

題號： 95

國立臺灣大學105學年度碩士班招生考試試題

科目：分析化學(A)

節次： 6

題號：95

共 1 頁之第 1 頁

1. What weight of $\text{Ba}(\text{IO}_3)_2$ (mol.wt.=487 g mol^{-1}) can be dissolved in 1000 mL of water? Solubility product constant for $\text{Ba}(\text{IO}_3)_2$ is 1.57×10^{-9} . (25%)

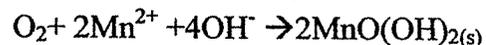
2. Describe (a) Principle of elution chromatography. (10%)

Explain the following terms: (b) Retention time (5%), (c) HETP (5%), (d) Elution programming (5%).

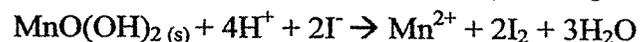
3. Oxygen is usually measured by the Winkler titration method.

A water sample in a 500 mL bottle is added with 1 mL of Mn^{2+} reagent, 1 mL of OH^- / I^- reagent. Oxygen is precipitated with manganese hydroxide:

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The precipitate is further dissolved by adding sulfuric acid to release I_2 :



Iodine is titrated with thiosulfate using a starch indicator:



If the titer concentration is 0.1 M, the titration volume is 10 mL, what is the concentration of dissolved oxygen ($\mu\text{mol L}^{-1}$) in the water sample (25%).

4. "Hardness" of water is usually defined as the combined concentration of dissolved magnesium and calcium ions. Describe a method to measure the "hardness" of drinking water. (25%)

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