01-02-2018

APBI 200
LAB # 5 ASSIGNMENT

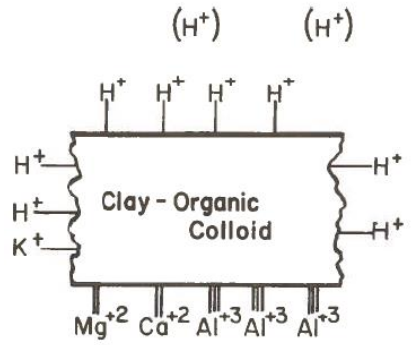
Section 1 - Soil pH

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*]

[4 points]

3. The soil sample which you used to obtain data for pH in this lab, was from the coarse textured A horizon of Totem field, the agricultural location of lab #1. This site has been amended with compost (approximately 6% SOM), and has been under turf grass for a number of years. 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:

[4 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
   g) Texture

[1 point]

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

[4 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 sheets for hygroscopic water content and soil organic matter content showing formulas used, calculations and units.

[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:

- 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.

[4 points]

Total for lab #5 assignment [29 points]