

國立中央大學103學年度碩士班考試入學試題卷

所別：大氣科學學系大氣物理碩士班 不分組(一般生) 科目：普通化學 共    /    頁 第    /    頁  
大氣科學學系大氣物理碩士班 不分組(在職生)

本科考試禁用計算器

\*請在試卷答案卷(卡)內作答

1. Given the radius of earth is  $6.371 \times 10^6$  m, and averaged sea level pressure is 101300 Pa, estimate the total mass of the atmosphere. (10%)
2. Let  $M_A$  means mass of air,  $m_A$  is the molecular weight of air,  $M_T$  means mass of a chemical species T, and  $m_T$  is the molecular weight of that species T. What is the volume mixing ratio (vmr) for T? (10%)
3. Estimate number density of air in 1 atm and  $0^\circ\text{C}$  atmosphere (Gas constant  $R=8.314 \text{ m}^3 \text{ Pa mole}^{-1} \text{ K}^{-1}$ ) (10%)
4. (1) If  $[\text{OH}]=10^6 \text{ molecules cm}^{-3}$ ,  $T = 285 \text{ K}$ , and reaction rate constant  $k$  between  $[\text{CH}_3\text{CCl}_3]$  and  $[\text{OH}]$  is  $k=5 \times 10^{-12} \exp(-1820/T)$ . Please estimate the chemical lifetime for  $[\text{CH}_3\text{CCl}_3]$  in the atmosphere. (20%)  
(Note:  $\exp(-1820/285)=1.7 \times 10^{-3}$ )  
(2) Discuss the implication of changing atmosphere temperature  $T$  on the chemical lifetime of  $[\text{CH}_3\text{CCl}_3]$ . (10%)
5. Write down detailed chemical reaction mechanism leading to the photochemical production of ozone in the troposphere. (20%)
6. Write down detailed chemical reaction mechanism leading to the  $[\text{OH}]$  production in the troposphere. (20%)

參考用