

國立臺北科技大學 100 學年度碩士班招生考試

系所組別：3711 有機高分子研究所甲組

第二節 分析化學 試題 (選考)

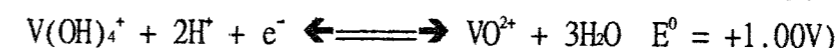
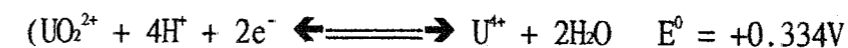
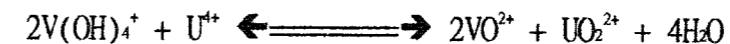
第一頁 共一頁

注意事項：

1. 本試題共 10 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Describe the difference and list any particular advantage possessed by one over the other for photovoltaic cells and phototubes as detectors for electromagnetic radiation. (10 points)
2. Sulfur dioxide is a nonlinear molecule. How many vibrational modes will this compound have? How many IR absorption bands would sulfur dioxide be expected to have? (10 points)
3. Why is ^{13}C - ^{13}C spin-spin splitting not observed in ordinary organic compounds? (10 points)
4. Methylcyclohexane and methylcyclohexene have retention times of 10.0 and 10.9min, respectively, on a 40-cm packed column. An unretained species passes through the column in 1.9min. The peak widths(at base) for methylcyclohexane and methylcyclohexene are 0.76 and 0.82min, respectively. Calculate (a) column resolution, (b) average number of plates in the column. (10 points)
5. Analysis of several plant-food preparations for potassium ion yields the following data: 4.80, 8.04, 3.77, 4.07, 6.84, calculate (a) the relative standard deviation (b) the variance. (10 points)
6. A 50.00mL aliquot of 0.0500M NaCN is titrated with 0.1000M HCl. Calculate the pH after addition of 25.00mL of acid. ($K_a(\text{HCN})=6.2 \times 10^{-10}$) (10 points)

7. Calculate the equilibrium constant for the reaction. (10 points)



8. Describe the mechanism of the production of an MNN Auger electron. (10 points)
9. What is the short-wavelength limit of the continuum produced by an X-ray tube having a silver target and operated at 50kV. (10 points)
($h = 6.625 \times 10^{-34}\text{Js}$, $e = 1.60 \times 10^{-19}\text{C}$, $c = 3.0 \times 10^8\text{ms}^{-1}$)
10. What is the difference between a concentration-sensitive and a mass-sensitive detector for gas chromatograph, and give examples. (10 points)