# CHAPTER 4

# CONCLUSION

Cadmium and lead are well recognized to be highly toxic elements to human beings. They are widely dispersed in the environment, and exposure to either element can increase the number of adverse health effects due to their toxicity after accumulation in the multiple organs in human body. Seafood samples are the constant source for cadmium and lead contamination. The concentration of cadmium and lead in seafood samples are usually found at the trace levels. The direct determination of trace amount of cadmium and lead in seafood samples which have complicated matrices is usually difficult owing to matrix interferences. Therefore, the sensitive instrument technique and preconcentration step are more important (Correia *et al.,* 2000).

This investigation presents the sample preparation method for cadmium and lead determination in seafood samples. The separation method in this research was performed by using octadecyl silica membrane disk modified by 8-hydroxyquinoline as a solid phase extraction and then GFAAS was used for quantitative analysis.

GFAAS conditions were optimized such as type of matrix modifier, pyrolysis and atomization temperature. The optimum matrix modifier was the combined of 0.06% (w/v) $Mg(NO_3)_2$ and 1% (w/v) $NH_4H_2PO_4$. The optimum pyrolysis and atomization temperature were 700 $^{o}$C , 800 $^{o}$C, 1,400 and 1,500 $^{o}$C respectively. The optimum conditions were provided the high absorbance and good characteristic absorption profiles. The linearity range for cadmium and lead determination were found in the range 0.1-8.0 μg $L^{-1}$ Cd and 0.1-160.0 μg $L^{-1}$ Pb with correlation coefficient ($R^2$) 0.9971 and 0.9972 respectively.

The digestion methods such as dry ashing, hot plate digestion and water bath digestion were performed in this study. The suitable digestion method was water bath digestion because this method is less time consuming and many replicate of sample can be done. Moreover, the method was performed in the closed vessel which can reduce the risk of contamination.

The sample solutions were extracted by using the octadecyl silica membrane disk modified by 8-hydroxyquinoline. The optimum solid phase extraction conditions were pH range 6.0-7.0, 8-hydroxyquinoline 10.00 mg and 1.0 M nitric acid 5.0 mL as an eluent.

The study method was verified by considering the analytical performance. The accuracy of the method was obtained by analysis of certified reference material (DORM-2). The recoveries of cadmium and lead were 109.8 and 104.6% with the relative standard deviation (%RSD) 1.29 and 6.80 respectively. The detection limits of cadmium and lead determination were 0.073 μg $L^{-1}$ and 0.332 μg $L^{-1}$ respectively. Maximum capacity of the membrane disks modified by 10.00 mg of 8-hydroxyquinoline in 2.0 mL ethanol was found to be 30.67 ± 3.77 μg $L^{-1}$ and 168.82 ± 11.13 μg $L^{-1}$ respectively. The various ions were not effect the analysis of cadmium and lead by using the developed method. For the quantitative analysis of cadmium and lead in seafood samples. The various seafood samples such as tunafishes, squids, cuttlefishes, octopuses and prawns were collected from the frozen seafood companies in Trang, Pattani and Songkhla provinces. The concentration of cadmium and lead in various frozen seafood samples were found in range as follows; tunafishes; 0.001-0.016 μg $g^{-1}$ and 0.009-0.129 μg $g^{-1}$, squids; 0.001-0.009 μg $g^{-1}$ and 0.005-0.165 μg $g^{-1}$, cuttlefishes; 0.003-0.004 μg $g^{-1}$ and 0.003-0.005 μg $g^{-1}$, octopuses; 0.019-0.049μg $g^{-1}$and 0.002-0.018 μg $g^{-1}$ and prawns; 0.002-0.004 μg $g^{-1}$ and 0.005-0.025 μg $g^{-1}$ (dry weight) respectively. However, the concentration of these metals in seafood samples were lower than the food contamination standard limited level issued by the Ministry of Public Health of Thailand.

The proposed sample preparation method in this research was successfully due to simple and rapid technique with a highly effective method and could be applied to determination of cadmium and lead in seafood samples.

For further study, the various chelating agent can introduce to modified octadecyl silica membrane disks for the effective separation and preconcentration of these metals. The application of this study could be use as a sensitive method for a vary low concentration of heavy metals in seafood samples and other samples.