

臺北醫學大學 九十二學年度第 一 學期 期中 考試 (試) 命題紙

系級	科目	授課教師	考試日期	學號	姓名
日藥二 夜藥二	藥用物理化學	黃安邦	93年元月9日 第4節		

※①請注意本試題共 一 張。如發現頁數不足及空白頁或缺印，應當場請求補齊，否則缺少部份概以零分計。
 ②每張試題卷務必填寫(學號)、(姓名)。③可使用簡易型 Calculator。

Physical Chemistry Final Exam (Problem #2 or #6 is 20% each; the rest is 15 % each.)

1. The concentration of N_2O_5 in liquid bromine varied with time as follows:

t/s	0	200	400	600	1000
$[N_2O_5]/(mol L^{-1})$	0.110	0.073	0.048	0.032	0.014

Determine the reaction order by using the integrated rate equations and calculate the rate constant.

- The activation energy of the first-order decomposition of dinitrogen oxide into N_2 and O is $215 kJ mol^{-1}$. The half-life of the reaction is $5.6 \times 10^6 s$ at $435^\circ C$. What will it be at $530^\circ C$?
- Calculate the pH, pOH, and fraction of solute protonated or deprotonated in the following aqueous solutions: (a) 0.152 M lactic acid ($pK_a = 3.08$), (b) 0.152 M benzenesulfonic acid ($pK_a = 0.70$). Note: Do not use the approximate method.
- The standard Gibbs energy of formation of ammonia (g) is $-16.5 kJ mol^{-1}$ at 298 K. What is the Gibbs energy when the partial pressures of nitrogen, hydrogen and ammonia (treated as perfect gases) are 3.8, 1.6 and 4.5 bar, respectively? Is the reaction spontaneous?
- The Henry's law constant for carbon dioxide in water at $25^\circ C$ is $1.25 \times 10^6 K/Torr$. Calculate the solubility of carbon dioxide in water at $25^\circ C$ when its partial pressure is (a) 5.4 kPa, (b) 125 kPa.
- Estimate the boiling point of benzene given that its vapor pressure is 21.2 kPa at $36^\circ C$ and 51.5 kPa at $60^\circ C$.