Lab 5 Worksheet: Igneous Rocks & Volcanoes!

**Part 1: Igneous Rocks**

Materials: computer, internet access, the following website: <https://omg.georockme.com/>

**Part A - Identifying Igneous Rocks [[1]](#footnote-1)**

Objectives: You will learn to

* **recognize** features of common igneous rocks relevant for identification of the rock by name
* **navigate** a simplified classification table of the common igneous rocks
* **observe** an igneous rock sample and **describe** observational facts
* **make inferences** based on observations
* **identify a rock sample by name**, based on a unique collection of properties

You will test and identify igneous rocks using this website: <https://igg.georockme.com/>

You will work through a portion of the set of “unknown rocks” given here: <https://igg.georockme.com/unknowns>

Instructions to test and identify them:

* **Review** training videos and text to learn how to observe online images and video for characteristic properties of common igneous rocks.
* **Access** unidentified igneous rock samples in the Unknowns section.
* **Make notes** and **record observations**. Print and use this Data Form, or one issued by your instructor.
* **Compare** your recorded observations with an identification chart in your textbook or other resource, OR consult the limited bank of identified igneous rocks.
* **Identify** the unknown igneous rock samples by name by comparing your recorded observations with an identification chart.
* **CAUTION**. Some links to online resources outside of this website will display content in a new browser tab. *Some links will be accompanied by advertisements*. The value of the displayed content outweighs the distraction that may be caused by ads - so ***IGNORE ADS***!

Table 1. Igneous Rock Notation Chart - Fill in this chart as you work through the lab. (Questions 1-5)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sample # | Texture | Color (light, intermediate, dark) | Dominant Minerals | Other Notes | Rock Name |
| A01 |  |  |  |  |  |
| A02 |  |  |  |  |  |
| A08 |  |  |  |  |  |
| A12 |  |  |  |  |  |
| A17 |  |  |  |  |  |

**Part B - Results and Interpretations (Igneous Rocks):**

6. There are two types of lithospheric plates on the Earth: continental crust and oceanic crust. Continental crust is mostly felsic, having a higher amount of light-colored silicate minerals than dark-colored silicate minerals. Contrastingly, oceanic crust is mostly mafic, having a lower amount of light-colored silicate minerals. Based on this understanding, how do you think that andesite is formed?

**Part 2: Learning about Volcanoes[[2]](#footnote-2)**

Materials: computer, internet access, Google Earth online: <https://earth.google.com/web/>

**Part A - Association of Magma Type with Tectonic Setting**

The questions in this exercise demonstrate the control that tectonic setting has on the type of magma produced. For the Google Earth questions, copy and paste the latitude and longitude coordinates into the search bar on Google Earth online <https://earth.google.com/web/> (or just type them in).

7. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the Mid-Ocean Ridge, where oceanic plates are diverging and magma is generated by partial melting of the mantle.

a. ultramafic magma is produced b. mafic magma is produced

c. intermediate magma is produced d. felsic magma is produced

8. Type 19 28 19.70 N 155 35 31.94 W in the search bar on Google Earth, and zoom

out to an eye altitude of ~119 miles. This volcano is composed of:

a. mafic rocks, because a hotspot partially melted the mantle below the oceanic crust

b. mafic rocks, because a hotspot partially melted the oceanic crust

c. ultramafic rocks, because a hotspot partially melted the mantle below the oceanic crust

d. ultramafic rocks, because a hotspot partially melted the oceanic crust

9. Type 35 35 08.45 S 70 45 08.22 W in the search bar in Google Earth. This volcano formed from an intermediate magma type, because:

a. subduction of oceanic crust beneath the continental crust occurs here

b. continental crust is subducting, causing magma to form

c. a hot spot is partial melting the continental crust

d. this is the result of a divergent plate boundary

**Part B - Magma Viscosity**

The following questions address what factors control how fast a magma or lava can flow. The resistance to flow (viscosity) depends primarily on the magma or lava composition, and is also affected by temperature.

10. Intermediate lavas can flow \_\_\_\_\_ than mafic lavas, due to the \_\_\_\_\_\_\_viscosity.

a. slower, higher b. slower, lower c. faster, higher d. faster, lower

11. Let’s relate food items to magmas of different viscosity; if we compare how honey and water flow when poured from a container:

a. then the honey represents felsic magma, and the water represents mafic magma

b. then the honey represents mafic magma, and the water represents mafic magma.

12. Imagine putting the honey in the refrigerator overnight; will its viscosity be affected?

a. yes; the viscosity will increase

b. yes, the viscosity will decrease

c. no. there will be no change as the composition stays the same

13. Keep the honey in mind while you answer this question: when it is first erupted, basalt lava typically erupts at 1200°C; after flowing away from the vent, the temperature falls, therefore the viscosity of the basaltic lava will:

a. increase b. decrease c. stay the same

**Part C - Volcanic Landforms**

The composition of a magma or lava may also control what type of volcanic features or landforms are seen on the earth’s surface. In this exercise, you will use Google Earth to identify these landforms. Figures 9.9 through 9.11 may help you in this section. For the Google Earth questions, copy and paste the latitude and longitude coordinates into the search bar on Google Earth online <https://earth.google.com/web/> (or just type them in).



Figure 9.9 | A comparison of a typical shield volcano versus a smaller, steeply sloped composite volcano. The size and shape of these volcano types are due to the different types of magma and associated eruption styles. Author: Karen Tefend. Source: Original Work. License: CC BY-SA 3.0



Figure 9.10 | Diagram of a composite volcano. Notice the structure is composed of layered ashflows (F) and viscous lava flows (D). Also of note is the buildup of viscous lava at locations labelled C; these are lava domes. Author: User “Woudloper”. Source: Wikimedia Commons. License: CC BY-SA 3.0



Figure 9.11 | Lava domes are extrusions of viscous lava on the surface of the Earth. The lava does not travel too far from the vent before solidifying completely. Author: Karen Tefend. Source: Original Work. License: CC BY-SA 3.0

14. Type 43 25 04.18N 113 31 37.38 W in the search bar of Google Earth. Zoom out to an eye elevation of ~90 miles. Based on the size of the area which is dark colored and sparsely vegetated, this region is:

a. a basaltic dike b. a shield volcano c. a lava dome d. a flood basalt

15. Click on the nearby photo icon (SW of your latitude/longitude coordinate in Question 14) to view a picture of the area as seen from the ground. This is a picture of:

a. a basalt flow b. a felsic dome c. a plutonic rock d. an ultramafic rock

16. Type 46 12 07.84N 121 31 02.85W in the search bar of Google Earth. This volcano (Mt. Adams) has a lot of snow cover and small glaciers on it, but you can still see the volcanic rock, especially on the eastern flank (side) of the volcano. Zoom in to an eye altitude of ~9000ft to closely examine the rocks on this eastern side of the volcano; do you see any evidence of layering? This volcano is:

a. a shield volcano b. a lava dome

c. a composite volcano d. a large volcanic dike

17. How tall is Mt. Adams, and what is the length of its base (in the widest, N-S dimension)? You need to zoom out to an eye altitude of ~17 miles to measure the base.

a. ~12,290 ft above sea level, and over 7 miles long

b. ~11, 890 ft above sea level, and over 4 miles long

c. at least 12, 703 ft above sea level, and over 6 miles long

d. unable to determine because of the ice

18. Compared to the Big Island of Hawaii (19 53 48.36 N 155 34 58.11 W, or refer to Figure 9.6), which is actually the volcano Mauna Loa, Mt. Adams is:

a. the same height, but the base is a lot smaller

b. the same height, but the base is a lot wider

c. smaller in height, and smaller at the base

d. smaller in height, but larger at the base

19. Type in 58 15 58.56 N 155 09 35.98 W in the search bar of Google Earth. Examine the shape of this feature by zooming in to an eye altitude of ~3330 ft; use the eye icon in the upper right corner to rotate the view. Now zoom out to an eye altitude of ~7306 ft to see the entire structure and the surrounding area. Based on the size and appearance of this volcanic feature, this is a:

a. dike b. shield volcano c. lava dome d. flood basalt

**Part D - Volcanic Hazards**

Potential hazards associated with certain volcanic types can be identified using topographic maps or aerial photographs. In this exercise, we will use Google Earth.

20. Type Mount St. Helens, WA in the search bar in Google Earth and examine the crater at an eye altitude of ~26,000 ft. Based on the appearance of the crater:

a. a lahar removed the north side of the volcano

b. a pyroclastic eruption removed the north side of the volcano

c. a lava dome grew so large that it is higher than the north side of the crater

d. a glacier has eroded the north side of the crater

21. Type Mount Rainier, WA in the search bar in Google Earth. The Carbon River flows from the north part of Mount Rainier (fed by meltwater from the Carbon Glacier on the flank of the volcano). At an eye altitude of ~20,000ft, follow the course of the Carbon River, past the town of Carbonado and stop at the town of Orting. Based on the locations of these two towns, which do you think is in danger from a lahar?

a. Both are in danger of lahars

b. Carbonado, because it is closer to Mount Rainier

c. Orting, because it is in a low lying area along Carbon River

d. Neither one is in danger because Mount Rainier is dormant

1. **(all materials taken from** <https://omg.georockme.com/>**)** [↑](#footnote-ref-1)
2. (questions taken from Laboratory Manual for Introductory Geology, University System of Georgia) [↑](#footnote-ref-2)