淡江大學 99 學年度碩士班招生考試試題

系別：化學工程與材料工程學系　　科目：物 理 化 學

准帶項目請打「V」	
V	計 算 機

本試題共 壹 頁，五 大題

You are requested to present your calculated results in SI units for all problems.

20% 1. The irreversible reaction $A \longrightarrow B$ has been found to be third order with respect to reactant.

10% (i) Write the rate expression for the reaction.

10% (ii) Derive the half life period expression for the reaction.

20% 2. The vapor pressures of pure solid A and pure liquid A are given by the following equations, respectively:

$\ln P_{(\text{solid A})} = 24.00 - (6140.1 / T)$

$\ln P_{(\text{liquid A})} = 21.41 - (5432.8 / T)$

where P is in torr and T is in K.

10% (i) Calculate the triple point.

10% (ii) Calculate the molar enthalpy of fusion of A at its triple point.

20% 3. The equilibrium constants Kp for a gaseous reaction at 327 °C and 347 °C are 1×10^{-12} and 5×10^{-12}, respectively.

10% (i) Calculate ΔH° for the reaction.

10% (ii)Calculate ΔS° for the reaction.

Consider ΔH° and ΔS° to be constant.

20% 4. Two moles of an ideal monoatomic gas, initially at a pressure of 1.62×10^6 Pa and a temperature of 300 K, are allowed to expand adiabatically and reversibly until the final pressure is 1.01×10^5 Pa.

10%(i) Calculate the final temperature in the process.

10%(ii)Calculate the work done in the process.

20% 5. Two trivial problems.

10%(i) Calculate the wavelength associated with the transition from n=4 to n=1 level in hydrogen atom.

10%(ii) Calculate the highest frequency corresponding to the spectral series of transition to the second orbital in the hydrogen atom.

NOTE: Rydberg constant = 3.289×10^{15} s^{-1}.