大同大學 106 學年度 (暑)轉學入學考試試題

每題10%

考試科目:化學　　系別: 生物工程學系　　第全頁

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； 可以使用計算器。

1. A gas company in Massachusetts charges $1.30 for 15ft^3 of natural gas (CH_4) measured at 20℃ and 1.0 atm. Calculate the cost of heating 200mL of water(enough to make a cup of coffee or tea) from 20℃ to 100℃. Assume that only 50 percent of the heat generated by the combustion is used to heat the water; the rest of the heat is lost to the surroundings.

2. Predict the molecular structure (including bond angles) for each of the following. a. PCl_3 b. SCl_2 c. SiF_4 d.ICl_5 e. $XeCl_4$ f. $SeCl_6$

3. Give the maximum number of electrons in an atom that can have these quantum numbers:

a. $n = 4$

b. $n = 5, m_\ell = +1$

c. $n = 5, m_s = +\frac{1}{2}$

d. $n = 3, \ell = 2$

e. $n = 2, \ell = 1$

4. The diffusion rate of methane was found to be 1.41 times faster than that of an unknown gas molecule at room temperature. Question: What is the density of the unknown gas molecule under STP condition? (CH_4= 16.04 g/mol)

5.A gas sample containing of CO_2 and N_2 in 1:2 molar ratio has a volume of 350 mL at 40 ℃ with a CO_2 partial pressure of 560 torr. What is the volume of the mixed gases under STP condition?

6.. The pressure of a mixture of He and Kr in a container with volume of 200 L at 20.0℃ is 1.38 atm. The mass ration of He:Kr is 57%:43%. What is the mass of He?(He=4.00 g/mol, Kr= 83.8 g/mol)

7. An organic compound (hydrocarbon) containing only carbon and hydrogen is 85.3% C by mass. The molar mass of the hydrocarbon is between 50 and 60 g/mol. What is the formula of the compound .

8. Calculate the pH of a 0.011 M solution of NH_4NO_3 ($K_b(NH_3) = 1.8 \times 10^{-5}$)

9.Calculate the pH of a solution that is 0.20M $NH_3(aq)$ and 0.35 M $NH_4Cl(aq)$. ($K_b(NH_3) = 1.8 \times 10^{-5}$)

10. The K_{sp} of CaF_2 is 4×10^{-11}. What is the maximum concentration of Ca^{2+} possible in a 0.10 M NaF solution?