大同大學 九十四 學年度 轉學考試 試題

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；　可以使用計算器。

1. (a)What are the main subatomic particles that make up the atom?
   (b)What is the charge, in units of the electronic charge, of each of the particles?
   (c)Which of the particles is the most massive? Which is the least massive?
   (10%)

2. Isopropyl alcohol is composed of C, H,and O. Combustion of 0.255g of isopropyl alcohol produces 0.561g carbon dioxide and 0.306g water. Determine the empirical formula of isopropyl alcohol.(atomic weight: C:12, H:1.0, O:16).
   (10%)

3. One commercial method used to peel potatoes is to soak them in a solution of NaOH for a short time, remove them from the NaOH, and spray off the peel. The NaOH is analyzed periodically. If 45.7 mL of 0.500 M H_2SO_4 is required to neutralize a 20.0 mL sample of NaOH solution. What is the concentration of the NaOH solution?
   (10%)

4. If a system loses 1000 J of heat to the surroundings. And the system also does 500 J of work on the surroundings. What is the change in the internal energy?
   (10%)

5. Define and explain:
   (a) compounds and mixtures　　　　　　(b) mole
   (10%)

6. (a) In each of the following sets, which atom or ion has the smallest radius in each set?
      (1) Li, Na, K　　　(2) O^+, O, O^-　　　(3) S, Cl, Ar
   (b) Complete and balance the equations for the following reactions.
      (1) $Li(s) + O_2(g) \rightarrow$
      (2) $K(s) + S(s) \rightarrow$
   (10%)

7. Write the Lewis structure for each molecule or ion.
   (a) ClF_3　　　(b) XeO_3　　　(c) $RnCl_2$　　　(d) $BeCl_2$　　　(e) ICl_4^-
   (10%)

8. The vapor pressure of water at 25℃ is 23.8 torr, and the heat of vaporization of water at 25℃ is 43.9 kJ/mol. Calculate the vapor pressure of water at 50℃.
   (Note: $\ln(P_{vap}) = -(\triangle H_{vap}/R)(1/T) + C$)
   (10%)

9. How would you prepare 1.0 L of an aqueous solution of sodium chloride (NaCl) having an osmotic pressure of 15 atm at 22℃? (NaCl:58.5 g/mol)
   (10%)

10. A certain first-order reaction has a half-life of 20.0 minutes.
    (a) Calculate the rate constant for this reaction.
    (b) How much time is required for this reaction to be 75% complete?
    (10%)