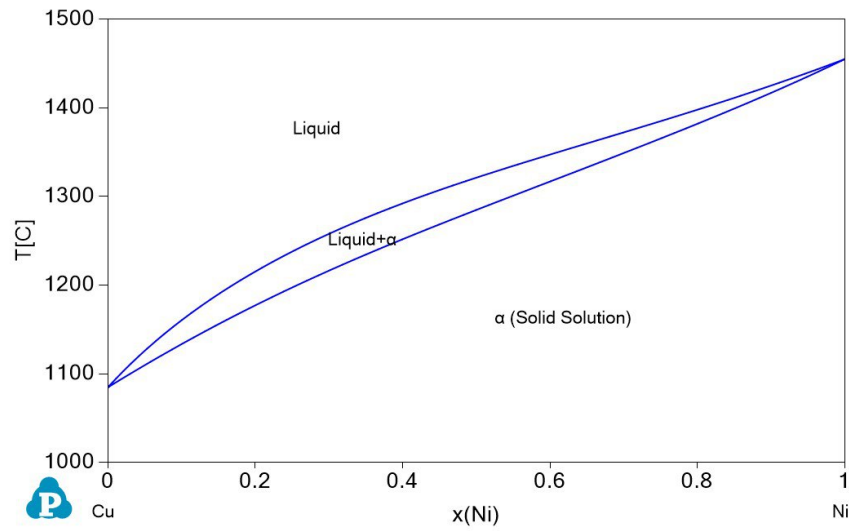# Exercise 1

Exercise 2

Figure 1: Phase diagram Cu-Ni
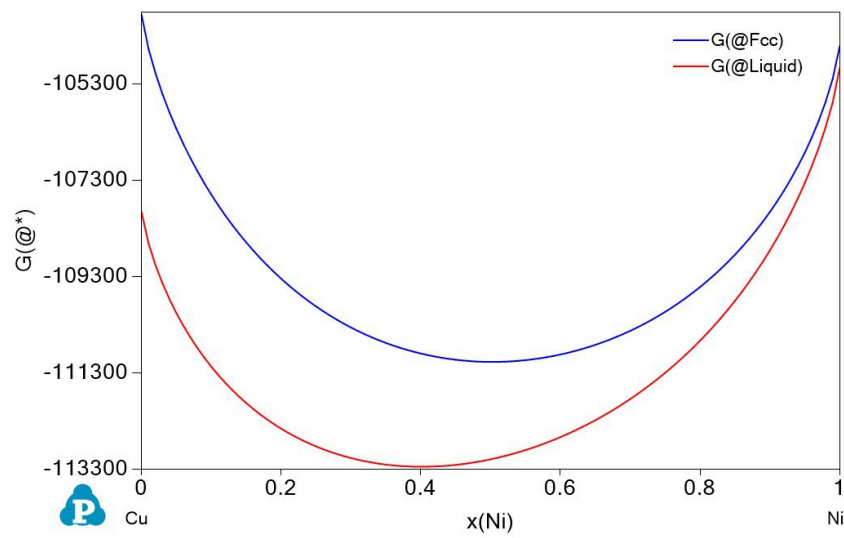

Figure 2: Energy curve @ 1500°C
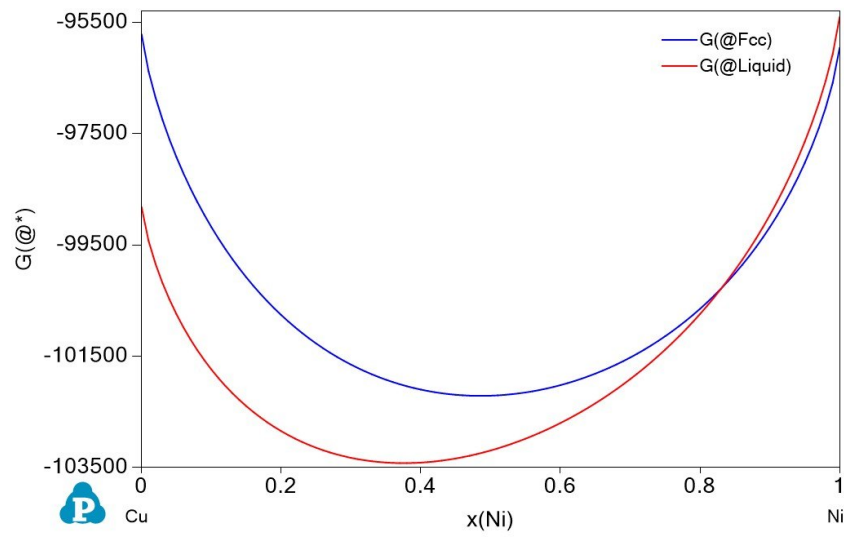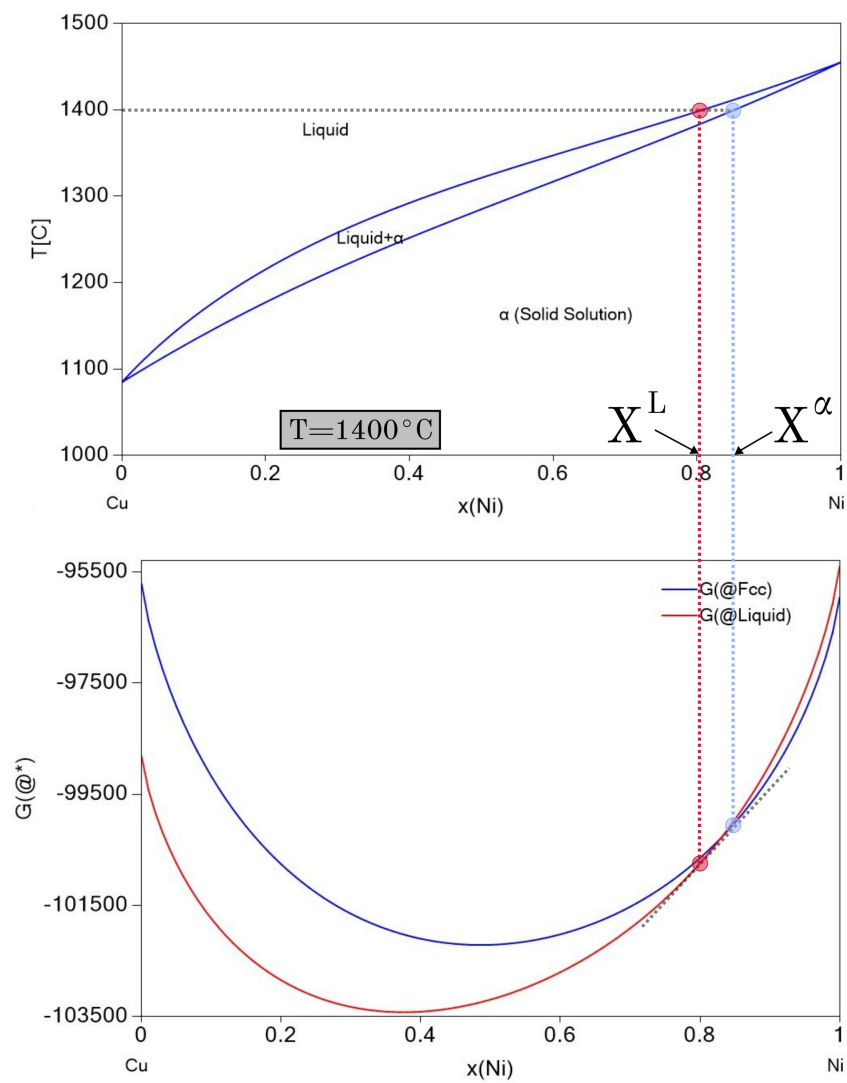
2

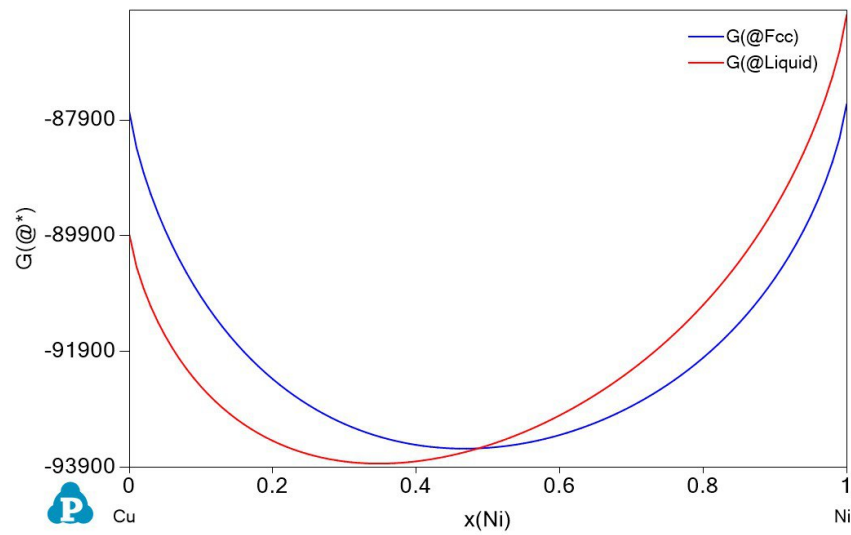Figure 3: Energy curve @ 1400°C

Figure 4: Tangetn method @ 1400°C

4

Figure 5: Energy curve @ 1300°C
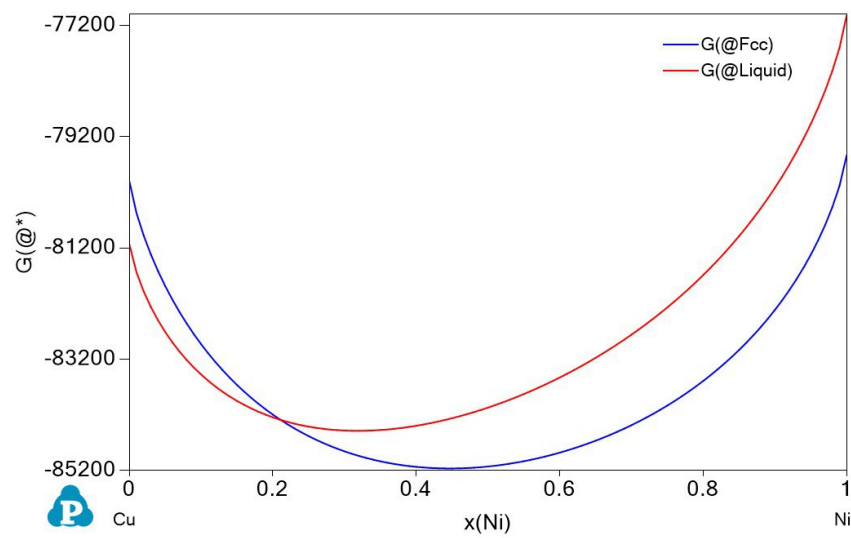

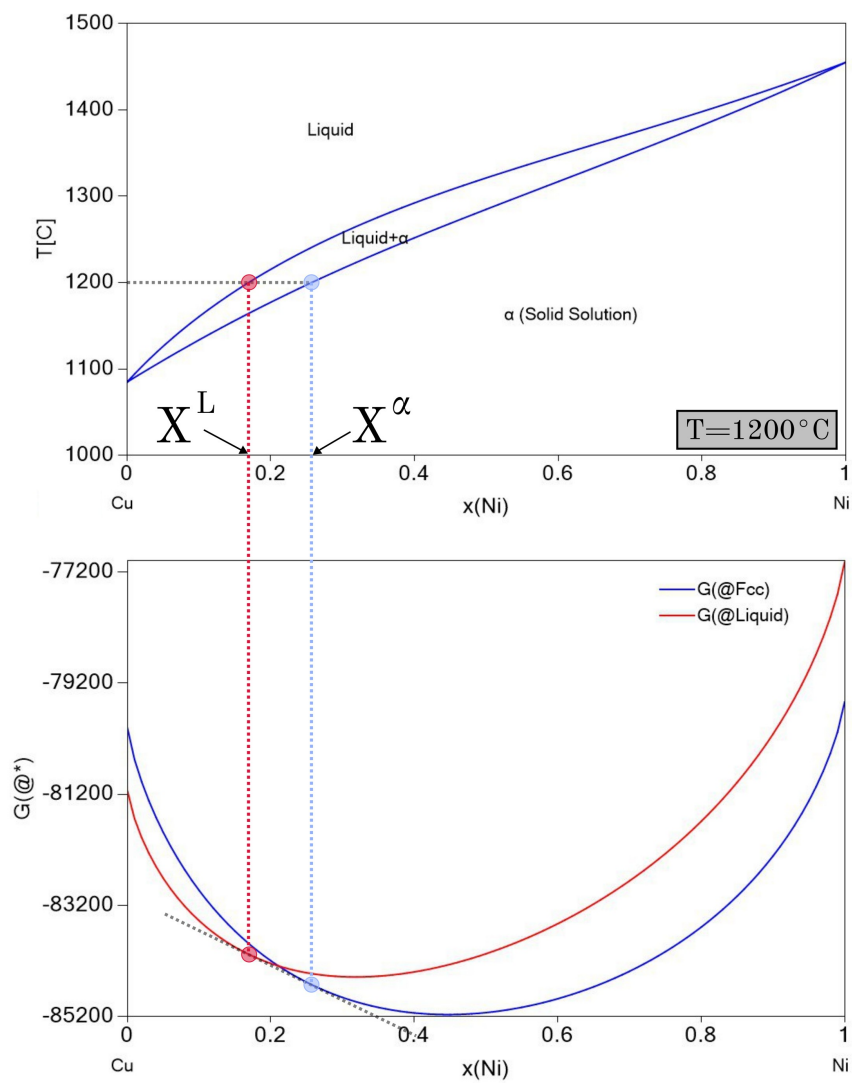Figure 6: Energy curve @ 1200°C

5

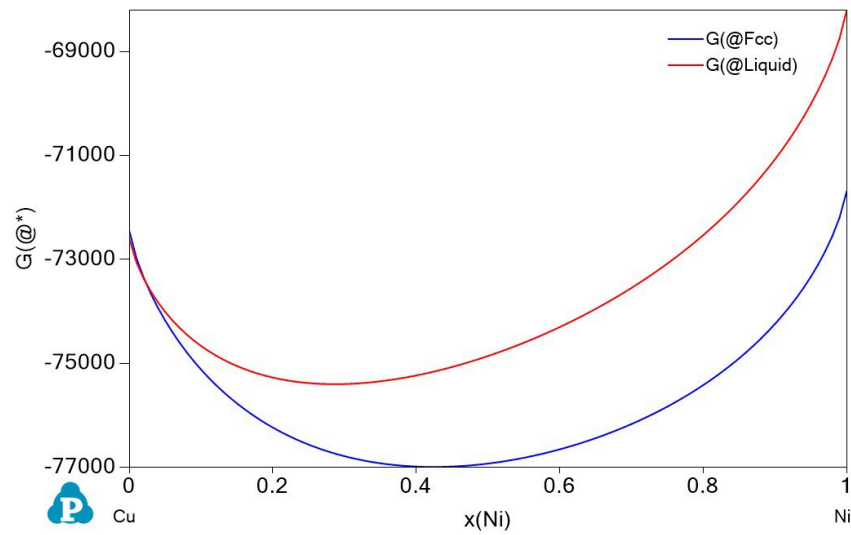Figure 7: Tangent method @ 1200°C
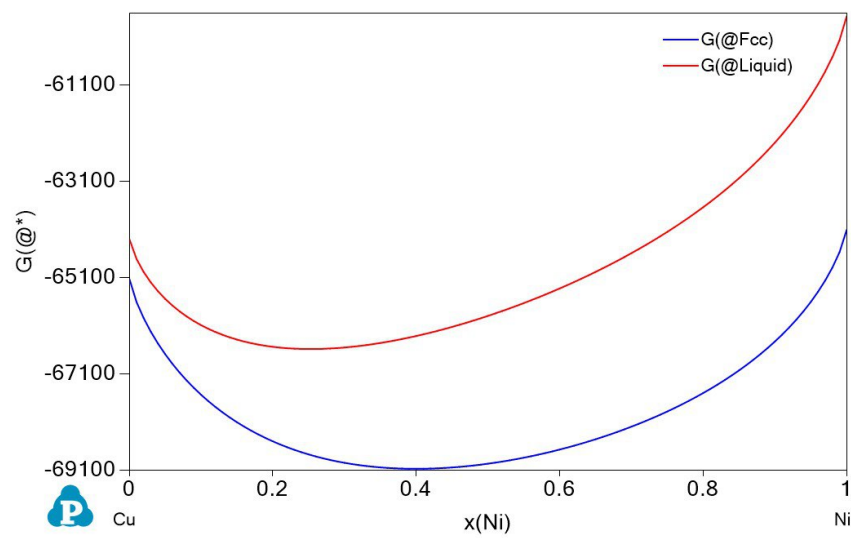
Figure 8: Energy curve @ 1100°C

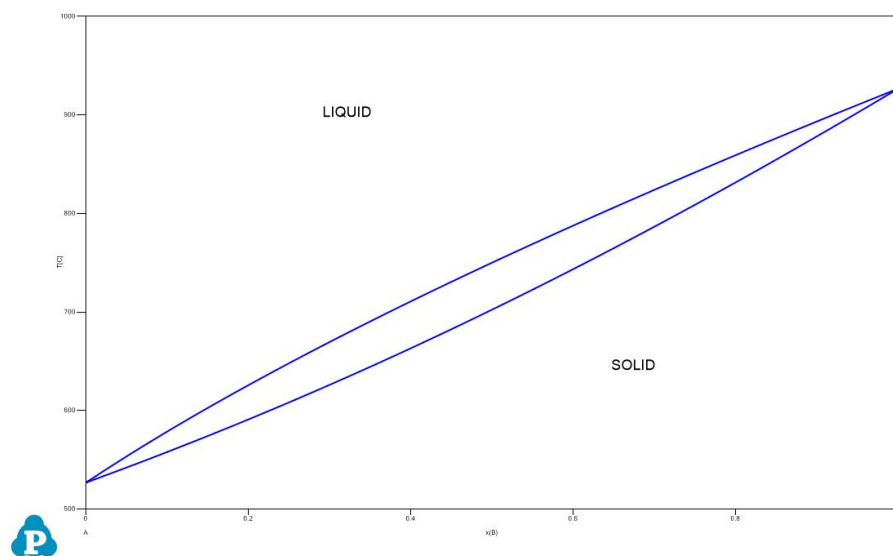Figure 9: Energy curve @ 1000°C

7

Exercise 3
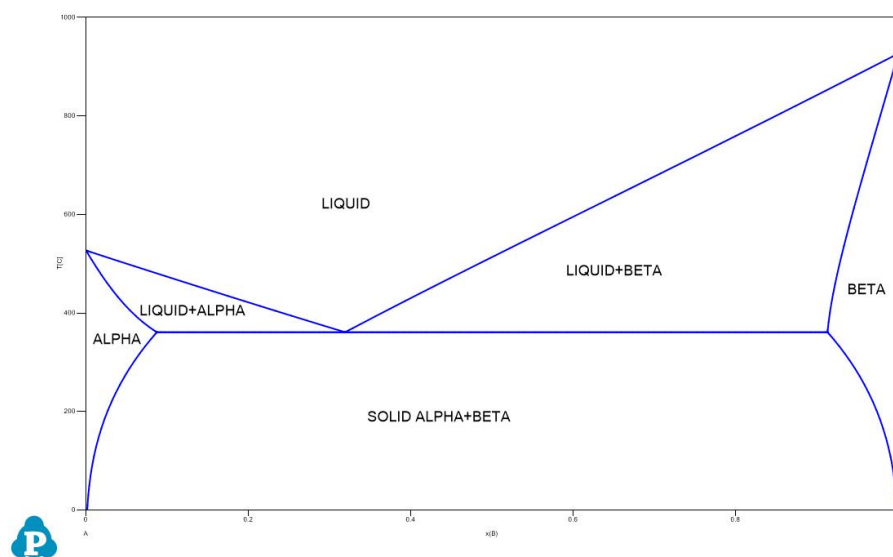

Figure 10: $\Omega_l = 0$, $\Omega_s = 0$

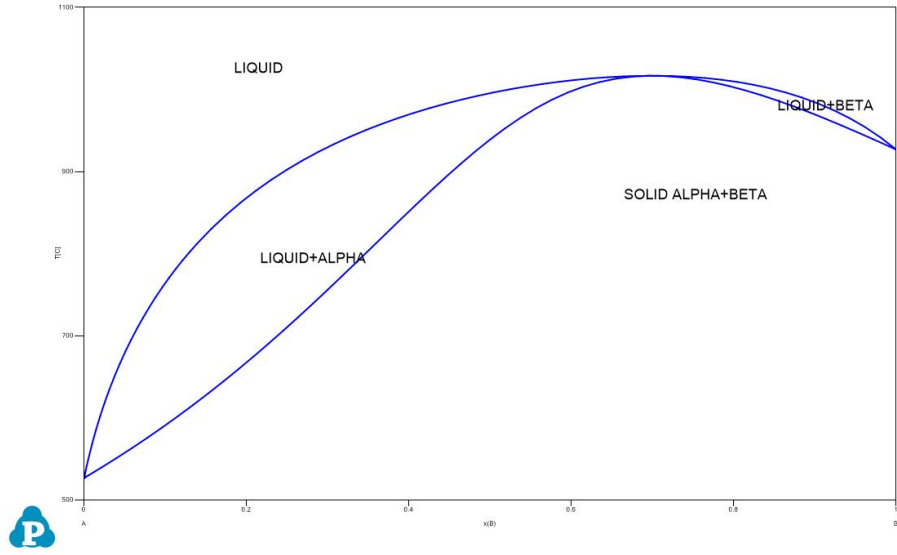Figure 11: $\Omega_l = 0$, $\Omega_s = 15$

8

Figure 12: $\Omega_l = 10$, $\Omega_s = 0$
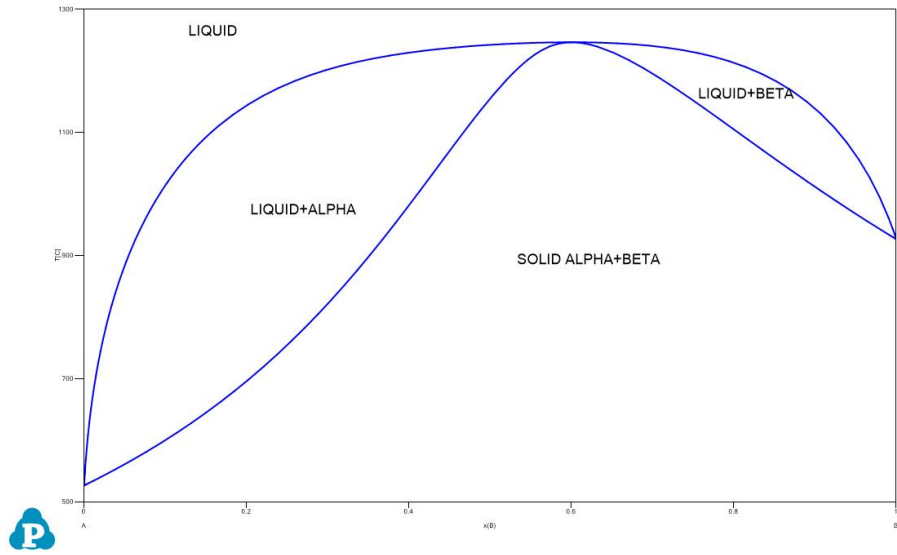

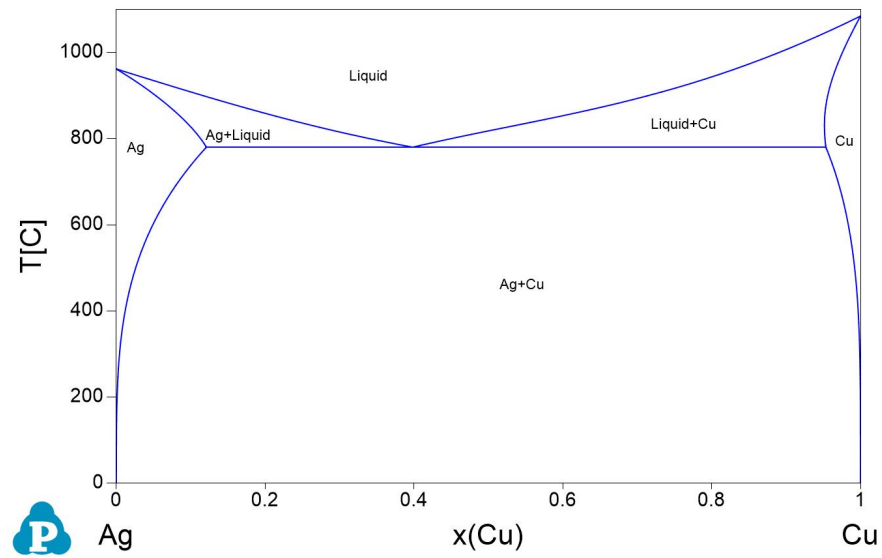Figure 13: $\Omega_l = 20$, $\Omega_s = 0$
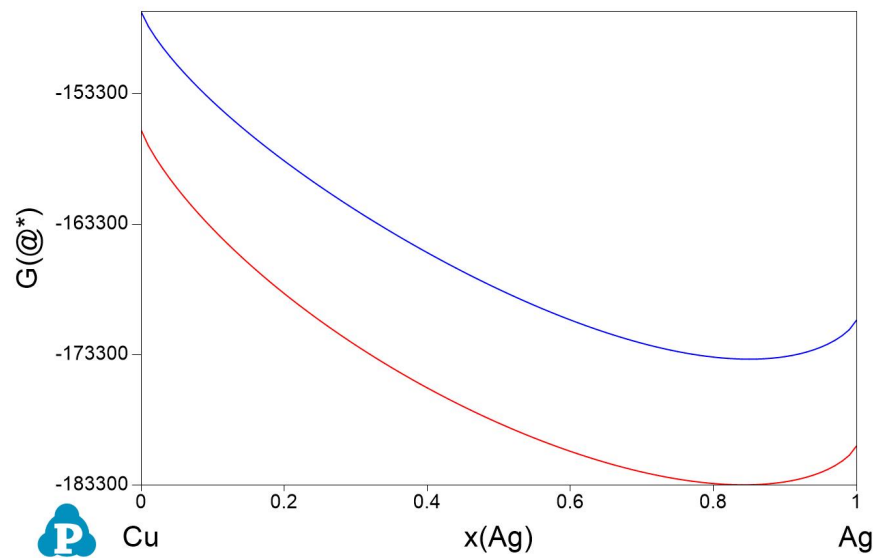
9

Exercise 4

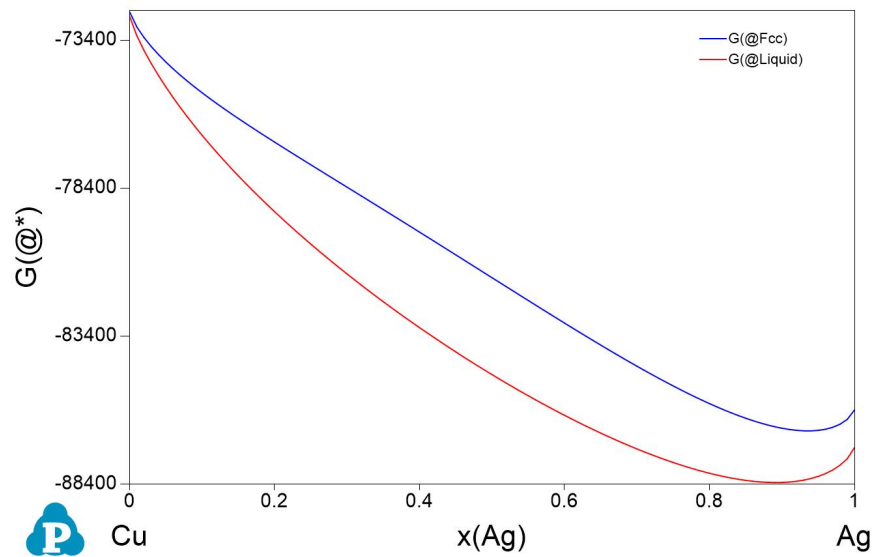Figure 14: Phase diagram Ag-Cu

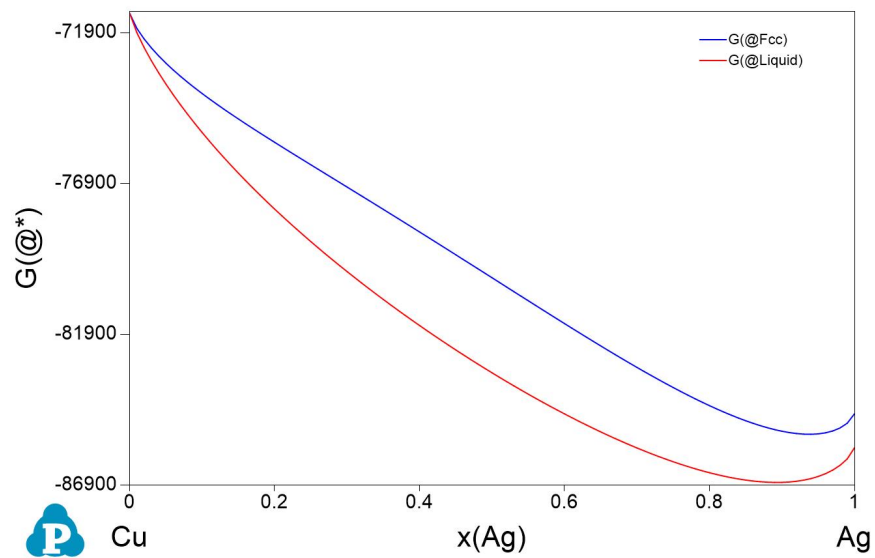Figure 15: Energy curve @ 2000°C

10

Figure 16: Energy curve @ 1100°C
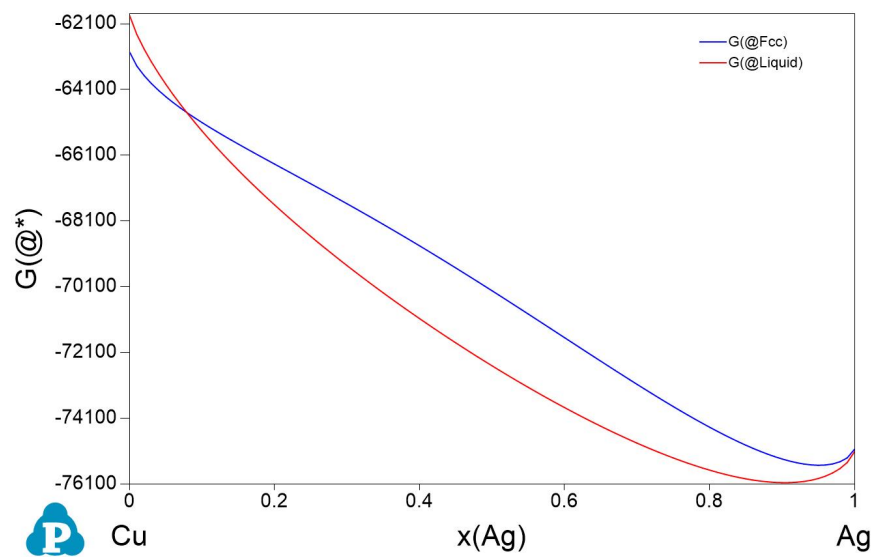

Figure 17: Energy curve @ 1084°C

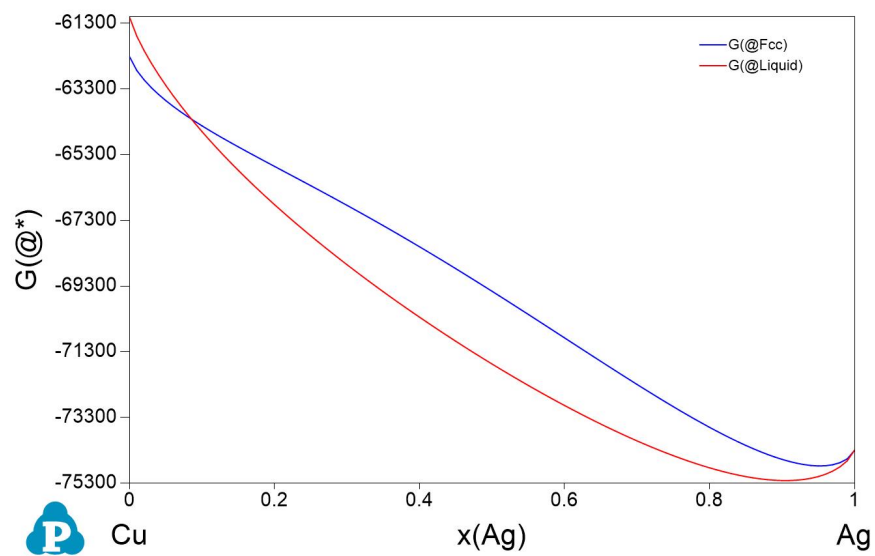Figure 18: Energy curve @ 970°C

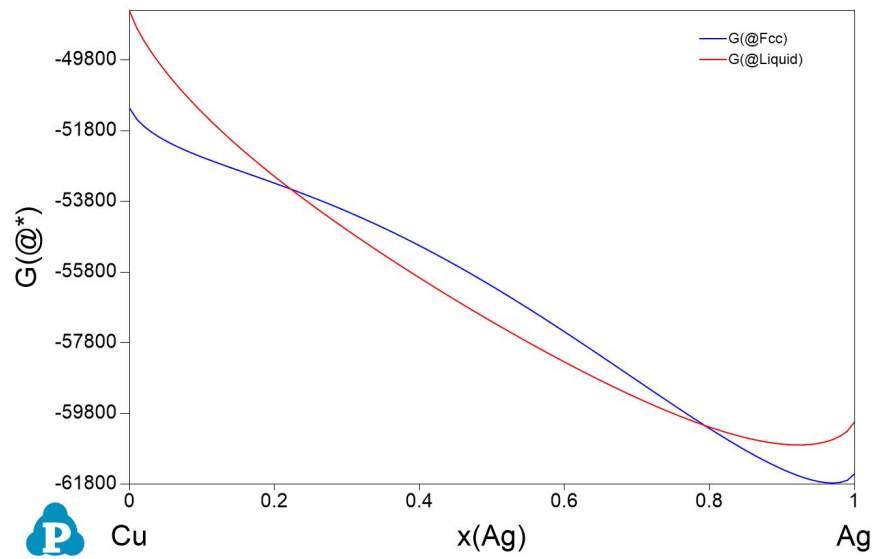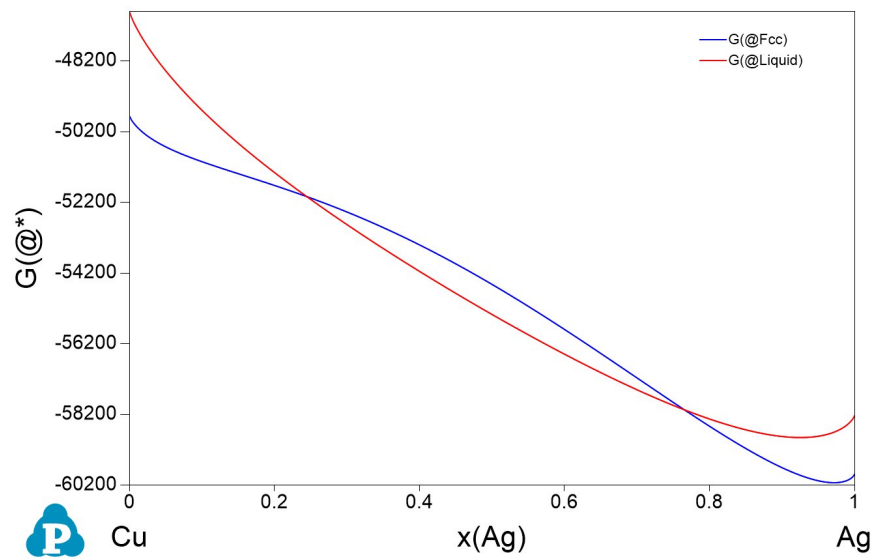Figure 19: Energy curve @ 961°C

Figure 20: Energy curve @ 800°C

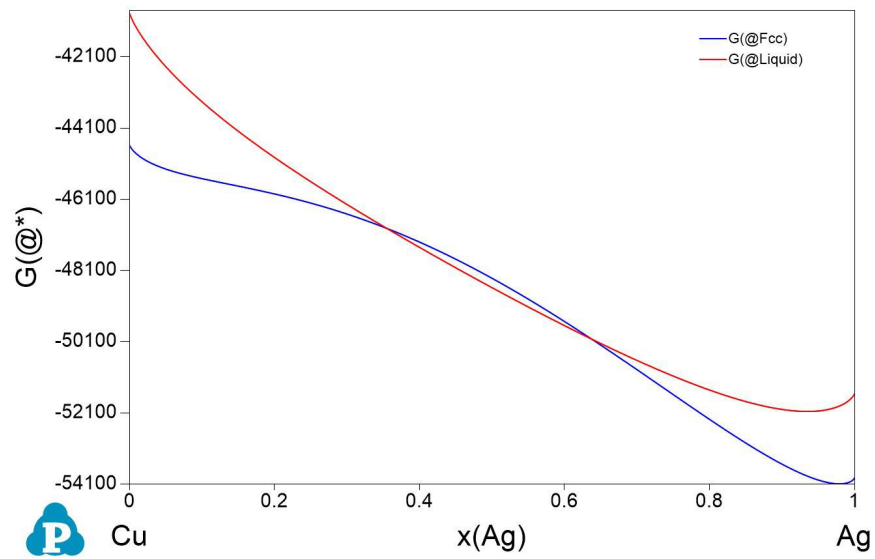
Figure 21: Energy curve @ 779°C
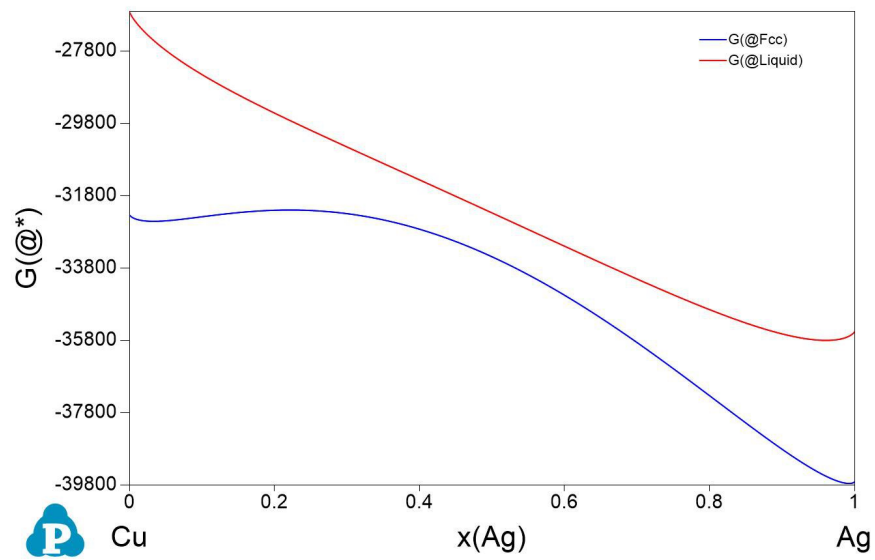
13

Figure 22: Energy curve @ 700°C
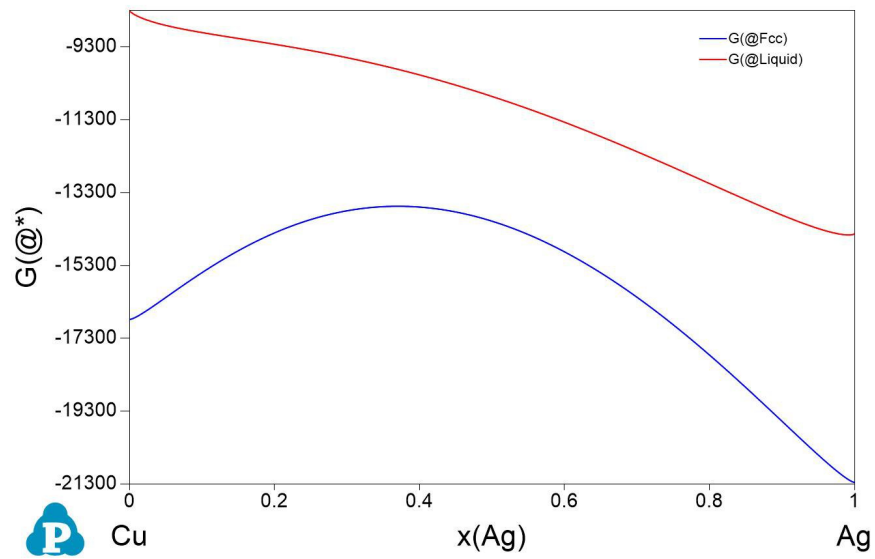

Figure 23: Energy curve @ 500°C
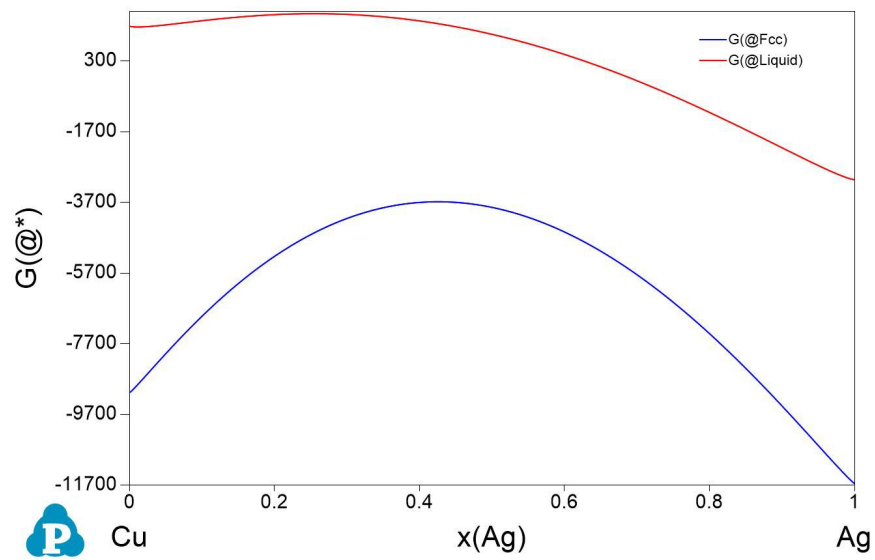
14

Figure 24: Energy curve @ 200°C

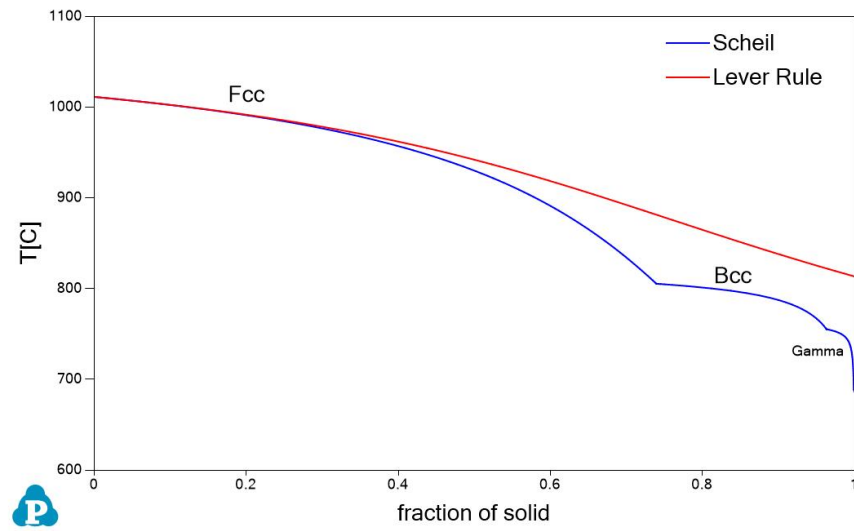Figure 25: Energy curve @ 0°C

15

Exercise 5

Figure 26: Solidification curves

Exercise 6

Granta LAB part

Overview: First of all we are choosing the mechanical properties that are the most intereseting for a helmet. We chose `Hardness - Vickers (HV)` and `Fracture toughness (MPa.m`$^{0.5}$`)`

Physical conditions consideration: We should take into consideration the following environment conditions when designing the product.

Property	Value
Temperature	20–25 °C
Energy absorption	550 kJ/m^2
Sun resistance	Yes
Rain resistance	Yes

Materials candidates ABS (internal) and EPS (external)