

Sediment Bottles

Objective

Students will be able to explain how particle size determines the rate of deposition of sediments.

Introduction

Sediments can be formed as a result of combinations of minerals in seawater or as a result of the breakdown of mineral deposits or rocks. The sediments we typically find along our coast are a result of weathering (the mechanical or chemical breakdown) of mineral deposits found nearby and/or carried to the coast. Rocks are broken down into smaller and smaller pieces or particles by wind, water (rain or in streams) and chemical reactions. These particles are carried by creeks, streams and rivers as sediment toward the coast. Large amounts of sediment are transported by water during periods of high rain fall and particularly during floods and major storms. During transportation the sediment particles are broken into increasingly smaller bits. The size of sediment particles in a certain area indicates what energy conditions existed when the sediment was deposited. Sediments that are formed during periods of high wave or current energy consist of large particles. Relatively large particles are the only ones that will settle out of the water under these high energy conditions. Smaller particles will remain in suspension and will not settle out of the water column to form deposits until the wave or current energy is lower. Deposits of silt and clay are only formed when wave and current energy are very low. In addition, smaller sediment particles fall more slowly through the water column. Even when water is standing still the smallest particles will be the last to settle on the bottom.

Materials

- 2 liter sediment bottles with caps (1 per group). Note: Plastic 2 liter soda bottles work well.
- Stop watch or timer
- Student hand-out (1 per student)
- Various sediments (approximately 1 cup of each):
 - Pebbles
 - Gravel
 - Sand
 - Silt
 - Clay

Constructing Bottles

1. Remove the cap off of the bottle.
2. Using a funnel, add the various sediment types to the bottle to a form a total depth of 3 to 4 inches.
3. Fill the bottle with water to the top shoulder.
4. Put the cap on the bottle.

Note: The sediment bottles may be pre-made or each group may construct their own bottle.

Procedure

1. Each group (3-4 per class) will receive or construct a sediment bottle.
2. Start by instructing someone in the group to shake the jar up thoroughly and place it on a desk or table. The bottle should not be disturbed during the remaining part of the experiment.
3. Students will make observations of the sediment in the jar at each of the time periods listed below.
4. Student will describe and record the order in which the sediments are settling for each time period.

5 seconds:

30 seconds:

1 minute:

10 minutes:

30 minutes:

1 hour:

At the end of Lab:

Questions

1. What change did you notice in the amount of the sediment on the bottom of the jar as time passed?

2. What change did you notice in the appearance of the sediment on the bottom of the jar as time passed?

3. What changes did you notice in the water as time passed?

4. How would you explain these changes?

5. What is the relationship between sediment size and how fast it settles?

6. How would the distance a particle travels be affected by its size?

7. What factors in the environment might move large particles great distances?
