

## Experiment 24: Sequential Soil Extractions

**SYNOPSIS** In order to determine the availability of the soil lead, the soil may be extracted with sequentially more powerful extractants. The method shown below is based on that of Soon and Abboud:

### **PROCEDURE**

1. Extract soils with distilled deionized (DD) water:
  - a. Weigh 3 g of air-dried (<2 mm) soil into 120 mL Erlenmeyer flask and add DD water.
  - b. Shake soils for 2 hours 120 cycles/min with pure water.
  - c. Filter through a Whatman No. 42 filter paper.
  - d. Save supernatant.
2. Extract soils with 1 M ammonium acetate/acetic acid (pH 7).
3. Extract soils with dilute 1 M HNO<sub>3</sub>:
  - a. 1 M HNO<sub>3</sub>: add 250 mL of concentrated HNO<sub>3</sub> to 3 L of distilled deionized water and dilute to 4 liters.
  - b. Weigh 3 g of air-dried soil (< 2 mm) into a 125 mL Erlenmeyer flask and add 30 mL of 1 M HNO<sub>3</sub> extractant.
  - c. Shake at 2 hours at a speed of 120 cycles/min.
  - d. Filter through a Whatman No. 42 filter paper. Save filtrate for analysis.
4. Extract soils with EDTA:
  - a. 0.05 M EDTA (pH 7): dissolve 93.05 g of EDTA (di-sodium salt) in approximately 4 L of distilled and deionized water (DD). Adjust to pH 7.0 with 7 M NH<sub>4</sub>OH, and make up to 5 L with DD water.
  - b. Weigh 5 g of air-dried (< 2 mm) soil into a 125 mL Erlenmeyer flask and add 25 mL of 0.05 M EDTA solution.
  - c. Shake for 1 hour at a speed of 120 cycles/min.
  - d. Filter through a Whatman No. 42 filter paper after shaking, save filtrate for analysis.
5. Extract with concentrated HNO<sub>3</sub> and peroxide:
  - a. Follow instructions given for a single total extraction of lead (Experiment 10 )

**Report** In addition to title, introduction, materials and methods, include an essay based on the following questions:

1. Compare your extraction procedure to the possible forms of lead in the soil. Suggest what soil chemical form will be released (hint consider solubilities) with each form of the extractant.

2. Which one will be most likely to relate to the acid digestible form of lead in a stomach acid environment?
3. From a public health standard, how will you interpret your results for a single total lead acid digestion?
4. Would you suggest that the cost of sequential extractions would be worthwhile for public health surveys?