

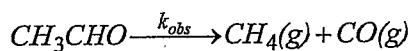
國立中山大學 107 學年度碩士暨碩士專班招生考試試題

科目名稱：物理化學【材光系碩士班甲組】

題號：439005

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（問答申論題） 共 1 頁第 1 頁

1. The density of a noble gas was found to be 1.23 g/L at 330 K and 25.5 kPa. What is the molar mass of the compound? (20%)
2. Given the van der Waals constants for ethane gas as $a = 5.0 \text{ L}^2 \text{ bar/mol}^2$, $b = 0.07 \text{ L/mol}$, for 20.0 mol of ethane at 300 K and under 30 bar
 - (a) Find the second virial coefficient B at this temperature.
 - (b) Calculate the compressibility factor Z from the first two terms.
 - (c) Estimate the approximate molar volume from Z .
 - (d) What is its Boyle temperature T_B ? (20%)
3. When 2 mole of water supercooled to -10°C freezes isothermally, what are the entropy change of the system and surroundings? Give the molar enthalpy of the melting of ice at 0°C is 6025 J/mol, the molar heat capacities of ice and water are 37.3 and 75.3 J/mol.K, respectively. (20%)
4. The vapor pressure of methyl bromide is 13.0 torr at -70°C and 117 torr at -36.7°C . Evaluate
 - (1) the molar enthalpy of vaporization of methyl bromide
 - (2) the vapor pressure of methyl bromide at -40°C . (20%)
5. On the basis of the following proposed mechanism, calculate the rate law for the methane, where the mechanism was summarized as follows: (20%)



A proposed mechanism is

