

Homework 2: Binary Phase Diagrams

Consider the binary systems below. For Q. 1-3, arrange your answers on the attached table.

albite-corundum

spinel-corundum

albite-silica

nepheline-albite

periclase-lime

bunsenite-periclase

1. What are the melting points (= freezing points) of the end-member minerals in this system?
2. At the eutectic, what are the compositions of the coexisting solid phases?
[where applicable, write solid solution phase compositions in our conventional structural formula notation (e.g. $(\text{Mg}_{0.80}\text{Ni}_{0.20})\text{O}$).]
3. On cooling a melt of 50:50 composition:
 - a) What is the temperature at which the first mineral crystal will form and what are these crystals?
 - b) What is the temperature at which the last melt will solidify and what is the composition of this last melt?
4. Write a narrative of the crystallization history (what phase appears or disappears on cooling; what happens to the melt composition and the compositions of mineral crystals throughout the cooling range) for the following compositions of melt:
 - a) 80% silica: 20% albite. This diagram stops at about 950°C. Use your lecture notes and texts (including Mineralogy!) to continue the cooling history of each mineral to 25°C.
 - b) 25% albite: 75% nepheline

Question:	1	2	3a	3b
	T_{mp}	comps. of solid phases	T and mineral	T and comp. of last melt
albite-corundum				
spinel-corundum				
albite-silica				
nepheline-albite				
periclase-lime				
bunsenite-periclase				