CHAPTER 6

CONCLUSIONS AND RECOMMENDATION

Lead and lead compounds are considered cumulative poison. The effect of lead intoxication may range from simply upsetting to disabling and even fatal. Lead is usually found as impurities in food, drug, environmental pollutants, etc. There are many techniques used in trace quantitative determination of lead. The two techniques which give high sensitivity are studied in this thesis. They are IR spectrophotometric method and anodic stripping analysis.

The IR spectrophotometric study of $Pb(TMDTC)_2$ in solid KBr showed a weak symmetrical C-S peak at 693 cm^{-3} and a strong broaden peak of C=N vibration at 1462 cm^{-1}. The strong absorption peak of C=N vibration yields no quantitative relationship of absorbance to the amount of $Pb(TMDTC)_2$. However, the weak absorption peak of C-S vibration results a quantitative determination of lead in the range of 0.25-4.00 mg $Pb(TMDTC)_2$ or 0.10-1.66 mg Pb(II). The optimum amount of KBr in these pellets was found to be 225.0 mg. The sensitivity for determination of lead could be improved if the strong absorption peak Pb-S at 305 cm^{-1} was used. This would be suggested for further study of quantitative analysis of lead in case of IR spectroscopic equipment is able to perform at 305 cm^{-1}.

This IR spectrophotometric analysis of lead at 693 cm^{-1} was applied to determine lead impurities in tooth paste. Since very low

amounts of lead are in tooth paste samples examined (0-7.06 µg/100 g sample), no $Pb(TMDTC)_2$ precipitate yielded. Thus, no IR spectrophotometric analysis of lead in tooth paste sample, as $Pb(TMDTC)_2$ in solid KBr, could be done. The IR spectrophotometric analysis of lead as $Pb(TMDTC)_2$ in $CHCl_3$ might be worth for further study. The technique has been thought for this study but the lack of liquid IR cell in the laboratory makes it impossible.

The anodic stripping analysis for determination of lead is proved to be a higher sensitive technique than IR spectrophotometric method. Anodic stripping analysis of lead was performed in 1.00×10^{-5} M $Hg(NO_3)_2$ and 0.10 M in KNO_3. Using a 20-minute-deposition at -0.80 V and 0.8 V/minute for scan rate, a linearity of anodic peak current to concentration of lead (II) obtained in the range of 1.50×10^{-6} - 2.00×10^{-7} M Pb(II). When the technique was used to determine lead in tooth paste samples, it resulted in a simple and precise technique as well as the time consumed for this analysis was quite short. (ca. 30 minute/trial; excluding dissolution of lead from tooth paste sample).

Since decomposition of organic matters in tooth paste sample is necessary for an anodic stripping analysis, the modifying method for the determination of lead in evaporated milk was used to decompose organic compounds in tooth paste and lead (II) in tooth paste residue was dissolved with HNO_3.

The tooth paste samples used are Colgate DMF, Colgate, Darkie, Denza, Vademecum Menthy and White lion. No lead was found in Colgate DMF but in the other tooth paste samples lead were found as trace

impurities, ranging from 0.67 to 7.06 μg for a hundred gram sample. The amounts of lead in tooth paste samples examined did not exceed the maximum permission value of the Ministry of Industry of Thailand.

The anodic stripping voltammetric technique for determination of lead may be improved by using a rotating glassy carbon electrode mercury plated in situ, or using a faster scan rate, or using both the rotating glassy carbon electrode mercury plated in situ and faster scan rate. The technique may be interesting for further study of trace lead in any sample.