CHAPTER V

CONCLUSIONS

The chelating ligand, 2-(3-(2-aminoethylthio)propylthio)ethanamine (AEPE), was synthesized and used in the surface modification of hectorite. The AEPE-hectorite was prepared by initial grafting of 3-aminopropyltriethoxysilane onto surface via reaction with hydroxyl groups on the hectorite surface, followed by reaction with ethyl-2-bromopropionate and the AEPE ligand, respectively. Then, the modified hectorite was characterized by XRD, FTIR, TGA, EA and nitrogen adsorption. The results from all techniques confirmed the successful modification of hectorite with the chelating ligand AEPE.

In the adsorption study, AEPE-hectorite was applied for the removal of mercury(II) and silver(I) in aqueous solutions using batch method. The effect of pH of metal ions solutions, extraction time, adsorbent dose, ionic strength, interfering ion and initial concentration were investigated. The adsorption behaviour of AEPE-hectorite for Hg(II) and Ag(I) ions in solution are listed in Table 5.1.

Moreover, the adsorption capacity of Ag(I) was higher than that of Hg(II). It was possibly a result from the combination of the ion exchange and coordination mechanism for Ag(I) ions adsorption onto the AEPE-hectorite, while the interaction of Hg(II) ions with the AEPE-hectorite occurred only via coordination. However, the AEPE-hectorite has high affinity towards Hg(II) and Ag(I) ions, confirmed by the interfering ions results.

The application to real water samples i.e. sea water and the wastewater from the laboratory of the gem and jewelry institute of Thailand, was performed. The results showed that the AEPE-hectorite could be used to remove Hg(II) and Ag(I) ions in real water samples.

Table 5.1 The adsorption behaviour of Hg(II) and Ag(I) onto the AEPE-hectorite[a]

Titles	Adsorption behaviour for metal ions	
	Hg(II)	**Ag(I)**
Initial pH of solutions	3-8	4-8
Kinetic model	Pseudo-second order	Pseudo-second order
Ionic strength and interfering ions	No effect	No effect
Adsorption isotherm	Langmuir	Langmuir
Maximum adsorption capacities ($mmol\ g^{-1}$)	0.33	0.47

[a] Using the extraction time and adsorbent dose of 60 min and 0.01 g.

The suggestions for this work and future work

- The reuse of adsorbents should be investigated.

- By the presence of electron donor site as nitrogen and sulfur atoms on the AEPE-hectorite, the material may be applied to adsorb gold(III) ions in wastewater or to prepare nanogold particle for further applications.

- Because the AEPE-hectorite has high affinity towards Hg(II) and Ag(I) ions. Therefore, it may be applied to prepare sensor for detection with Hg(II) and Ag(I) ions in water.