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BINARY PHASE DIAGRAMS - SOLID SOLUTIONS

The attached phase diagram shows the equilibrium relationships at 1 Atm for the binary system Mg_2SiO_4 - Fe_2SiO_4 . The only phases found in the system are liquid and olivine solid solution.

1. Lines A and B are referred to as the _____ and _____.

2. How many degrees of freedom exist for each of the following points?

C _____

C'' _____

3. Describe what happens during perfect equilibrium crystallization of a liquid of composition C. What are the relative proportions of the phases at C'' and what are the compositions of the phases?

4. Describe what happens during perfect fractional crystallization of liquid C.

5. If a solid of composition C was heated, what would be the composition of the first liquid?

6. Compared to the plagioclases, zoning is not nearly as well-developed in the olivine series. Why is this true? (HINT: The question cannot be answered from the phase diagram. Thinking is required)

