

## Assignment 2: Describing rocks and understanding their genetic origin

Name \_\_\_\_\_

The objectives of this assignment are to give you some practice in describing rock samples, and to provide some insight into how the different rocks formed – their genetic origin. The key reason for trying to understand the genesis of rocks is to be able to make inferences about the geological history of a particular region or area. On completion of this assignment you should:

- be able to recognize the different rock types – sedimentary, igneous or metamorphic
- be familiar with the features of a few of the common rocks of the crust, and
- have an understanding how these different rocks formed.

Please ensure that descriptions you provide below are in your own words.

There is a list of the rock letters and names at the bottom of this assignment.

### Step 1 – Rock Groups

As a first step, classify the rock samples by writing their letter and name (e.g., A – basalt) in the appropriate sections of the table below. You can use your textbook and notes to assist you in figuring out which belongs in which group.

Igneous	Sedimentary	Metamorphic
Intrusive	Clastic	Regional (foliated)
Extrusive	Chemical	Contact (non-foliated)

Here are some guidelines to help with the first step:

**Igneous rocks** are hard and crystalline and they typically lack any kind of planar fabric or preferred orientation of crystals. Most intrusive igneous rocks have visible crystals (larger than 1 mm) while most extrusive igneous rocks have crystals that are too small to identify.

Most **sedimentary rocks** are relatively soft; in some cases fragments will come off in your hands. Some sedimentary rocks show distinctive layering (i.e., bedding), and some have fossils in them. Many sedimentary rocks are made up of visible fragments (e.g., sand grains).

**Metamorphic rocks** tend to be harder than sedimentary rocks, can be crystalline and most (but not all) show some signs of foliation - layering or banding with aligned minerals.

**Step 3 – Texture**

Texture refers to the types and sizes of grains in rocks and how they are arranged. Grain size is an important factor. In igneous rocks crystals can be either visible (phaneritic) or not visible the naked eye (aphanitic). (Larger crystals imply a longer cooling process than small ones.) For sedimentary rocks grain size refers to the diameter of the clasts: gravel (2 mm - 6 cm), sand ( $1/16 - 2$  mm) and silt/clay ( $<1/16$  mm).

Texture is also the relationship of grains to each other, such as: bedding in sedimentary rocks or foliation (alignment of minerals) in metamorphic rocks. Most igneous rocks do not have layering, but many sedimentary rocks have some type of bedding and most metamorphic rocks have foliation. Look carefully at the samples and for those that have a visible layering describe the nature of the layering below.

Sample	Grain size description (include range in mm)	Describe layering or foliation (if any)
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		

**Step 4 – Mineral Composition**

All of these rocks are comprised entirely of minerals, but in some cases the mineral crystals or fragments are too small to see clearly. Carefully examine the coarse-grained samples listed below and name any minerals that you can identify.

Sample	Minerals visible
B	
C	
D	
E	
F	
G	
H	
K	

**Step 5 – Genetic Origin**

Now that you have become more familiar with the characteristics of the rock samples you should be able to say something about their genetic origin—the type of environment they formed in and the geological processes that were involved. Be as specific as you can in describing the environment (e.g., “deep within the crust” or “in a high energy river”) and the processes (e.g. “rapid cooling” or “metamorphism at moderate temperature and high pressure”), that led to the formation of the various rocks.

Sample	Environment of formation	Processes of formation
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		

**List of rock names**

A	Basalt	E	Diorite	I	Shale
B	Phyllite	F	Sandstone	J	Andesite
C	Conglomerate	G	Granite	K	Gabbro
D	Limestone	H	Gneiss		