Assignment 3

Due date for submitting this assignment has passed. As per your records you have not submitted this assignment.

1. If the rate of a thermally activated process doubles as the temperature is increased from 300°C to 400°C, determine the activation energy for the process.
   - Answer: 2 kJ/mol
   - Accepted Answers: 2 kJ/mol
   - Points: 2

2. If the chemical potential of B in a binary Al-B alloy containing 20 mol% B is -0.000 J/mol at 600°C and the thermodynamic activity of B in the alloy is 0.15 with respect to pure FCC B at 500°C, determine the Gibbs free energy of pure FCC B at 300°C.
   - Answer: 153 J/mol
   - Accepted Answers: 153 J/mol
   - Points: 1

3. A binary alloy contains 0.1 mol% of component A and 0.0005 mol% of component B. If the partial molar volume of A is 9 cm³/mol, what is the partial molar volume of B in the alloy?
   - Answer: 8 cm³/mol
   - Accepted Answers: 8 cm³/mol
   - Points: 1

4. In a ternary system, the diffusional fluxes of components A, B, and C at a plane in volume fixed frame of reference are found to be -1.8 x 10⁻ⁱ⁴, 2.3 x 10⁻¹⁴, and 1.02 x 10⁻¹⁵ molecules/Å²·s respectively. If the partial molar volumes of A and B are 7 and 6 cm³/mol, respectively, what is the partial molar volume of C?
   - Answer: 12.3 cm³/mol
   - Accepted Answers: 12.3 cm³/mol
   - Points: 1

5. Self-diffusion in a pure FCC crystal is trapped in a particular direction. If d is the angle that a given possible jump vector makes with the diffusion direction, what should be the value of sin²d over all possible jump vectors?
   - Answer: 2.4
   - Accepted Answers: 2.4
   - Points: 1

6. Consider an atom located at the body center in a BCC crystal. If the atom makes a jump to a vacancy located at the position (1, 1, 1) and if the microscopic diffusion direction is along (1,1,1), what would be the contribution of the jump to the diffusion direction?
   - Answer: 2
   - Accepted Answers: 2
   - Points: 2

7. The figure below shows the co-ordinate system for a cubic lattice. If the crystal to be considered was FCC, which of the following jump vectors would not be a nearest-neighbour jump?
   - Answer: (3, 3, 3)
   - Accepted Answers: (3, 3, 3)
   - Points: 2