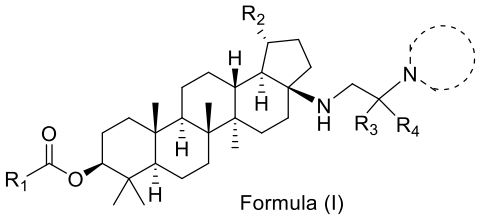
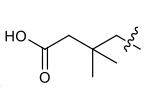
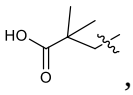
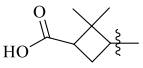
CLAIMS

1. A compound of the formula (I):



Formula (I)

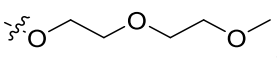
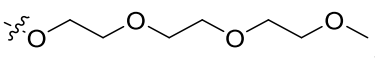
wherein,

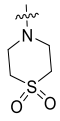
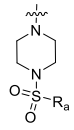
R_1 is selected from , , or ;

R_2 is selected from C_1-C_6 alkyl, optionally substituted C_2-C_6 alkenyl, or optionally substituted C_3-C_8 cycloalkyl; wherein the optional substituent is C_1-C_6 alkyl;

R_3 is hydrogen;

R_4 is selected from optionally substituted C_1-C_6 alkyl, or -C(O)OR_a; wherein C_1-C_6 alkyl is ethyl and the optional substituent is selected from halo, hydroxy, alkoxy, or -OC(O)CH_2alkoxy;

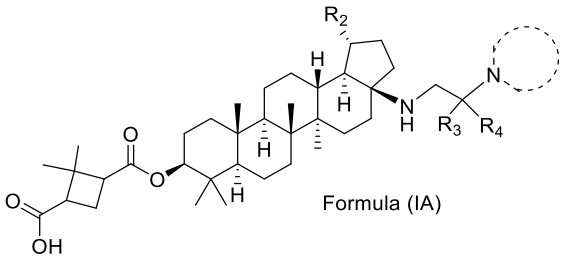
wherein "alkoxy" refers to a straight or branched hydrocarbon chain with oxygen radical consisting carbon and hydrogen atoms, containing saturation or unsaturation, having from one to eight carbon atoms, and which is attached through oxygen atom to the rest of the molecule by a single bond; and one of the hydrogen atoms in the alkoxy group may be further substituted by one or more alkoxy groups to further increase the alkoxy chain length with a group selected from methyloxy, ethyloxy, isopropoxy, n-propyloxy, t-butyloxy, 1-methylethyloxy (isopropyloxy), n-butyloxy, n-pentyloxy, 1,1-dimethylethyloxy (t-butyloxy), , , or ;

ring  is , or ; and

R_a is hydrogen, or C_1-C_6 alkyl, or

pharmaceutically acceptable salts, pharmaceutically acceptable stereoisomers, or combination thereof.

2. The compound according to claim 1, which is a compound of the formula (IA):



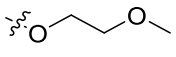
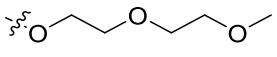
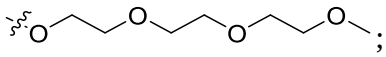
Formula (IA)

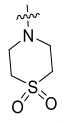
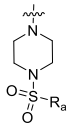
wherein,

R_2 is  , , or .

R_3 is hydrogen;

R_4 is selected from optionally substituted C_1-C_6 alkyl, or -C(O)OR_a; wherein C_1-C_6 alkyl is ethyl and the optional substituent is selected from halo, hydroxy, alkoxy, or -OC(O)CH_2alkoxy;

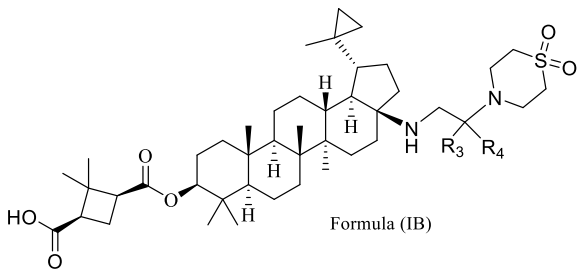
wherein "alkoxy" refers to a straight or branched hydrocarbon chain with oxygen radical consisting carbon and hydrogen atoms, containing saturation or unsaturation, having from one to eight carbon atoms, and which is attached through oxygen atom to the rest of the molecule by a single bond; and one of the hydrogen atoms in the alkoxy group may be further substituted by one or more alkoxy groups to further increase the alkoxy chain length with a group selected from methyloxy, ethyloxy, isopropoxy, n-propyloxy, t-butyloxy, 1-methylethyloxy (isopropyloxy), n-butyloxy, n-pentyloxy, 1,1-dimethylethyloxy (t-butyloxy), , , or ;

ring  is , or ; and

R_a is hydrogen, or C_1-C_6 alkyl, or

pharmaceutically acceptable salts, pharmaceutically acceptable stereoisomers, or combination thereof.

3. The compound according to claim 1, which is a compound of the formula (IB):

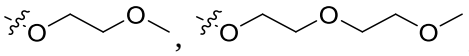
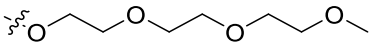


Formula (IB)

wherein,

R_3 is hydrogen;

R_4 is selected from optionally substituted C_1-C_6 alkyl, or -C(O)OR_a; wherein C_1-C_6 alkyl is ethyl and the optional substituent is selected from halo, hydroxy, alkoxy, or -OC(O)CH_2alkoxy;

wherein "alkoxy" refers to a straight or branched hydrocarbon chain with oxygen radical consisting carbon and hydrogen atoms, containing saturation or unsaturation, having from one to eight carbon atoms, and which is attached through oxygen atom to the rest of the molecule by a single bond; and one of the hydrogen atoms in the alkoxy group may be further substituted by one or more alkoxy groups to further increase the alkoxy chain length with a group selected from methyloxy, ethyloxy, isopropoxy, n-propyloxy, t-butyloxy, 1-methylethyloxy (isopropyloxy), n-butyloxy, n-pentyloxy, 1,1-dimethylethyloxy (t-butyloxy), , , or ; and

R_a is hydrogen, or C_1-C_6 alkyl, or

pharmaceutically acceptable salts, pharmaceutically acceptable stereoisomers, or combination thereof.

4. The compound according to claim 1, selected from the group consisting of:

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3R)-2-(1,1-dioxidothiomorpholino)-3-hydroxybutyl)amino)-5a,5b,8,8,11a-pentamethyl-1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy) carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3S)-2-(1,1-dioxidothiomorpholino)-3-fluorobutyl)amino)-5a,5b,8,8,11a-pentamethyl -1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-di methylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2S,3S)-2-(1,1-dioxidothiomorpholino)-3-hydroxybutyl)amino)-5a,5b,8,8,11a-penta methyl-1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3R)-3-hydroxy-2-(4-(isopropylsulfonyl)piperazin-1-yl)butyl)amino)-5a,5b,8,8,11a-pentamethyl-1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy) carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3R)-2-(1,1-dioxidothiomorpholino)-3-hydroxybutyl)amino)-5a,5b,8,8,11a-penta methyl-1-(prop-1-en-2-yl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((R)-2-carboxy-2-(1,1-dioxidothiomorpholino)ethyl)amino)-5a,5b,8,8,11a-pentamethyl-1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3R)-2-(1,1-dioxidothiomorpholino)-3-(2-(2-methoxyethoxy)acetoxy)butyl)amino)-5a,5b,8,8,11a-pentamethyl-1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((12R,13R)-13-(1,1-dioxidothiomorpholino)-12-methyl-2,5,8,11-tetraoxatetradecan-14-yl)amino)-5a,5b,8,8,11a-pentamethyl-1-(1-methylcyclopropyl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3R)-2-(1,1-dioxidothiomorpholino)-3-(2-(2-methoxyethoxy)acetoxy)butyl)amino)-5a,5b,8,8,11a-pentamethyl-1-(prop-1-en-2-yl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid,

4-(((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((2R,3R)-2-(1,1-dioxidothiomorpholino)-3-hydroxybutyl)amino)-5a,5b,8,8,11a-pentamethyl-1-(prop-1-en-2-yl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)-2,2-dimethyl-4-oxobutanoic acid,

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((15R,16R)-16-(1,1-dioxidothiomorpholino)-15-methyl-13-oxo-2,5,8,11,14-pentaoxaheptadecan-17-yl)amino)-5a,5b,8,8,11a-pentamethyl-1-(prop-1-en-2-yl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid, and

(1R,3S)-3-((((1R,3aS,5aR,5bR,7aR,9S,11aR,11bR,13aR,13bR)-3a-(((12R,13R)-13-(1,1-dioxidothiomorpholino)-12-methyl-2,5,8,11-tetraoxatetradecan-14-yl)amino)-5a,5b,8,8,11a-pentamethyl-1-(prop-1-en-2-yl)icosahydro-1H-cyclopenta[a]chrysen-9-yl)oxy)carbonyl)-2,2-dimethylcyclobutane-1-carboxylic acid, or

pharmaceutically acceptable salts, pharmaceutically acceptable stereoisomers, or combination thereof.

5. A pharmaceutical composition comprising a compound according to any one of claims 1-4 and at least one pharmaceutically acceptable excipient.

6. The pharmaceutical composition according to claim 5, wherein the pharmaceutically acceptable excipient is a carrier or diluent.

7. A compound according to any one of claims 1-4, or a composition according to any one of claims 5-6, for use in the prevention, amelioration or treatment of a viral mediated disease, disorder or syndrome in a subject in need thereof.

8. A compound according to any one of claims 1-4, or a composition according to any one of claims 5-6, for use in the prevention, amelioration or treatment of a viral mediated disease, disorder or syndrome in a subject in need thereof, wherein the viral mediated disease, disorder or syndrome is HIV infection, HBV infection, HCV infection, a retroviral infection genetically related to AIDS, respiratory disorders (including adult respiratory distress syndrome (ARDS)), inflammatory disease, or a combination thereof.

9. Use of a compound according to any one of claims 1-4, or a composition according to any one of claims 5-6, in the manufacture of a medicament for the treatment of HIV infection in a subject in need thereof, wherein the medicament is to be administered to the subject.

10. Use of a compound according to any one of claims 1-4, or a composition according to any one of claims 5-6, in the manufacture of a medicament for the treatment of a viral mediated disease, disorder or syndrome in a subject in need thereof, wherein the medicament is to be administered to the subject.

11. The use according to claim 10, wherein the viral mediated disease, disorder or syndrome is HIV infection, HBV infection, HCV infection, a retroviral infection genetically related to AIDS, respiratory disorders (including adult respiratory distress syndrome (ARDS)), inflammatory disease, or a combination thereof.