

Sedimentary Rocks

Overview

In this one-class-period activity, students closely observe 6 sedimentary rock samples, attempt to identify them, and speculate about how they might have formed. Afterward, they learn about how some of these rocks formed.

North Carolina Standard Course of Study

6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops.

Background

Sedimentary rocks result from the weathering of existing rocks. There are two main types, chemical/biochemical and clastic/detrital (pieces in a matrix). Two common chemical/biochemical sedimentary rocks are coal from ancient plants and limestone from aquatic organisms. Rocks in the chemical/biochemical category, such as chert (microcrystalline quartz) and stalactites and stalagmites, form from dissolved minerals left behind when water evaporates. Within these two categories, rocks are further distinguished by particle size and shape, mineral composition, reaction with hydrochloric acid, and hardness.

Materials

Materials for the Teacher

- A teacher set of identified samples.
- Ability to Project SD-3, Sedimentary Rock Stories

Materials for teams of 4

- One set of sedimentary rock samples
- 1 bottle of dilute acid (0.75 molar). **The dilute acid is not dangerous. However, always explain proper handling to students: wear safety glasses and avoid acid contact with skin, eyes, and clothing. After exposing samples to acid, rinse and dry them before storing.**
- 2 hand lenses
- a small pad of paper
- one copy SD-1, Sedimentary Rocks Chart
- one copy SD-2, Sedimentary Rocks Identification Sheet
- *safety glasses
- *science notebooks

* to be supplied by the teacher

Preparation

1. From the dilute acid stock solution provided in the kit, fill the 8 labeled student acid bottles.
2. Make a copy of SD-1, Sedimentary Rocks Chart and SD-2 Sedimentary Rock Identification Sheet for each team of 4.

Exploration

1. Set up teams of 4 and provide each team with a small pad of paper and a set of sedimentary rock samples. Explain that these are called sedimentary rocks.
2. Without identifying the sample, choose a sedimentary rock from the teacher set for the whole class to look at. Either walk around the classroom to show every team, or project it with a document camera. Ask teams to find this sample in their box and place it on a piece of paper from their pad.
3. Ask teams to observe the rock closely and write as detailed a description of it as they can.
4. Discuss some of the characteristics that students observed.

Procedure

1. Give out hand lenses. Students should still have their set of 6 sedimentary rocks. Ask teams to lay each sample out on a separate sheet of paper. On that sheet of paper, ask them to describe the rock carefully, including as many characteristics as they can. Ask them to do this with all 6 rocks.
2. Ask for observations. If students have read about sedimentary rocks, ask them to compare what they see with what they know about sedimentary rocks. If the class has not read about sedimentary rocks, explain that sedimentary rocks come from the weathering of other rocks or living things. Small particles from the weathering are washed into one place and laid down as sediment. Afterward, the sediment fuses together into rocks.
3. Give each team a copy of SD-1, the Sedimentary Rocks Chart, and SD-2, the Sedimentary Rock Identification Sheet. Ask students to use the Sedimentary Rocks Chart to place the rocks in the correct blank squares of the Sedimentary Rock Identification Sheet. **Do not give out the acid bottles yet.**
4. After students finish, as a final test, give out the acid bottles and require students put on safety glasses, explain the test procedure, and ask students to use it to confirm the identity of the limestone sample. **The test procedure is to place 2-3 drops of dilute acid on the sample and look for fizzing. A hand lens makes it easier to see the fizzing.**
5. As groups finish, ask them to look at other groups' placement of rocks and observations to compare with their own. Ask for ideas about how some of the rocks might have formed, based on their appearance.

6. Project SD-3, Sedimentary Rock Stories, and go through the stories with the class. Let the class know that each story is about one of the rocks in their set of 6 sedimentary rock samples. Ask each team to predict which rock each story is about. Ask for reasons for the predictions. An Answer Key is below. Included with the answer key are some helpful YouTube videos and website images.

ANSWER KEY

Limestone forms in shallow ocean water, where pieces of shell, coral, fragments of skeletons and algae accumulate. When animals that use calcium carbonate in their shells and skeletons die, they settle on the ocean bottom and collect. Some limestones are filled with fossils.

https://upload.wikimedia.org/wikipedia/commons/6/68/Xenocrinus_baeri_fossil_crinoids_in_fossiliferous_limestone_%28Whitewater_Formation%2C_Upper_Ordovician%3B_northeastern_Warren_County%2C_southwestern_Ohio%2C_USA%29_2_%2815115228788%29.jpg

Conglomerate forms where small rounded rocks or pebbles accumulate in sediments. Powerful currents in water are necessary to move and round rocks of this size. As a result, conglomerate usually occurs where there is or has been a fast stream or a beach with strong waves. The pebbles are usually cemented together by silica, calcite or iron oxide.

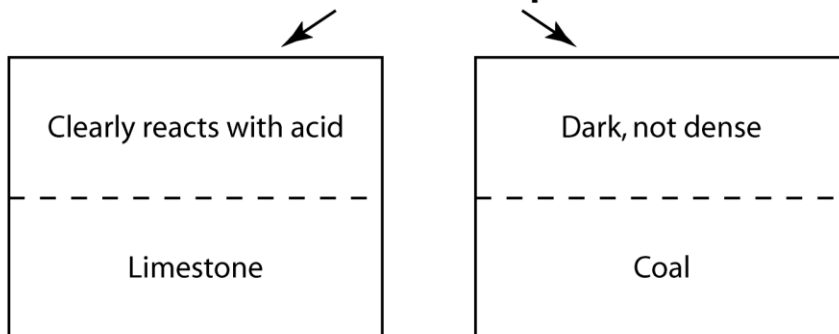
<http://law.yourdictionary.com/conglomerate>

Breccia forms where jagged fragments of rock or mineral debris accumulate. This can happen at the base of an outcrop where weathered debris accumulates or in streams near an outcrop of rock. It can also be formed when tectonic forces break brittle rock in a fault zone. It is almost always made of angular pieces surrounded by a fine-grained matrix.

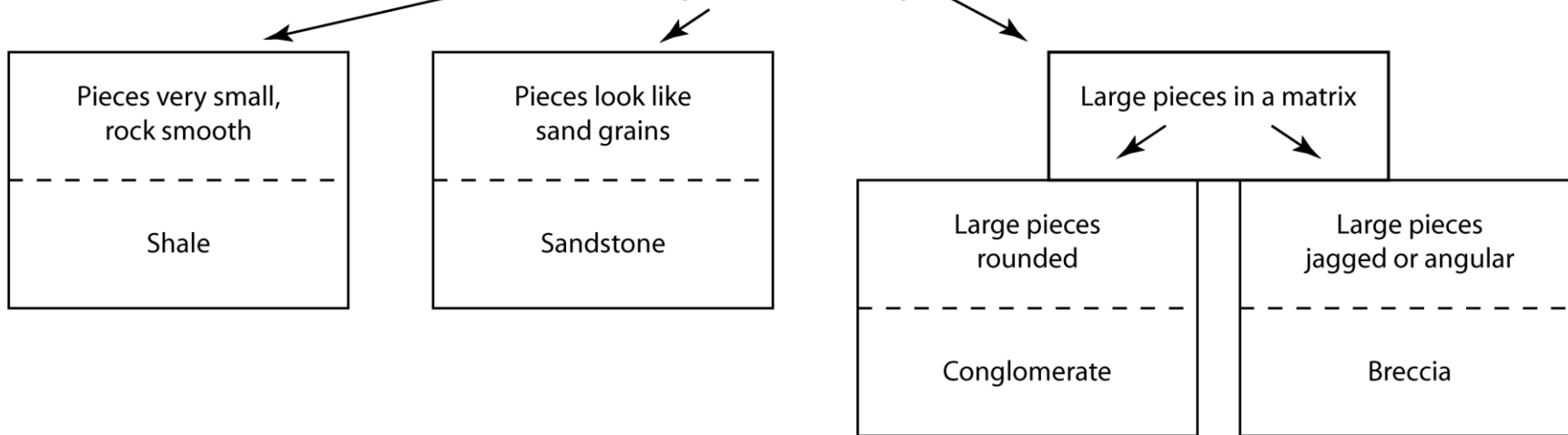
<http://www.impact-structures.com/impact-rocks-impactites/the-impact-breccia-page/polymictic-polymict-polygenetic-polyolithologic-breccia/>

SEDIMENTARY ROCKS CHART

**Rocks made by
chemical/biochemical processes**



**Rocks made of pieces
(clastic/detrital)**



SD 2 – Sedimentary Rock Identification Sheet

<p>Limestone</p>	<p>Coal</p>
<p>Shale</p>	<p>Sandstone</p>
<p>Conglomerate</p>	<p>Breccia</p>

SD 3 – Sedimentary Rock Stories

Story 1

This rock forms in shallow ocean water, where pieces of shell, coral, fragments of skeletons and algae accumulate. When animals that use calcium carbonate in their shells and skeletons die, they settle on the ocean bottom and collect. Because of this, some of these rocks are filled with fossils.

Story 2

This rock forms where small rounded rocks or pebbles accumulate in sediments. Powerful currents in water are necessary to move and round the pebbles that make up this type of rock. As a result, it usually occurs where there is or has been a fast stream or a beach with strong waves. The pebbles in this rock are usually cemented together by silica, calcite or iron oxide.

Story 3

This rock forms where jagged fragments of rock or mineral debris accumulate. This can happen at the base of an outcrop where weathered debris accumulates or in streams near an outcrop of rock. It can also be formed when tectonic forces break brittle rock in a fault zone. It is almost always made of angular pieces surrounded by a fine-grained matrix.