

大葉大學 九十五 學年度 研究所碩士班 招生考試試題紙					
系 所 別	組 別	考 試 科 目 (中 文 名 稱)	考 試 日 期	節 次	備 註
環工所	乙	普通化學	4 月 23 日	第 2 節 10:30 ~ 12:00	可用計算機 共 2 頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

p2-1

I. 選擇題(全部單選), 每題 5 分

- What is the coefficient of O_2 when the following equation is properly balanced with the smallest set of whole numbers?

$$\underline{\quad} CH_3OH + \underline{\quad} O_2 \rightarrow \underline{\quad} CO_2 + \underline{\quad} H_2O$$
 (A) 1 (B) 2 (C) 3 (D) 7
- Select the compound in which sulfur has its highest possible oxidation number.
 (A). H_2S (B). Na_2SO_4 (C). SO_2 (D). H_2SO_3
- When 0.7521g of benzoic acid was burned in a calorimeter containing 1,000g of water, a temperature rise of $3.60^\circ C$ was observed. What is the heat capacity of the bomb calorimeter, excluding the water? The heat of combustion of benzoic acid is -26.42 kJ/g .
 (A). $15.87 \text{ kJ}^\circ C$ (B). $4.18 \text{ kJ}^\circ C$ (C). $5.52 \text{ kJ}^\circ C$ (D). $1.34 \text{ kJ}^\circ C$
- A certain first-order reaction $A \rightarrow B$ is 25% complete in 42 min at $25^\circ C$. What is its rate constant?
 (A). $6.8 \times 10^{-3} / \text{min}$ (B). $8.3 \times 10^{-3} / \text{min}$ (C). $3.3 \times 10^{-2} / \text{min}$ (D). $-3.3 \times 10^{-3} / \text{min}$
- The reaction of many spontaneous reactions are actually very slow. Which of the following is the best explanation for this observation?
 (A). K_p for the reaction is less than one (B). The activation energy of the reaction is large (C). Such reaction are endothermic (D). The standard free energy change is positive.
- 有關催化劑之敘述下列何者錯誤(A). 增加正反應之反應速率 (B). 增加逆反應之反應速率 (C). 降低活化能 (D). 增大平衡常數
- 若一反應同時為吸熱反應及自發反應,則該反應之
 (A). $\Delta S > 0$ (B). $\Delta E = 0$ (C). $\Delta H < 0$ (D). $\Delta G > 0$
- 一個二階反應之半衰期為?
 (A). $t_{1/2} = 0.693 / k$ (B). $t_{1/2} = [A]_0 / 2k$ (C). $t_{1/2} = 1 / k[A]_0$ (D). $t_{1/2} = k$
- 將 500ml, 0.10M 之 $NaOCl$ 溶液與 500 ml, 0.20M 之 $HOCl$ 之溶液混合後, 混合液之 pH 為?
 ($HOCl$ 之 $K_a = 3.2 \times 10^{-8}$) (A). $pH = 7.49$ (B). $pH = 7.00$ (C). $pH = 7.19$ (D). $pH = 7.80$
- 在溫度 350K 下, NH_3 之擴散速率為另一氣體之 3.32 倍, 試問該氣體之分子量為?
 (A). 34.0 (B). 56.5 (C). 112 (D). 188

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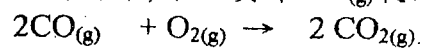
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p2-2

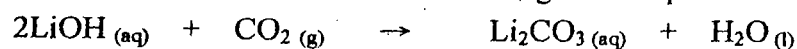
II. 計算題：請詳列計算步驟否則概不計分(可使用計算機), 第 1,2 題各 15 分, 第 3,4 各題 10 分

1. 在 1atm, 25°C 條件下, 將 2 莫耳 $\text{CO}_{(g)}$ 氧化成 2 莫耳 $\text{CO}_{2(g)}$ 時則內能(ΔE)變化為多少?



$\text{CO}_{(g)}$, $\text{O}_{2(g)}$, $\text{CO}_{2(g)}$ 之標準生成熱分別為 -110 kJ/mole, 0 kJ/mole, -393.5 kJ/mole; 理想氣體常數 $R = 8.314 \text{ J/K mole}$

2. Aqueous lithium hydroxide solution is used to purify air in spacecrafts and submarines because it absorbs carbon dioxide according to the equation



The pressure of carbon dioxide in a cabin having a volume of $2.4 \times 10^5 \text{ L}$ is $7.9 \times 10^{-3} \text{ atm}$ at 312K. A solution of lithium hydroxide (LiOH) of negligible volume is introduced into the cabin. Eventually the pressure of CO_2 is reduced to $1.2 \times 10^{-4} \text{ atm}$. How many grams of lithium carbonate are formed by this process. (AW: C=12.0, Li=6.8., O=16)

3. 於一密閉容器中進行 $\text{N}_2\text{O}_4(g) \rightleftharpoons 2\text{NO}_2(g)$ 之反應, 若初始之 $\text{N}_2\text{O}_4(g)$ 為 1mole, 反應到達平衡時, 有 α mole 之 $\text{N}_2\text{O}_4(g)$ 分解。若總壓為 P, 則平衡常數 K_p 為?

4. Acetylsalicylic acid ($\text{C}_9\text{H}_8\text{O}_4$) is a monoprotic acid commonly known as the "aspirin.". A typical aspirin tablet, however, contains only a small amount of the acid. In an experiment, a 0.400g of aspirin tablet required 12.25ml of 0.1466M NaOH for neutralization. What is the percent weight of aspirin in the tablet. (Atomic Weight: C=12, N=14, O=18)