

GEOS 3010 Minerals and Rocks
Spring 2009

Exam 1 Info:

Part 1: Multiple choice, T/F, fill-in, matching

Part 2: Short answer

Exam will cover lecture and reading materials from the Introduction, Chapter 1, and Chapter 2 of the M&RCP. Review notes and be able to answer questions from the end of each chapter.

Topics to be covered – be able to:

General

- Explain why “no rock is an accident”
- Compare/contrast critical thinking and the scientific method
- Compare/contrast inductive and deductive reasoning
- Explain differences between the simple rock cycle and the tectonic rock cycle, and explain why the tectonic rock cycle is “better”
- Explain what is meant by fractionation, and give examples of this process

Tectonics

- Define a plate and rock layer(s) making up a plate
- Briefly describe plate tectonic theory (what it is, how plates move)
- Describe the composition and rheology (behavior) of layers making up the earth
- Describe the significance of the Moho
- Explain where heat comes from in the Earth, and what happens to the heat through time
- Explain the connection between convection cells and plate tectonics
- Name and describe the six tectonic lithospheric regimes (and be able to identify these on a cartoon or map)
- Explain the origin and fractionation of magma in different tectonic regimes (specifically - how, why, and where primitive or recycled igneous rock is generated)

Wilson Cycle

- Define and describe the Wilson Cycle (what it is)
- Identify the stages of the Wilson Cycle and list them in order (you do not need to memorize the letters – the exam will use stage names)
- Describe what happens tectonically in each stage of the Wilson Cycle
- Describe the structures and landscape features created in each stage of the Wilson Cycle
- Describe the rock types created (what and how) in each stage of the Wilson Cycle
- Identify and describe the two types of orogenesis, and identify the Wilson Cycle stages in which each occurs
- Give a modern example of each stage of the Wilson Cycle
- Explain the connection between the Wilson Cycle and the tectonic rock cycle (briefly)

“Homework”

This assignment should help you to organize what you have learned about the Wilson Cycle and plate tectonics from the lectures and readings. Complete the table on the next page – we will discuss these in class.

Column 1 has been completed for you – lists the Stages of the Wilson Cycle

In Column 2, name the tectonic regime (or regimes) that best fits with this stage of the Wilson Cycle. Reminder, the 6 regimes are: craton, ocean basin, hot spot, divergent boundary, convergent boundary, and transform boundary. Subdivide the convergent boundary category into three types: ocean-ocean convergence, ocean-continent convergence, and continent-continent convergence.

In Column 3, describe the tectonic or structural features that are characteristic of each Stage of the Wilson Cycle. Features to include: suture, hinterland, foreland, trench, volcanic arc, mélangé, thrust faulting, normal faulting, backarc, forearc, axial rift, horst and graben, peneplain. Feel free to add in your own features not on the list.

In Column 4, describe the rocks that characteristically form during this Stage of the Wilson Cycle. Note the category of rock type and the most important members of the category. Rocks and terms to include (add others if you feel it necessary):

- Igneous: mafic, intermediate, felsic, primitive, recycled, bimodal, intrusive, extrusive, ophiolite
- Sedimentary: basin fill, DCM, submarine, subareal, turbidity current, foreland basin, mélangé
- Metamorphic: Barrovian, Blueschist, paired metamorphic belt, high grade, low grade

Wilson Cycle Stage	Tectonic Regime	Structural Features Forming	Rock Types Forming
A (Stable craton)			
B (Hot spot and rifting)			
C (Early divergent margin)			
D (Full divergent margin)			
E (Volcanic island arc)			
F (Island arc-continent collision)			
G (Cordilleran arc)			
H (Continent-continent collision)			
I (Stable craton)			

