Binary Phase Diagrams - Solid Solution Behavior

1. On Figure 1, outline the liquidus in green, the solidus in brown.

2. Trace the behavior of the melt at A as it cools from 1950°C to 1400°C. Show the path followed by the liquid in red, and by the solid in blue on the first attached diagram.

   At what temperature do the first crystals appear? 1840°C

   What is the composition of the first crystals? Fo0.97

   At what temperature is the liquid entirely converted to the solid? 1600°C

   What is the composition of the final liquid phase? Fo0.38

   What is the composition of the liquid phase at 1700°C? Fo0.57

   What is the composition of the solid at 1700°C? Fo0.90

3. Using Figure 2, trace the behavior of composition B as it is heated from 1320°C to 1800°C.

   Again, show the path followed by the solid in blue and the path followed by the liquid in red.

   At what temperature does the first liquid appear? 1380°C

   What is the composition of the liquid at this temperature? Fo0.15

   What is the composition of the solid at this temperature? Fo0.81

   At what temperature does the last solid disappear? 1620°C

   What is the composition of the last solid? Fo0.84

   What is the liquid composition at 1800°C? Fo0.41

   What is the liquid composition at 1450°C? Fo0.73

   What is the solid composition at 1450°C? Fo0.57

Grading -

1 point for each colored line
1 point per blank ± 20°C and ± 4% composition
± 40°C and ± 8% composition, -½ point

Total - 20 points
Figure 1

OLIVINE SOLID SOLUTION

TEMPERATURE, DEGREES CELSIUS

WEIGHT % FORSTERITE

MELT

A
Figure 2