淡江大學九十二學年度碩士班招生考試試題

系別：化學學系　　科目：物 理 化 學

准帶項目請打「○」否則打「×」
✓ 簡單型計算機

1．Describe the following terms： [15%]

(a) Transference number　　(b) Clausius – Clapeyron equation

(c) Activation Energy　　(d) Critical pressure

(e) The third law of thermodynamics

2．Answer the following questions： [15%]

(a) Why the temperature of triple point of water is 0.01℃ ?

(b) How to predict the molecular weight of a compound by using any one of "Colligative properties" of solution.

(c) How to predict the specific rate constant of a gaseous reaction by the collision frequency.

3．Describe the definitions and properties of the following terms： [10%]

(a) Ideal gas　　(b) Ideal solution

4．A certain gas has the state equation as： [20%]

$(P - A/V)(V + B) = nRT$； where A and B are constants

(a) Calculate the work done by one mole of this gas expands form 2 liters to 5 liters at 25℃.

(b) Calculate the entropy change of one mole of this gas from 25℃ and 1 atm to 50℃ and 3 atm.

5．At 25℃ the half-life period for the decomposition of N_2O_5 is 5.7 hr and is independent of the initial pressure of N_2O_5. [20%]

(a) Calculate the specific rate constant of this reaction.

(b) Calculate the time required for the reaction to go 90% to completion.

6．(a) A particle on a straight line is described by： [20%]

$$\Psi = \frac{1 + ix}{1 + ix^2}$$

Please show the normalization factor

(b) Show that the expectation value $\langle a \rangle$ is the eigen value a when represented by the eigenfunction Ψ_A and operator A. Ψ_A is already normalized.