

國立臺北科技大學

九十二學年度有機高分子研究所入學考試

分析化學試題

填准考證號碼

第一頁 共一頁

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注意事項：

1. 本試題共 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. Define (30 points)

- (a) coordination number
- (b) population standard deviation
- (c) molar concentration
- (d) column resolution
- (e) wavenumber
- (f) the chemical shift parameter

2. Calculate the approximate wavenumber of the fundamental absorption

peak due the stretching vibration of a carbonyl group C=O. (10 points)

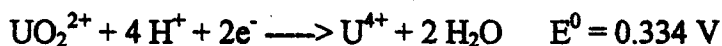
(C=12, O=16, force constant = 1×10^3 N/m, $c = 3 \times 10^{10}$ cm/s)

3. Calculate the hydronium ion concentration of a 0.100M NaHCO₃ solution. (10 points)

(The dissociation constant for H₂CO₃ are $K_{a1} = 4.45 \times 10^{-7}$ and $K_{a2} = 4.69 \times 10^{-11}$)

4. Derive an expression for the equivalence-point potential in the titration of

0.0500 M U⁴⁺ with 0.1000 M Ce⁴⁺. Assume both solutions are 1.0 M in H₂SO₄. (10 points)



5. Calculate the kinetic energy that a singly ion ($z = 1$) will acquire if it is accelerated through a potential of 10^3 V in an electron-impact source. (10 points)
($e = 1.6 \times 10^{-19}$ coulombs)
6. What is the short-wavelength limit of continuum produced by an X-ray tube having a silver target and operated at 80 kV. (10 points)
($h = 6.626 \times 10^{-34}$ J.s)
7. Calculate the equilibrium concentration of Ni^{2+} in a solution with an analytical NiY^{2-} concentration of 0.0150 M at pH = 3.0. (10 points)
($\text{Ni}^{2+} + \text{Y}^{4-} \longrightarrow \text{NiY}^{2-}$, $K_{\text{MY}} = 4.2 \times 10^{18}$, $\alpha_4 = 2.5 \times 10^{-11}$ at pH = 3, Y = EDTA)
8. The proton spectrum in the following is for an empirical formula $\text{C}_4\text{H}_7\text{BrO}_2$. Identify the compound. (10 points)

