



Clay is composed of very tiny particles. Some of these particles are blown from land and fall from the atmosphere out at sea. Other pelagic clay includes dust from volcanic eruptions. These inorganic red clay deposits cover 38 percent of the ocean bottom. In some parts of the ocean floor, the clay is hundreds of feet thick. Scientists study these clay deposits to learn about ancient weather and the effects of past volcanoes and meteorites.

Pelagic *ooze* comes from the **organic** remains of tiny plants and animals that once floated near the surface of the ocean. This material was once living and may contain small microscopic fossils. There are two types of ooze. The most abundant type comes from animals that had shells made of calcium. This *calcareous* ooze covers 48 percent of the ocean floor and is mostly associated with warmer, shallow waters. *Siliceous* ooze comes from the remains of animals and plants that had glass-like shells composed of silica. The remains of these silicon-shelled organisms cover 14 percent of the ocean floor and are mostly associated with colder, deep waters.

Hydrogenous Sediments: The Bed of Minerals

Scientists are just discovering a variety of different types of hydrogenous sediments on the deep-ocean floor on places where pelagic sediments typically do not accumulate. *Hydrogenous* means “derived from sea



water.” These deposits are formed from a chemical action within seawater. Some of these deposits are too difficult and, therefore, expensive to gather, and so their use by industry has been limited. Other deposits have too low a concentration of minerals and so are not yet valuable to industry.

Phosphorite is one example of a valuable hydrogenous sediment found in high concentration on the ocean floor. Phosphorous is used to produce phosphates—a key ingredient used in fertilizer and the production of other chemicals. As our mineral supplies on land decrease, industry will direct more effort towards extracting these deposits from sediments.

Manganese nodules, lumps of the mineral manganese, are the best known of the hydrogenous deposits. They contain manganese and iron with smaller amounts of nickel, copper, cobalt, and aluminum. Researchers estimate that over one billion tons of these nodules are sitting on the seafloor, mostly in the Pacific Ocean. Because this mineral lies over 3,200 meters down, extracting it is not yet practical. One machine being developed to collect these nodules functions like a giant vacuum cleaner that sucks them up from the sea bed.

Summary

The ocean’s floor is blanketed by *sediment*—particles from the land, atmosphere, and the sea, and often from the remains of once-living organisms. Scientists classify sediment according to its source and where it is deposited. Different kinds of sediment support different organisms. Wave action continually moves sediment onto and off of coastal areas, often sweeping smaller particles away and leaving larger ones. Where there is no or little wave action, mud accumulates.



The composition of sandy beaches varies according to the local environment.



Practice

Match each **characteristic** with the correct **habitat**. Write the letter on the line provided. **One or more habitats will be used more than once.**

- | | |
|--|---------|
| _____ 1. very little oxygen | M. Mud |
| _____ 2. may be made of quartz and feldspar | R. Rock |
| _____ 3. quiet, stable, and soft | S. Sand |
| _____ 4. abundant food, shelter, and oxygen | |
| _____ 5. grinding motion | |
| _____ 6. barnacles, starfish, algae | |
| _____ 7. hiding places, hard surfaces | |
| _____ 8. animals bury themselves or have hard shells | |
| _____ 9. animals may be attached | |
| _____ 10. eel grass | |
| _____ 11. no waves or circulation | |
| _____ 12. loosely packed | |



Practice

Match each **description** with the correct **zone**. Write the correct letter on the line provided. **One or more zones will be used more than once.**

- | | |
|--|------------------|
| _____ 1. high-tide zone | A. littoral |
| _____ 2. between tides | B. sublittoral |
| _____ 3. low-tide zone | C. supralittoral |
| _____ 4. remains under water | |
| _____ 5. constantly covered and uncovered by water | |
| _____ 6. very dry zone | |
| _____ 7. sea urchins, flexible algae | |
| _____ 8. periwinkle snails | |
| _____ 9. fish, sea palms | |
| _____ 10. black algae line, splash zone | |



Practice

Use the list below to write the correct term for each description on the line provided.

hydrogenous sediment
pelagic sediment

terrigenous sediment

- _____ 1. eroded land material
- _____ 2. comes from the open ocean
- _____ 3. manganese nodules
- _____ 4. clay and ooze
- _____ 5. rock, sand, and mud
- _____ 6. comes from minerals in seawater
- _____ 7. remains of once-living organisms
- _____ 8. found close to land
- _____ 9. formed from chemical action within seawater
- _____ 10. sinks to the deep ocean



Lab Activity: Sand Observations



Investigate:

- Observe the different components of sand.

Materials:

- sand samples from different areas
- white paper
- double-sided tape or clear glue diluted 3 to 1 with water
- magnifying glass or microscope
- metric ruler

Procedure:

1. Take a sample of sand.
2. Place one drop of glue diluted 3 to 1 with water on the microscope slide or a piece of double-sided tape.
3. Sprinkle a small amount of sand on the glue or tape and allow to dry.
4. Look at your prepared slide under the magnifying glass or microscope.
5. Record your observations below.
6. Repeat for the number of samples provided.

Observations:

1. **Color:** Describe any color in your sand sample.
2. **Shape:** Draw the shape of the sand grains seen under magnification.
3. **Size:** Measure the average length of the grains in millimeters (mm).



4. **Luster:** Describe the surface appearance of the sand grains (such as shiny, glassy, dull).
5. **Origin:** Describe the type of sediment (such as terrigenous—from land).
6. **Roundness:** Describe whether or not the sand grains are rounded or have sharp edges.
7. **Other:** List any other observations of the sand grains. Draw any shells or parts present.

| Sand Observations | | | |
|--------------------------|------------------|------------------|------------------|
| | Sample #1 | Sample #2 | Sample #3 |
| Color | | | |
| Shape | | | |
| Size | | | |
| Luster | | | |
| Origin | | | |
| Roundness | | | |
| Other | | | |



Analysis:

1. Compare the different types of sand grains you observed. _____

2. Where did each of our samples probably come from? _____

How can you tell? _____



Practice

Match each definition with the correct term. Write the letter on the line provided.

- | | |
|--|-------------------------|
| _____ 1. to endure or resist the action of | A. hydrogenous sediment |
| _____ 2. zones in a state of change from one condition to another | B. pelagic sediment |
| _____ 3. the speed or rate of flow at which liquid or gas passes through a porous material such as sediment | C. permeability |
| _____ 4. particles once suspended in the water that settle to the ocean floor as sediment, such as manganese nodules and phosphorite | D. sediment |
| _____ 5. sediment from the open ocean | E. terrigenous sediment |
| _____ 6. sediment that comes from the land; gravel, sand, mud | F. tolerate |
| _____ 7. particles of sand and silt formed from rock or animal remains | G. transitional zones |



Practice

Use the list below to write the correct term for each definition on the line provided.

| | | | |
|--------------------|------------------|----------------|-----------------|
| clay | feldspar | nodules | porosity |
| composition | lava | ooze | quartz |
| dweller | manganese | organic | |

- _____ 1. rounded lumps of valuable mineral deposits found on the ocean floor containing manganese and other elements; formed from minerals crystallizing from seawater
- _____ 2. made up of parts of once-living organisms; contains carbon atoms
- _____ 3. mud-like organic remains of animals and plants; common on the deep-ocean floor
- _____ 4. very fine sediment particles
- _____ 5. an organism that lives in a certain place; an inhabitant
- _____ 6. the ratio of the volume of all the pores in a material to the volume of the whole
- _____ 7. the most common mineral on Earth; made up of silica, aluminum, and other elements
- _____ 8. very hard crystal-like mineral made up of silicon and oxygen; second most common mineral on Earth after feldspar
- _____ 9. molten, or melted, volcanic rock
- _____ 10. the make-up of something; what is in it