

Name _____

Possible exam questions

1. For each of the following rocks, tell me (fill in the table) whether they are mafic or silicic or intermediate, intrusive or extrusive, and what minerals they (must) contain. Which may contain glass?

	mafic, silicic or intermediate?	intrusive or extrusive?	Necessary minerals	Could there be glass?
andesite				
basalt				
diorite				
gabbro				
granite				
komatiite				
peridotite				
rhyolite				

2. Name one example of the following:

a sheet silicate common in granites: _____

an amphibole common in diorites: _____

a network (framework) silicate common in gabbros: _____

an island (isolated tetrahedral silicate) often found in basalts: _____

3. Define the following terms and give a rock type for each.

Aphanitic:

Porphyritic:

Phaneritic:

4. Draw Bowen's reaction series. Draw the temperature gradient and silicate variations. Supply one chemical

formula for each mineral on the series. Use the back of this page, and be precise!

5. Looking at a thin section, you see a large mineral and want to know if it is isotropic or anisotropic. How would you make this determination? Be precise in your answer.

6. When you look at some mineral in thin section, for example biotite, you sometimes see pleochroism. What is pleochroism and under what circumstances do you see it?

7. When you look at biotite in a thin section, you sometimes see interference colors. What are interference colors and under what circumstances do you see them?

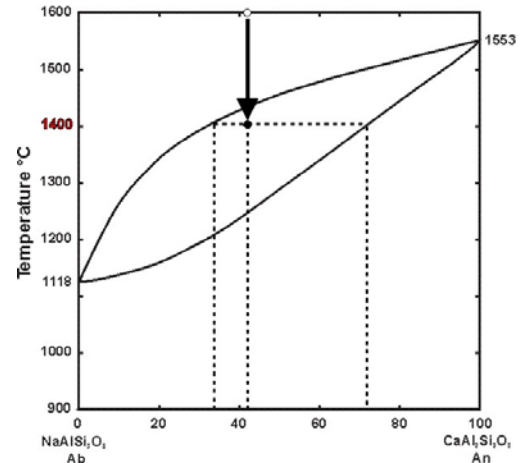
Often, different grains of biotite in a thin section show different interference colors. Why?

If interference colors can be different for different grains of the same mineral, how can we use them to help with mineral identification?

8. What are the liquidus and solidus curves on a phase diagram? Label them on the plagioclase diagram shown.

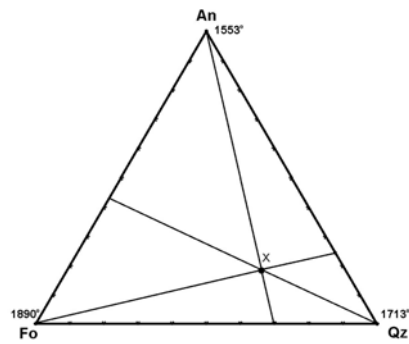
9. Consider a composition (shown by the arrow in the diagram) that has begun to crystallize and has cooled to 1400. What will be present and in what approximate amounts?

If the crystals that are present at 1400 degrees settle to the bottom of the magma chamber so they can no longer react with the melt, and then crystallization continues, what will be the composition of the very last drop of melt before crystallization is complete?



10. Consider the diagram shown at right. What is the composition shown?

- a. 20% SiO_2 , 42% Mg_2SiO_4 , 38% $\text{CaAl}_2\text{Si}_2\text{O}_8$
- b. 21% SiO_2 , 38% Mg_2SiO_4 , 41% $\text{CaAl}_2\text{Si}_2\text{O}_8$
- c. 55% SiO_2 , 15% Mg_2SiO_4 , 30% $\text{CaAl}_2\text{Si}_2\text{O}_8$
- d. 25% SiO_2 , 56% Mg_2SiO_4 , 19% $\text{CaAl}_2\text{Si}_2\text{O}_8$
- e. 57% SiO_2 , 24% Mg_2SiO_4 , 19% $\text{CaAl}_2\text{Si}_2\text{O}_8$

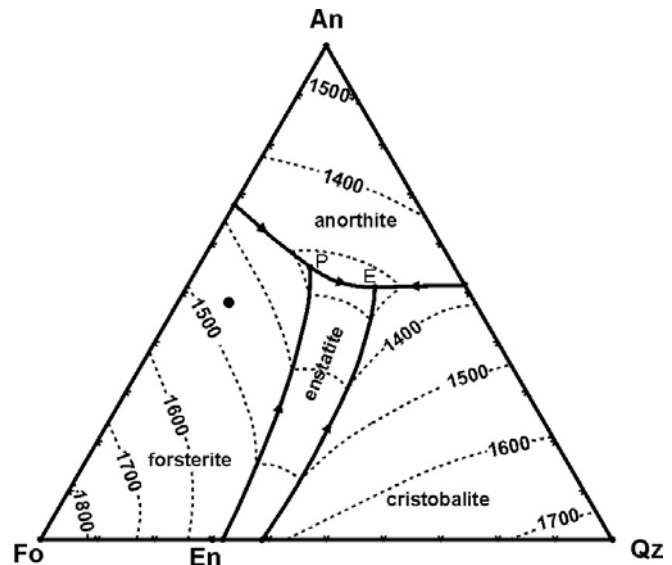


11. On the diagram shown at right, the solid dot shows a magma composition.:

a. At what temperature will it begin to crystallize?

b. What will be the final minerals present after crystallization is complete? What will be the approximate proportions of each of them?

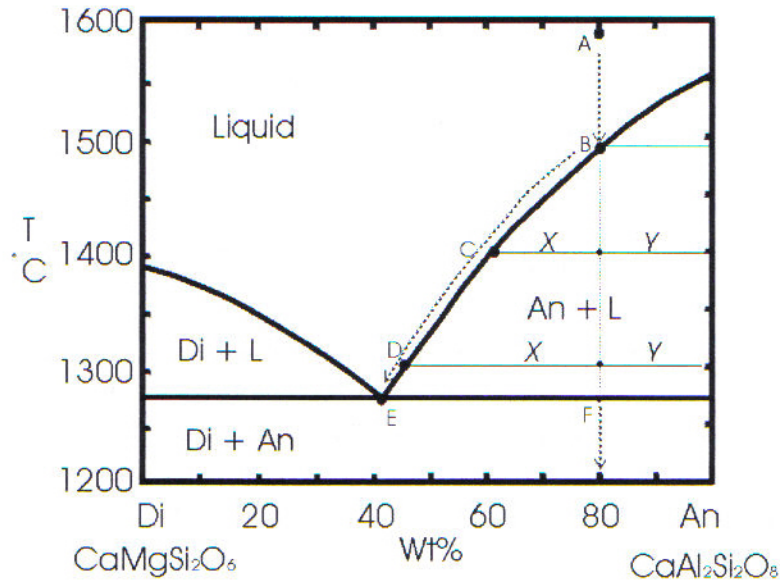
c. Draw an arrow or two to show the path followed by the liquid composition



12. Consider the diagram for question 11. And consider a rock that is composed of 15% quartz, 75% of anorthite and 10% forsterite. We heat up this rock and it begins to melt. Which mineral will melt first?

13. What are komatiites and how do they form? Give some details about their formation not just general BS.

14. What is the Red Hill dike? That is, what kind of rocks does it contain and how did it form?



Mr. Phase diagram says, “Hi! Remember me?” That’s right, of course you do.

15. Name the minerals represented on the diagram above.

Which of the following are present in this diagram? (Circle the ones that are present and label them on the diagram.)

- peritectic
- eutectic
- solvus

16. Describe the history of a melt of composition X (on the diagram above) as it cools from 1600 to 1200 degrees. What will be present at what temperatures, etc.?

What would this rock be called after it is completely cooled?

17. What is the major rock type found in an MOR?

18. Olivine Theoliites do not have _____ in their CIPW norm.

19. Yellowstone volcanism has involved a great deal of rhyolitic magma. How much? What is the volume of volcanic material involved? Discuss, explain, as appropriate. What sort of eruptions occurred?

20. What was the source of Yellowstone’s rhyolitic magma?

21. The pressure in the earth is given by the expression $P = \rho gh$.

P = Pressure

ρ = Density

g = acceleration of gravity

h = height of the column of overlying rock

If the density yield pressure gradient is 0.1Gpa (1kb/3.3km), calculate the pressures expected at 10km, 20km and 30km.

If the density is 2.70 gm/cm³, calculate the the pressure at 20 km.

Compare your two answers. How are they different, and why?

22. Define tuff. How is this formed? What magma compositions are mostly likely to produce tuffs, and why?

23. Name an aphanitic rock composed of 6% quartz, 39% alkali feldspar, 43% plagioclase, 3% hornblende, 3% biotite, 3% magnetite and 3% sphene.

24. Define differentiation in regard to magmas. What does this do? How does it affect rock composition? Why is it important to be able to recognize this process? Describe how differentiation has led to a crust that is significantly less mafic than the mantle.

25. Where are rhyolites normally found? How do they form? Why are they found in these locations?

26. What is meant by granitization? How does this affect rock type?

27. Describe one example (name a place where it is found) of a layered ultramafic intrusion. What is the size, what rocks are present, and how did they form?