

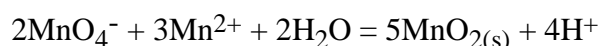
國立高雄師範大學 100 學年度碩士班招生考試試題

(請用藍、黑色筆作答，以其他顏色或鉛筆作答者不予計分)

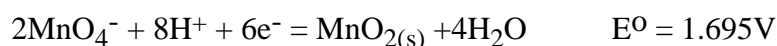
系所別：化學系

科 目：綜合化學一（含分析化學、無機化學）（第 1 頁，共 2 頁）

1. Please calculate the equilibrium constant (K_{eq}) for the equation



The half-reactions of the above reaction are: (10%)



2. The calcium in a 200 mL sample of a natural water was determined by precipitating the cation as CaC_2O_4 . The precipitate was filtered, washed, and ignited in a crucible with an empty mass of 26.6002 g. The mass of the crucible plus CaO (56.077 g/mol) was 26.7134 g. Calculate the concentration of Ca (40.078 g/mol) in water in units of grams per 100 mL of the water. (10%)
3. Please describe the preparation of 2.0 L of 0.108 M BaCl_2 from $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ (244.3 g/mol). (10%)
4. What is the order of elution of the following compounds from an HPLC column containing a normal-phase packing? (10%)
- (1) propylene, hexane, benzene, dichlorobenzene
- (2) ethyl acetate, acetic acid, dimethylamine

(背面有題)

系所別：化學系

科 目：綜合化學一（含分析化學、無機化學）（第 2 頁，共 2 頁）

5. Please describe the reasons that cause the line broadening in atomic spectrometry. (10%)

6. 一氧化碳（CO）是以碳或氧端和過渡金屬形成配位鍵？為什麼？（10%）

7. 畫下列分子之幾何圖形，並寫下其之點群（point group）。（20%）

(1) PCl_2F_3

(2) ClF_3

(3) SF_6

(4) SF_4

(5) XeF_4

8. 寫出 d^2 電子組態之 term symbol. (10%)

9. $\text{H}_2 + \text{Co}_2(\text{CO})_8 \rightarrow 2\text{HCo}(\text{CO})_4$ 之反應速率定律（Rate Law）如下：

$$\text{Rate} = k[\text{Co}(\text{CO})_8][\text{H}_2]/[\text{CO}]$$

寫出符合此速率定律之反應機構（mechanism）。（10%）