CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Phosphorus partitioning results in sediments from three selected extraction methods are not comparable.

2. Reducible ferric bound P or Fe-P (Ruttenberg, 1992; Vink et al., 1997) or Fe and Al bound P (Agemian, 1997) is the dominant form of phosphorus partitioning in the Mae Klong, Chao Phraya and Bang Pakong estuarine sediments.

3. Agemian (1997)'s extraction scheme was found to be the relatively most accurate than Vink et al. (1997)'s extraction scheme and SEDEX scheme (Ruttenberg, 1992) judging from quantitative comparison of its sum of all P fractions with total P from the X-ray fluorescence spectroscopy (XRF).

4. XRF is the best quantitative method for total P analysis in sediment. This due to the fact that XRF apply series of certified reference materials to calibrate its accuracy. In addition, amount of sediment samples used per analysis in XRF is more than other techniques. The average values from the larger amount of sample per analysis can make the accuracy better than other techniques. Furthermore, its preparation technique (fuse cast bead method) has less risk of sediment lost than that of other methods. However, XRF cannot be used in analyzing phosphorus partitioning in sediments.

5. Total phosphorus analyzed by total digestion method ($HF\text{-}HClO_4\text{-}HNO_3$) plus soluble phosphate analysis by the procedure of Strickland and Parsons (1972) is recommended for analyzing phosphorus in estuarine sediments where XRF is not available.

6. The concentration of total P is strongly related to the amount of clay size fraction in sediments. Therefore, the higher amount of clay size fraction in the sediments, the higher the total P concentration. The Bang Pakong sediment which has the highest amount of total P, also has the highest amount of clay size fraction.

Recommendations

The final pH of extracted solution after adding mixed reagent should be checked and controlled to be in the range from 0.7 to 1.1 in order to eliminate interference from silicate in all sediment extracts. If the pH is out of that range, the absorbance of phosphorus will increase with time.

The following study is recommended to:

1. Using of certified reference material (from BCR) to improve the accuracy of sequential extraction scheme for phosphorus partitioning in sediment

2. Improve the Fe-P analysis step by testing the efficiency of citrate bicarbonate dithionite (CDB-reagent) and bicarbonate ditionite (BD-reagent) with the certified reference material from BCR. In addition, the isobutanol extraction method should also be improved. However, another technique such as sold -phase extraction for pretreatment of colorimetric determination of soluble reactive phosphate in sediment extract proposed by Suzumura

and Koike (1995) might be adopted if it provides more accurate result than the isobutanol extraction method.

3. Study the geochemistry of phosphorus in four major Thai rivers (Mae Klong, Tha-chin, Chao Phraya and Bang Pakong) that discharge water into the upper Gulf of Thailand especially in the part of phosphorus partitioning in suspended and deposit sediments after a sequential extraction method for phosphorus partitioning in sediment was proved reliable to provide the quantitatively accurate results. This will be the baseline data for the better understanding of phosphorus behavior in those four major rivers. The bioavailable phosphorus (e.g. exchangeble or loosely bound P, reducible ferric bound P (Fe-P) and organic P) can be used to assess the potential of phytoplankton bloom in estuaries and coastal waters. Polyphosphate data can be used to assess the pollution status of the rivers and their estuaries together with dissolved reactive phosphate and dissolved oxygen data. Therefore, phosphorus partitioning results in suspended and deposited sediment together with its particle size distribution (PSD) can be utilized for environmental impact assessments and management plans for watersheds and coastal zones.