

淡江大學八十八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

本試題共 壹 頁

1. For CO_2 the van der Waals constants are

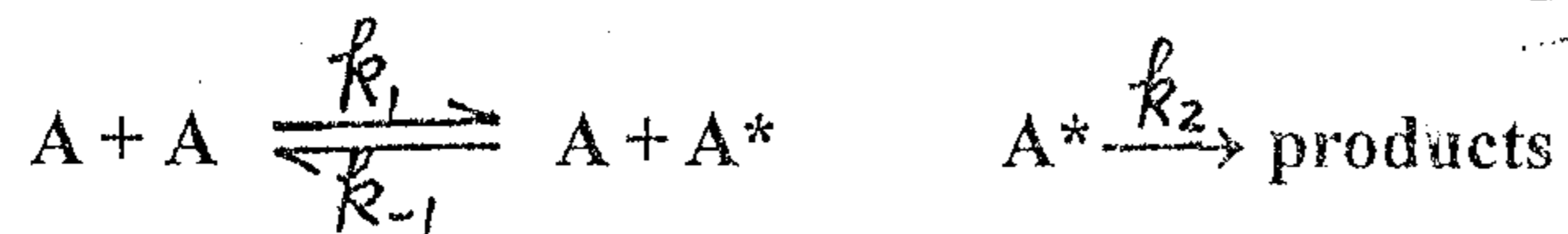
$a = 3.59 \text{ atm-liter}^2/\text{g mole}^2$ and $b = 0.0427 \text{ liter}$. Find the minimum work required to compress 1 g mole of CO_2 from a volume of 10 liters to 1 liter isothermally at 27°C . (20%)

(van der Waals equation : $P = nRT/(V-nb) - an^2/V^2$)

2. Assume CO_2 follows ideal gas law, find the final temperature of 1 g mole of CO_2 when it is compressed from 10 liters and 27°C to 1 liter adiabatically and reversibly. And what is the work required? Assume $C_p = (7/2)R$. (30%)

3. At 373.6 K and 372.6 K the vapor pressures of $\text{H}_2\text{O}_{(l)}$ are 1.018 and 0.982 atm, respectively. What is the heat of vaporization of water in cal/g mole? (20%)

4. For unimolecular gas-phase reaction of component A, i.e. $A \rightarrow$ products, Lindemann suggested the following mechanism:



- (1) Write the expression for the concentration of A^* in terms of the concentration of A. (15%)

- (2) Write the rate equation for the reaction $A \rightarrow$ products, in terms of the concentration of A. Under what conditions would result in the reaction being first-order with respect to A? What conditions would make it second-order? (15%)