

Binary Phase Diagrams - Eutectic Behavior

1. On the attached diagram, outline each liquidus line in **green**, each solidus line in **brown**.

2. Label the diagram with point A, 80 wt. % Cd at 350°C, trace the cooling behavior of the melt down to 0°C. Show the path followed by the liquid in **red**, the path followed by the solid in **blue**. Then answer the following questions for:

- 2A:
- a) At what temperature does the first crystal appear? 282°C
 - b) What is the composition of the first crystal? 100% Cd
 - c) At what temperature does the first crystal of Bi appear? 144°C
 - d) At what temperature does the liquid disappear? 144°C
 - e) What is the composition of the final liquid phase? 40% Cd, 60% Bi
 - f) What is the composition of the final solid mixture? (Phases present and percent of each) 80% Cd, 20% Bi

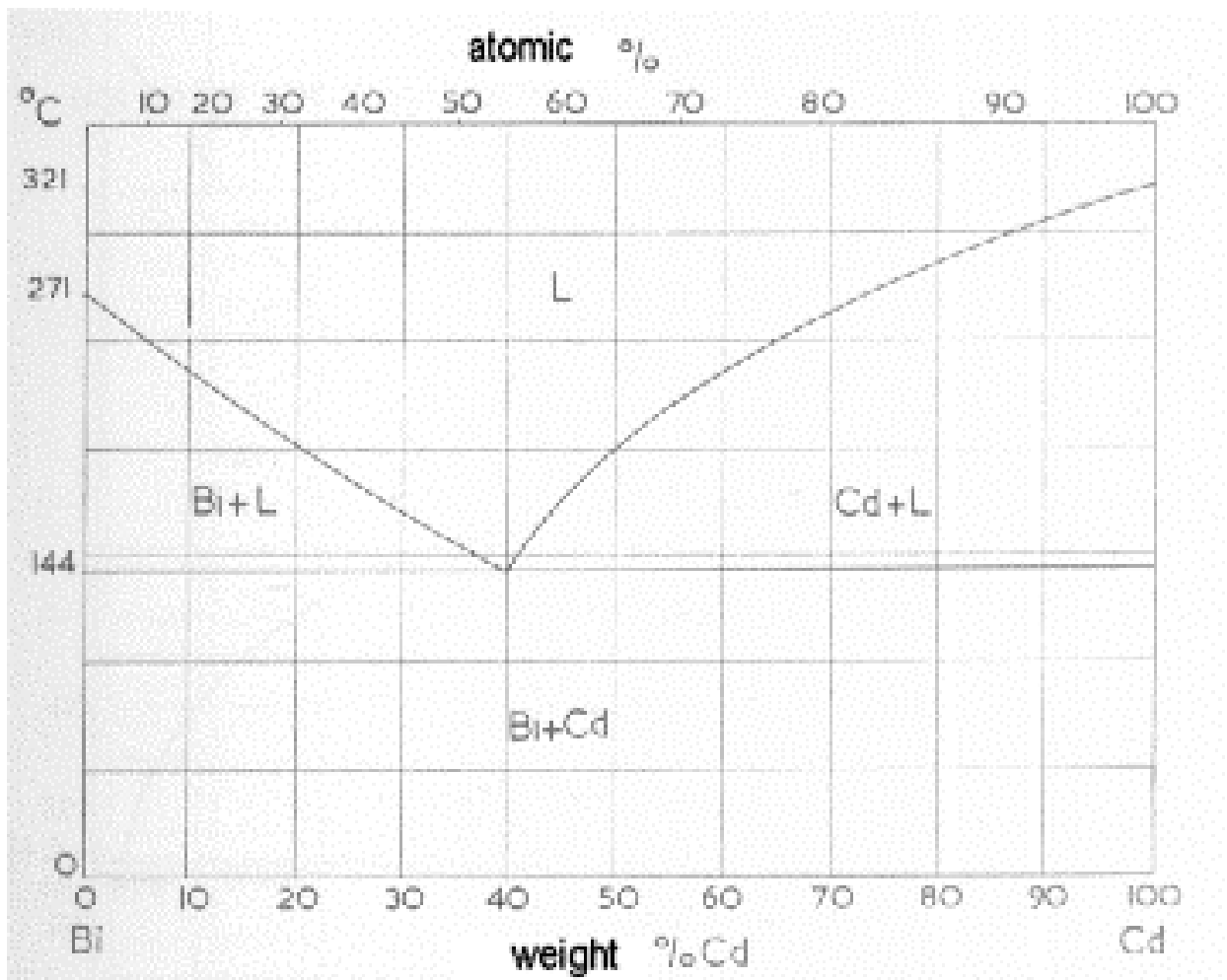
3. Starting at point B, 20 wt.%Cd at 0°C, trace the behavior of the solid up to 350°C. Indicate the paths followed by the solid and liquid as in question 2. Then answer the following questions:

- 3B
- a) At what temperature does the first liquid appear? 144°C
 - b) What is the composition of the first liquid? 40% Cd, 60% Bi
 - c) At what temperature does the Bi disappear? 204°C
 - d) At what temperature does the last solid disappear? 204°C
 - e) What is the composition of the final solid phase? 100% Bi
 - f) What is the composition of the final liquid phase? 20% Cd, 80% Bi

Grading - 1 point for each colored line
1 point per blank ± 4°C and ± 1% composition
± 8°C and ± 2% composition, -1/2 point

Total - 18 points

Figure for problems 1-3



Note: The vertical temperature scale markings are 50°C per division, starting at 0°C at the bottom. Use the bottom scale (weight % Cd) for the horizontal axis.