Igneous Rocks

CLASS NOTES

• Igneous Rocks - ____________________________________________________________

• Methods to classify igneous rocks:

  1. Environment of Formation - __________________________________________________

     • Magma - _________________________________________________________________

     • Plutonic - rock that formed ______________________ within the Earth

     • Intrusive - ______________________ Earth’s crust

     • Lava - _________________________________________________________________

     • Volcanic - rock that formed ______________________ Earth’s surface

     • Extrusive - ______________________ Earth’s crust
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- Methods used to classify igneous rocks [continued):

2. **Crystal Size** - ____________________________________________________________________________________

   - Crystal size is an important factor to determine the environment of formation
     - The _____________________ the cooling time the _____________________
       the crystal size [coarse or very coarse]
     - The _____________________ the cooling time the _____________________
       the crystal size [glassy or fine]

   - Remember:

   ![Fine Grained](Fine%20Grained.png)  ![Coarse%20Grained](Coarse%20Grained.png)

3. **Texture** - ____________________________________________________________________________________

   - **Vesicular** - ____________________________________________________________________________________

   - **Porphyritic** - texture that contains large crystals in a fine grained matrix
Methods used to classify igneous rocks:

4. **Color** - the shade of the rock based on its composition
   - Either: _____________________ or _____________________

5. **Density** - the ratio of mass to volume of the rock based on its composition
   - Either: _____________________ or _____________________

6. **Composition** - a mixture of materials that make up an igneous rock
   - Either: felsic or mafic
     - **Felsic** - _______________________________________________________________________
     - **Mafic** - _______________________________________________________________________

7. **Mineral Composition** - _______________________________________________________________________

![Diagram showing the classification of igneous rocks based on color and density.](image)
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PART I QUESTIONS: MULTIPLE CHOICE

1. Which is a fine-grained igneous rock made up primarily of pyroxene and plagioclase feldspar?
   a. granite
   b. gabbro
   c. basalt
   d. rhyolite

2. The best evidence for determining the cooling rate of an igneous rock is provided by
   a. the disintegration of radioactive substances
   b. the crystal size of its minerals
   c. index fossils
   d. faults in the rock

3. Basalt contains the greatest quantity of which mineral?
   a. mica
   b. quartz
   c. pyroxene
   d. potassium feldspar

4. Which statement best describes the percentage of plagioclase feldspars in a sample of gabbro?
   a. Gabbro always contains less plagioclase than pyroxene
   b. Gabbro contains no plagioclase feldspars
   c. Plagioclase feldspars always make up 25% of a gabbro sample
   d. The percentage of plagioclase feldspar in gabbro can vary

5. Which property would be most useful for identifying igneous rocks?
   a. types of fossils present
   b. kind of cement
   c. number of minerals present
   d. mineral composition

6. A fine-grained igneous rock contains 11% plagioclase, 72% pyroxene, 15% olivine, and 2% amphibole. This rock would most likely be classified as
   a. rhyolite
   b. gabbro
   c. basalt
   d. granite

7. Which is the best description of the properties of basalt?
   a. fine-grained and felsic
   b. coarse-grained and mafic
   c. coarse-grained and felsic
   d. fine-grained and mafic
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8. Rhyolite and granite are alike in that they both are
   a. felsic
   b. fine-grained
   c. dark-colored
   d. mafic

9. Most igneous rocks form by which processes?
   a. erosion and deposition
   b. heat and pressure
   c. melting and solidification
   d. compaction and cementation

10. Rhyolite is an example of a
    a. polymineralic sedimentary rock
    b. polymineralic igneous rock
    c. monomineralic sedimentary rock
    d. monomineralic igneous rock

11. Which texture best describes an igneous rock that formed deep underground?
    a. glassy
    b. fine grained
    c. vesicular
    d. coarse grained

12. A nonvesicular rock is made entirely of green 2-millimeter-diameter crystals is most likely
    a. granite
    b. dunite
    c. obsidian
    d. pumice

13. Which igneous rock has a vesicular texture and a mafic composition?
    a. pumice
    b. basalt
    c. granite
    d. scoria

14. Which is the best description of the properties of granite?
    a. fine-grained and felsic
    b. coarse-grained and mafic
    c. coarse-grained and felsic
    d. fine-grained and mafic

15. Which is the best description of the properties of pumice?
    a. vesicular and felsic
    b. vesicular and mafic
    c. non-vesicular and felsic
    d. non-vesicular and mafic
The Mica Family

The familiar term “mica” is not the name of a specific mineral, but rather the name for a family of more than 30 minerals that share the same properties. All members of the mica family have high melting points and are similar in density, luster, hardness, streak, type of breakage, and crystal shape. As a result, telling the micas apart can be difficult. However, some common members of the family can be identified by color. For example, biotite is black to dark brown while muscovite can be light shades of several colors, or even colorless. When less common members of the mica family have any of these colors, or have similar colors, chemical tests are needed to tell them apart.

16. Identify the two chemical elements present in biotite mica that are not present in muscovite mica.

17. Name the igneous rock in which crystals of biotite mica are larger than 10 mm in diameter.

18. Identify the luster, hardness, and dominant form of breakage for members of the mica family.

19. Large crystals of mica, sometimes weighing several hundred tons, have been found in igneous rock in Canada. Identify the environment of formation and the relative rate of cooling of the magma that formed the igneous rock containing these large crystals.