

淡江大學 97 學年度轉學生招生考試試題

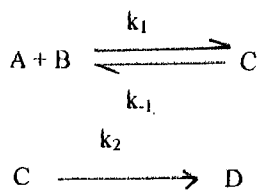
系別：化學工程與材料工程學系三年級 科目：物理化學

可否使用計算機			
可	✓	否	

本試題共 四 大題， 三 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



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

25% 3. Consider the reaction



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

Data: $\Delta H_f^\circ (\text{HI}_{(g)}) = 26.48 \text{ KJ mol}^{-1}$

$\Delta H_f^\circ (\text{I}_{2(g)}) = 62.44 \text{ KJ mol}^{-1}$

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 $E = 6 h^2 / 8ma^2$ (h is Planck's constant) if the particle is in a cube?