

CHAPTER 4

CONCLUSION

The determination of arsenic in contaminated water samples from Ronpiboon District, Nakhon Sri Thammarat province by epithermal neutron activation analysis (ENAA) were studied. It was found that, the optimal condition for coprecipitation of As(III) and As(V) with a matrix of ammoniumpyrrolidine dithiocarbamate (APDC) and $\text{Pb}(\text{NO}_3)_2$ is at pH 3. However, the speciation between As^{3+} and As^{5+} can not be verified. Thus we use pH 3 for coprecipitation total arsenic with ammoniumpyrrolidine dithiocarbamate (APDC) and $\text{Pb}(\text{NO}_3)_2$.

In complex natural water system, the degree of precipitation of As(III) with dithiocarbamate may be significantly reduced due to competition caused by other metal ions present in the system. The proposed precipitation method not only eliminated interference for neutron activation analysis but also provide a large preconcentration factor for arsenic.

In addition to being a rapid and selective to the desired elements, the coprecipitation process provides a solid sample favorable for NAA. It is essential that in this procedure most of the alkali metals, the alkali earth metals and halogens are eliminated. This will also decrease the background level of radiation and the radiation dose received by personnel. Additionally, $\text{Pb}(\text{NO}_3)_2$ and TiCl_3 were chosen as the carrier and the reducing agent to avoid possible spectral interference.

From the results, suitable conditions for determination of arsenic by epithermal neutron activation analysis (ENAA) were 11 hr irradiation, 13 hr cooling times and 100 s measuring times.

The difficulties for determination of arsenic in water sample by neutron activation analysis was a neutron flux gradient in the vertical direction of the Thai Research Reactor (TRR-1/M1).

Neutron flux gradient was also found in this research. The flux variations can cause serious bias and lack of reproducibility in activation analysis if background correction is not performed. Neutron gradients should be measured in vertical rabbit axes by use of copper wire flux monitors.

From this experiment, concentrations of total arsenic in contaminated water from eight sites in Ronpiboon District, Nakhon Sri Thammarat province, ranged from 0.005-0.24 ppm.

Precision (% RSD) of this method ($n = 6$) was 2.35, shown in Table 3.4. From the experiment of natural waters spiked with known amount of arsenic, recovery of total arsenic was found to be satisfactory with the percent recovery 92.6% - 95.6% (Table 3.5).

The detection limit of this method was 8×10^{-4} ppm for irradiation times = 4 hr in a flux of $2.2 \times 10^9 \text{ n cm}^{-2} \text{ s}^{-1}$ and measuring times = 100 s.

Several completing processes modify the concentrations of the arsenic in natural waters including oxidation of arsenite to arsenate or reverse reaction, precipitation and absorption reactions, dissolution of solid material (especially organic matter), diffusion of arsenic from and into the sediments and the addition due to the compaction flow. The kinetics of the arsenite-arsenate transformation in the river waters are still not well-understood.[26]