國立嘉義大學九十一學年度轉學生招生考試試題

科目：普通化學　　（請將答案寫在答案卷上）

一、填充題：90 分 (每格 3 分)

1.An orange liquid is distilled, resulting in the collection of a yellow liquid and a red solid. State whether the process is a chemical or a physical change. ***(1)***

2.Name the compound: HClO (in English). ***(2)***

3.How many molecules are there in a drop of H_2O, weighing 0.050g? ***(3)***

4.The formula of red copper oxide can be determined by heating the oxide in the presence of excess hydrogen. When a 1.256g sample reacts with hydrogen, 1.116g copper is obtained. What is the simplest formula of the compound? (Cu: 63.55) ***(4)***

5.Microwave ovens heat food by the energy given off by microwaves. These microwaves have a wavelength of 5.00×10^{6}nm. How much energy in kJ/mol is given off by a microwave oven. ($h=6.63\times10^{-34}$ J.s) ***(5)***

6.Calculate the molarity of solution when 5.42g $Na_2C_2O_4$ (FW=134.0) is added to 250mL volumetric flask and distilled water is added until the mark is reached. ***(6)*** Calculate the concentration in terms of weight percent if the density of the solution is 1.03g/mL. ***(7)***

7.Assign oxidation numbers for P in H_3PO_4 and P_4O_6. ***(8)***

8.Calculate the density of air at room temperature and 1atm (suppose that air is composed of 80% N_2 and 20% O_2). ***(9)***

9.At STP, 5.87L of a gas weighed 10.5g. Its molar mass is ***(10)***

10.At 500℃ the equilibrium constant K for the reaction $H_2(g)+I_2(g)\rightarrow2HI(g)$ is 45.0. If 0.300 moles of $H_2(g)$ and 0.300 moles of $I_2(g)$ are placed into a 10.0-L container and allowed to react at this temperature, what is the HI molar concentration at equilibrium? ***(11)***

11.According to the Bronsted-Lowry definition, a base is ***(12)***

12.The pH of a 0.2M solution of a weak acid is 4.0. What percent of the acid is ionized? ***(13)***

13.Which of the following are state functions? Energy, work, enthalpy and heat. ***(14)***

14.What is the ground-state electronic configuration of $_{26}Fe^{+3}$ ion? ***(15)***

15.Predict the bond order for O_2, O_2^+, O_2^-. ***(16)***

16.Which of the following form network atomic solid? CO_2, SiO_2, CH_4, $CaCO_3$, C(diamond). ***(17)***

17.What concentration of NaCl in water is needed to produce an aqueous solution isotonic with blood (π=7.70atm at 25℃)? ***(18)***

18.How many seconds must a current of 5.00A be applied to a solution of Cu^{2+} to produce 10.5g cupper metal? (Cu:63.55) ***(19)***

19.What type of radioactive decay happened in the following reaction? $^{227}_{89}Ac\rightarrow{}^{227}_{90}Th+?$ ***(20)***

20.Calculate the electrode potential for the following half-reactions: Zn electrode immersed in 0.0500M Zn^{+2}, $E°_{Zn^{+2}/Zn}$ = -0.763V ***(21)***

21.Given $CH_3COOH(aq)\rightarrow H^+(aq)+CH_3COO^-(aq)$ at 25℃, Ka for $CH_3COOH=1.8\times10^{-5}$, what is $\Delta G°$ at 25℃? ***(22)***

22.A solution was prepared by dissolving 18.00g nonelectrolyte nonvolatile compound in 150.0g water. The resulting solution has a boiling point of 100.34℃. Calculate the molar mass of the compound (Kb for water is 0.51℃·kg/mol). ***(23)***

23.For the reaction A+B→products, the following data were obtained:

Initial rate, M/s	6.60×10^{-3}	1.32×10^{-2}	2.64×10^{-2}	5.28×10^{-2}
[A], M	0.10	0.20	0.10	0.20
[B], M	0.10	0.10	0.20	0.20

Write the rate expression for the reaction. ***(24)***

24.A first-order reaction is 35% complete after 55 min. What is the rate constant? ***(25)***

25.List the following in order of increasing acid strength: HOI, HOCl, HOBr. ***(26)***

26.List the following species in order of increasing first ionization energy N, O, B, Al. ***(27)***

27.The following reaction takes place at 120℃. $H_2O(l)\rightarrow H_2O(g)$ ΔH=44.0kJ/mol, ΔS=0.119kJ/mol K. Calculate ΔG. ***(28)***

28.For the reaction: $3H_2(g)+N_2(g)\rightarrow2NH_3(g)$, what is the relationship between Kc and Kp at temperature T? ***(29)***

29.The hybridization of the central atom, sulfur, in SF_4 is ***(30)***.

二、 計算與問答題：10 分 (每題 5 分)

1.When a 1.00-g sample of C_2H_5OH (46.1g/mol) is burned, how much energy is released as heat? ΔH_f^o for $C_2H_5OH(l)$=-278 kJ/mol, ΔH_f^o for $H_2O(l)$=-286 kJ/mol, ΔH_f^o for $CO_2(g)$ =-394 kJ/mol.

2.Draw the Lewis structures and tell the molecular geometry and molecular polarity for ICl_3.