CHAPTER V

CONCLUSIONS

1-Phenyl-3-methyl-4-stearoyl-5-pyrazolone (HPMSP) doped mesoporous silica prepared via a sol-gel method was subjected to use as a sorbent for the extraction of metal ions from aqueous solution. Various parameters influenced its metal sorption behavior were investigated in both batch and column methods. The results based on batch experiments showed that not only the initial pH of metal solution but also the presence of salts governed the ability of such sorbent to extract the metal ions. The optimum pH values for quantitative sorption of metal ions including Cd(II), Pb(II) and Zn(II) were in the range of 4 to 6. The presence of salts in metal solution enhanced significantly the metal extractability of the silica. The amounts of Cd(II), Pb(II) and Zn(II) extracted by the modified sorbent from metal solution containing 0.1 M $NaNO_3$ were found to be 0.21, 0.12 and 0.32 mol/kg, respectively. The amelioration of the metal extractability of the HPMSP doped mesoporous silica with the accompaniment of salt in metal solution offered a benefit of such sorbent to the extraction of metal from environmental samples containing several salts.

For the column method, the 2^3 factorial design was used to determine the principal parameters on the Cu(II) desorption efficiency of the sorbent. The experimental design reached the conclusion that the significant factors were the amount of Cu(II) and the concentration of HNO_3 used as eluent. The utilization of large amount of Cu(II) loaded and the high concentration of HNO_3 were recommended to obtain the high Cu(II) desorption proficiency of the sorbent. The Cu(II) sorption capacity of the modified silica determined by dynamic method at optimum conditions was found to be 6.34 mg of copper per gram of sorbent. The application of this modified silica to the preconcentration of Cu(II) from aqueous solution was successfully achieved with the maximum preconcentration factor of 40. The study of adsorption-desorption cycles demonstrated the reusability of the HPMSP doped sorbent without the decline in the sorption capacity. The present modified silica was also successfully used as a sorbent for the extraction of metal ions from different sample matrices.

Suggestion for future works

1. The investigation of adsorption properties of HPMSP doped mesoporous silica towards different metal ions in column method.

2. The application of HPMSP doped mesoporous silica to the on-line preconcentration and determination of metal in environmental samples.