

## Development of Effective Metal-Adsorbents for the Separation of Trace Concentration of Metal Ions in Sea Water

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### Summary

High-performance metal-adsorbents were developed by using chitin and chitosan, marine bio-polymers of polysaccharides, as polymer matrices for the separation and preconcentration of trace concentration of metal ions including toxic heavy metal ions in sea water and for their recovery and removal; i.e. phosphorylated and methyl phosphorylated chitin and EDTA- and DTPA-type chitosan were prepared in order to examine their adsorption behaviors for metal ions from chloride media. Since metal ions are adsorbed on these adsorbents according to cation-exchange mechanism, the effect of pH on the adsorption from dilute hydrochloric acid solution were examined in detail for various metal ions.

Although some metal ions were selectively adsorbed on phosphorylated and methyl phosphorylated chitin at low pH, their pH functionality was only poor, suggesting the difficulty of elution. On the other hand, contrarily, EDTA- and DTPA-type chitosan exhibited high selectivity and high pH functionality at low pH, suggesting easy mutual separation among various metal ions and easy elution at low pH for concentration. Particularly, the high selectivity to toxic heavy metals such as copper, nickel and lead should be noticeable. The selectivity series for metal ions are in accordance with those of EDTA and DTPA themselves, suggesting that the characteristics of these chelating ligands for complexation with metal ions are still maintained after the immobilization on chitosan.