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**Spectrophotometer Use for Soil Analysis Lab**

**Materials:**

* Spectrophotometer (Spec 20 is an example of one type that could be used in this lab)
* Unscratched cuvettes for the spectrophotometer
* 10ml graduated cylinder
* Tap water
* 3 different soil types
* Timer or watch for one-minute intervals

**Instructions:**

1. Calibrate the Spec -20.
   * + Use the empty cuvette
     + Set the wavelength to 300 – 500
     + Set the transmittance to 100%
     + Match the white line of the cuvette with the plastic line on the sample holder
     + Calibration must occur before each sample is measured
2. Put 2ml of soil into the cuvette.
   * Use a 10ml graduated cylinder to measure the soil
   * Observe and record the color and texture on the data table
3. Add 7ml of water to the cuvette.
   * Shake for 20 – 30 seconds
   * Observe and record the appearance with water while shaking
   * Immediately put the cuvette into the Spec 20
   * Start the timer and note percent transmittance quickly for start data
4. Note percent transmittance at 1-minute intervals for 10 minutes.
5. Use the table on the next page to distinguish the particle size and soil type. Convert percent transmittance to size of particles.

**Grain Size Scale Table :**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Size of Particle (in mm)** |  |  | **Number of Sieve Series** |  |  | **Texture Type/Name** |  |  |
|  |  |  |  |  |  |  |
| 3.35 | |  | 6 | |  |  | Very coarse/gravel |  |  |
| 2.00 | |  | 10 | |  |  | Very coarse/gravel |  |  |
| 0.850 | |  | 20 | |  |  | Coarse/sand |  |  |
| 0.425 | |  | 40 | |  |  | Medium/sand |  |  |
| 0.250 | |  | 60 | |  |  | Medium fine/sand |  |  |
| 0.150 | |  | 100 | |  |  | Fine/silt |  |  |
| 0.075 | |  | 200 | |  |  | Very fine/silt |  |  |
| 0.038 | |  | 400 | |  |  | Very, very fine/clay |  |  |
| 0.002 | |  |  |  |  |  | Very, very, very fine/clay |  |  |

1. Repeat for each sample.
2. Graph the data with a line graph (time is the x-axis).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  | **% Transmittance Recorded Every Minute** | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **Analysis** | | |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  | **Sample** |  | **Color** |  |  |  | **Texture** |  |  |  | **With** |  |  | **Start** |  |  |  | **1** |  | **2** |  | **3** |  |  |  | **4** |  | **5** |  |  |  | **6** |  |  |  | **7** |  | **8** |  |  |  | **9** |  | **10** |  |  |  | **Particle** |  | **Soil** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | **water** |  |  |  |  |  | **min** |  | **min** |  | **min** |  |  |  | **min** |  | **min** |  |  |  | **min** |  |  |  | **min** |  | **min** |  |  |  | **min** |  | **min** |  |  |  | **Size** |  | **Type** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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#1

#2

#3

Mix of 2

1. Which soil type had the highest percent transmittance after 10 minutes?
2. What does percent transmittance mean? How does this relate to soil particle size?
3. How could this test be used in a CSI lab?