Soil Lab

Background: Often, forensic scientists need to determine the characteristics of items found at a crime scene and compare these items to ones found on a suspect or at the suspect's home or car or boat or anything connected to the suspect. Physical Properties of these trace substances can be used to describe and compare these items of interest.

     The Locard Principle states that if one surface touches another, there will be an exchange of some physical material, which can be identified. Physical properties that describe substances can include: weight, volume, color, boiling or melting points, density, conductivity, and pH.

     Examples of physical properties that can be used to compare soil samples are the fluorescence, pH, sedimentation rate, and conductivity. In general different soil samples will have different properties.

Fundamental Understanding:
- Different soils will have different physical characteristics e.g. pH, fluorescence, sedimentation rates, conductivity, and color
- Amount of electrolytes and color

Essential Questions:
- What are some possible components of soil and how can they be analyzed?

Purpose:
- To determine characteristics of soils in order to compare soil samples

Materials
1. pH paper
2. 10.0 mL graduated cylinder
3. 100 mL beakers or paper cups
4. Petri dish
5. distilled water
6. sieves to remove larger particles

Optional
1. UV black light
2. Vernier CBL's or Labpro's with conductivity probes and/or pH probes

Activity 1 – Physical Characteristics

Procedure
1. Place about 2.0 cm^3 of soil into a Petri dish.
2. Observe physical characteristics, color, types of particles, coarseness.
3. Determine the presence of fluorescence in the soil by using a UV black light.

Activity 2 - pH of soil

Procedure
1. Dissolve a small amount of soil in 1.0 cm^3 into 20-30 ml of distilled water.
2. Measure pH of each soil sample with pH paper or Verneir pH probe
3. Repeat for each soil sample.

Activity 3 - Sedimentation rate

    Procedure
1. Fill 10.0 ml graduated cylinder with H_2O (or any other solvent e.g. methanol or acetic acid)
2. Record how long it takes for most of the soil sample to sediment (or fall to the bottom of each graduated cylinder).
3. Repeat for each soil sample.

Activity 4 – Conductivity of Soils
    Procedure
1. Place ~2.0 g of soil into beaker of 50.0 mL H_2O. (It is important to weigh the same amount of soil for each soil sample.)
2. Using a conductivity probe connected to CBL or Labpro, record the conductivity level of each sample.
3. Repeat for each sample

Questions and Conclusion
1. What is pH?
2. What is fluorescence?
3. What is conductivity? How can it be measured?

Name_____
Evidence Sheet for Soil Analysis

Suspect 1 Soil	Suspect 2 Soil	Suspect 3 Soil	Crime Scene

Describe Soils:

Suspect 1: _____

_____

Suspect 2: _____

_____

Suspect 3: _____

_____

Crime Scene soil:_____

_____

Time for Sedimentation of Soils

Suspect 1	Suspect 2	Suspect 3	Crime Scene

PH Of Soils

Suspect 1	Suspect 2	Suspect 3	Crime Scene

Fluorescence

Suspect 1	Suspect 2	Suspect 3	Crime Scene