PHOSPHATE RECOVERY FROM WASTEWATER—PRECIPITATION CONDITIONS

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Phosphorus recovery from wastewater accords with the demands of sustainable development of phosphate industry and the stringent enviromental quality standard. Although a few techniques for phosphorus recovery have been developed, there is a lack of basic knowledge on the precipitation and crystallization processes of calcium phosphate from wastewater. The purpose of the study is to obtain basic information on calcium phosphate precipitation from wastewater, paying attention to the effects of pH values, Ca/P ratios, and carbonate.

Experiments were undertaken in a stirring beaker reactor. 20 mg $P.l^{-1}$ phosphate was precipitated by calcium with Ca/P molar ratios of 1.67, 3.33, 5.0, and 6.67 at pH values ranging from 7.5-11.0; residual P and Ca were analyzed at intervals during the precipitation process. 2.5 and 5.0 $mmol.l^{-1}$ Na_2CO_3 were added to the above reaction systems to understand the effect of carbonate on calcium phosphate precipitation.

The results show that both higher pH values and higher Ca/P molar ratios benefit the efficiencies of calcium phosphate precipitation. If taking phosphate recovery efficiency of 85% in 3 hours as a standard, the lowest pH value for Ca/P 1.67, 3.33, 5.0, and 6.67 should be 10.0, 9.0, 9.0, and 7.5, respectively. Because of the buffer effect of the studied phosphate system, exception took place under pH 8.0, where higher final efficiencies than that of pH 8.5 were obtained above Ca/P molar ratio 3.33. Carbonate affects calcium phosphate precipitaion by lowering the reaction efficiency, but pH value is still the dominate factor of the precipitation process, and higher Ca/P molar ratios also help to overcome the influence of carbonate.

The above studies provide important information for phosphate recovery from wastewater. Further studies on the effects of organic matters and the role of seeding materials are still going on.