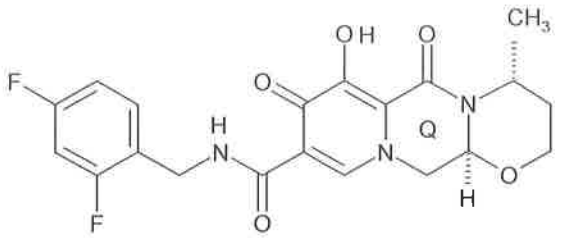
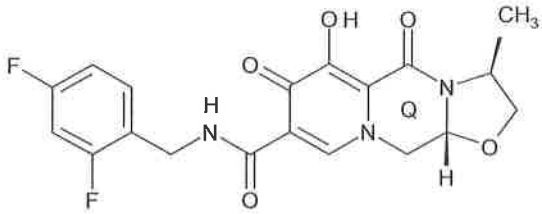
**What is Claimed is:**

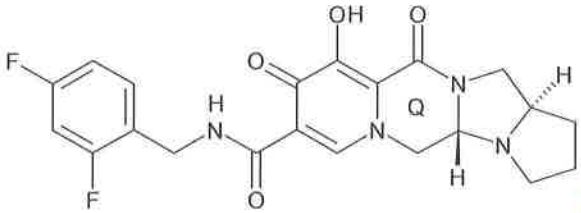
1. A process of for the preparation of a pyridone compound of formula (AA), (BB) or (CC):



AA



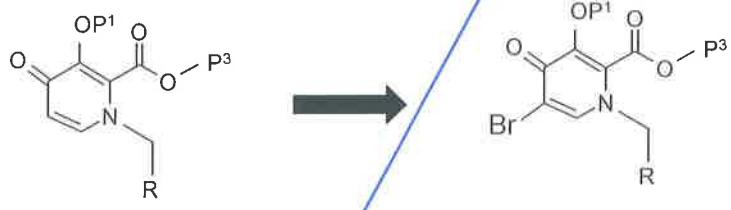
BB



CC

comprising the steps of:

P-1) brominating a compound of the following formula (I-I) to produe a bromine compound of the following formula (II-II):



I-I

II-II

wherein

R is -CHO, $-CH(OH)_2$, $-CH(OH)(OR^4)$, $-CH(OH)-CH_2OH$ or $-CH(OR^5)(OR^6)$;

$P^1$ is H or a hydroxyl protecting group;

$P^3$ is H or a carboxy protecting group;

$R^4$ is lower alkyl;

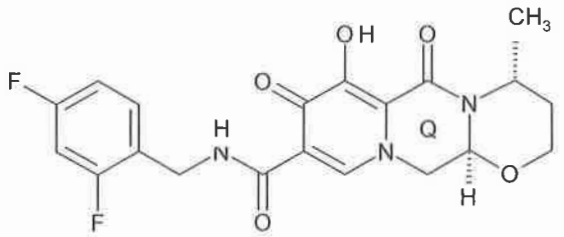
$R^5$ and $R^6$ are independently lower alkyl or $R^5$ and $R^6$ can be alkyl and joined to form a 5-, 6-, or 7-membered ring,

and

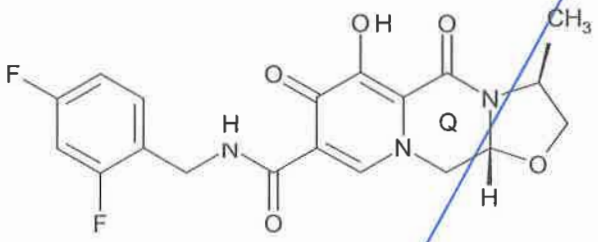
P-2) creating the 2,4-di-fluorophenyl-$CH_2$-NH-C(O)- sidechain with the reactants

2,4-di-fluorophenyl-$CH_2$-$NH_2$ and carbon monoxide.

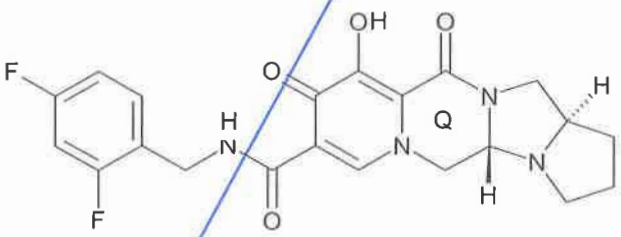
2. A process is provided for the preparation of a pyridone compound of the following formula (AA), (BB) or (CC):




AA




BB




CC

comprising the steps of:

P-1) brominating a compound of the following formula (I-I) to produce a bromine compound of the following formula (II-II):



I-I II-II

wherein

R is –CHO, $-CH(OH)_2$, $-CH(OH)(OR^4)$, $-CH(OH)-CH_2OH$ or $-CH(OR^5)(OR^6)$;

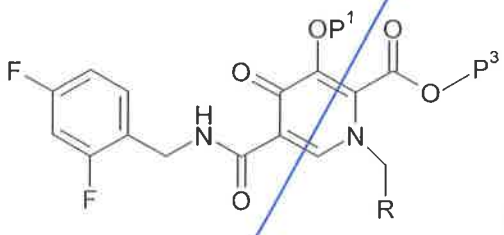
$P^1$ is H or a hydroxyl protecting group;

$P^3$ is H or a carboxy protecting group;

$R^4$ is lower alkyl;

$R^5$ and $R^6$ are independently lower alkyl or $R^5$ and $R^6$ can be lower alkyl and joined to form a 5-, 6-, or 7-membered ring,

P-2) creating the 2,4-di-fluorophenyl-$CH_2$-NH-C(O)- sidechain with the reactants 2,4-di-fluorophenyl-$CH_2$-$NH_2$ and carbon monoxide to form a compound of formula III-III:



(III-III)

P-3) condensing and debenzylating a compound of formula III-III to form a compound of formula AA, BB, or CC.

3. The process according to claim 1, wherein said step P-2) is carried out before creation of the Q ring.

4. The process according to claim 1 or 2, wherein said pyridone compound is of the formula AA.

5. The process according to claim 1 or 2, wherein said pyridone compound is of the formula BB.

6. The process according to claim 1 or 2, wherein said pyridone compound is of the formula CC.

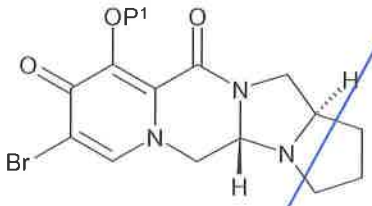
7. The process according to claim 1, wherein said step P-2) is carried out after creation of the Q ring.

8. The process according to claim 7, wherein said pyridone compound is of the formula AA.

9. The process of Claim 7, wherein said pyridone compound is of the formula BB.

10. The process of Claim 7, wherein said pyridone compound is of the formula CC.

11. A compound of the following formula (DD):



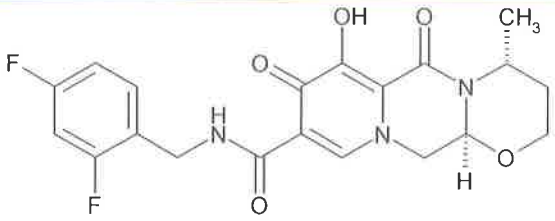

DD

wherein $P^1$ is H or a carboxy protecting group.

12. The compound of claim 11, wherein $P^1$ is benzyl.

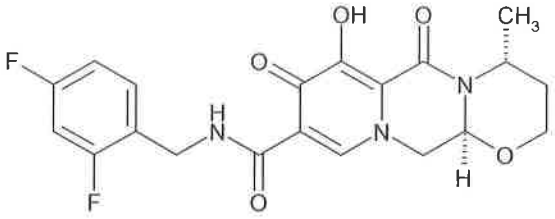
13. A process according to any of claims 1-10 wherein $P^1$ is benzyl; $P^3$ is methyl; and R is –CHO, –CH(OH)($OR^4$), -CH($OR^5$)($OR^5$) wherein $R^4$ and $R^5$ are lower alkyl.

14. A salt or a hydrate thereof of a compound of formula AA



AA

15. A crystal form of a sodium salt or a hydrate thereof of a compound of formula AA



AA

16. A crystal form according to claim 15 having one or more physical properties selected from the group consisting of (i) and (ii):
(i) having characteristic diffraction peaks at 6.4° ± 0.2°, 9.2° ± 0.2°, 13.8° ± 0.2°, 19.2° ± 0.2° and 21.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern; and
(ii) having characteristic infrared absorption spectra at 1641$cm^{-1}$ ± 2$cm^{-1}$, 1536$cm^{-1}$ ± 2$cm^{-1}$, 1503$cm^{-1}$ ± 2$cm^{-1}$ and 1424$cm^{-1}$ ± 2$cm^{-1}$.

17. A crystal form according to claim 15 having characteristic diffraction peaks at 6.4° ± 0.2°, 9.2° ± 0.2°, 13.8° ± 0.2°, 19.2° ± 0.2° and 21.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

18. A crystal form according to claim 15 having characteristic diffraction peaks at 6.4° ± 0.2°, 9.2° ± 0.2°, 13.8° ± 0.2°, 14.6° ± 0.2°, 15.2° ± 0.2°, 17.6° ± 0.2°, 19.2° ± 0.2°, 21.8° ± 0.2°, 24.1° ± 0.2° and 28.7° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

19. A crystal form form according to claim 15 having characteristic infrared absorption spectra at 1641$cm^{-1}$ ± 2$cm^{-1}$, 1536$cm^{-1}$ ± 2$cm^{-1}$, 1503$cm^{-1}$ ± 2$cm^{-1}$ and 1424$cm^{-1}$ ± 2$cm^{-1}$.

20. A crystal form according to claim 15 having characteristic infrared absorption spectra at 1641$cm^{-1}$ ± 2$cm^{-1}$, 1536$cm^{-1}$ ± 2$cm^{-1}$, 1503$cm^{-1}$ ± 2$cm^{-1}$, 1424$cm^{-1}$ ± 2$cm^{-1}$, 1282$cm^{-1}$ ± 2$cm^{-1}$, 1258$cm^{-1}$ ± 2$cm^{-1}$, 1093$cm^{-1}$ ± 2$cm^{-1}$ and 1069$cm^{-1}$ ± 2$cm^{-1}$.

21. A crystal form according to claim 15 having one or more spectra selected from the group consisting of (a) to (c):

(a) X-ray powder diffraction pattern substantially as shown in Figure 1;
(b) Infrared absorption spectra substantially as shown in Figure 2; and
(c) Solid state $^{13}$C-NMR spectra substantially as shown in Figure 3.

22. A crystal form according to claim 15 having one or more physical properties selected from the group consisting of (iii) and (iv):
(iii) having characteristic diffraction peaks at 8.0° ± 0.2°, 9.3° ± 0.2°, 11.3° ± 0.2°, 16.0° ± 0.2°, and 22.8° ± 0.2°degrees two-theta in an X-ray powder diffraction pattern; and
(iv) having characteristic infrared absorption spectra at 1637cm$^{-1}$ ± 2cm$^{-1}$, 1536cm$^{-1}$ ± 2cm$^{-1}$, 1501cm$^{-1}$ ± 2cm$^{-1}$ and 1422cm$^{-1}$ ± 2cm$^{-1}$.

23. A crystal form according to claim 15 having characteristic diffraction peaks at 8.0° ± 0.2°, 9.3° ± 0.2°, 11.3° ± 0.2°, 16.0° ± 0.2°and 22.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

24. A crystal form according to claim 15 having characteristic diffraction peaks at 8.0° ± 0.2°, 9.3° ± 0.2°, 11.3° ± 0.2°, 15.4° ± 0.2°, 16.0° ± 0.2°, 18.7° ± 0.2°, 19.1° ± 0.2°, 19.8° ± 0.2°, 22.8° ± 0.2° and 26.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

25. A crystal form according to claim 15 having characteristic infrared absorption spectra at 1637cm$^{-1}$ ± 2cm$^{-1}$, 1536cm$^{-1}$ ± 2cm$^{-1}$, 1501cm$^{-1}$ ± 2cm$^{-1}$ and 1422cm$^{-1}$ ± 2cm$^{-1}$.

26. A crystal form according to claim 15 having characteristic infrared absorption spectra at 1637cm$^{-1}$ ± 2cm$^{-1}$, 1536cm$^{-1}$ ± 2cm$^{-1}$, 1501cm$^{-1}$ ± 2cm$^{-1}$, 1422cm$^{-1}$ ± 2cm$^{-1}$, 1277cm$^{-1}$ ± 2cm$^{-1}$, 1258cm$^{-1}$ ± 2cm$^{-1}$, 1093cm$^{-1}$ ± 2cm$^{-1}$ and 1069cm$^{-1}$ ± 2cm$^{-1}$.

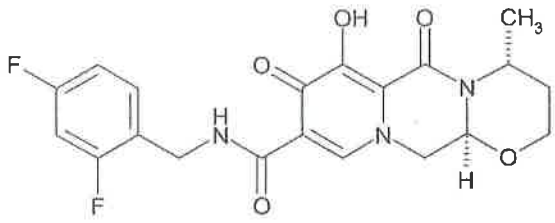
27. A crystal form according to claim 15 having one or more spectra selected from the group consisting of (d) and (e):
(d) X-ray powder diffraction pattern substantially as shown in Figure 4; and
(e) Infrared absorption spectra substantially as shown in Figure 5.

28. A pharmaceutical composition comprising a crystal form as defined in any one of the claims 15 to 27.

29. A process for preparation of a crystal form as defined in any one of the claims 15 to 27.

What is Claimed is:

1. A sodium salt of a compound of formula AA



AA

or a hydrate thereof.

2. A crystal form of the sodium salt of a compound or a hydrate according to claim 1 having one or more physical properties selected from the group consisting of (i) and (ii):
(i) having characteristic diffraction peaks at 6.4° ± 0.2°, 9.2° ± 0.2°, 13.8° ± 0.2°, 19.2° ± 0.2° and 21.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern; and
(ii) having characteristic infrared absorption spectra at 1641$cm^{-1}$ ± 2$cm^{-1}$, 1536$cm^{-1}$ ± 2$cm^{-1}$, 1503$cm^{-1}$ ± 2$cm^{-1}$ and 1424$cm^{-1}$ ± 2$cm^{-1}$.

3. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having characteristic diffraction peaks at 6.4° ± 0.2°, 9.2° ± 0.2°, 13.8° ± 0.2°, 19.2° ± 0.2° and 21.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

4. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having characteristic diffraction peaks at 6.4° ± 0.2°, 9.2° ± 0.2°, 13.8° ± 0.2°, 14.6° ± 0.2°, 15.2° ± 0.2°, 17.6° ± 0.2°, 19.2° ± 0.2°, 21.8° ± 0.2°, 24.1° ± 0.2° and 28.7° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

5. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having one or more spectra selected from the group consisting of (a) to (c):
(a) X-ray powder diffraction pattern substantially as shown in Figure 1 below;

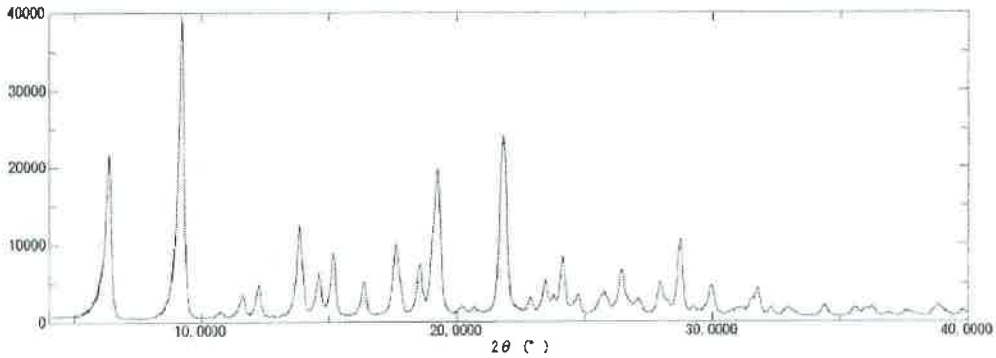



**Fig. 1**

(b) Infrared absorption spectra substantially as shown in Figure 2 below; and

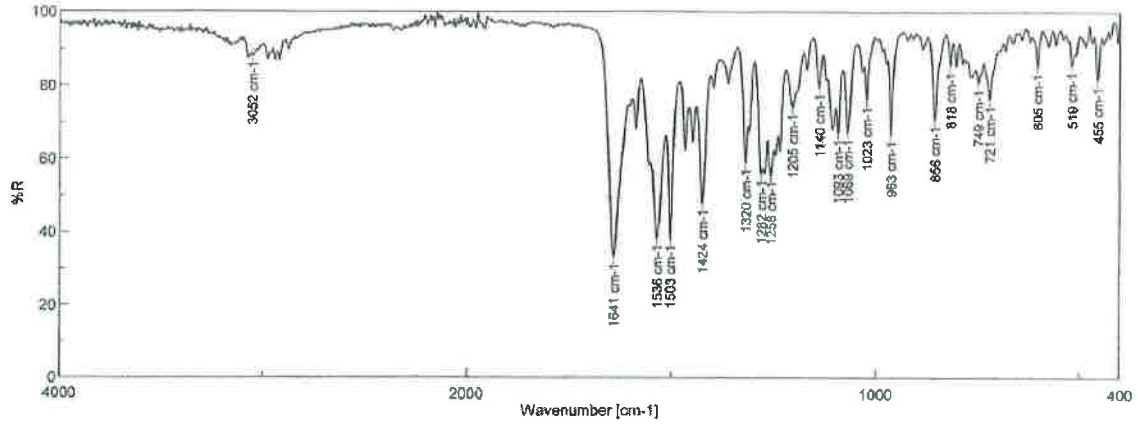



**Fig. 2**

(c) Solid state $^{13}$C-NMR spectra substantially as shown in Figure 3 below.

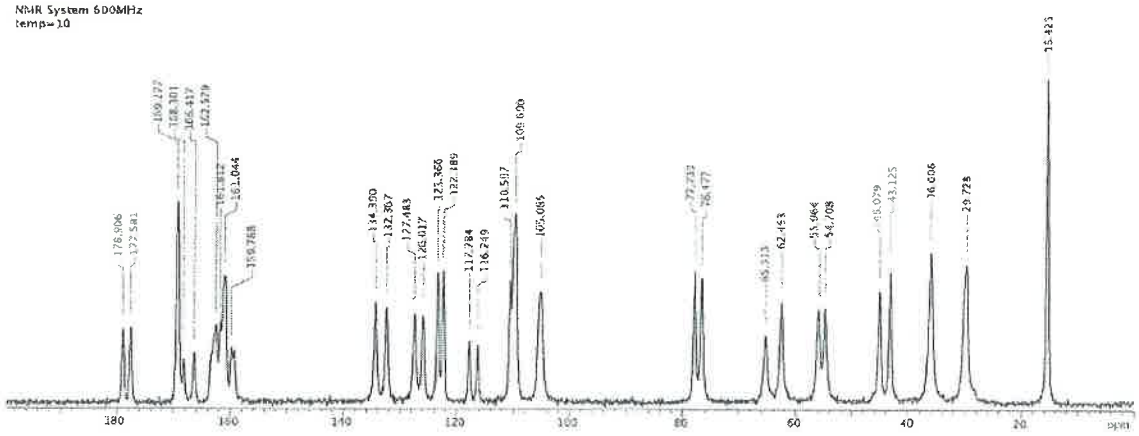



**Fig. 3**

6. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having one or more physical properties selected from the group consisting of (iii) and (iv):
(iii) having characteristic diffraction peaks at 8.0° ± 0.2°, 9.3° ± 0.2°, 11.3° ± 0.2°, 16.0° ± 0.2°, and 22.8° ± 0.2°degrees two-theta in an X-ray powder diffraction pattern; and
(iv) having characteristic infrared absorption spectra at 1637cm$^{-1}$ ± 2cm$^{-1}$, 1536cm$^{-1}$ ± 2cm$^{-1}$, 1501cm$^{-1}$ ± 2cm$^{-1}$ and 1422cm$^{-1}$ ± 2cm$^{-1}$.

7. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having characteristic diffraction peaks at 8.0° ± 0.2°, 9.3° ± 0.2°, 11.3° ± 0.2°, 16.0° ± 0.2°and 22.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

8. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having characteristic diffraction peaks at 8.0° ± 0.2°, 9.3° ± 0.2°, 11.3° ± 0.2°, 15.4° ± 0.2°, 16.0° ± 0.2°, 18.7° ± 0.2°, 19.1° ± 0.2°, 19.8° ± 0.2°, 22.8° ± 0.2° and 26.8° ± 0.2° degrees two-theta in an X-ray powder diffraction pattern.

9. A crystal form of the sodium salt of a compound or hydrate according to claim 1 having one or more spectra selected from the group consisting of (d) and (e):

(d) X-ray powder diffraction pattern substantially as shown in Figure 4 below;

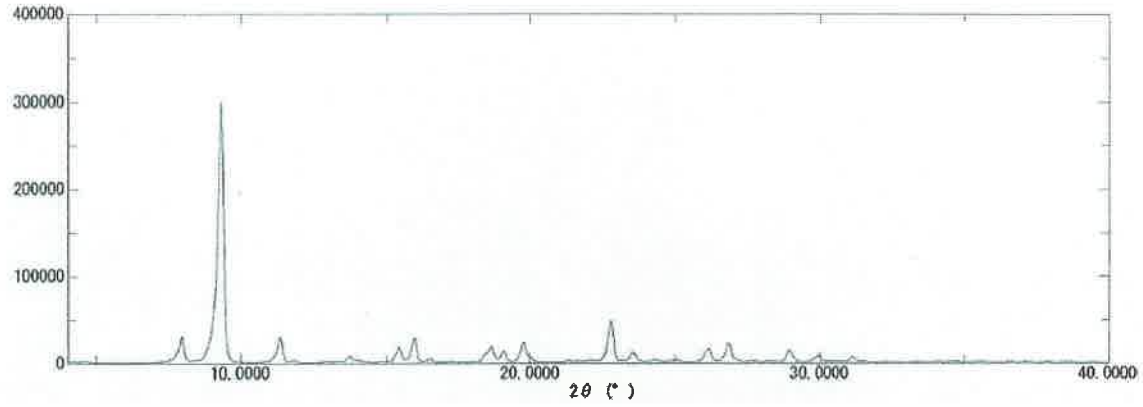



**Fig. 4**

and

(e) Infrared absorption spectra substantially as shown in Figure 5 below.

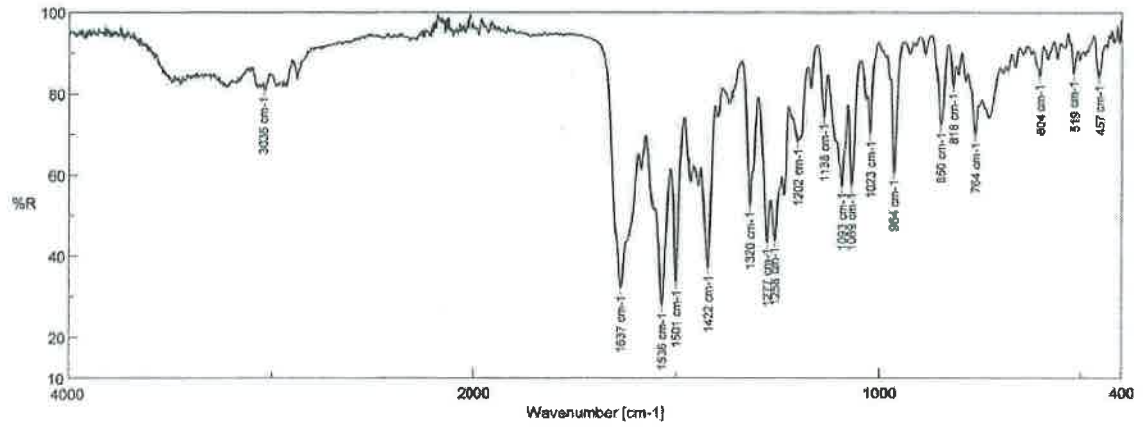



**Fig. 5**

10. A pharmaceutical composition comprising a crystal form as defined in any one of the claims 2 to 9.