-1,3-diyl, butane-1,4-diyl and pentane-1,5-diyl;

each occurrence of X is independently selected from the group consisting of bond, NH, NR^9 and O;

each occurrence of R^9 is independently alkyl or substituted alkyl; and

R^{10} is H, halogen, cyano, alkyl, substituted alkyl, alkoxy or substituted alkoxy;

in the manufacture of an effective amount of a pharmaceutical composition for the prevention of the destabilization or for the stabilization of breathing rhythm in a subject in need thereof, wherein the destabilization is associated with a breathing control disorder or disease selected from the group consisting of respiratory depression, sleep apnea, apnea of

prematurity, obesity-hypoventilation syndrome, primary alveolar hypoventilation syndrome, dyspnea, altitude sickness, hypoxia, hypercapnia, chronic obstructive pulmonary disease (COPD), sudden infant death syndrome (SIDS), congenital central hypoventilation syndrome, Alzheimer's disease, Parkinson's disease, stroke, Duchenne muscular dystrophy, and brain and spinal cord traumatic injury.

92. The use of claim 91, wherein the respiratory depression is caused by an anesthetic, a sedative, a sleeping aid, an anxiolytic agent, a hypnotic agent, alcohol or a narcotic.

93. The use of claim 91, wherein the subject is to be further administered at least one additional agent useful for treating the breathing disorder or disease.

94. The use of claim 93, wherein the at least one additional agent is selected from the group consisting of doxapram and enantiomers thereof, acetazolamide, almitrine, theophylline, caffeine, methylprogesterone and related compounds, sedatives that increase arousal threshold in sleep disordered breathing patients, benzodiazepine receptor agonists, orexin antagonists, tricyclic antidepressants, serotonergic modulators, adenosine and adenosine receptor and nucleoside transporter modulators, cannabinoids, orexins, melatonin agonists, ampakines, sodium oxybate, modafinil, armodafinil, and inhaled therapeutics.

95. The use of claim 93, wherein the compound and the agent are to be separately administered to the subject.

96. The use of claim 93, wherein the compound and the agent are to be co-administered to the subject, further wherein the compound and the agent are physically mixed or physically separated prior to being administered to the subject.

97. The use of claim 91, wherein the subject is to be further administered at least one additional therapeutic agent known to change normal breathing control in the subject

98. The use of claim 97, wherein at least one additional agent is selected

from the group consisting of opioid narcotics, benzodiazepines, sedatives, sleeping aids, hypnotics, propofol, and any combinations thereof.

99. The use of claim 91, wherein the composition is to be administered in conjunction with the use of a mechanical ventilation device or positive airway pressure device on the subject.

100. The use of claim 91, wherein the subject is a mammal or bird.

101. The use of claim 100, wherein the mammal is a human.

102. The use of claim 91, wherein the composition is to be administered to the subject by a nasal, inhalational, topical, oral, buccal, rectal, pleural, peritoneal, vaginal, intramuscular, subcutaneous, transdermal, epidural, intratracheal, otic, intraocular, intrathecal or intravenous route.

103. The use of claim 102, wherein the composition is to be orally administered to the subject.

104. The use of claim 91, wherein the at least one compound is selected from the group consisting of:

N^2,N^6-Dimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^6,N^8-Tetra-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*i*-propyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dimethyl-N^4-*n*-propyl-N^8-prop-2-ynyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-(N-methoxy(N-methyl)amino)-N^4,N^8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidine;

N-(6-Chloro-4,8-*bis*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-O,N-dimethyl-hydroxylamine;

N^2,N^6-Bis-(N-Methoxy(N-methyl)amino)-N^4,N^8-bis-n-propylamino-pyrimido[5,4-d] pyrimidine hydrochloride;

N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

O,N-Dimethyl-N-(6-methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d] pyrimidin-2-yl)-hydroxylamine;

N^4,N^8-Dimethyl-N^2,N^6-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Trimethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-methyl-N^4,N^8-di-*n*-propylpyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2-Diethyl-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-(4,8-Bis-*n*-propylamino-6-methylamino-pyrimido[5,4-d]pyrimidin-2-yl-amino)-ethanol;

N^2-(2-Methoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl- pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(2-Isopropoxy-ethyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^8-Methyl-N^4,N^6-di-*n*-propyl-N^2-(3,3,3-trifluoropropyl)-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(morpholin-4-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-pyrrolidin-1-yl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-methoxy-piperidin-1-yl)-pyrimido[5,4,-d]pyrimidine-2,4,8-triamine;

N^2-(3-Chloro-2-methyl-benzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(3,4-Dichlorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2-(4-Fluorobenzyl)-N^6-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^2,N^4,N^8-Tetramethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2-Diallyl-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-methyl-amino]-ethanol;

N^2-(2-Isopropoxy-ethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-[N-(2-Dimethylamino-ethyl)-N-methyl]amino-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-4,6,8-triamine;

2-[(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl)-(2-hydroxy-ethyl)-amino]-ethanol;

N^2,N^2-Bis-(2-methoxyethyl)-N^4,N^8-dimethyl-N^6-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-(4-Oxo-piperidin-1-yl)-N^4,N^8-dimethyl-N^2-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-(3-Trifluoromethyl-piperidin-1-yl)-N^4,N^8-dimethyl-6-*n*-propylamino-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-6-*n*-Propylamino-N^4,N^8-dimethyl-2-(1,1-dioxo-thiomorpholin-4-yl)-pyrimido-[5,4-d]pyrimidine-2,4,8-triamine;

N^2-*n*-Propyl-N^4,N^8-dimethyl-6-(4,4-difluoro-piperidin-1-yl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^6,N^8-Tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Di-*n*-butyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diisobutyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diallyl-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

2-Chloro-6-(N,N'-dimethyl-hydrazino)-N^4,N^8-dimethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

6-(N,N'-Dimethyl-hydrazino)-N^2,N^2,N^4,N^8-tetramethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-6-propoxy-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-propylsulfanyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Benzyloxy-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ol;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(aminomethyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Carbamoyl-N^4,N^8-dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carboxylic acid;

N-(*n*-Propyl)-[4,8-bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-yl]-amidine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2-Methyl-N^4,N^8-di-*n*-propyl-6-(4-fluorophenyl)-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^4,N^8-Dimethyl-N^2-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-*n*-Butyl-N^2-methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methoxy-N^2-Methyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Methylamino-4,8-bis-*n*-propylamino-pyrimido[5,4-d]pyrimidine-2-carbonitrile;

N^2,N^4,N^6,N^8-Tetraethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine

2,6-Dichloro-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-4,8-diamine;

N^4,N^8-Diethyl-N^2,N^6-Di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-diethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Diethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

6-Chloro-N^2-ethyl-N^4,N^8-bis-cyclopropylmethyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^6-Diethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Dicyclopropyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^6-Bis-cyclopropylmethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^2,N^6,N^6-Tetramethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^4,N^8-Diallyl-N^2,N^6-dimethyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

N^2,N^4,N^8-Triallyl-6-[4-(4-fluorobenzyl)-piperazin-1-yl]-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

6-Chloro-N^2,N^4,N^8-triallyl-pyrimido[5,4-d]pyrimidine-2,4,8-triamine;

N^2,N^4,N^8-Triallyl-6-{4-[bis-(4-fluorophenyl)-methyl]-piperazin-1-yl}-pyrimido[5,4-d] pyrimidine-2,4,8-triamine;

N^2,N^2,N^6-Triethyl-N^4,N^8-di-*n*-propyl-pyrimido[5,4-d]pyrimidine-2,4,6,8-tetraamine;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid tert-butyl ester;

(4,8-Bis-methylamino-6-*n*-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid;

N-*n*-Propyl-[2-(4,8-bis-methylamino-6-propylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)]-acetamide;

(6-Chloro-4,8-bis-methylamino-pyrimido[5,4-d]pyrimidin-2-ylamino)-acetic acid ethyl ester;

a salt thereof, and any combinations thereof.

105. The use of claim 91, wherein the salt is selected from the group consisting of sulfate, hydrogen sulfate, chloride, bromide, iodide, nitrate, carbonate, phosphate, hydrogen phosphate, dihydrogen phosphate, formate, acetate, propionate, succinate, glycolate, gluconate, lactate, malate, tartrate, citrate, ascorbate, glucuronate, maleate, fumarate, pyruvate, aspartate, glutamate, benzoate, anthranilate, 4-hydroxybenzoate, phenylacetate, mandelate, pamoate, methanesulfonate, ethanesulfonate, benzenesulfonate, pantothenate, trifluoromethanesulfonate, 2-hydroxyethanesulfonate, *p*-toluenesulfonate, sulfanilate, cyclohexylaminosulfonate, stearate, alginate, β-hydroxy-butyrate, salicylate, galactarate, galacturonate, saccharin, saccharate, and glycerol-phosphonate.