

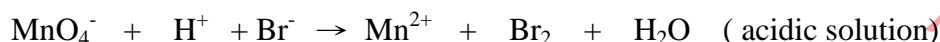
大葉大學九十學年度研究所碩士班招生考試試題紙

系 所 組 別	考 試 科 目 (中文名稱)	考 試 日 期	備 註
環境工程研究所乙組	普通化學	4 月 22 日 第 2 節	可使用計算機; p2-1

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）

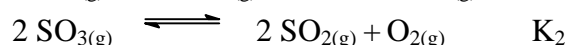
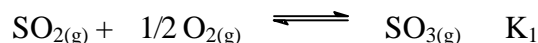
I. 選擇題(全部單選), 每題 5 分

1. Complete and balance the following redox equation. The sum of the coefficients when they are all whole numbers is



(A). 11 (B). 29 (C). 17 (D). 43

2. Consider the two gaseous equilibria



(A).  $K_2 = (K_1)^2$  (B).  $(K_2)^2 = K_1$  (C).  $K_2 = (K_1)^{-2}$  (D). none of the above

3. For the chemical reaction  $A \rightarrow C$ , a plot of  $1/[A]$  versus time was found to give a straight line with a positive slope. What is the order of reaction with respect to A?

(A). zero (B). first (C). second (D). Such a plot cannot reveal the order of reaction.

4. Which statement is true in regard to a spontaneous redox reaction? (A).  $E^\circ_{\text{red}}$  is always negative (B).  $E^\circ_{\text{cell}}$  is always positive (C).  $E^\circ_{\text{ox}}$  is always positive (D).  $E^\circ_{\text{red}}$  is always positive

5. 平衡常數  $K$  值愈大表示 (A). 反應程度較完全 (B). 反應向反應物方向進行 (C). 反應向產物方向進行 (D). 反應速率快

6. 醋酸水溶液加水稀釋, 下列何者敘述正確? (A).  $K_a$  變大 (B).  $\text{H}^+$  莫耳數增加 (C).  $[\text{H}^+]$  變大 (D). 解離度變小

7. 對一氧化還原反應之  $\Delta E^\circ$ , 下列何者敘述正確 (A).  $\Delta E^\circ$  愈大則平衡常數  $K$  愈大 (B).  $\Delta E^\circ$  愈大則反應速率愈快 (C). 方程式各係數加倍後則  $\Delta E^\circ$  亦加倍 (D).  $\Delta E^\circ$  值與溫度無關

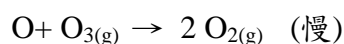
8. 水之解離常數( $K_w$ ) 為  $1 \times 10^{-14}$  ( $25^\circ\text{C}$ ), 試問在  $25^\circ\text{C}$  時水之解離反應之  $\Delta S^\circ$  與  $\Delta H^\circ$  之值為正 (+) 或負 (-) (A).  $\Delta S^\circ$  為正,  $\Delta H^\circ$  為正 (B).  $\Delta S^\circ$  為正,  $\Delta H^\circ$  為負 (C).  $\Delta S^\circ$  為負,  $\Delta H^\circ$  為正 (D).  $\Delta S^\circ$  為負,  $\Delta H^\circ$  為負

II. 計算題：請詳列計算步驟否則概不計分(可使用計算機)，每題 15 分

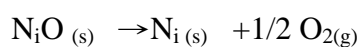
1. 臭氧分解之速率式如下



試解釋下列之反應機構是否合理



2. 下列反應之 $\Delta G^\circ$  為 212 kJ/mol，試問在 25°C 時，氧氣( $\text{O}_2$ )之壓力為多少 atm? (理想氣體常數  $R=8.314\text{J/mol K}$ )



3. Dissolved oxygen in water samples can be determined according to the reaction below (the equation need to be balanced).



Exactly 200.0ml of a water sample is treated according to the first two equations above and then titrated with  $\text{Na}_2\text{S}_2\text{O}_3(\text{aq})$ . The titration requires 8.32 ml of 0.0500M  $\text{Na}_2\text{S}_2\text{O}_3(\text{aq})$ . Calculate the concentration of dissolved oxygen in moles per liter.

4. A sample of 0.5662g of sea sand containing chloride ion was dissolved in water. After the insoluble material was filtered, the filtrate was treated with an excess of silver nitrate ( $\text{AgNO}_3$ ). A precipitate of silver chloride ( $\text{AgCl}$ ) was formed. If the mass of precipitate is 1.6323g, what is the ppm of chloride in this sea sand sample. (MW:  $\text{Ag}=107.9$ ,  $\text{Cl}=35.45$ )