

2002 - 0008821  
2002 01 31

WO 2000/45867  
2000 08 10

(74)

•

(54)

가

1

47

i) , i) 1 , i  
 , iii) , iv)  
 , v)  
 , vi)  
 가

가 가 , 0.5 2.0 mm , 가  
 ,  
 ,  
 ,  
 가 가 가  
 , 1 1 ,  
 가  
 ( , 100 MPa ) , 가  
 , 가

1

47

가

) (

가

.가

|                                  |                                                                      |                                                                      |                                                                      |
|----------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|
|                                  | (C <sub>17</sub> H <sub>33</sub> OCOOH),                             | (C <sub>17</sub> H <sub>31</sub> COOH),                              | (C <sub>15</sub> H <sub>31</sub> COOH),                              |
|                                  | (C <sub>15</sub> H <sub>29</sub> COOH),                              | (C <sub>17</sub> H <sub>35</sub> COOH),                              | (C <sub>17</sub> H <sub>29</sub> COOH),                              |
| OH),                             | (C <sub>13</sub> H <sub>27</sub> COOH),                              | (C <sub>11</sub> H <sub>23</sub> COOH),                              | (C <sub>9</sub> H <sub>19</sub> COOH),                               |
|                                  | (C <sub>17</sub> H <sub>33</sub> COOH),                              | (C <sub>7</sub> H <sub>15</sub> COOH),                               | (C <sub>21</sub> H <sub>41</sub> COOH),                              |
|                                  | (C <sub>13</sub> H <sub>27</sub> COOC <sub>2</sub> H <sub>5</sub> ), | (C <sub>17</sub> H <sub>33</sub> COOC <sub>2</sub> H <sub>5</sub> ), | (C <sub>15</sub> H <sub>31</sub> COOC <sub>2</sub> H <sub>5</sub> ), |
|                                  | (C <sub>17</sub> H <sub>31</sub> COOC <sub>2</sub> H <sub>5</sub> ), | (C <sub>11</sub> H <sub>23</sub> COOC <sub>2</sub> H <sub>5</sub> ), | (C <sub>17</sub> H <sub>29</sub> COOC <sub>2</sub> H <sub>5</sub> ), |
|                                  | (C <sub>17</sub> H <sub>35</sub> COOC <sub>2</sub> H <sub>5</sub> ), | (C <sub>19</sub> H <sub>39</sub> COOC <sub>2</sub> H <sub>5</sub> ), | (C <sub>7</sub> H <sub>15</sub> COO                                  |
| C <sub>2</sub> H <sub>5</sub> ), | (C <sub>9</sub> H <sub>19</sub> COOC <sub>2</sub> H <sub>5</sub> ),  | (C <sub>5</sub> H <sub>11</sub> COOC <sub>2</sub> H <sub>5</sub> ),  | (C <sub>3</sub> H <sub>7</sub> COO                                   |
| C <sub>2</sub> H <sub>5</sub> ), | (C <sub>9</sub> H <sub>14</sub> O <sub>6</sub> ),                    | (C <sub>29</sub> H <sub>50</sub> O <sub>2</sub> ),                   | (C <sub>28</sub> H <sub>48</sub> O <sub>2</sub> ),                   |
| <sup>46</sup> O <sub>2</sub> ),  | (C <sub>28</sub> H <sub>48</sub> O <sub>2</sub> ),                   | (C <sub>7</sub> H <sub>8</sub> O),                                   | (C <sub>14</sub> H <sub>12</sub> O <sub>2</sub> ),                   |
| - n -                            | (C <sub>18</sub> H <sub>34</sub> O <sub>4</sub> ),                   | (C <sub>12</sub> H <sub>14</sub> O <sub>4</sub> ),                   | (C <sub>21</sub> H <sub>40</sub> O <sub>4</sub> ),                   |
| [CAS                             | 8002 - 43 - 5],                                                      | [CAS                                                                 | 8012 - 95 - 1],                                                      |
| 8009 - 03 - 8],                  |                                                                      |                                                                      |                                                                      |

- [CAS 8001 - 29 - 4], [CAS 8001 - 79 - 4]

[CAS 8002 - 03 - 7], [CAS 8001 - 22 - 7]

[CAS 8001 - 30 - 7], [CAS 8008 - 74 - 0],

$$1 \quad \begin{array}{llll} [\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}], & & [\text{Ca}_2\text{P}_2\text{O}_7], & [\text{CaCO}_3], \\ [\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}], & [\text{Ca}(\text{H}_2\text{PO}_4)_2], & & [\text{CaHPO}_4], \\ [\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}], & [\text{Ca}_8\text{H}_2(\text{PO}_4)_6 \cdot 5\text{H}_2\text{O}], & - & [-\text{Ca}_3(\text{PO}_4)_2], \\ [-\text{Ca}_3(\text{PO}_4)_2], & [\text{Ca}_5(\text{PO}_4)_3\text{OH}], & & [\text{Ca}_4(\text{PO}_4)_2\text{O}], \\ [\text{Ca}_{10-x}(\text{HPO}_4)_x(\text{PO}_4)_{6-x}(\text{OH})_{2-x}], & & & [\text{Ca}_5(\text{PO}_4)_3\text{F}], \\ [\text{Ca}_{10}(\text{PO}_4)_6\text{O}], & [\text{Ca}(\text{OH})_2], & & \end{array}$$

2.  $[H_2SO_4]$ ,  $[H_3PO_4]$ , 가 .

가 . 가 가 가 ,

가 (Ca/P = 1.0) 가 (Ca/P = 1.33 1.67), (Ca/P = 1.7) (Ca/P = 1.33), (Ca/P = 1.67), (Ca/P = 1.7) 800 가 TCP, 가 [Ca/P = 2.0, Ca<sub>4</sub>(PO<sub>4</sub>)<sub>2</sub>O]

가

(

가

가

/

가

가,

가

가

(

)

(

)

(

)

가 (PAA) .

- TCP

- TCP

가 , , [CAS 9004 - 65 - 3], [CAS 9050 - 31 - 1], [CAS 9004 - 62 - 0], [CAS 9004 - 64 - 2], 가 [CAS 9000 - 65 - 1], [CAS 9005 - 38 - 3], [CAS 9004 - 67 - 5], [CAS 11138 - 66 - 2], [CAS 9004 - 61 - 9], [CAS 9012 - 76 - 4] 가 가 . 가 ( 1 %) .

가 가 . 가 ( , 10 100 nm)

(1) (TetCP; Ca/P = 2.0,  $\text{Ca}_4(\text{PO}_4)_2\text{O}$ ), (DCPD),  
가  
( , - , - ) 가  
가  
가  
( nm ) (TetCP; Ca/P = 2.0,  $\text{Ca}_4(\text{PO}_4)_2\text{O}$ ),  
(DCPD), 가 - TCP  
(  
( ,  $\text{Na}_2\text{HPO}_4$ ,  $\text{KHPO}_4$ ,  $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}$ ) 가 ,  
가 - TCP/MCPM/  
, DCPD  
( )

가 (tensioactive agent) 가 ( , 0.001 %).

가

100 mPa · s

가

0.5 5.0 g/ml , 1.5 g/ml 가

(PMMA) PMMA 가

가 PMMA ( ) PMMA

PMMA 가

25 가 Tegosoft M Triacetin 가 가 4

가 가

가

가 가 가

가 / ( )

가 가 가

가

25

- 30 % 80 % 가

0% 가

( " " ) 1 가 , 1 "

" " " " "

- TCP 8 g, (  $\text{Ca}_9(\text{HPO}_4)(\text{PO}_4)_5\text{OH}$  ) 1.2 g, PAA 1% Cremophor EL (  $\text{C}_{17}\text{H}_{34}\text{O}_2$  ) 0.001% 5.0 ml, 8.0 ml 4 2 .  
 . 12 , 1250 4 . - TCP .  
 0.05 < d < 10 . 75% , 55%가 200 < d < 500 , 18%  
 300 . 2% 가 . 100

2

- TCP 1.1 g, MCPM 0.9 g,  $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$  0.02 g,  $\text{H}_2\text{O}$  0.8 ml 100 ml 10 .  
 ( ) 1100 2  
 100 300

3

a - TCP 8 g, 0.8 g, CC 0.5 g, Cremophor EL 0.001% 6.0 ml, Tegosoft M (  $\text{C}_{17}\text{H}_{34}\text{O}_2$  ) 8.0 ml 4 .  
 , . x - FTIR ,

(57)

1.

가 1 2 , 1 2  
 3 , 3 가

2.

1 , 2 가  
 .

3.

2 , 가 :

$(C_{20}H_{37}NaO_7S)$ ,  $(C_{12}H_{25}NaO_4S)$ ,  $(C_{17}H_{35}COOH)$ ,  
 $(C_{17}H_{38}BrN)$ , [CAS 8001 - 54 - 5],  $(C_{27}H_{42}ClNO_2)$ ,  
 $(C_{21}H_{40}O_4)$ , 20  $(C_{58}H_{114}O_{26})$ ,  
21  $(C_{26}H_{50}O_{10})$ , 40  $(C_{62}H_{122}O_{26})$ , 60  $(C_{64}H_{126}O_{26})$ , 61 ( $C_3$   
 $C_{32}H_{62}O_{10}$ ), 65  $(C_{100}H_{194}O_{28})$ , 80  $(C_{64}H_{124}O_{26})$ , 81 ( $C_3$   
 $H_{64}O_{11}$ ), 85  $(C_{100}H_{188}O_{28})$ , 120  $(C_{64}H_{126}O_{26})$ ,  $((C_2H_4O)$   
 $n$ ),  $(C_{42}H_{80}O_7)$ ,  $(C_{42}H_{76}O_7)$ ,  
 $(C_{24}H_{46}O_6)$ ,  $(C_{18}H_{34}O_6)$ ,  $(C_{24}H_{44}O_6)$ ,  
 $(C_{22}H_{42}O_6)$ ,  $(C_{24}H_{46}O_6)$ ,  $(C_{33}H_{63}O_{6.5})$ ,  $(C_{33}H_{63}O_{6.5})$ ,  
 $(C_{33}H_{63}O_{6.5})$ ,  $(C_{33}H_{63}O_{6.5})$ ,  $(C_{33}H_{63}O_{6.5})$ ,  
 $(C_{33}H_{63}O_{6.5})$ ,  $(C_{21}H_{40}O_4)$ ,  $(C_{17}H_{34}O_2)$ ,  $(C_{33}H_{63}O_{6.5})$ ,  
 $^{19}H_{38}O_2$ ), [CAS 8006 - 54 - 0], [CAS 8027 - 33 - 6], [CAS  
8020 - 84 - 6], [CAS 8002 - 43 - 5], ( ),  
 $(C_2H_7NO)$ ,  $(C_{17}H_{33}COOH)$ , [CAS 9004 - 95 - 9],  
[CAS 9005 - 00 - 9], [CAS 9004 - 98 - 2],  
9002 - 92 - 0], [CAS 61791 - 12 - 6], 40  $(C_{98}H_{196}O_{42})$ , 50  $(C_{118}H_{23}$   
 $O_{52})$ ,  $(C_6H_{15}NO_3)$ , [CAS 8014 - 38 - 8], [CA  
S 977069 - 99 - 0],  $(NaC_{12}H_{25}SO_4)$ .

4.

1 3 , 가 :

$(C_{17}H_{33}OCO_2H)$ ,  $(C_{17}H_{31}COOH)$ ,  $(C_{15}H_{31}COOH)$ ,  $(C_{15}H_{29}COO$   
 $H)$ ,  $(C_{17}H_{35}COOH)$ ,  $(C_{17}H_{29}COOH)$ ,  $(C_{19}H_{39}COOH)$ ,  $(C_{13}H_{27}C$   
 $OOH)$ ,  $(C_{11}H_{23}COOH)$ ,  $(C_9H_{19}COOH)$ ,  $(C_5H_{11}COOH)$ ,  $(C_{17}H_{33}COOH)$ ,  
 $(C_7H_{15}COOH)$ ,  $(C_{21}H_{41}COOH)$ ,  $(C_3H_7COOH)$ ,  $(C_{13}H_{27}COOC$   
 $H_5)$ ,  $(C_{17}H_{33}COOC_2H_5)$ ,  $(C_{15}H_{31}COOC_2H_5)$ ,  $(C_{17}H_{31}$   
 $COOC_2H_5)$ ,  $(C_{11}H_{23}COOC_2H_5)$ ,  $(C_{17}H_{29}COOC_2H_5)$ ,  $(C_{17}H_{31}$   
 $^{17}H_{35}COOC_2H_5)$ ,  $(C_{19}H_{39}COOC_2H_5)$ ,  $(C_7H_{15}COOC_2H_5)$ ,  $(C_{17}H_{31}$   
 $(C_9H_{19}COOC_2H_5)$ ,  $(C_5H_{11}COOC_2H_5)$ ,  $(C_3H_7COOC_2H_5)$ ,  $(C_{17}H_{31}$   
 $^9H_{14}O_6)$ ,  $(C_{29}H_{50}O_2)$ ,  $(C_{28}H_{48}O_2)$ ,  $(C_{27}H_{46}O_2)$ ,  
 $(C_{28}H_{48}O_2)$ ,  $(C_7H_8O)$ ,  $(C_{14}H_{12}O_2)$ ,  $(C_7H_8O)$ ,  $-n-$ ,  
 $C_{18}H_{34}O_4)$ ,  $(C_{12}H_{14}O_4)$ ,  $(C_{21}H_{40}O_4)$ , ,

5.

1 3 , 가 , , , , , ,

6.

1 5 , 1 2 0.001  
90.000 %

7.

6 , 1 2 0.1 80.0 %

8.

1 7 , 3 10 90 %

9.

8 , 3 20 80 %

10.

1 9 , 1 2 40 70 % 3 30 60 %

11.

1 10 , CaP 가 1.0 20.0

12.

11 , CaP 가 1.0 2.0

13.

12 , CaP 가 1.0 1.67

14.

13 , CaP 가 1.45 1.60

15.

1 14 , 1 [CaSO<sub>4</sub> · 1/2H<sub>2</sub>O],  
 [Ca<sub>2</sub>P<sub>2</sub>O<sub>7</sub>], [CaCO<sub>3</sub>], [Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub> · H<sub>2</sub>O], [Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>],  
 [CaHPO<sub>4</sub>], [CaHPO<sub>4</sub> · 2H<sub>2</sub>O], [Ca<sub>8</sub>H<sub>2</sub>(PO<sub>4</sub>)<sub>6</sub> · 5H<sub>2</sub>O],  
 [ - Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> ], [ - Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> ], [Ca<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>OH],  
 [Ca<sub>4</sub>(PO<sub>4</sub>)<sub>2</sub>O], [Ca<sub>10-x</sub>(HPO<sub>4</sub>)<sub>x</sub>(PO<sub>4</sub>)<sub>6-x</sub>(OH)<sub>2-x</sub>],  
 [Ca<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>F], [Ca<sub>10</sub>(PO<sub>4</sub>)<sub>6</sub>O], [Ca(OH)<sub>2</sub>],

16.

1 15 , 2 [H<sub>2</sub>SO<sub>4</sub>], [H<sub>3</sub>PO<sub>4</sub>],  
 가

17.

1 16 , 2 가 가 ,  
가 .

18.

17 , 가 가 , , , ,  
 , .

19.

1 18 , 2 가 가  
 .

20.

19 , 가 가 .

21.

20 , 가 .

22.

21 , 가 :

[CAS 9004 - 65 - 3], [CAS 9004 - 62 - 0], [CAS 9050 - 31 - 1],  
[CAS 9004 - 64 - 2], 가 [CAS 9000 - 65 - 1], [CAS 9005 - 38 - 3],  
[CAS 9004 - 67 - 5], [CAS 11138 - 66 - 2], [CAS 004 - 61 - 9],  
[CAS 9012 - 76 - 4]. 9

23.

20 , 가  
 .

24.

1 23 , 2 1 ,  
가 .

25.

24 , 가 .

26.

1 25 , 3 1 600 .

27.

26 , 2 60 .

28.

27 , 5 20 .

29.

1 28 , 2 (VL)  $0.5 VT < VL < 10 VT$  (VT 1 ) .

30.

1 29 , 2 (VL)  $0.8 VT < VL < 2.0 VT$  (VT 1 ) .

31.

1 30 , 3 (SHS)가  $0.01 SC < SHS < 100.00 SC$  (SC 1 2 ) .

32.

1 31 , 가 0 55 0.01 100,00  
0 mPa · s .

33.

1 32 , 가 0.2  $10.0 \text{ g/cm}^3$  .

34.

1 33 , 1 , 10  
가 .

35.

1 34 , 1 mm 3 mm .

36.

34 35 , .

37.

34 35 , .

38.

34 35 , .

39.

1 38 , 가  $0 \leq x \leq 2$   
 $[Ca_{10-x} (HPO_4)_x (PO_4)_{6-x} (OH)_{2-x}]$  .

40.

1 38 , 가  $[CaHPO_4 \cdot 2H_2O]$  .

41.

1 40 , 1 - 가  $[Ca(H_2PO_4)_2 \cdot H_2O]$ ,  $[Ca(H_2PO_4)_2]$   $[H_3PO_4]$   $[Ca(H$

42.

1 40 , 1 - .

43.

42 , 1 가 .

44.

43 , Ca/P 가  $1.50 \pm 0.02$  .

45.

1 44 , , ,  
 , , .  
 [ 2 , 3 가 ]

46.

1 45 , 가 ,  
 가 .

47.

a) , 가 ,

b) a) ,

c) ,  
.

48.

47 ,  
가 .

49.

47 48 , 가  
가 .

50.

47 49 , 가 , ,  
 , .

51.

47 50 , .

52.

47 51 - .