

Depositional Environments

Rock Types

Limestone

This rock is made from the minerals that used to form the shells of **marine** organisms like coral, bivalves (clams, oysters, ect) and some microscopic organisms called foraminifera. Most of these organisms don't live in very deep water. Coral, especially, needs shallow water because it has an algae that lives inside of it that needs light to help survive. The mineral grains are very small, and can be carried away easily in moving water.

1. Which of these places might limestone form? (Select all that apply)
 - a) Fast-moving river
 - b) a coral reef
 - c) Shallow ocean water
 - d) deep ocean water

Sandstone

Sandstone is first formed when ancient sand settles out in water that is relatively low-energy, or in areas where there are large amounts of sand that build up on top of one another. Over time, the sand is compacted, and some amount of moisture causes the sand to cement together.

2. What are some places where sandstone would form? Name 3 specific watery environments and 1 land environment where sandstone could form.

Conglomerate and Breccia

Conglomerates and Breccias are stones that are made of sediments larger than sand grains. Conglomerates are typically rounded sediments, and breccias are made of sediments that are very angular. They form in environments with large amounts of energy (which carries away the smaller sediments) and places where the energy level changes (allowing varied sizes of rocks).

3. Explain which type of rock (Conglomerate or Breccia) may have formed in each of these environments, and how it formed:
 - a) in a glacial environment
 - b) In a fast-moving river
 - c) Volcanic area

Coal

Coal is made from the compressed remains of ancient organic matter, mainly plants. The dead plant matter is deposited in very large amounts on the ground, but then it would also have to be covered so that oxygen does not allow the plant matter to decompose.

Which of these environments would be a better place for coal to form?
Explain.

4. Swamps or forests? (may need to look up what a swamp is)
5. Wetlands or grasslands?

Evaporite Deposits

The most familiar evaporite deposit would be salt deposits. Evaporite deposits would form where salt water evaporates in large quantities, leaving the salt behind to form into large rock deposits.

7. Explain how plate tectonics might contribute to large salt deposits in the future for the Mediterranean area.
8. If you found salt deposits in an area, what would you know about what that area was like in the past?

Glacial Till

Glacial Till is a special kind of conglomerate rock that forms in areas where there is glacial activity. The glacier carves out, carries along, and pushes along rock sediments of all sizes. When the glacier melts or recedes, the glacial sediments are left over and form into rocks. It typically has both rounded and angular rock grains in it, of many different sizes.

9. If you found a rock that looked like glacial till, what would you know about the area when it formed?

Special Features

Ripple Marks

Ripple marks form where light, regular wave action reshapes sediments into the shapes you see in front of you.

10. What types of environments would create ripple marks?

Mud cracks

Mud cracks form when mud is deposited in large amounts and then dries out.

11. What areas would be common places to find mud cracks? In what climate would you expect to find mud cracks? Why?

Fossils

Ancient Greeks and the people of medieval Europe thought that the fossils in the earth had formed inside the rock, or that they were animals of some sort that died inside of rock. But when the Greeks found fish on mountains, they thought that perhaps the fish swam through cracks in the rocks and then died on the mountains. Today, we know that fossils are the leftover remains of ancient organisms, or evidence of their activity, that have turned into rock. The fossils that are found in rocks tell something about what the environment was like when the organism died.

12. Make a Chart in your answers and tell what the fossil is in column 1, and what this fossil would tell us about the depositional environment in column 2.

Sedimentary Rock features and depositional environments

Grain Size

The grains that make up a sedimentary rock are typically smaller in low energy environments, but larger in high-energy environments.

13. Which of these rocks would have probably been formed in the bottom of a lake? How about the edge of a river?

Angular vs. Rounded grains

The grains of a rock are more rounded when they've undergone more abrasion, typically in a watery environment.

14. Was this rock more likely formed in water or in a dry environment?

Faulting and Folding

Faults and folds are caused by large compressional or tensional forces in an area, leading to the sedimentary rocks being cracked (faulted) or folded.

15. Where would we find lots of folding and faulting in rocks? What would these folds and faults tell us about what's going on in that area in the past?

Igneous rock

With igneous rocks, the mineral grains are smaller if they cooled off very quickly, but they are larger if the rock cooled off very slowly.

16. Which of these rocks probably formed by cooling inside the earth?

17. Which of them indicate that a volcano may have been there? Explain.

Atmospheric conditions

Fossil size and O₂

Sometimes in the fossil record, we find that organisms change in size DRAMATICALLY! For example, the common millipedes we see today are usually only about 2-3 cm long. However, there are fossils that show these organisms once grew to over 100 cm! That's a big millipede! Scientists have found that these increases in size are largely due to more oxygen being available in the atmosphere.

18. The fossils in front of you, which look like rice grains, are called foraminifera. They are marine organisms that float about in the ocean, making up a basis for much of the food chain. Today, they are microscopic. What does their size tell you about when these organisms were alive?

Rusting

Rocks that have red in them are usually red because they have "rusted". Rust happens when iron and oxygen mix together. This process doesn't actually require water, but water acts as a "catalyst". A "catalyst" is something that speeds up a chemical reaction, but it doesn't actually need to be there for the reaction to occur.

19. What can these rocks tell us about the depositional environment?

20. These 2 rocks had the exact same chemical composition, but one of them underwent rusting. The rusted one was formed about 1 billion years ago, while the other one is far older. What do these rocks tell us about the atmosphere when the rusted rock formed versus when the other rock formed? What could have contributed to this change in the atmosphere?

Depositional Environments Lab

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Watery a. _____

b. _____

c. _____

Land d. _____

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Types of Depositional Environments- Do a short internet search and define these.

Continental_____

Alluvial an aquatic - _____

Aeolian-_____

Fluvial-_____

Lacustrine-_____

Transitional-_____

Deltaic-_____

Tidal-_____

Lagoonal-_____

Beach-_____

Lake-_____

Marine-_____

Shallow water marine environment_____

Deep water marine environment_____

Reef-_____

Others

Evaporite-_____

Glacial-_____

Volcanic-
