

(2411)

1. (20%)

$\Delta G = \Delta H - T\Delta S$ is a equation of the second thermodynamics. Please (i) define the meaning of G, H, S, respectively, and (ii) describe the relationship between this equation and chemical reaction.

2. (20%)

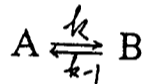
Potassium crystallizes with a body-centered cubic lattice and has a density of $0.856 \times 10^3 \text{ kg m}^{-3}$. What is the length of the side of the unit cell a and the distance between (200), (110), and (222) planes? What is the closest distance between atoms and what is the potassium atom radius r ? (the mass of the contents of a unit cell is nM/N_A ; where n is the number of molecules molar mass M in a unit-cell, and N_A is Avogadro constant)

3. (20%)

Describe what is the van der Waals forces.

4. (20%)

Derive the integrated rate equation for a reversible first-order reaction. (assume; only A is present initially)



5. (20%)

Calculate the standard electrode potentials for the following three electrode: $\text{Cd}^{2+}|\text{Cd}$, $\text{Cl}^-|\text{Cl}_2(\text{gas})|\text{Pt}$, $\text{Cl}^-|\text{AgCl}(\text{solid})|\text{Ag}$.

