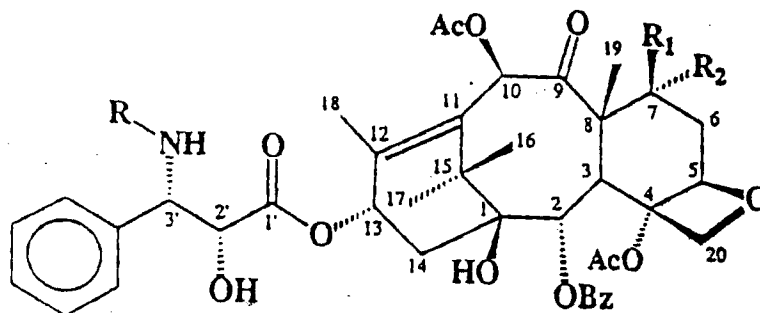


We claim:

1. A compound of the formula:

5



10

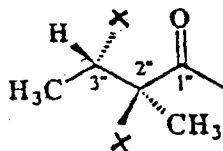
wherein R, R<sub>1</sub> and R<sub>2</sub> are selected from:

(2''R, 3''S)-dihalocephalomannine

(I)

15

R=



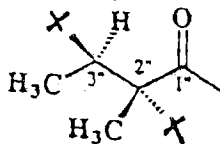
R<sub>1</sub>=OH R<sub>2</sub>=H;

(2''S, 3''R)-dihalocephalomannine

(II)

20

R=



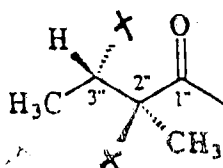
R<sub>1</sub>=OH R<sub>2</sub>=H;

(2''R, 3''S)-dihalo-7-epi-cephalomannine

(III)

25

R=

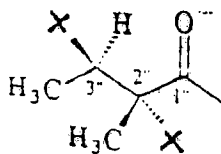


R<sub>1</sub>=H R<sub>2</sub>=OH;

(2''S, 3''R)-dihalo-7-epi-cephalomannine

(IV)

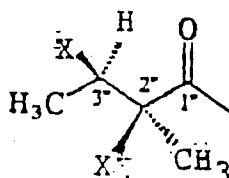
R=



R<sub>1</sub>=H R<sub>2</sub>=OH;

30 (2''S, 3''S)-dihalocephalomannine

R=



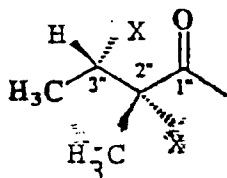
R<sub>1</sub>=OH R<sub>2</sub>=H;

- 82 -

(2"*R*, 3"*R*)-dihalocephalomannine

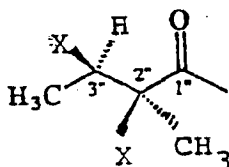
5

R=

 $R_1=OH$   $R_2=H$ ;(2"*S*, 3"*S*)-dihalo-7-epi-cephalomannine

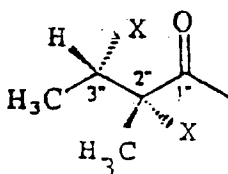
10

R=

 $R_1=H$   $R_2=OH$ ; or(2"*R*, 3"*R*)-dihalo-7-epi-cephalomannine

15

R=

 $R_1=H$   $R_2=OH$ ; and

X is halogen.

20

2. A pharmaceutical formulation which comprises a compound according to claim 1, or a pharmaceutically acceptable salt thereof, associated with one or more pharmaceutically acceptable carriers, excipients or diluents therefor.

3. Use of a compound according to claim 1 for treating animal or human tumors.

30

4. A method for the production of dihalocephalomannine and/or dihalo-7-epi-cephalomannine comprising halogenating cephalomannine and/or 7-epi-cephalomannine under conditions effective to selectively

- 83 -

halogenate the 2", 3" unsaturated side chain portion of cephalomannine and/or 7-epi-cephalomannine to produce 2", 3"-dihalocephalomannine and/or dihalo-7-epi-cephalomannine.

5

5. The method of claim 4 wherein the cephalomannine and/or 7-epi-cephalomannine is present in any amount in a mixture comprising paclitaxel and other taxane ring-containing compounds, and the resulting 2", 3"-dihalocephalomannine is then separated from the mixture.

6. The method of claim 5 wherein the halogenation reaction is carried out in the dark at a temperature range of between -20°C to 20°C.

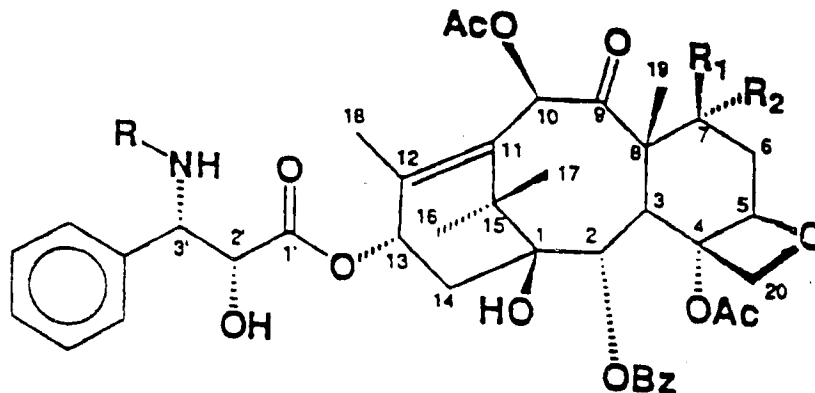
7. The method of claim 6 wherein the temperature range is between -5°C to 5°C.

8. The method of claim 7, wherein the halogenation reaction is carried out using a stoichiometric amount of halogen, relative to cephalomannine concentration.

25

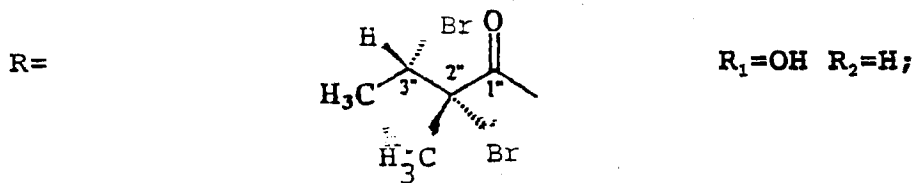
9. A compound of the formula:

30

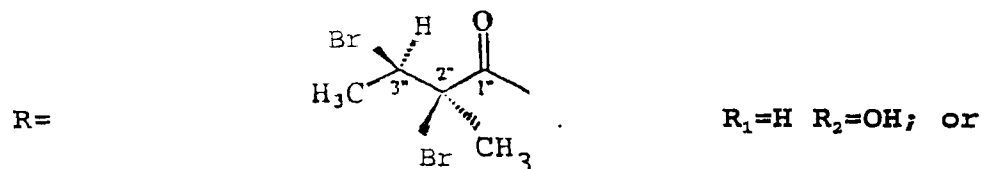




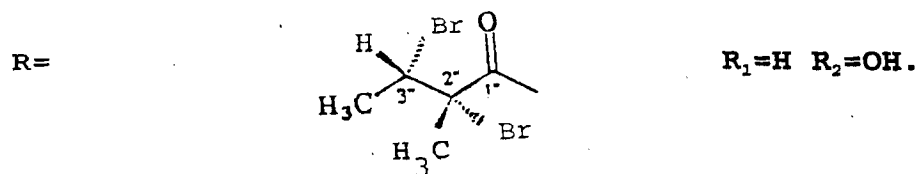
- 85 -



5 (2''S, 3''S)-dibromo-7-epi-cephalomannine



10 (2''R, 3''R)-dibromo-7-epi-cephalomannine



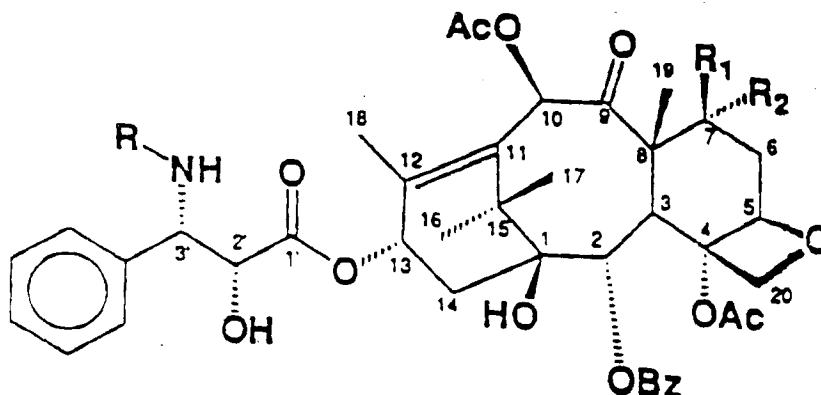
15

10. A pharmaceutical formulation which comprises a compound according to claim 9 or a pharmaceutically acceptable salt thereof, associated with one or more pharmaceutically acceptable carriers, excipients or diluents therefor.

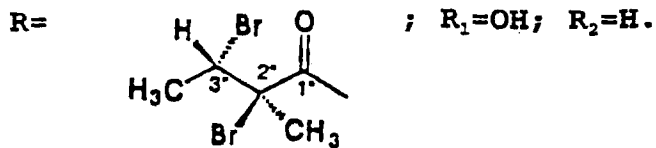
11. Use of a compound according to claim 9 for treating animal or human tumors.

25

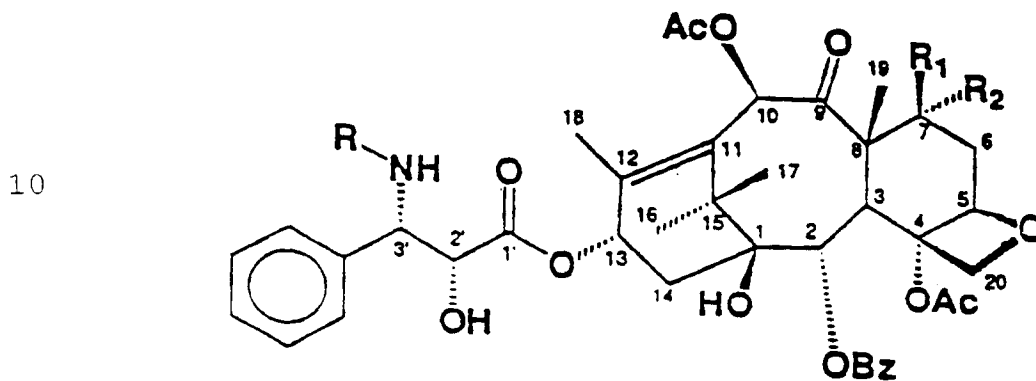
12. The use as claimed in claim 11, wherein the compound is



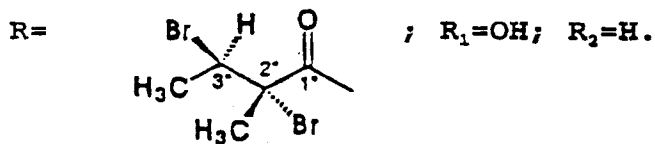
- 86 -



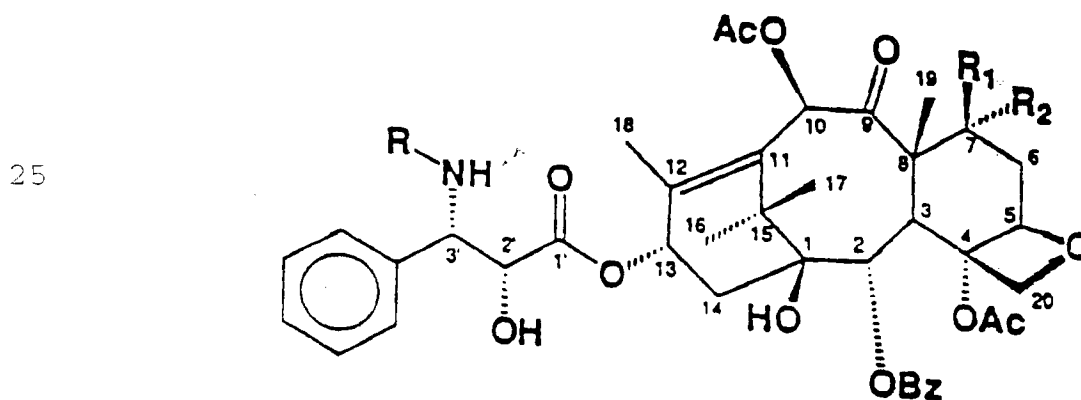
5                    13. The use as claimed in claim 11 wherein the compound is



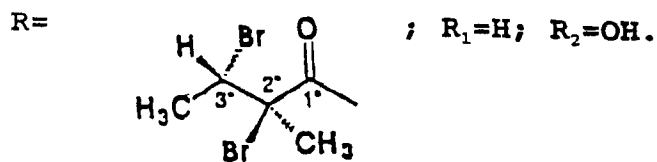
15



20                    14. The use as claimed in claim 11 wherein the compound is



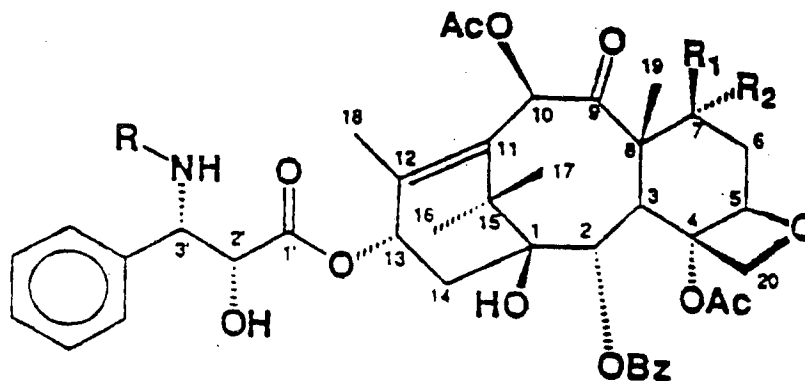
30



15. The use as claimed in claim 11 wherein the compound is

5

10

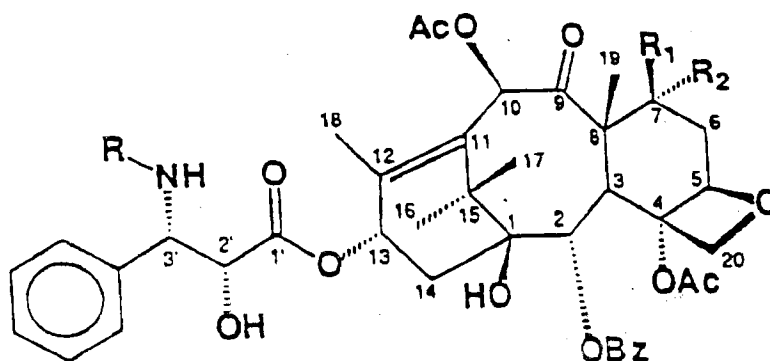


15

16. A method for the production of a compound of the formula,

20

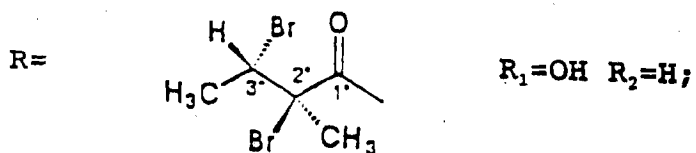
25



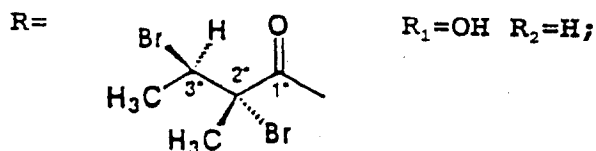
wherein R, R<sub>1</sub> and R<sub>2</sub> are selected from:

30

(I) (2''R, 3''S)-dibromocephalomannine

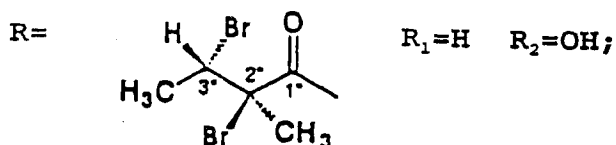


(II) (2''S, 3''R)-dibromocephalomannine



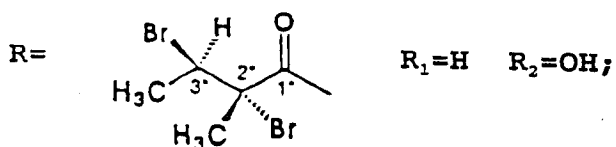
5

(III) (2''R, 3''S)-dibromo-7-epi-cephalomannine



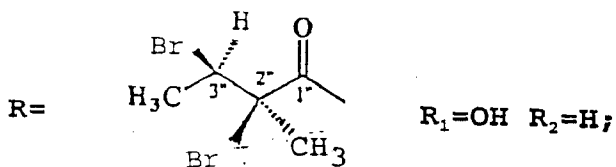
10

(IV) (2''S, 3''R)-dihalo-7-epi-cephalomannine



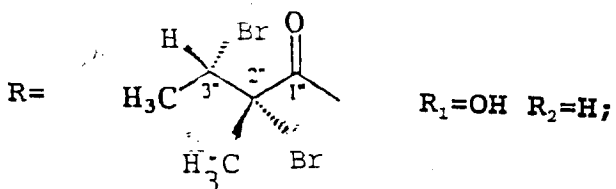
15

(2''S, 3''S)-dibromocephalomannine



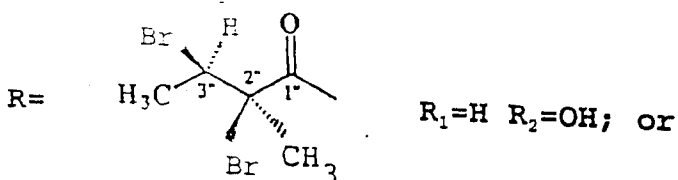
20

(2''R, 3''R)-dibromocephalomannine



25

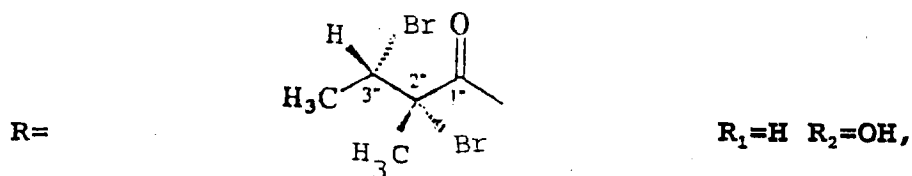
(2''S, 3''S)-dibromo-7-epi-cephalomannine



30

(2''R, 3''R)-dibromo-7-epi-cephalomannine

- 89 -



5 comprising brominating cephalomannine and/or 7-epi-  
cephalomannine under conditions effective to selectively  
brominate the 2'', 3'' unsaturated side-chain portion of  
cephalomannine and/or 7-epi-cephalomannine.

10 17. The method of claim 16 wherein a mixture  
of diastereomeric compounds I, II, III and IV is  
produced, and further comprising separating each of  
compounds I, II, III, IV from the mixture.

15 18. The method of claim 16 wherein the  
cephalomannine and/or 7-epi-cephalomannine is present in  
a mixture in any amount comprising paclitaxel and other  
taxane ring compounds.

20 19. The method of claim 16, wherein the  
bromination reaction is carried out in the dark at a  
temperature range of between -20°C to 20°C.

25 20. The method of claim 19, wherein the  
temperature range is between -5°C to 5°C.

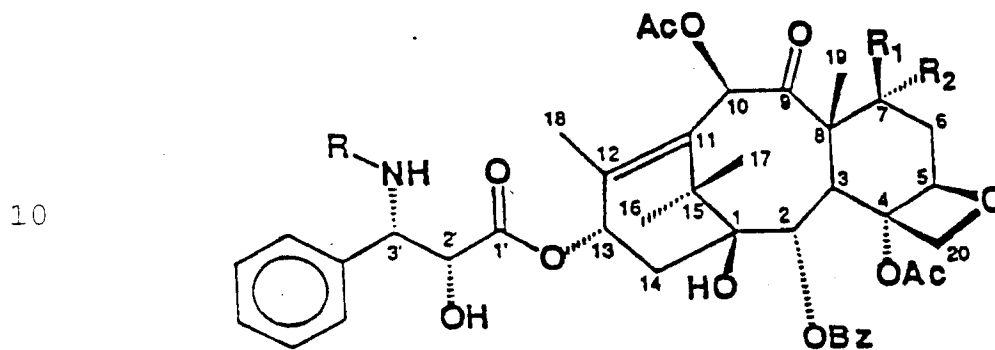
30 21. The method of claim 18, wherein the  
bromination reaction is carried out using a  
stoichiometric amount of bromine, relative to  
cephalomannine and/or 7-epi-cephalomannine concentration.

22. The method of claim 18, wherein the  
bromination reaction is carried out using a solution of

bromine in a chlorinated solvent selected from the group consisting of  $\text{CCl}_4$ ,  $\text{CHCl}_3$ ,  $\text{ClCH}_2\text{CH}_2\text{Cl}$  and  $\text{CH}_2\text{Cl}_2$ .

23. A compound of the formula,

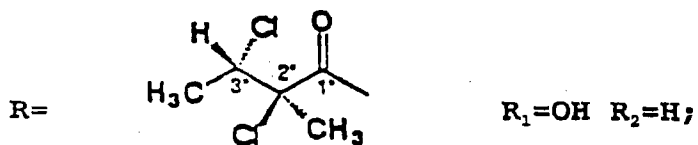
5



15 wherein R,  $R_1$  and  $R_2$  are selected from:

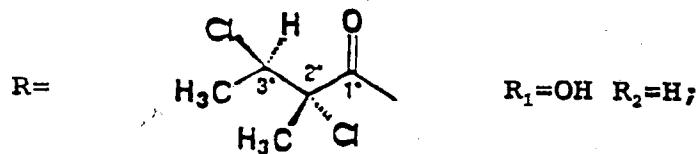
(2''R, 3''S)-dichlorocephalomannine

(I)



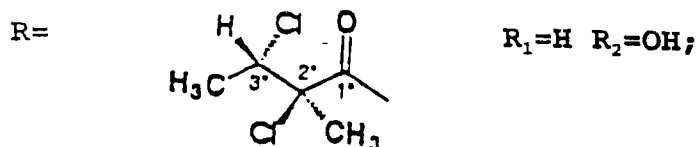
(2''S, 3''R)-dichlorocephalomannine

(II)

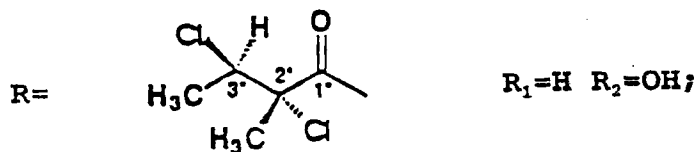


(III)

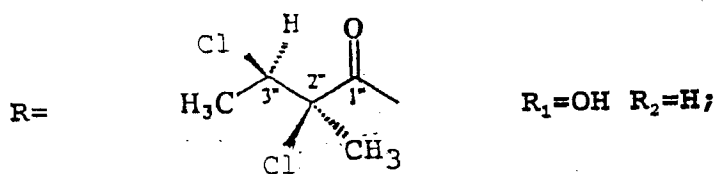
(2''R, 3''S)-dichloro-7-epi-cephalomannine



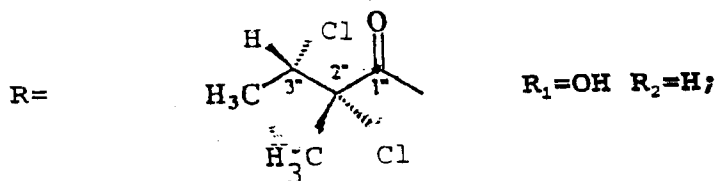
- 91 -

(IV) (2"*S*, 3"*R*)-dichloro-7-epi-cephalomannine

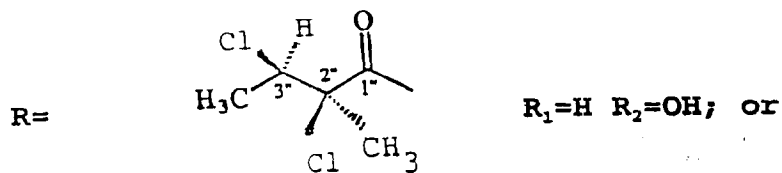
5

(2"*S*, 3"*S*)-dichlorocephalomannine

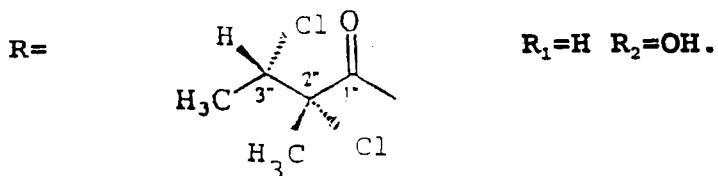
10

(2"*R*, 3"*R*)-dichlorocephalomannine

15

(2"*S*, 3"*S*)-dichloro-7-epi-cephalomannine

20

(2"*R*, 3"*R*)-dichloro-7-epi-cephalomannine

25

30

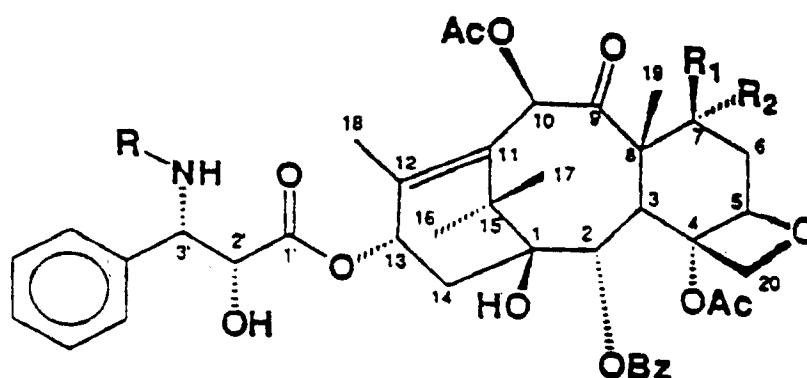
24. A pharmaceutical formulation which comprises a compound according to claim 23 or a pharmaceutically acceptable salt thereof, associated with

one or more pharmaceutically acceptable carriers, excipients or diluents thereof.

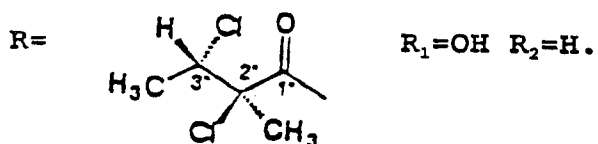
25. Use of a compound according to claim 23  
5 for treating animal or human tumors.

26. The use as claimed in claim 25 wherein the  
compound is

10



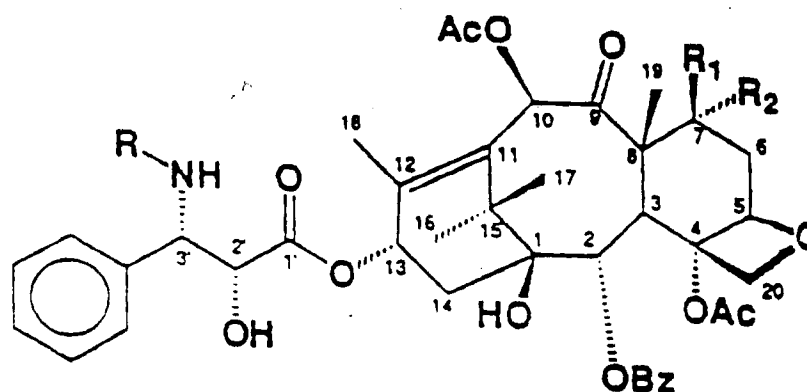
15



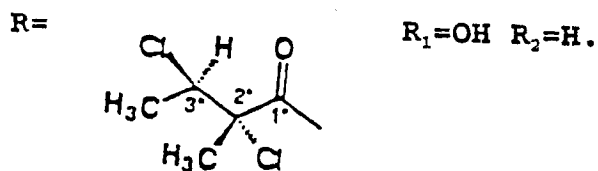
20

27. The use as claimed in claim 25 wherein the  
compound is

25



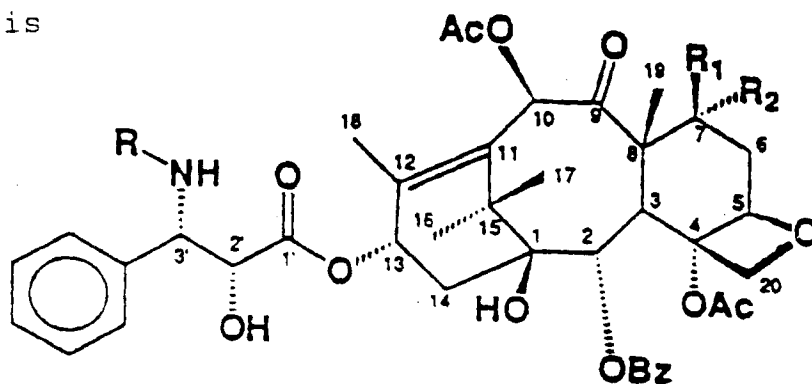
30



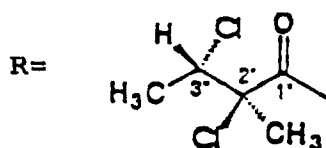
- 93 -

28. The use as claimed in claim 25 wherein the compound is

5

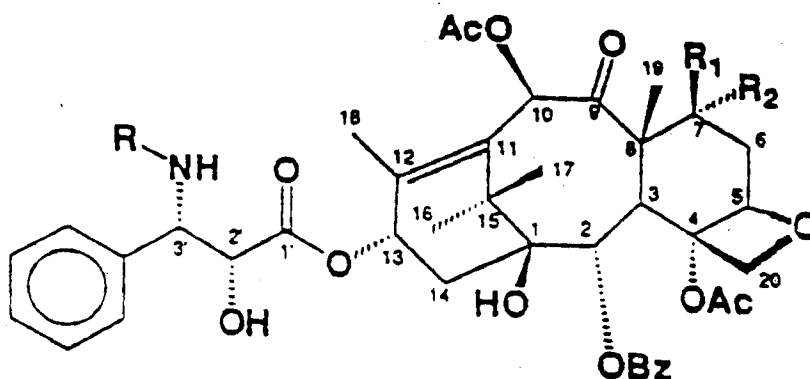


10

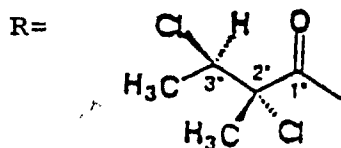
R<sub>1</sub>=H R<sub>2</sub>=OH.

29. The use as claimed in claim 25 wherein the compound is

15



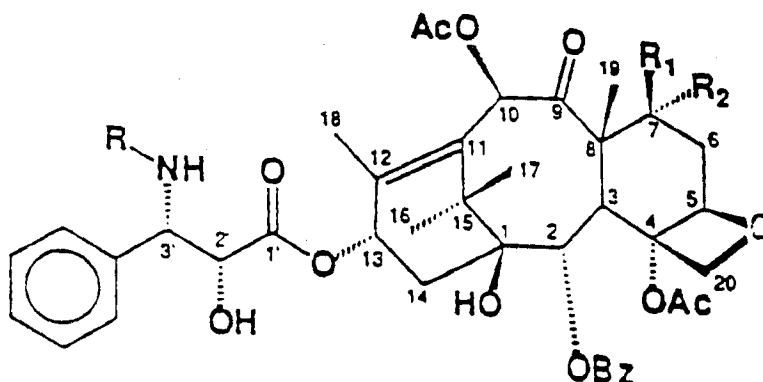
20

R<sub>1</sub>=H R<sub>2</sub>=OH.

25

30. A method for the production of a compound of the formula,

30

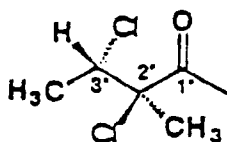


wherein R, R<sub>1</sub> and R<sub>2</sub> are selected from:

(I) (2''R, 3''S)-dichlorocephalomannine

5

R=

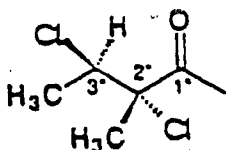
R<sub>1</sub>=OH R<sub>2</sub>=H;

(II) (2''S, 3''R)-dichlorocephalomannine

(II)

10

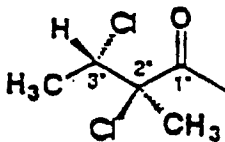
R=

R<sub>1</sub>=OH R<sub>2</sub>=H;

(III) (2''R, 3''S)-dichloro-7-epi-cephalomannine

15

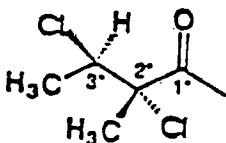
R=

R<sub>1</sub>=H R<sub>2</sub>=OH;

(IV) (2''S, 3''R)-dichloro-7-epi-cephalomannine

20

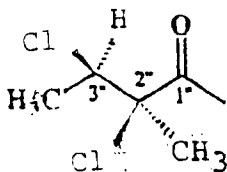
R=

R<sub>1</sub>=H R<sub>2</sub>=OH,

(2''S, 3''S)-dichlorocephalomannine

25

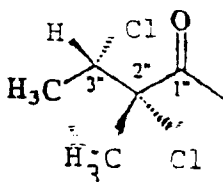
R=

R<sub>1</sub>=OH R<sub>2</sub>=H;

(2''R, 3''R)-dichlorocephalomannine

30

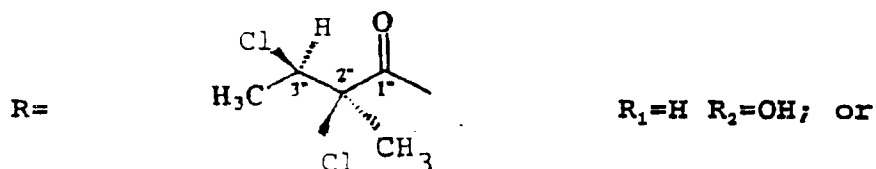
R=

R<sub>1</sub>=OH R<sub>2</sub>=H;

- 95 -

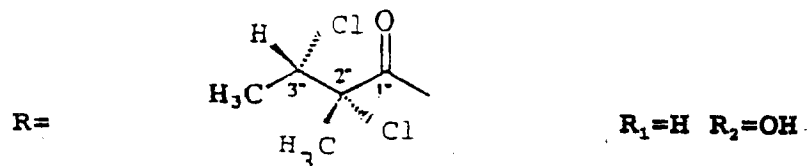
(2"S, 3"S)-dichloro-7-epi-cephalomannine

5



10

(2"R, 3"R)-dichloro-7-epi-cephalomannine



15 comprising chlorinating cephalomannine and/or 7-epi-cephalomannine under conditions effective to selectively chlorinate the unsaturated 2", 3" side chain portion of cephalomannine and/or 7-epi-cephalomannine.

20 31. The method of claim 30 wherein a mixture of diastereomeric compounds I, II, III and IV is produced, and further comprising separating each of compounds I, II, III, IV from the mixture.

25 32. The method of claim 30 wherein the cephalomannine and/or 7-epi-cephalomannine is present in a mixture in any amount comprising paclitaxel and other taxane ring compounds.

30 33. The method of claim 32, wherein the chlorination reaction is carried out at a temperature range of between -20°C to 20°C.

- 96 -

34. The method of claim 32, wherein the chlorination reaction is carried out at a temperature range of between -5°C to 20°C.

5 35. The method of claim 32, wherein the chlorination reaction is carried out in the dark.

36. The method of claim 32, wherein the chlorination reaction is carried out using a  
10 stoichiometric amount of chlorine relative to cephalomannine and/or 7-epi-cephalomannine concentration.

37. The method of claim 32, wherein the chlorination reaction is carried out using a solution of  
15 chlorine in a chlorinated solvent selected from the group consisting of  $\text{CCl}_4$ ,  $\text{CHCl}_3$ ,  $\text{ClCH}_2\text{CH}_2\text{Cl}$  and  $\text{CH}_2\text{Cl}_2$ .