Name: _____ Laboratory Section: _____

Date: _____ Score/Grade: _____

Video
Exercise 28
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LAB EXERCISE 28 Soils

Lab Exercise and Activities

SECTION 1

Soil Color

1. Using soil samples (observed/collected in the field or provided by your instructor, or soil photographs), note the predominant soil color and indicate the likely soil component responsible for the color. (Answers will vary, depending on the samples/photographs provided.) Be sure and note whether the sample is wet, moist, or dry.

Personal answers to all of these questions will be based on soil sample provided by instructor.

a) Soil sample A

b) Soil sample B

c) Soil sample C

d) Soil sample D

Using These Same Four Samples

2. Using a *Munsell Color Chart*, note the *color description* and the *Munsell notation* for each of the four samples you assessed in question 1.

Personal answers to all of these questions will be based on soil sample provided by instructor.

a) Soil sample A

b) Soil sample B

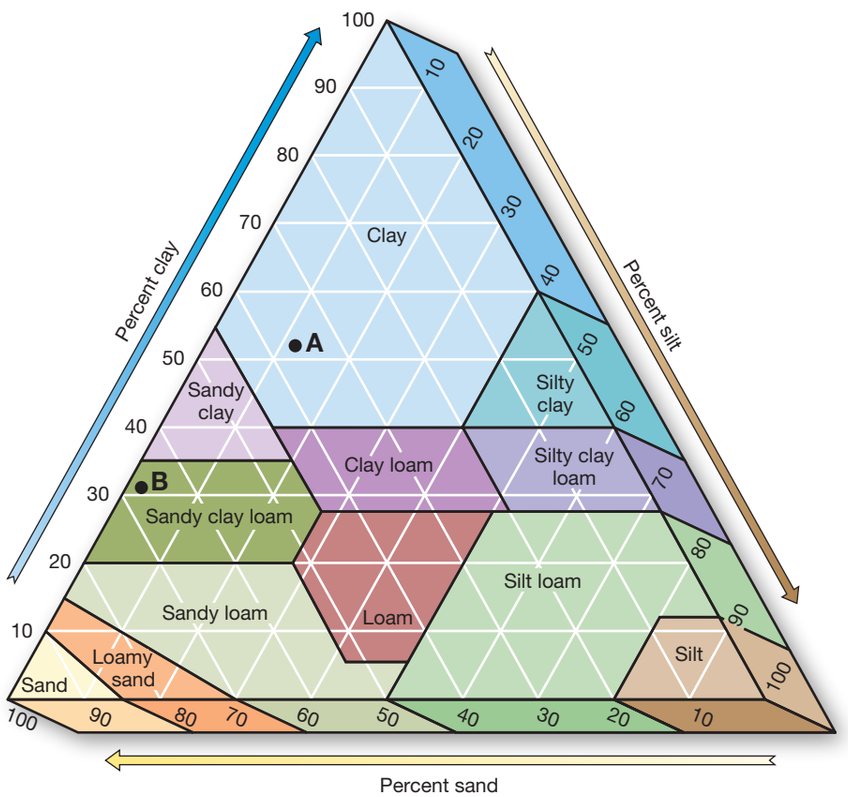
c) Soil sample C

d) Soil sample D

SECTION 2

Soil Texture and Soil Structure

1. Use the soil texture triangle to name the following by its correct texture class (named on Figure 28.2):
   - **a)** 17% sand, 28% silt, 55% clay: ***clay***
   - **b)** 31% sand, 55% silt, 14% clay: ***silt loam***
2. Determine the percentage of each particle size for A and B examples plotted on the triangle (Figure 28.2):
   - **a)** A: ***33%*** % sand, ***14%*** silt, ***53%*** clay
   - **b)** B: ***65%*** % sand, ***5%*** silt, ***30%*** clay



▲ **Figure 28.2** Soil texture triangle
A *Soil Survey Manual*, USDA, Handbook No. 18, Natural Resources Conservation Service, October 1993, p. 137.

3. Using the numbers **1, 2,** and **3** to designate each of the three soil horizons, place these numbers in the appropriate locations on the soil texture triangle in Figure 28.2. In the textural analysis of mineral particle sizes, the A horizon is mainly made up of ***silt loam***

the B horizon is mainly made up of ***clay***

and the C horizon is mainly made up of ***loam***

In a soil profile, is this what you would expect the particle size distribution to be? Explain.

Soil erosional and depositional actions between the horizons result in the re-deposition of different soil components.

4. In a less quantitative way than using sieves to physically sort soil particles, soil texture can be determined in the field by feeling the soil and estimating the percentages of sand, silt, and clay. Try this method using the following procedure with available soil samples, recording your observations and results through each of these steps. Your instructor may direct you to use the four original soil samples from previous sections of this exercise.

Post your results from **Step 4** and **Step 5** and Table 28.3 here:

Personal answers for A, B, and C will based on soil sample provided by instructor.

a) Soil sample A

b) Soil sample B

c) Soil sample C

SECTION 3

Soil Texture and Porosity

1. You can perform a simple demonstration to observe the effect of soil texture and structure on porosity. Your instructor may have you use the same soil samples from earlier sections in this exercise.

Personal answers to all of these questions will be based on soil sample provided by instructor.

a) Soil sample A

b) Soil sample B

c) Soil sample C

2. Optional: A similar demonstration can be done "in the field." Selecting a site where the soil is not compacted, trim any vegetation completely to the ground and carefully remove any loose organic materials. Pound a soup can (both ends removed) into the soil several inches. If necessary, place a board over the top of the can to prevent the can from crumpling while you do this. Pour water into the can, filling it to the top. After a period of time, observe how much water has been absorbed. You can do this demonstration at several sites and compare the results. (Again, while you could take careful measurements, the purpose of this investigation is primarily observation and relative absorption rates.)

Personal answers to all of these questions will be based on soil sample provided by instructor.

a) Site A

b) Site B

c) Site C

SECTION 4

Soil Profiles of Soil Horizons

The Illustrated Guide to Soil Taxonomy, available for download at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/taxonomy/?cid=nrcs142p2_053580 has many images of soil horizons.

1. Using photographs of three soil profiles (either in the soils chapter of a textbook or provided by your instructor) and working in groups with your lab partners, identify the various soil horizons in each profile. Observe horizon characteristics such as thickness, color, texture, and structure, and note variations from one profile to another. Speculate on the factors that combined to produce the appearance of each.

Personal answers to all of these questions will be based on soil sample provided by instructor.

a) Soil profile A

b) Soil profile B

c) Soil profile C

2. You may be able to locate one or more sites on your campus or nearby where you can see soil profiles in their natural setting. As you did in the first activity, observe the profile's characteristics; if more than one profile is available, note variations between them and see if you can determine the major factors influencing the formation of each.

Personal answers to all of these questions will be based on soil sample provided by instructor.

a) Profile site A

b) Profile site B

c) Profile site C

SECTION 5

Soil Acidity and Alkalinity

1. Using pH test equipment provided by your instructor, evaluate two soil samples, perhaps one from your home and one from campus, or from two different areas on your campus. Ideally, you would use samples from sites with different vegetation. Record their pH readings on Figure 28.4 above. How far apart on the pH scale are the two readings?

   Personal answer based on soil sample provided by instructor.

2. Are either of the samples strongly acidic? What remedial actions could be taken to make them more pH neutral, and under what circumstances might you want to do this?

   Personal answer based on soil sample provided by instructor.

3. Review Focus Study 3.1 in *Geosystems* or Focus Study 2.1 in *Elemental Geosystems*. How has acid deposition affected soils, forests, and lakes in the United States and Europe? Do you think that the remedial actions you outlined in item 2 are practical for large-scale problems affecting entire regions? What do you think would be the best solution at these larger spatial scales? (*Hint:* Consider what the sources of acidifying materials are.)

   Personal answer

SECTION 6

1. Use Figure 28.5, map of the worldwide distribution of the Soil Taxonomy orders, find your present approximate location. Although this is only a general assessment because of the scale of the world map, use the color map legend and identify the one or two soil orders and their main characteristics that seem to represent your region. Record your findings here:

   Personal answer

Optional—Internet access required

2. You can see from Table 28.5 that there are some 15,000 soil series identified in the soil taxonomy for the United States and Canada. The USDA-Natural Resources Conservation Service has a website about its soil surveys: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

To find out about the horizons, color, texture, structure, consistence, mineral, and chemical composition of your soil—or any other soil—go to this website.

Web page
Soil Surveys
https://goo.gl/a8ChLn

Zoom in to your campus and use the tools to set the Area of Interest to your campus.
Answer the following questions for your campus: how many map units are on your campus? Which covers the largest area? How many acres and what percent of your campus does it cover? How well drained is it? What is its farmland classification?

Personal answer

Note: When doing actual field work with a soil pedon (the complete soil profile and the basic sampling unit in soil surveys), you will find different colors in each horizon and perhaps a couple colors in one horizon. If you identify more than one color in the soil samples provided for this exercise, be sure to note it in your assessment.