

## Experiment 9: Direct Titration of Lead with ErioT and EDTA

**Synopsis** Lead is held in solution by weakly chelating tartrate so that it may react with Erio T to form a bluish violet color. The lead is titrated with standard EDTA. The end point is observed by a loss of the bluish violet color as the last of the lead-Erio-T complex is consumed.

**READINGS** Read pages 279-285 in Critical Reviews

### Reagents

0.01 M lead solution

0.01 M EDTA standard solution: Dilute from 0.100 M EDTA

37.22 g of disodium EDTA in 1000 mL deionest water.

Or

Dry the acid for two hours at 130-150C. Cool. Weigh 29.210 g of acid EDTA, add to 600 mL water, add pellet by pellet NaOH, until the EDTA comes into solution. Dilute to 1L.

Erio T indicator powder:

Grind 100 mg of indicator with 10 g of NaCl to a very fine powder and store.

Tartaric acid

pH 10 buffer

: Dissolve 70 g of  $\text{NH}_4\text{Cl}$  in 570 ml of ammonia ( s. G. 0.90) and dilute to distilled water to 1 L.

### Procedure

1. Place 10-30 ml (exactly measured) 0.01 M lead soluiton in 250 ml flask
2. Add a spatula end of tartaric acid.
3. Add 5 ml of buffer pH 10 and dilute to about 50-100 ml. If a turbidity occurs ( $\text{Pb}(\text{OH})_2$ ) add more tartaric acid.
4. Add Erio T (too much will change the color intensity, so start small).
5. Titrate until the colour changes from violet just to clear blue.
6. Repeat twice to be able to report the rsd of the method.

1 ml 0.01 M EDTA = 2.0719 mg Pb

**REPORT** In addition to material, methods and results, include:

1. What is the rsd of this method?
2. What will determine the minimum amount of lead that can be measured in this method?
3. What constitutes a blank in this procedure? What are the sources of error embodied in the

- standard deviation of the blank?
4. How does sample matrix affect your results?
  6. What was the estimated time for turn around in samples?
  7. Are there any problems with disposal of hazardous materials?
  8. How easy would it be to instruct a technician on this method?
  9. How easy would it be to construct a paper trail for this method?
  10. What metals will interfere the most with Pb in this method?
  11. Why doesn't the lead precipitate. Use the actual values of complex formation constants to justify your answer.
  12. What is the color forming species and why is it affected by lead?
  13. Why does the pH have to be brought to 12?