Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Student Exploration:** **Rock Classification**

**Vocabulary:** classify, extrusive igneous rock, foliation, fossil, igneous rock, intrusive igneous rock, metamorphic rock, mineral, sedimentary rock, strata, texture, vesicle



**Rocks are classified by how they formed**. The three types are:

* **Igneous rocks** form from cooling magma or lava.
* **Sedimentary rocks** form from the bonding of rock fragments such as sand, silt, or clay; from organic materials; and from chemicals dissolved in water.
* **Metamorphic rocks** form when other rocks are changed by heat and pressure.

In this lesson, you will get to explore these three types of rocks. Think about how each type of rock is formed.

1. **Fossils** are the remains of ancient plants and animals. Which type of rock do you think is most likely to contain fossils? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **Foliation** occurs when minerals are flattened by heat and pressure. This results in a layered or banded texture. Which type of rock do you think is foliated? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Air pockets, or **vesicles**, can form in rapidly cooling magma or lava. In which type of rock would you expect air pockets? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Activity A: Classifying Rocks**

**Introduction:** You can classify rocks by examining characteristics such as **texture**. A rock’s texture is determined by the sizes, shapes, and positions of the grains that make up the rock.

**Goal: Classify rocks as igneous, sedimentary, or metamorphic.**

1. Summarize: The three groups of rocks each have unique characteristics. For example, many igneous rocks have a texture of interlocking **mineral** crystals. Sedimentary rocks may have distinct layers of sediments, known as **strata**.

To learn other characteristics of igneous, metamorphic, and sedimentary rocks, turn on **Show common characteristics** in the CHARACTERISTICS pane. In the table below, summarize the textures that will allow you to identify and classify these rock types.

|  |  |
| --- | --- |
| **Rock type** | **Characteristics** |
| Igneous |  |
| Sedimentary |  |
| Metamorphic |  |

1. Classify: Select **Name** on the SIMULATION pane. Move your cursor over the rock pictures. Based on what you see, classify the rocks by dragging them into the correct box on the CHARACTERISTICS tab. Record your classifications (in pencil) in the table below.

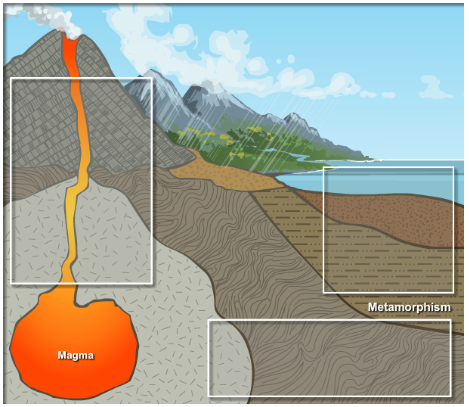
|  |  |
| --- | --- |
| **Rock type** | **Rock names** |
| Igneous |  |
| Sedimentary |  |
| Metamorphic |  |

Click on **Status** to check your answers. If necessary, change your classifications of rocks on the Gizmo, and make any needed corrections to the table above.

**Activity B: Rock Locations**

**Introduction:** Igneous rocks that form under Earth’s surface are called intrusive. **Intrusive igneous rocks** usually have large mineral grains because they form from magma that cools slowly. Igneous rocks that form above ground are extrusive. **Extrusive igneous rocks** have small mineral grains or no grains at all because they form from lava that cools quickly.

**Question: Where do different kinds of rocks form?**



1. Label: Review how the different types of rock form. On the diagram at right, label where you would expect the following types of rock to form:
2. Extrusive igneous rocks (volcanic)
3. Intrusive igneous rocks (plutonic)
4. Metamorphic rocks
5. Sedimentary rocks

Select **Show classification names** to check your labels. Correct any rock locations that you labeled incorrectly.

1. Classify: Drag the rocks from the SIMULATION pane to the correct positions on the LOCATION tab. Click on **Status** to check your placements. Which rocks did you classify as extrusive and intrusive igneous rocks?

**Extrusive:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Intrusive:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Draw conclusions: Extrusive igneous rocks often have air pockets, but intrusive igneous rocks never do. Why do you think is this the case? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Activity C: Class Rock Samples**

Using what you have learned, answer the following:

1. **Igneous Rock Station** – There are numerous rocks provided for observation. Classify rock samples 1, 2, 4, 6, 8, 11, 12,14,15. Find out the names of each rock from the answer key given and record below.

**Plutonic Intrusive** **Volcanic Extrusive**

1. **Sedimentary Rock Station** – These types of rocks can be main separated into 3 main groups: Clastic, Chemical, and Organic. Find **1 good example** of each type. Find the name on the answer key given and record below.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Clastic rocks** are formed when different particles from preexisting rocks are compacted together. They typically have visible uniform sized grains or fragmented irregular grains.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Chemical rocks** are formed when preexisting rock dissolve. The resulting precipitate is then deposited. These will appear with no visible grains. Some may react to acid.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Organic rocks** are formed from the compaction of plant remains. They usually appear black because of the high amounts of carbon material.

1. **Metamorphic Rock Station** – These are formed when rocks are buried under the ground. The heat and pressure underground cause the rock to change form and re-crystalize. An example of this is when limestone is buried and undergoes a metamorphic change. The resulting rock is marble (13). In other rocks, individual minerals become very visible (3 – the shiny mineral is mica). Slate (6) is commonly used for tile because it can be broken easily into long sheets along the rock plane. Slate is metamorphosed shale.

**ANSWER KEY – ROCK NAMES**

**IGNEOUS**

1 – Pegmatite

2 – Granite

4 – Anorthosite

6 – Rhyolite

8 – Basalt

11 – Tuff

12 – Obsidian

14 – Pumice

15 – Scoria

**SEDIMENTARY**

1 – Conglomerate

2 – Arkose

3 – Sandstone

4 – Quartz Sandstone

5 – Oil Shale

6 – Shale

7 – Breccia

8 – Siltstone

9 – Gypsum

10 – Fossil Limestone

11 – Dolomite

12 – Limestone

13 – Rock Salt

14 – Chalk

15 – Bituminous Coal