國立勤益技術學院九十三學年度研究所招生初試試題卷

所別：材化所 組別：材料科技組與化工科技組 身分別：一般生或在職生

科目：物理化學 准考證號碼：□□□□□□□□（考生自填）

考生注意事項：

一、考試時間 100 分鐘。

二、請考生自填准考證號碼。

三、可使用工程用計算機。

試題：

一、A mole of Argon is allowed to expand adiabatically from a pressure of 10 bar and 298.15 K to 1 bar. What is the final temperature and how much work can be done?(10%)

二、The boiling point of n-Hexane at 1 bar is 68.6 $^{\circ}C$. Estimate (a) its molar heat of vaporization, and (b) its vapor pressure at 60 $^{\circ}C$. (15%)

三、(a) Write the reaction that occurs when the cell $Zn/ZnCl_2(0.555mol\cdot kg^{-1})/AgCl/Ag$ delivers current and calculate (b) ΔG (c) ΔS (d) ΔS at 298 K for this reaction. At 298 K E=1.015 V and $\left(\frac{\partial E}{\partial T}\right)_P = -4.02*10^{-4}\,V\cdot K^{-1}$.(15%)

四、The half-life of a first-orde5r chemical reaction $A \longrightarrow B$ is 10 min. What percent of A remains after 1 h? (10%)

五、Find the △H,and q if 2.000mol of supercooled liquid water at –15.00℃ freezes irreversibly at constant pressure of 1.000atm ice at –15.00℃. Assume that the surrounding remain at equilibrium at -15.00℃. Calculate the entropy change of the system ,the surroundings and universe. Assume the molar heat capacity of liquid water to be constant and equal to $76.1JK^{-1}mol^{-1}$,and that of ice to be constant and equal to $37.15JK^{-1}mol^{-1}$. The latent heat of fusion of water is $333.5Jg^{-1}$. (15%)

六、The vapor pressure of pure benzene at 20.0℃ is equal to 74.9 torr, and that of pure toluene at this temperature is 21.6 torr. Assuming ideality, find the partial vapor pressure of each component ,the total vapor pressure, and the composition of the vapor at equilibrium with a solution of mixing of 1.200 mol of benzene and 1.300 mol of toluene at 20 ℃. (10%)

七、At 40℃, a solution of ethanol (component 2) in benzene (component 1) having a mole fraction of ethanol equal to 0.02 has a partial vapor pressure of ethanol equal to 30.2 torr. Assuming that Henry's law holds at this composition, (1) find value of the Henry's law constant for ethanol in benzene.(2) find the vapor pressure of a 0.05 $molkg^{-1}$ solution of ethanol in benzene. （Benzene C_6H_6=78 $gmol^{-1}$）(15%)

背面還有試題

八、Find expressions for the isothermal compressibility and coefficient of thermal expansion for an ideal gas. (10%)