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國立臺北科技大學九十五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（選考）試題

填 准 考 證 號 碼

注意事項：

1. 本試題共 8 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. Define the following terms (25 points)
   (a) phosphorescence
   (b) eddy diffusion
   (c) photoionization detector
   (d) Nernst equation
   (e) leveling solvent

2. Calculate the molar solubility of calcium oxalate in solution that has been buffered so that its pH is constant and equal to 4.00. [$K_{sp}(C_aC_2O_4)=1.7\times10^{-9}$, $H_2CO_4(K_1=5.60\times10^{-2}$, $K_2=5.42\times10^{-5})$] (15 points)

3. Calculate the goniometer setting, in terms of 2θ, required to observe the $L_{\beta1}$ lines for Br at 8.126 Å when the diffracting crystal is (a) ethylene diamine d-tartrate (d=4.404 Å) (b) ammonium dihydrogen phosphate (d=5.325 Å) (10 points)

4. For a grating, how many lines per millimeter would be required in order for the first-order diffraction line for λ=500 nm to be observed at a reflection angle of 10 deg when the angle of incidence is 60 deg? (10 points)

5. The standard deviation measuring the diameter d of a sphere is ±0.02 cm, What is the standard deviation in the calculated volume V of the sphere if d=2.15 cm? (10 points)

6. What is the absorption frequency in a 2.4-T magnetic field of (a) ^{1}H (b) ^{13}C? (Magnetogyric Ratio $^{1}H=2.6752x10^{8}$, $^{13}C=6.7283x10^{7}$ radian $T^{-1}s^{-1}$) (10 points)

7. What length of mirror drive in a Fourier transform spectrometer would be required to provide a resolution of (a) 0.020 cm^{-1} (b) 2.0 cm^{-1}? (10 points)

8. What accelerating potential will be required to direct a singly charged water molecule through the exit slit of a magnetic mass spectrometer if the magnet has a field strength of 0.240T (tesla) and the radius of curvature of the ion through the magnetic field is 12.7 cm? (charge per ion $ez=1.60x10^{-19}$ C) (10 points)