

## CHAPTER 4

### CONCLUSION

The metal determination in natural water samples in dissolved and particulate phase. The analytical technique was performed using GFAAS for determination Cd, Cu, Pb in filtered and Cd, Cu, Pb and Zn in filtered and particulate sample, FAAS for determination Zn in filtered sample and Al, Fe, Mn in particulate sample and ICP-AES for determination Al, Fe and Mn in filtered sample after preconcentration by extraction with APDC/DDDC into chloroform filter sample. The digestion of particulates sample using HF and aqua regia microwave digestion.

In the optimum condition study of GFAAS for determination Cd, Cu, Pb and Zn as follows pyrolysis temperature were 600, 800, 750 and 700 °C, respectively. The atomization temperature of Cd, Cu, Pb and Zn were 1400, 2100, 1500 and 1700 °C, respectively. The suitable matrix modifiers of Cd and Pb was  $\text{La}(\text{NO}_3)_2$ .

In this study, average dissolved Cd, Cu, Pb, Zn, Al, Fe and Mn concentrations in Thale Noi were  $0.03\pm 0.06$ ,  $0.4\pm 0.3$ ,  $0.005\pm 0.005$ ,  $27\pm 29$ ,  $90\pm 165$ ,  $148\pm 107$  and  $135\pm 225$   $\mu\text{g/L}$ , respectively; Inner Lake were  $0.03\pm 0.04$ ,  $0.4\pm 0.5$ ,  $0.002\pm 0.003$ ,  $18\pm 18$ ,  $36\pm 119$ ,  $18\pm 51$ ,  $189\pm 328$   $\mu\text{g/L}$ , respectively; Middle Lake  $0.03\pm 0.06$ ,  $0.4\pm 0.2$ ,  $0.005\pm 0.010$ ,  $25\pm 30$ ,  $27\pm 50$ ,  $22\pm 25$ ,  $37\pm 55$   $\mu\text{g/L}$ , respectively; Outer Lake  $0.02\pm 0.04$ ,  $0.7\pm 0.6$ ,  $0.003\pm 0.004$ ,  $20\pm 12$ ,  $97\pm 196$ ,  $58\pm 138$ ,  $12\pm 26$   $\mu\text{g/L}$ , respectively

Average Cd, Cu, Pb and Zn concentrations in particulated form in Thale Noi were  $0.4\pm 0.7$ ,  $21\pm 23$ ,  $60\pm 61$  and  $84\pm 157$   $\mu\text{g/g}$ , respectively; Inner Lake were  $0.2\pm 0.2$ ,  $37\pm 54$ ,  $18\pm 18$  and  $84\pm 148$   $\mu\text{g/g}$ , respectively; Middle Lake were  $0.07\pm 0.07$ ,  $57\pm 148$ ,  $22\pm 18$  and  $61\pm 67$   $\mu\text{g/g}$ , respectively; Outer Lake were  $0.1\pm 0.3$ ,  $19\pm 17$ ,  $41\pm 51$  and  $68\pm 101$   $\mu\text{g/L}$ , respectively. For Al, Fe and Mn in Thale Noi were  $155\pm 403$ ,  $150\pm 154$  and  $3.5\pm 5.6$   $\text{mg/g}$ , respectively; Inner Lake  $123\pm 218$ ,  $34\pm 47$  and  $2.3\pm 2.0$   $\text{mg/g}$ , respectively; Middle Lake  $95\pm 86$ ,  $24\pm 22$  and  $2.2\pm 2.4$   $\text{mg/g}$ , respectively; Outer Lake  $140\pm 186$ ,  $27\pm 12$  and  $1.7\pm 2.6$   $\text{mg/g}$ , respectively.



The average concentration of dissolved Cd, Cu, Pb, Zn, Al, Fe and Mn in the Outer Lake were in the same range founded in the last two decade. It should be noted that only dissolved Pb and Zn concentrations were elevated (2 to 10 folds) but the concentration level does not exceed baseline levels of natural water World.

The average concentration of particulate Cd, Cu, Pb, Zn, Al, Fe and Mn in the Outer Lake were higher than the value that reported by Sirinawin *et al.* (1998). The result showed that, the elevated particulate metal concentration from this study can be effect from strong acid digestion method while Sirinawin *et al.* (1998) used a mild digestion method.

The total metal study indicated that the total Cd and Cu concentrations in both seasons in each area showed small variation. The total Pb, Zn, Al and Fe in wet seasons showed higher variation than dry season. However, Total Mn showed high variation in the Inner Lake in both seasons.

In the partitioning of trace metal study, the  $K_d$  values of most metals in all areas were similar in both wet and dry season. However, the  $K_d$  of Cd and Cu in Thale Noi in dry season were slightly higher than other bodies of the lake. A sequence of  $\log K_d$  values (Al~Fe>Mn>Cu>Cd $\geq$  Pb>Zn) was found in most of areas studied. It is seen that high particle reactivity for a metal would tend to increase that  $K_d$  value of metal. The result form  $K_d$  and salinity plot, the  $K_d$  valued of Cd and Cu in Inner Lake, Middle Lake and Outer Lake decrease with salinity in wet season. The  $K_d$  valued of Cu in dry season of Middle Lake show an increase with salinity. The  $K_d$  valued of Zn in both seasons in Outer Lake decrease with salinity. The  $K_d$  valued of Mn in both seasons in Inner Lake, Middle Lake and Outer Lake increase with salinity. The  $K_d$ -PCA plot described the group of Cu, Pb and Zn was closely related to settling particles; allochthonous aluminum silicates and Fe/Mn oxide. In Outer Lake, the grouping of metals from this study was different from previously reported by Sirinawin (1998).

It is of interest to mention about the behavior of Cd. It is classified as a borderline B type (Turner, 1981), however the result from this study exhibited the closely relationship to metals which classified as borderline A type (Cu, Pb, Zn, Fe, Mn).