淡江大學97學年度轉學生招生考試試題

系別：化學工程與材料工程學系三年級　科目：物　理　化　學

可否使用計算機			
可	V	否	

本試題共 四 大題，共 壹 頁

25% 1. Two moles of an ideal gas (C_v= 1.5 R) are heated from 300K to 500K and the pressure increases from 2.5 atm to 4.0 atm. Calculate the entropy change for the process.

25% 2. Consider the reaction that has the mechanism

$$A + B \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} C$$

$$C \xrightarrow{k_2} D$$

Derive a rate equation for the production of D in terms of concentrations of A and B.

25% 3. Consider the reaction

$$2\,HI_{(g)} \rightleftharpoons H_{2\,(g)} + I_{2\,(g)}$$

If K_p at 300K is 0.00216, calculate K_p at 500K, assuming that ΔH^0 is constant.

Data : $\Delta H_f^0\,(HI_{(g)}) = 26.48\ KJ\ mol^{-1}$

$\Delta H_f^0\,(I_{2(g)}) = 62.44\ KJ\ mol^{-1}$

25% 4. The normalized wave functions for a particle of mass m moving in a three-dimensional potential-energy well that is infinitely deep and has sides of lengths a, b, and c are given by

$$\Psi(x,y,z) = A \sin[n_x \Pi x / a] \cdot \sin[n_y \Pi y / b] \cdot \sin[n_z \Pi z / c]$$

Where $A = (8/abc)^{0.5}$ and n_x , n_y, and n_z are positive integers.

(16%) (i) Determine the eigenenergies for the particle.

(9%) (ii) What is the degeneracy of the energy level $E = 6h^2/8ma^2$ (h is Planck's constant) if the particle is in a cube?