



**Bachelor of  
Science in  
Elementary  
Education with  
Electives in Special  
Education**



**A Collaborative Program Between Bermuda College and Wheelock College's  
Center for International Education, Leadership, and Innovation**

May 10, 2004

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**Beach Sand Analysis Lab**

**Part A: Qualitative Analysis - What materials is the beach made of?**

**Part B: Quantitative Analysis - What size particles make up the beach?**

**Part C: Inter particular Space and Density**

**Part A: Qualitative Analysis - What materials is the beach made of?**

**Purpose:** Identify the qualitative composition of beach sand samples and identify the source material(s) of the sand.

(To better understand that all beaches are not alike, that they are dynamic features undergoing constant change and to understand that beaches are composed of any materials that are available.)

**Materials:** Small sand sample (30 ml of sand)

Microscope or a hand lens

Magnet

Dilute hydrochloric acid (HCl) in dropper bottle

Glass microscope slides

**Procedure:**

1. Place a sample of sand petri dish, spread out sample to one layer of sand grains deep.
2. Examine them carefully under magnification and,
3. Complete a data table that includes the following information, see below.

Make a data table using the table below as a guide.

**Table 1** - Qualitative Analysis of Material (spreadsheet)

Sample #	Color	Percent	Source material	Age* (relative)	Relative Size (larger, smaller)

\* Rounded particles could indicate "older" sand, worn down edges.

Sharp edges could indicate "newer" "younger" sand.

4. Pass a magnet covered with plastic (0.5 cm) over the sample. You may actually have to run the magnet through the sand if no particles are attracted to the magnet after the magnet has been passed over the sand.

*Does the magnet pick up any particles?*

*What does this tell you about at least one component of beach sand?*

5. Place a small sample of the sand on a microscope slide and add a couple drops of dilute 0.1M HCl to the sand and observe the results. *Does the sand and HCl bubble\**? When using the HCl use only a drop or two, and perform this testing procedure last in all of your analyses.

*\*Does the sand and HCl bubble*

If so, this indicates the presence of calcium carbonate.

*What in the ocean is made of calcium carbonate?*

*What might be a source of some the sand particles?*

**Questions:**

1. What have you learned about the composition of sand?
2. Is all sand alike on all beaches? Why or Why not?

### **Part B: Quantitative Analysis - What size particles make up the beach?**

**Purpose:** What is the size composition of the beach sand?

Could the beach a deposition beach, an erosion beach or a "static" beach?

*How does the sand size composition of a beach change throughout a year?*

**Materials:** Balance

Sieve Set

Sand sample

**Procedure:**

1. Add sand to the sieve set, about 200 ml of sand, and separate the sample according to particle size.
2. After the sand has been separated by size in the sieves, carefully mass the sand from each of the sieves and the bottom container, and record the mass of each sieve sample on the data sheet, Table 2.

**IMPT.** - Repeat the above procedure for each sand sample.

3. After massing each sieve sample, calculate the percent each component particle size is of the original sample. [See Table 2, Percent per month.]

To do this add the masses of each sieve mass in a sample to arrive at a total mass of the sample. Then divide each sample mass by the mass of the total sample and enter this into the data table 2. This will give you the particle size composition of each sample.

4. Analyze the above data to determine which beaches are likely to be erosion beaches, deposition beaches or "static" beaches. If there is a large percentage of larger particles, the beach could be eroding. If there is a larger percentage of smaller particles the beach may be a deposition beach, it is growing larger. If the particle sizes are similar then the beach could be "static."

**Table 2: Sand Size Composition (spreadsheet)**

	Sample A	Sample B	Sample C
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Sieve	Mass (g)	Percent (%)	Mass (g)	Percent (%)	Mass (g)	Percent (%)
5 Top						
4						
3						
2						
1 Bottom						

### Part C - Density and Interparticular Space of Sand

**Purpose:** Calculate the density and space between the sand particles.

What percent of dry sand is air space?

What size sand particles have the largest amount of interparticular space?

**Materials:** Dry sand samples

Graduated cylinder

Water

Beakers or Dosage cups

#### Procedure:

1. Mass a 100 ml graduated cylinder.
2. Pour about 20 to 30 ml of dry sand into a graduated cylinder and measure its volume. Record this volume on data Table 3. [*Vol. of Sample*]
3. Mass the graduated cylinder and sand. What is the mass of the sand?
4. Pour the sand back into a cup and put approximately 30 ml of water into the graduated cylinder. Record this volume on the data table. [*Vol. of Water*]
5. Pour the dry sand sample back into the graduated cylinder and record the level of the Sand and Water column on the data table. [*Vol. of Sand & Water*]
6. Record the volume of the actual sand particles in the sample on the data table.

[Vol. of Sand & Water - Vol. of Water]

7. Calculate the volume of air space that was in the sand sample.

[Vol. of Sample - Vol. of Sand Particles]

8. Calculate the density of the sand and the percent of air space that was in the sand sample. The air space is equal to the interparticular space. [Vol. of Air Space/Vol. of Sample]

9. Repeat this for each sieved sample, the same sample used in the previous section of this lab.

*Is there a relationship between the interparticular space and the grain size composition?*

**Table 3** - Interparticular Space of Sand Samples

Sample No.	Vol. Of Sample (ml)	Mass of Sand (g)	Vol. Of Water (ml)	Vol. Of Sand + Water (ml)	Vol. Of Sand (ml)	Density of Sand (g/ml)	Vol. Of Air Space (ml)	Percent of Interparticular Space

**<<<< IDENTIFYING SOME COMMON BEACH MATERIALS >>>>**

**Quartz** - usually glassy looking clear.

May be pink, yellow, milky, white from granite.

Grains will scratch glass.

**Calcite** - (calcium carbonate)

usually present as shell fragments,

may be any color, but

ALWAYS effervesces in dilute HCl.

**Magnetite** - usually black in color, reacts to magnet

Source meteorites.

**Obsidian** - usually black in color

very glassy in appearance.

May show pits or pores.

May show conchoidal fracture pattern

(looks like mussel shell).

Associated with active volcanoes.

**Peridot or Olivine** - usually glassy looking,

pistachio or olive green color.

Associated with active volcanoes.

**Garnet** - usually reddish brown color,

glassy looking, looks like quartz.

**Coral** - (write a definition or characteristic for coral using the above samples as a guide)

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*Questions:*

*What substances makes up the sand sample?*