資源熱力學

一、 定義下列各術語並各舉一例 (30%)

1. Chemical equilibrium
2. Internal energy
3. Isolated system
4. Surface tension
5. Isothermal reversible expansion

二、 解答下列問題

6. Calculate the heat evolved in the freezing of water at constant pressure and temperature of -10℃, given ΔH_{H_2O} = -79.9 cal g^{-1}; $Cp_{H_2O(l)}$ = 1.00 cal g^{-1}; and $Cp_{H_2O(s)}$ = 0.49 cal g^{-1}. (10%)

7. Prove that the difference in the entropy change between the reversible and the irreversible processes for the freezing of water at -10℃ is 0.18 cal deg^{-1} mole^{-1}. Explain the meaning of the difference.
   (q_{rev} =79.7 cal g-1) (20%)

8. One mole of steam is compressed reversibly to liquid water at the boiling point 100℃. The heat of vaporization of water at 100℃ and 760mm is 539.7 cal g^{-1}. Calculate w and q and each of the thermodynamic quantities $\Delta H, \Delta E, \Delta G, \Delta A,$ and ΔS. The process is reversible, isothermal, and isobaric. (20%)

三、 填空

9. Figure 1 is the temperature – composition diagram for the system zinc – magnesium. Please give the phases that will be present in the numbered areas: a, b, c, d, and e. (20%)