CHAPTER V

CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

This study determined the effect of the amount of organic cation, dodecylpyridinium chloride (DPC), on the characteristics and PAHs sorption from synthetic wastewater of organoclays. The results from adsorption of DPC onto clay confirmed that DPC could be adsorbed onto clay in excess of the CEC of clay with two mechanisms: cation exchange and hydrophobic interactions.

The results from FTIR spectra confirmed that the surface modification of clay was achieved by DPC. The characteristics of organoclays depended on the amount of DPC. The BET surface areas of organoclays were lower than the base clay. At lower amount of DPC, the BET surface areas of organoclays increased, whereas higher amount of DPC, the BET surface areas of organoclays decreased. The interlayer spacing of organoclays was higher than the base clay and increased gradually with the amount of DPC increased from 0.25 to 1.25 times the CEC. When the amount of DPC was more than 1.25 times the CEC, the interlayer spacing decreased slightly. In addition, interactions between the alkyl chains and packing density of intercalated DP cation increased as the amount of DPC increased.

The results from sorption of PAHs onto organoclays indicated that the sorption capacities of PAHs onto organoclays were higher than the base clay and increased with the amount of DPC increased from 0.25 to 1.25 times the CEC. When the amount of DPC was more than 1.25 times the CEC, the sorption capacities of PAHs were not significantly different ($p. < 0.05$). The sorption isotherms of PAHs fitted to a linear model, suggesting that sorption could be described by partition mechanism. The higher distribution coefficient (K_d) of phenanthrene may be attributed to its lower aqueous solubility compared with naphthalene. The results of this study pointed out that organoclays were suitable for using as sorbent in PAHs contaminated water.

5.2 Suggestions

Chaipuriwong (2001) indicated that primary sources of accumulated PAHs in sediments from Tha Chin estuary were mostly of pyrolytic origin, namely automobile exhaust, industrial pollution and discharge of used lubricating oil directly into the river. While Boonyatumanond et al. (2006) indicated that street dust was one of the major sources of petrogenic PAHs in the urban area. These street dust particles could wash out from road selectively and cause the high concentrations of PAHs in the aquatic sediments in Bangkok. One method of treating road runoff and wastewater discharge is to use catch basin inserts. Catch basin inserts are devices that can be placed into a catch basin or stormwater insert, which will in some way reduce pollutant discharge to the receiving water (Lau et al., 2001).

Organoclays can potentially be used as a catch basin insert sorbent for removing PAHs from road runoff and wastewater discharge. Base on the results of this study, further study is needed to extend the batch and column tests with real wastewater. Moreover, road runoff and wastewater discharge contain yet other pollutants, such as suspended solids, oil and grease, and heavy metals. Thus, simultaneous sorption of these pollutants by organoclays may be an interesting research topic. In addition, studies on the environmental safety of the organic cations themselves, the long-term stability of organoclays under field conditions and the total costs of using organoclays compared with other sorbents should be thoroughly investigated before they can be used in large-scale field applications.