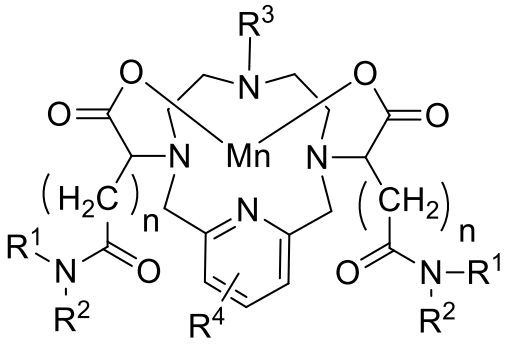
Claims

(1) A compound of Formula I:



(I)

or a salt or solvate thereof, wherein:

each R^1 is independently selected from the group comprising C_{1-20} hydroxyalkyl, C_{1-6} alkyl, C_{3-6} aryl optionally-substituted with one or more substituents selected from halo and –C(=O)-NH-C_{1-6} hydroxyalkyl, or a carbohydrate moiety;

each R^2 is independently selected from the group comprising C_{1-20} hydroxyalkyl, C_{1-6} alkyl or hydrogen;

R^3 is selected from the group comprising C_{1-3} alkyl or $–(CH_2)_m$-C(=O)-NR^5R^6 wherein m is an integer from 2-5, and R^5 and R^6 are as respectively defined for R^1 and R^2;

R^4 represents 0-3 substituents selected from the group comprising hydroxy, C_{1-6} alkyl and C_{1-6} hydroxyalkyl; and,

each n is an integer from 0-4;

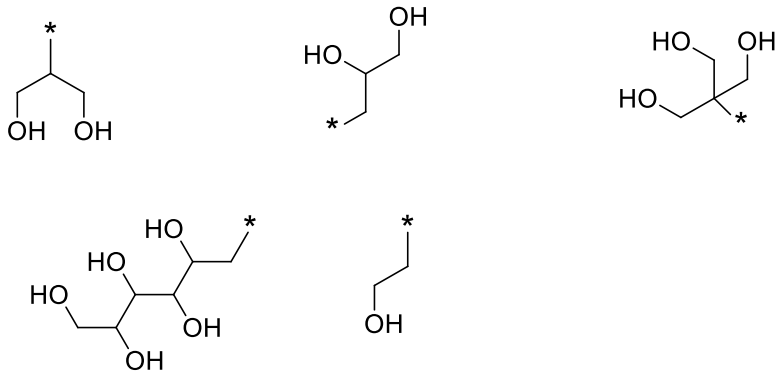
and wherein the compound of Formula I comprises at least two hydroxy groups.

(2) The compound as defined in Claim 1 wherein each R^1 is C_{1-12} hydroxyalkyl.

(3) The compound as defined in either Claim 1 or Claim 2 wherein each R^1 is C_{3-6} hydroxyalkyl.

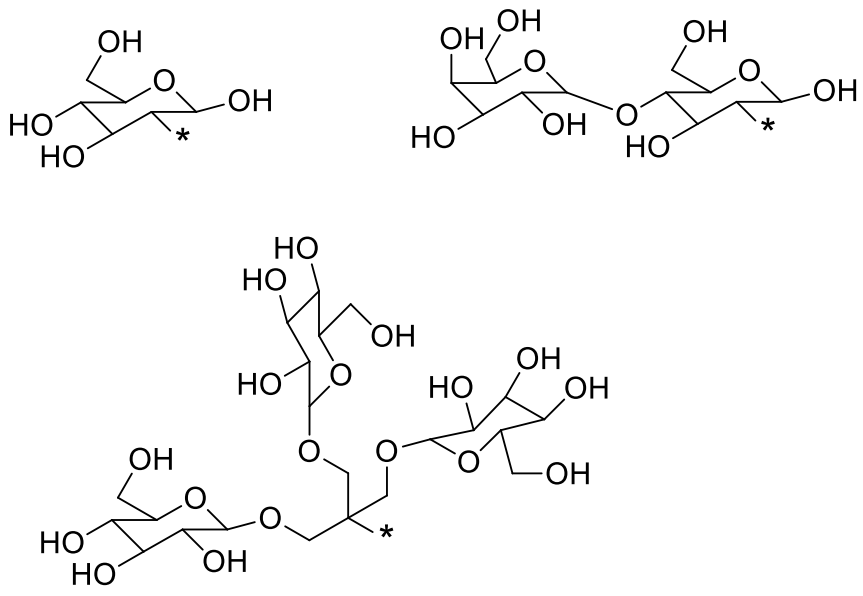
(4) The compound as defined in any one of Claims 1-3 wherein each R^1 is C_6 hydroxyalkyl.

(5) The compound as defined in any one of Claims 1-3 wherein each R^1 is independently selected from the group comprising:



wherein in each case the asterisk denotes the point of attachment to the rest of the compound of Formula I.

(6) The compound as defined in Claim 1 wherein each R^1 is independently selected from the group comprising:



wherein in each case the asterisk denotes the point of attachment to the rest of the compound of Formula I.

(7) The compound as defined in Claim 1 wherein each R^1 is a C_{3-6} aryl

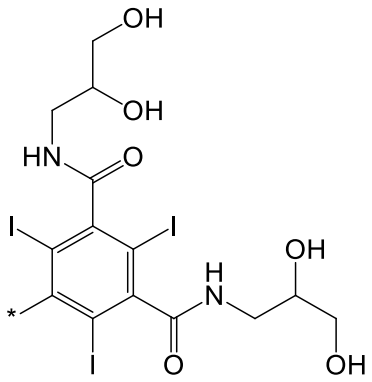
substituted with one or more substituents selected from halo and –C(=O)-NH-C_{1-6} hydroxyalkyl.

(8) The compound as defined in Claim 7 wherein said C_{3-6} aryl is phenyl.

(9) The compound as defined in Claim 7 or Claim 8 wherein said halo is iodo.

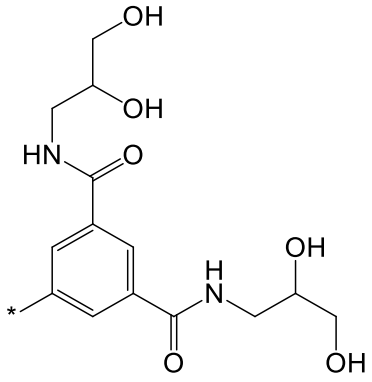
(10) The compound as defined in any one of Claims 7-9 wherein said –C(=O)-NH-C_{1-6} hydroxyalkyl is –C(=O)-NH-CH_2-C(OH)-CH_2-C(OH).

(11) The compound as defined in any one of Claims 7-10 wherein each R^1 is:



wherein the asterisk denotes the point of attachment to the rest of the compound of Formula I.

(12) The compound as defined in any one of Claims 7-10 wherein each R^1 is:



wherein the asterisk denotes the point of attachment to the rest of the compound of Formula I.

(13) The compound as defined in any one of Claims 1-12 wherein each R^1 is the same.

(14) The compound as defined in any one of Claims 1-13 wherein each R^2 is C_{1-3} alkyl.

(15) The compound as defined in Claim 14 wherein each R^2 is methyl.

(16) The compound as defined in any one of Claims 1-13 wherein each R^2 is hydrogen.

(17) The compound as defined in any one of Claims 1-13 wherein each R^2 is C_{1-20} hydroxyalkyl.

(18) The compound as defined in Claim 17 wherein each R^2 is C_{1-6} hydroxyalkyl.

(19) The compound as defined in Claim 18 wherein each R^1 is C_{1-6} hydroxyalkyl.

(20) The compound as defined in any one of Claims 1-19 wherein each R^2 is the same.

(21) The compound as defined in any one of Claims 1-20 wherein each n is an integer from 1-3.

(22) The compound as defined in Claim 21 wherein each n is 1.

(23) The compound as defined in Claim 21 wherein each n is 2.

(24) The compound as defined in Claim 21 wherein each n is 3.

(25) The compound as defined in any one of Claims 1-24 wherein R^3 is C_{1-3} alkyl.

(26) The compound as defined in Claim25 wherein R^3 is methyl.

(27) The compound as defined in any one of Claims 1-24 wherein R^3 is $–(CH_2)_m-C(=O)-NR^5R^6$ as defined in Claim 1.

(28) The compound as defined in Claim 27 wherein R^5 is as defined for R^1 in any one of Claims 2-12.

(29) The compound as defined in either Claim 27 or Claim 28 wherein R^6 is as defined for R^2 in any one of Claims 14-18.

(30) The compound as defined in any one of Claims 27-29 wherein m is 3.

(31) The compound as defined in Claim 30 wherein n is 2.

(32) The compound as defined in any one of Claims 1-31 wherein R^4 represents 0 substituents.

(33) The compound as defined in any one of Claims 1-31 wherein R^4 represents 1 or 2 hydroxy groups.

(34) The compound as defined in Claim 33 wherein R^4 represents 2 hydroxy groups at the meta positions of the pyridyl ring.

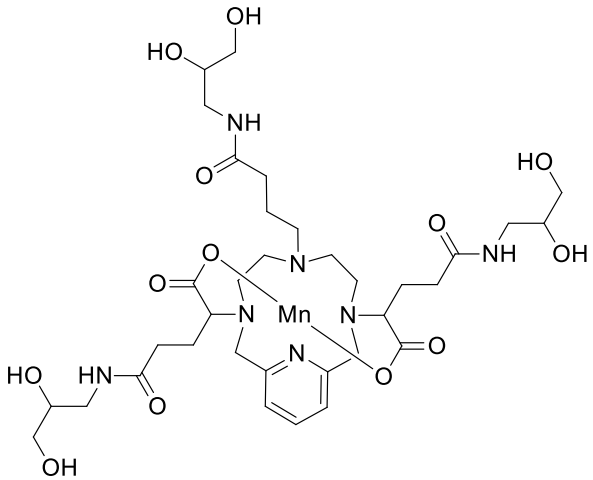
(35) The compound as defined in any one of Claims 1-34 which comprises at least 4 hydroxy groups.

(36) The compound as defined in Claim 35 which comprises 4-15 hydroxy groups.

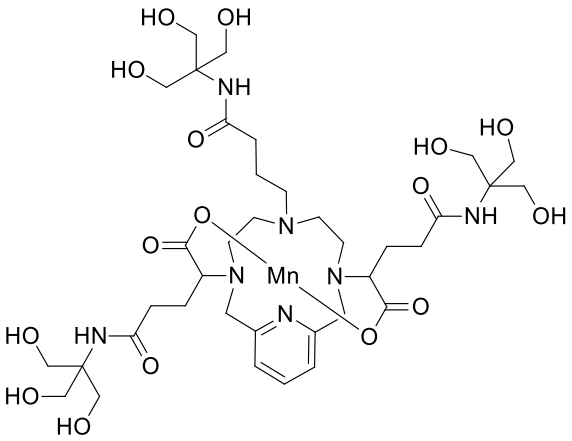
(37) The compound as defined in Claim 36 which comprises 5-10 hydroxy groups.

(38) The compound as defined in any one of Claims 1-37 wherein said Mn is an enriched isotope of Mn selected from the group comprising ^{52}Mn and ^{54}Mn.

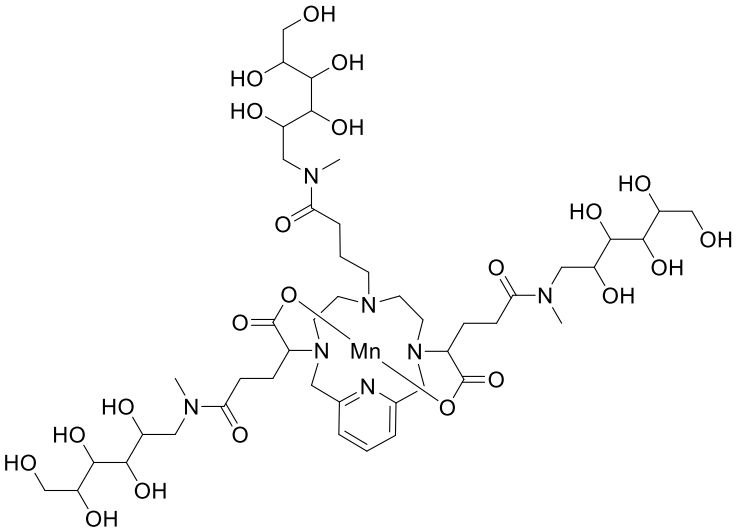
(39) The compound as defined in Claim 1 which is selected from any one of the following compounds:



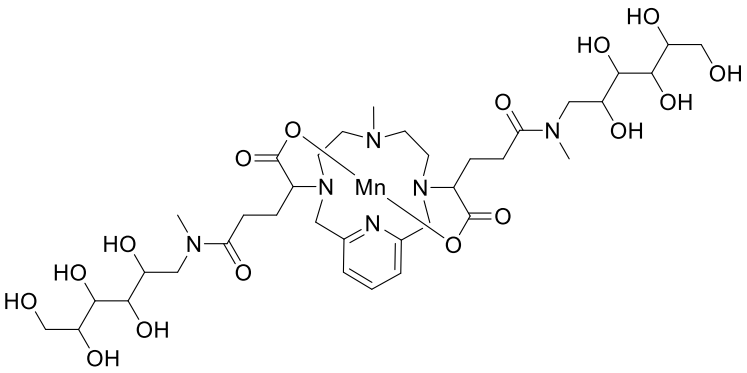
Mn Chelate 1 Racemate



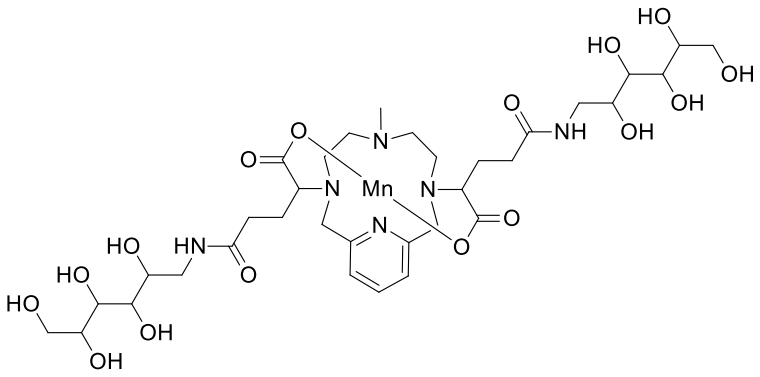
Mn Chelate 2 Racemate



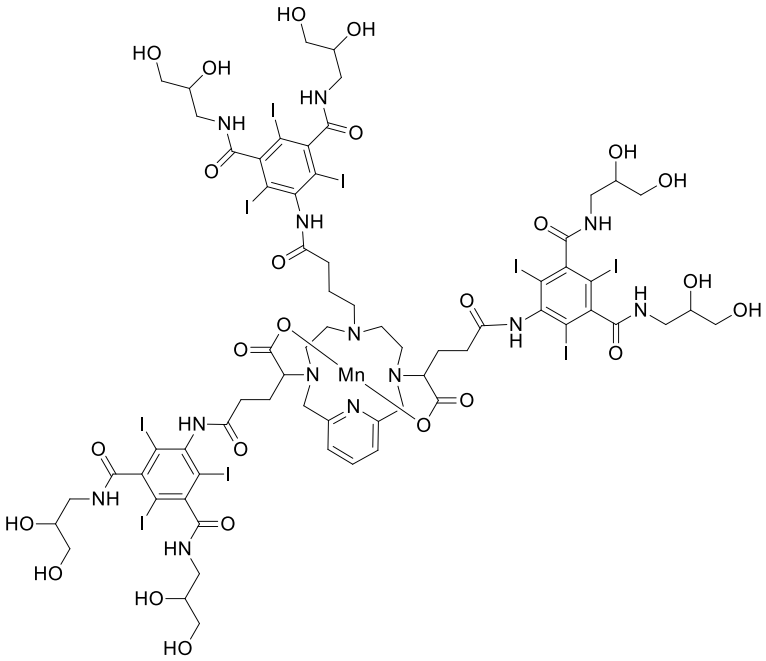
Mn Chelate 3 Racemate



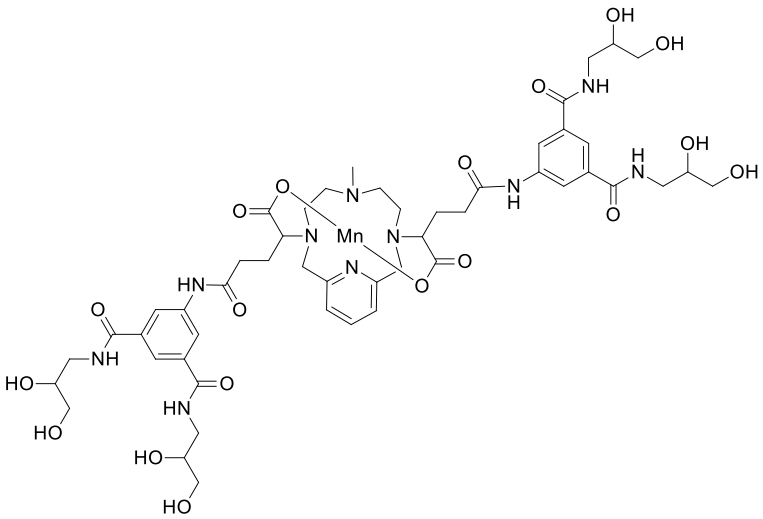
Mn Chelate 4 Racemate



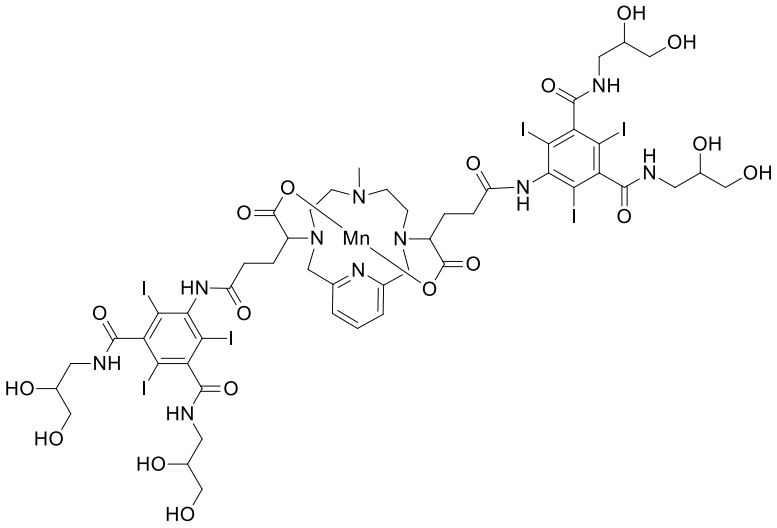
Mn Chelate 5 Racemate



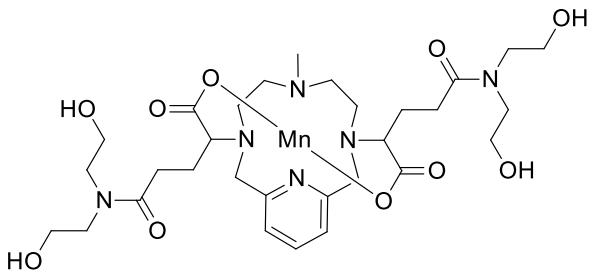
Mn Chelate 6 Racemate



Mn Chelate 7 Racemate

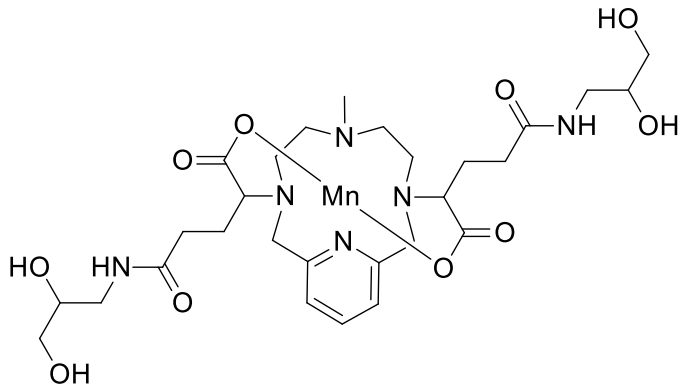


Mn Chelate 8 Racemate

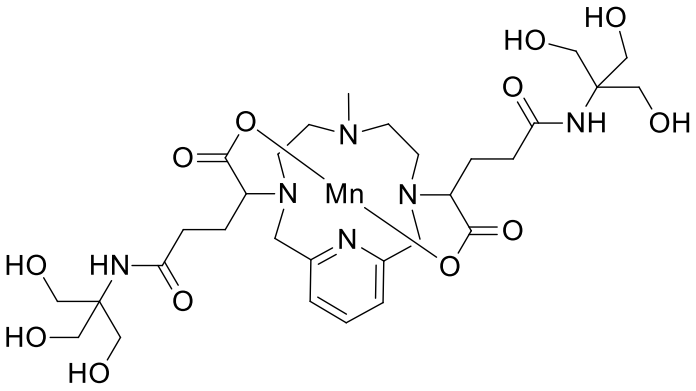


Mn Chelate 9 Racemate

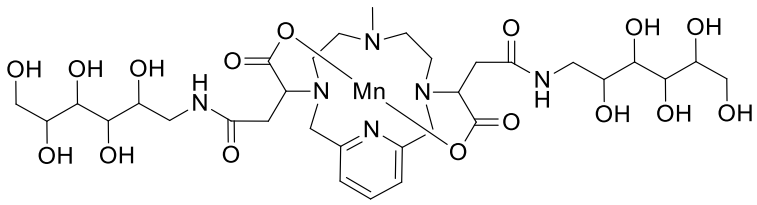
5



Mn Chelate 10 Racemate



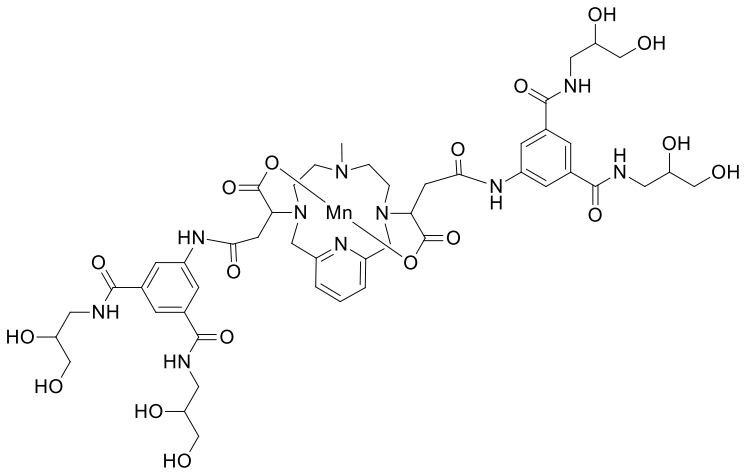
Mn Chelate 11 Racemate



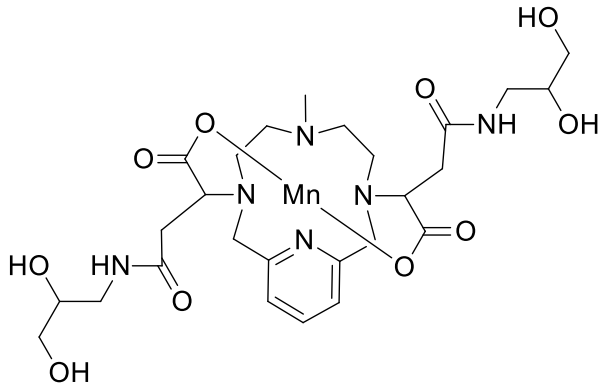
Mn Chelate 5a

Racemate

5



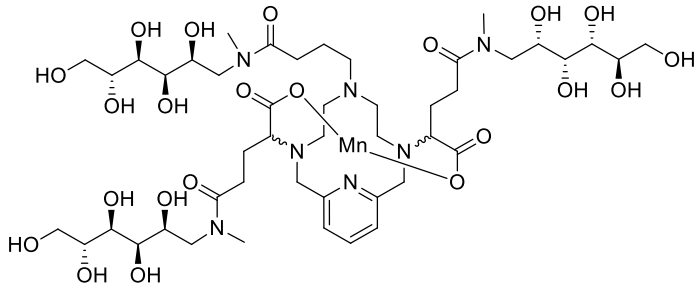
Mn Chelate 7a Racemate



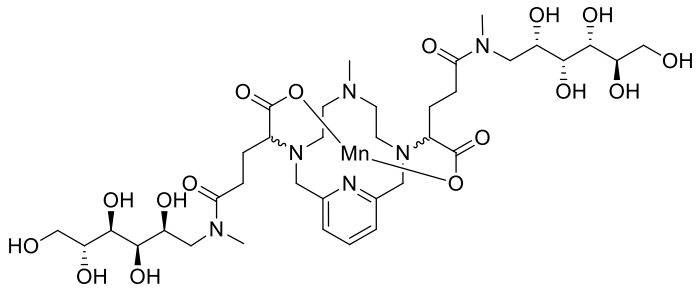
Mn Chelate 10a Racemate

(40) The compound of Formula I as defined in any one of Claims 1-39 which is diastereomerically pure.

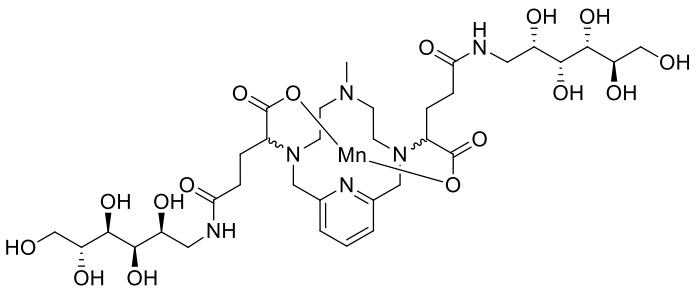
(41) The compound as defined in Claim 40 which is selected from any one of the following compounds:



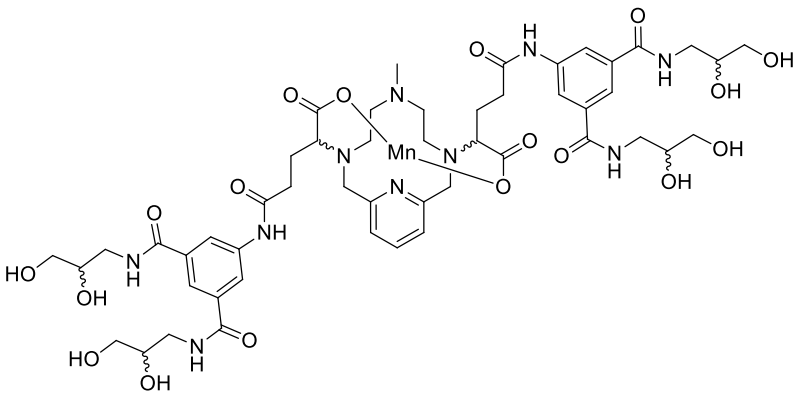
Mn Chelate 3



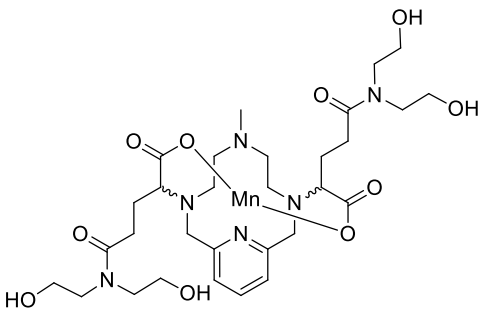
Mn Chelate 4



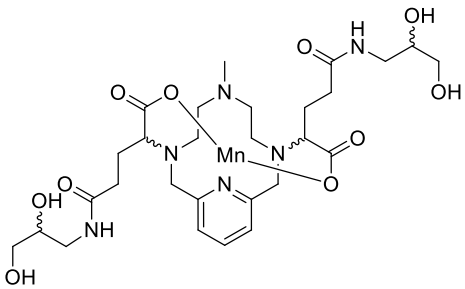
Mn Chelate 5



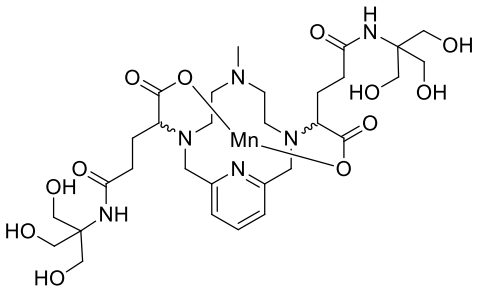
Mn Chelate 7



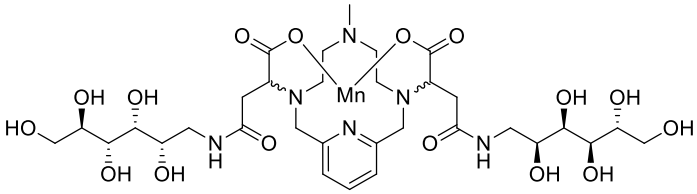
Mn Chelate 9



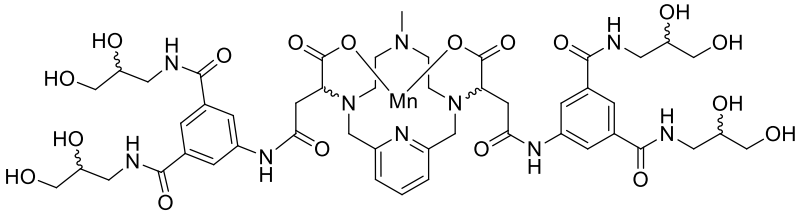
Mn Chelate 10



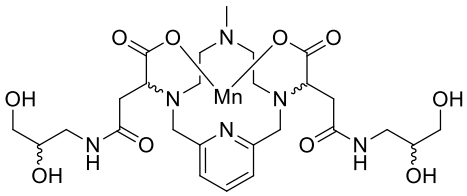
Mn Chelate 11



Mn Chelate 5a

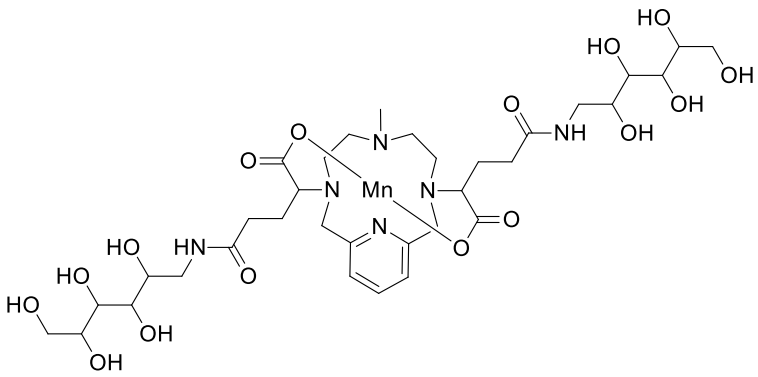


Mn Chelate 7a



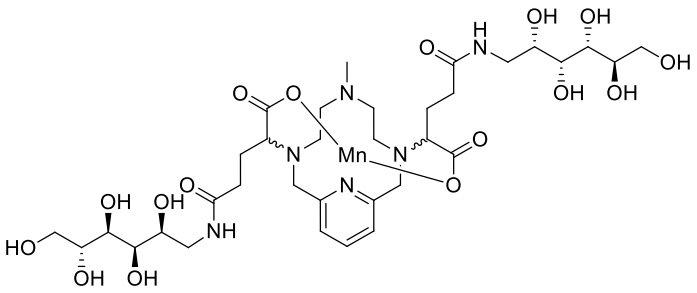
Mn Chelate 10a

(42) The compound as defined in claim 1, wherein said compound is



Mn Chelate 5 Racemate.

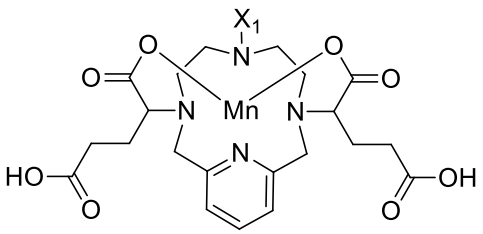
(43) The compound as defined in claim 1, wherein said compound is



Mn Chelate 5.

(44) A method for the preparation of a compound of Formula I as defined in any one of Claims 1-43 comprising:

(i) activating the carboxylate groups of a compound of Formula II with a peptide reagent

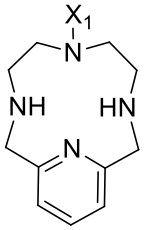


(II); then,

(ii) coupling said activated compound of Formula II with an amine derivative of substituent -NR^1R^2 to arrive at said compound of Formula I wherein R^1 and R^2 are as defined in Claim 1.

(45) The method as defined in Claim 44 wherein said peptide reagent is selected from 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide (EDCI) or hydroxybenzotriazole (HOBT).

(46) A method for the preparation of a compound of Formula II as defined in Claim 44 comprising alkylation of a compound of Formula III:



(III)

wherein X_1 is methyl or $–(CH_2)_3$-COOH

(47) A pharmaceutical composition comprising the compound of Formula I as

defined in any one of Claims 1-43 together with a biocompatible carrier in a form suitable for mammalian administration.

(48) The pharmaceutical composition as defined in Claim 47 further comprising one or more pharmaceutically-acceptable excipients.

(49) The pharmaceutical composition as defined in Claim 48 wherein said pharmaceutically-acceptable excipients are selected from buffering agents, stabilizers, antioxidants, osmolality adjusting agents, pH adjusting agents, excess cheland and weak complexes of physiologically tolerable ions.

(50) A method comprising:

(i) administration to a subject of the compound of Formula I as defined in any one of Claims 1-43 or the pharmaceutical composition as defined in any one of Claims 47-49;

(ii) detection of magnetic resonance (MR) signals from said subject or parts of said subject in which said compound has distributed;

(iii) generation of MR images and/or MR spectra from said detected signals.

(51) The compound of Formula I as defined in any one of Claims 1-43 for use in the method as defined in Claim 50.