

大同大學 九十二 學年度 轉學考試 試題

考試科目：化學 系別：材料工程學系

第 | 頁，共 | 頁

註：本次考試不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. (10%) State three chemical properties that are typical of (a) metals; (b) nonmetals.
2. (10%) What is the relation between the electronegativities of two atoms and the type of bond (covalent, polar, or ionic) they are likely to form?
3. (10%) Some substances are solids, some are liquids, and some are gases at room temperature. Are there any correlations between the state of substance and the interaction forces among molecules or atoms in the substance? Please give examples.
4. (10%) How does entropy differ from enthalpy? Explain why both the entropy and enthalpy changes of a system are necessary to determine whether a process is spontaneous.
5. (10%) Describe the correlation in the periodic trends of atomic radius and 1st ionization energy, both across a period and down a group in the periodic table.
6. (10%) What are the assumptions of the kinetic molecular theory which is used to interpret the ideal gas law? Please make comments on the assumptions.
7. (10%) A 1.14 g sample of molecular substance dissolved in 100.0 g camphor (freezing point 179.8 °C, freezing point constant, $k_f = 39.7 \text{ K}\cdot\text{kg}/\text{mol}$) freezes at 177.3 °C. What is the molar mass of the substance?
8. (10%) A piece of copper of mass 200.0 g at 100.0 °C is placed in a Styroform cup calorimeter containing 500.0 g of water at 22.0 °C. Calculate the final temperature of the water. Assume that all the energy lost by the copper is gained by the water. The specific heat capacities of copper and water are 0.38 and 4.18 J/°C-g, respectively.
9. (10%) When a solid NH_4HS and 0.200 mol $\text{NH}_3(\text{g})$ were placed into a 1.0 L vessel at 24 °C, the equilibrium $\text{NH}_4\text{HS}(\text{s}) = \text{NH}_3(\text{g}) + \text{H}_2\text{S}(\text{s})$, for which $K_c = 1.6 \times 10^{-4}$, was reached. What are the equilibrium concentrations of NH_3 and H_2S ?
10. (10%) Calculate the solubility of silver chloride in water and 0.10 M $\text{NaCl}(\text{aq})$ solution. K_{sp} of $\text{AgCl}(\text{s})$ is 1.6×10^{-10} .