

系所組別： 口腔醫學研究所丙組

考試科目： 普通化學

考試日期： 0308 · 節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

1. Please describe and explain (a) First law of thermodynamics, (b) Second law of thermodynamics, (c) Bohr Theory of the Hydrogen Atom, (d) Standard emf, (e) Hess's Law. (20%)
2. According to Maxwell's distribution of molecular speeds. Please compare the distribution of speeds of H_2 molecules for $0^\circ C$ and $300^\circ C$, respectively. (10%)
3. Describe and explain the effects of temperature and pressure on solubility. (10%)
4. Which aqueous solution has the lower freezing point, 0.01 m $CaCl_2$ or 0.01 m glucose ($C_6H_{12}O_6$)? Please explain. (10%)
5. What is oxidation-reduction reaction? Please explain and give a suitable example as an illustration. (10%)
6. If the chemical reaction is $A + B \rightarrow C + D$, how to determine the order of reaction from the rate law. (10%)
7. A sample of potassium aluminum sulfate 12-hydrate, $KAl(SO_4)_2 \cdot 12H_2O$, containing 237.2 mg is dissolved in 2.00 L of solution, Calculate the following for solution: (a) The molarity of $KAl(SO_4)_2$. (b) The molarity of SO_4^{2-} . (c) The molarity of , assuming that the density of the solution is 1.00 g/mL. (Atomic weight, K = 40, Al = 27, S = 32, O = 16, H = 1) (10%)
8. On the basis of molecular orbital theory, please describe the energy level diagram for the Na_2 molecule. (Atomic Number: Na = 11) (10%)
9. What is the density of nitrogen, N_2 , in gram per liter at $100^\circ C$ and 2 atm. (Atomic weight: N = 14) (10%)