CHAPTER 5
CONCLUSION

The following conclusion could be drawn from the experimental results:

1. It was proved that the two methods chosen for the preparation of TTCP by

   1. Sintering of the stoichiometric mixture of DCPD:$CaCO_3$
   2. Sintering of the stoichiometric mixture of γ-$Ca_2P_2O_7$ (400°C) : $CaCO_3$

could produce single phase TTCP, but the reproducibility of the 2nd method was better because the 1st one was prone to humidity in the furnace atmosphere. The best condition for method 1 was sintering the mixture of DCPD:$CaCO_3$ of molar ratio 1:1-1:1.3 at 1350-1400°C and for method 2 was sintering the mixture of γ-$Ca_2P_2O_7$(400°C) : $CaCO_3$ of molar ratio 2:4.0-2:4.3 at 1350-1400°C. Comparing between 1350 and 1400°C, it was found that the reproducibility at 1400°C was better. Therefore TTCP from method 2 was used as a constituent of the calcium phosphate cement composition.

2. The self-setting calcium phosphate cements prepared from the synthesized TTCP and DCPD had the following characteristics:

   a. Phases

after 1 day curing	1 month curing
HA+unreacted TTCP+DCPA	HA

   b. Setting time of this cement was affected by several factors, for example,

   - decreased with the increase of specific surface area and content of HA seed. 35 wt% HA(70) (SS = 140.15±4.20 m^2/g), P/L ratio = 2.4 g/ml, gave an initial setting time of TTCP(1350°C) cement = 9.0 minutes and that of 40 wt% = 7.3 minutes.

c. Compressive strength of the cement specimens.

- large specific surface area of TTCP favored high strength. The best one was 1.0 ± 0.80 MPa (1 day) which belonged to specimen composed of equimolar TTCP (1.63 ± 0.01 m^2/g):DCPD mixture, 35 wt% HA(70) seed, P/L ratio = 2.0 g/ml

- porosity of the specimen could be reduced by pressing the calcium phosphate cement paste (353.36 kg/cm^2) to attain a higher strength. The highest one was 16.2 ± 3.0 MPa

- higher crystallinity of the HA seed gave a reverse effect on the strength.

However the obtained results was much lower when compared with the minimum compressive strength 70 MPa of the acrylic bone cement (ASTM F 451-86-Appendix T) and 40 MPa for 1 day of calcium phosphate cement prepared from chemicals by Doi. et al (1989).

Therefore it could be said that, the compressive strength of the calcium phosphate cement prepared from cattle bone was still uncomparable to those prepared from the other means. However, it had to be mentioned here that the experimental condition of curing was not satisfactory because the humidity was only 80% which was for less than saturation(100%) and the big problem was that under the available experimental conditions, it was not possible to achieve a very high specific surface area TTCP. Nevertheless, there have been a number of researches on strength improvement and applications of calcium phosphate cements being carried on elsewhere.