GLY 4200
Homework Exercise 5

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? Fo_{97} At what temperature is the liquid entirely converted to the solid? 1600°C

What is the composition of the final liquid phase? Fo_{38}

What is the composition of the liquid phase at 1700°C? Fo_{52}

What is the composition of the solid at 1700°C? Fo_{90}

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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? Fo_{15}

What is the composition of the solid at this temperature? Fo_{41}

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

What is the composition of the last solid? Fo_{84}

What is the liquid composition at 1800°C? Fo_{41}

What is the liquid composition at 1450°C? Fo_{23}

What is the solid composition at 1450°C? Fo_{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

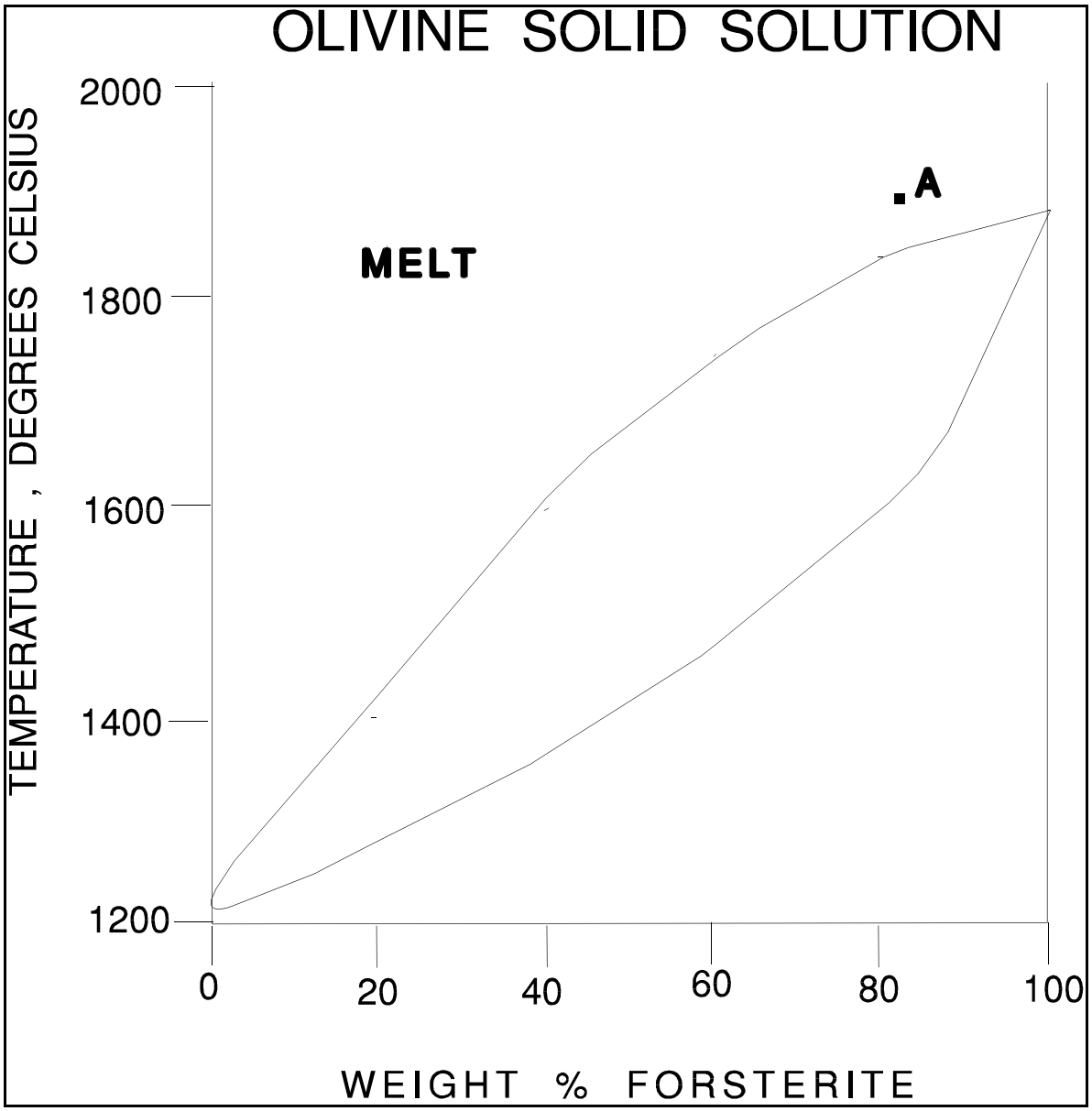
OLIVINE SOLID SOLUTION
TEMPERATURE , DEGREES CELSIUS
2000
1800
1600
1400
1200
MELT
.A
0
20
40
60
80
100
WEIGHT % FORSTERITE

Figure 1

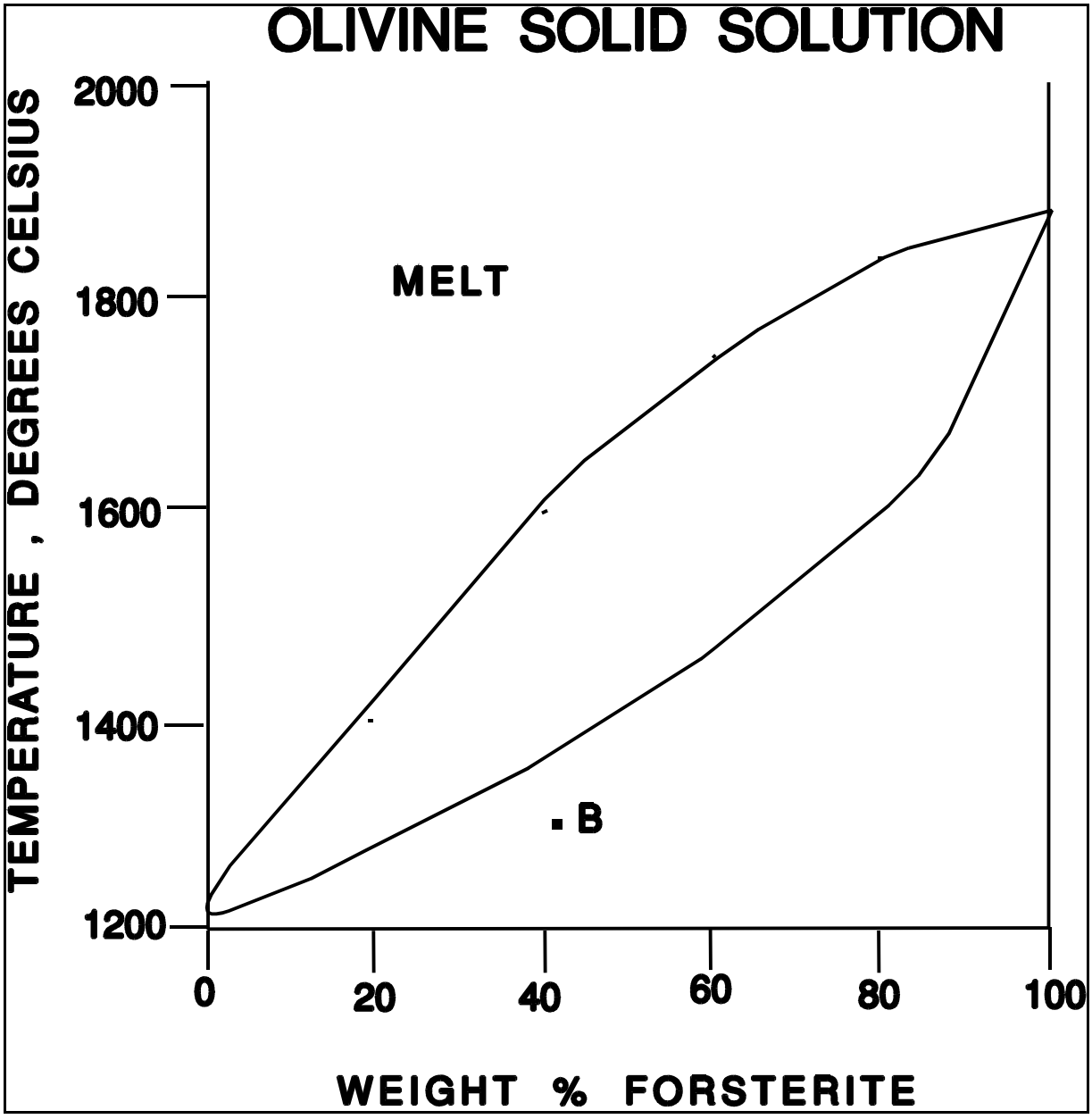
OLIVINE SOLID SOLUTION
TEMPERATURE , DEGREES CELSIUS
2000
1800
1600
1400
1200
MELT
B
0
20
40
60
80
100
WEIGHT % FORSTERITE

Figure 2