淡江大學九十學年度日間部轉學生招生考試試題

系別：化學工程學系三年級

科目：物 理 化 學

准帶項目請打「○」否則打「×」	
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本試題共 壹 頁

20% 1. Determine the degree of degeneracy of the n= 2 level of the hydrogen atom (omitting spin). List the quantum numbers for each of the wave functions involved.

20% 2. Use partition functions to find an expression for the internal energy E in terms of temperature T for a system consisting of 1 mole of an ideal monatomic gas. The molecules are not distinguishable. All atoms are in the ground state and ignore electronic transitions.

20% 3. A chemist reported the following data for the following reaction at 25°C:

$$A \longrightarrow B$$

Experimental Run	Initial Concentration of A (M)	Half-life (minute)
1	0.50	7.5
2	0.30	12.5

7% (a) Calculate the order of the reaction.
6% (b) Calculate the rate constant of the reaction.
7% (c) If a temperature increase of 10°C will double the reaction rate, determine the activation energy for the reaction.

20% 4. If one mole of an ideal gas at 273 K and 10 atm is allowed to expand isothermally against a constant pressure of 1 atm until the gas pressure is 1 atm, what are the values of q, ΔE, ΔS, ΔA, and ΔG ?

20% 5. From a handbook we found the following standard electrode potentials at 298 K

$$Ag^{+} + e \text{ ------ } Ag \qquad E^{\circ} = 0.799 \text{ V}$$

$$AgI + e \text{ -------- } Ag + I^{-} \qquad E^{\circ} = -0.152 \text{ V}$$

Calculate the solubility product constant of AgI.