

GEOL 1121 – Earth Materials, Processes and Environments

Review for Exam 1

The following is an attempt to provide a guide to your study of geology ***outside the classroom***. There is a complete vocabulary list along with some questions to help you prepare for Exam 1. Use this as a guide to what might be important, along with your notes from class.

When you look up the words or short phrases on the vocabulary list, try to think about how these words ***might relate to each other and to specific concepts within the text***. Thinking of the words in this way will make it a lot easier to use them properly when answering questions on exams.

When you are attempting to answer questions from this guide, keep in mind that most questions require thought **and** comprehension; ***simple memorization will usually not be enough***. Use your text and class notes to help you answer the questions.

Chapter 1 Vocabulary

Be able to define the following terms: asthenosphere, core, crust, fossil, geology, igneous rock, lithosphere, mantle, metamorphic rock, plate, principle of uniformitarianism, rock, scientific method, sedimentary rock, system

Chapter 1 Questions

1. Define hypothesis and theory in the scientific sense. What two important things do scientific theories have to be able to do in order to be valid?
2. What is the Big Bang? What are the main lines of evidence that support this theory?
3. What is the Solar Nebula Theory? What are the main lines of evidence that support this theory?
4. Be able to draw/describe the basic structure of the Earth and each of its layers.
5. The three “big ideas” in geology are a) Plate Tectonics, b) Geologic Time and Uniformitarianism, and c) Organic Evolution. You should know the main point(s) of each of these ideas and be able to describe them.
6. What are the three types of rocks? Describe how each type forms.
7. What’s the basic idea behind the Rock Cycle?

Chapter 3 Vocabulary

Be able to define the following terms: atom, atomic mass number, atomic number, bonding, cleavage, compound, covalent bond, crystal, crystalline solid, density, electron, electron shell, element, fracture, hardness, luster, mineral, neutron, nucleus, proton, reserve, resource, silica, silica tetrahedron, silicate, striations

Chapter 3 Questions

1. Be able to discuss the location and relationships between protons, neutrons and electrons within the atom, including relative charge, mass, etc.
2. What is the relationship between an atom and an element? What has to change in an atom to make a new element?
3. What is the atomic number? What is the atomic mass number? How are these values determined?
4. Given the atomic number and atomic mass number for an atom, you should be able to tell me: a) the number of protons; b) the number of neutrons; and c) the number of electrons.
5. What is an isotope? What has to change in order to form different isotopes?
6. What is an ion? How and why do ions form?
7. Use a periodic chart to predict the number of electrons in the outermost shell of an atom, and therefore the type of ion it will form.

8. Discuss the similarities and differences of the different types of chemical bonding.
9. Explain why covalent bonds are stronger than ionic bonds.
10. What type of bonding is responsible for the formation of silica tetrahedra? Discuss how the tetrahedra bond together to form the various silicate structures (p.73).
11. What accounts for the fact that some minerals have a range of chemical compositions rather than one specific composition?
12. What is primarily responsible for the physical properties of minerals?
13. Know Moh's Hardness Scale!!! (p.77)
14. Be able to give examples from the major categories of each type of rock-forming mineral (p.77).
15. Know what the following mineral types are and be able to give an example of each: oxides, halides, carbonates, native elements, ferromagnesian silicates, nonferromagnesian silicates, sulfides, sulfates.
16. Describe at least four processes which create minerals.
17. Mineral resources are said to be "nonrenewable". What does that mean?
18. What factors determine if a mineral is a resource or a reserve?

Chapter 4 Vocabulary

Be able to define the following terms: aphanitic texture, batholith, concordant, country rock, crystal settling, dike, discordant, extrusive, felsic magma, glassy texture, hot spot, igneous rock, intermediate magma, intrusive, laccolith, lava, mafic magma, magma, magma mixing, mantle plume, pegmatitic texture, phaneritic texture, pluton, porphyritic texture, pyroclastic materials, pyroclastic texture, sill, stock, ultramafic magma, viscosity, vesicle, vesicular texture, volcanic neck, volcanic pipe

Chapter 4 Questions

1. How do we tell the difference between felsic, intermediate, mafic and ultramafic magmas.
2. How do we tell the difference between intrusive and extrusive igneous rocks.
3. Which types of magma are most viscous? Least viscous? What factors control the viscosity?
4. What processes account for the origins of magma?
5. Be able to draw a diagram showing Bowen's Reaction Series with all the correct minerals in their correct positions. The diagram should include labels for the Continuous and Discontinuous series, and some arrows indicating decreasing (or increasing) temperature and silica content.
6. How are the ideas developed in Bowen's Reaction Series useful in explaining the origins of magmas of various kinds?
7. How do the different igneous textures form?
8. Be able to fill in an igneous rock classification chart like the one you received in class.
9. Two phaneritic rocks have the following compositions: Rock A – 10% olivine, 55% pyroxene, 5% amphibole, and 30% calcium-rich feldspar; Rock B – 5% biotite, 10% muscovite, 20% sodium-rich feldspar, 50% potassium feldspar, 15% quartz. Classify (aka name) these rocks. Which would you expect to be darkest and densest? Explain your answers.
10. What is Partial Melting and why might it be important in explaining the origins of magmas in general?
11. Read the sections on the origins of magma at various tectonic locations (p.92-93), and be able to explain the process that generates the specific magmas we see at each location.
12. Describe the different ways in which the composition of magma may be altered after it is formed.
13. Explain how to classify igneous rocks.
14. What is a porphyritic texture and how does it form?
15. Know the Igneous Rock Classification Chart as discussed in class.
16. Review the information on intrusive igneous bodies and be able to describe the geometry and origin of each type shown in Figure 1 on page 100.

17. What are assimilation, stoping, and forceful injection? How are these ideas related to the modern notion of how magma is emplaced in the crust of the Earth even though it often originates within the mantle at depths of 100 km or more?