

大學八十九學年度轉學生入學試題卷

系 二年級 科目: 普通物理與普通化學 共 / 頁 第 / 頁

1. Define the follows: (10)

- standard enthalpy of formation of a compound
- electron affinity of an element
- London dispersion force
- osmotic pressure
- the third law of thermodynamics

2. (a) For a process that occurs at constant temperature, express the change in Gibbs free energy in terms of changes in the enthalpy and entropy of the system. (b) For a process that occurs at constant T and P , the value of ΔG is positive. What can you conclude? (c) What is the relation between ΔG for a process and the rate at which it occurs? (12)

3. Explain the following observations: (a) The viscosity of ethanol, $\text{CH}_3\text{CH}_2\text{OH}$, is greater than that of Ether, $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$. (b) In contact with a narrow capillary tube made of polyethylene, water forms a concave downward meniscus like that of mercury in a glass tube. (10)

4. The carbon atom in CH_4 can not participate in multiple bonding, whereas that in formaldehyde, H_2CO , does. Explain this observation by using the hybridization at the carbon atom. (8)

5. Write the electron configuration for the element bismuth, atomic number 83. (10)

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6. A ball is projected horizontally at 15 m/s from a cliff of height 20m. Find : (a) its time of flight; (b) its horizontal range R. 25%

7. Two point charges are located on the x-axis, $q_1 = -e$ at $x = 0$ and $q_2 = +e$ at $x = a$. (a) Find the work that must be done by an external force to bring a third point charge $q_3 = +e$ from infinity to $x = 2a$. (b) Find the total potential energy of the system of three charges. 25%