02-07-2018

# APBI 200 - LAB # 5

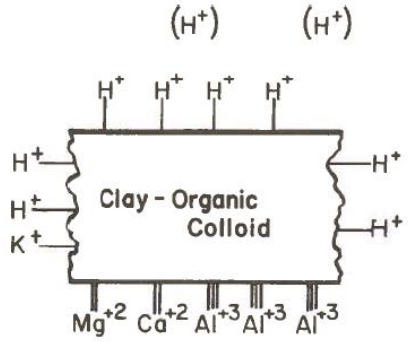
## Section 1 - Soil pH

**Please answer the following questions:**

1. Soils with a low pH are: (select all that apply)
   a) Acidic
   b) Alkaline
   c) Low in hydrogen ions
   d) High in hydrogen ions
   e) Generally found under humid climates
   f) Generally found under dry climates

**[1 point]**

2. Consider the following diagram:




where:
$(H^+)$ = Hydrogen ion in soil solution
$H^+$ = exchangeable Hydrogen ion
$Ca^{2+}$ = exchangeable Calcium ion
$Mg^{2+}$ = exchangeable Magnesium ion
$Al^{3+}$ = exchangeable Aluminum ion
$K^+$ = exchangeable Potassium ion

   a) If you test the pH of this soil in water, would you expect your pH reading to be acidic, neutral, or alkaline? Briefly explain your rationale.

   b) If you add a small amount of a base (e.g., KOH) to this soil, would you expect a significant increase in the pH of this soil, why or why not? [*Hint: consider exchangeable acidity, and indicate which ions would be involved in contributing to this pool of acidity*]

**[3 points]**

3. You obtained different values for the same soil sample when pH was measured in water and 0.01 *M* $CaCl_2$. Which reading was more acidic? Briefly explain why?

**[2 points]**

**Required attachments:**

- Your data sheet with pH values obtained by pH meter and field test kit:

**[2 points]**

## Section 2 - Soil organic matter

4. Soil organic matter has a direct impact on: (select all that apply)
   a) Soil bulk density
   b) Cation exchange capacity (CEC)
   c) Soil water holding capacity
   d) Texture

**[1 point]**

5. Briefly explain how organic compounds contribute to soil cation exchange capacity (CEC), and distinguish how this differs from the contribution that phyllosilicates make to CEC. [*Hint: think about the source of the charge on the two types of particles*]

**[2 points]**

6. Briefly explain how the following factors influence the decomposition of organic residues added to the soil.
   a) Soil aeration
   b) C:N ratio of the organic residues added to the soil [Hint: consider values above and below 24:1]

**[4 points]**

**Required attachments:**

Your data sheet with soil organic matter calculations.

**[4 points]**

## Section 3 – Soil phosphorus

7. Mehlich method for soil phosphorus is used to determine: (select the correct answer)
   a) Total phosphorus
   b) Plant available phosphorus

**[1 point]**

**Required attachments:** **[4 points]**

- The standard curve. Don't forget to include a title and axes labels.
- Data collection table, including all calculations for your sample; show your units.

**Total for lab 4 assignment [24 points]**