

# 國立臺北科技大學九十九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。

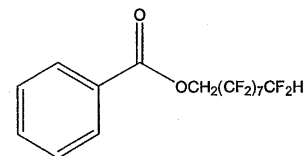
### 2010 Analytical Chem Exam (10 questions, 10 point each; please write down your procedures and answers on the answer sheet)

1. Calculate the molar solubility of  $\text{Ba}(\text{IO}_3)_2$  (487g/mol) in a solution that is 0.02 M in  $\text{Ba}(\text{NO}_3)_2$ . [  $K_{sp}$  of  $\text{Ba}(\text{IO}_3)_2 = 1.57 \times 10^{-9}$  ]
2. Calculate the solubility of  $\text{Ba}(\text{IO}_3)_2$  in a solution prepared by mixing 200 ml of 0.100 M  $\text{Ba}(\text{NO}_3)_2$  with 100 ml of 1.00 M  $\text{NaIO}_3$  (I:127, Ba:137.3, Na: 23, O: 16;  $K_{sp}$  see #1).
3. What is the pH of a solution that is 0.600 M in formic acid and 1.00 M in sodium formate? ( $K_a$  of  $\text{HCOOH} = 1.80 \times 10^{-4}$ )
4. Balance equation  
$$\text{MnO}_4^- + \text{H}_2\text{C}_2\text{O}_4 + \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{CO}_2(\text{g}) + \text{H}_2\text{O}$$
5. What  $\text{CrO}_4^{2-}$  conc. is required to initiate precipitation of  $\text{Ag}_2\text{CrO}_4$  from a solution that is  $3.41 \times 10^{-3}$  M in  $\text{Ag}^+$ ? ( $\text{Ag}_2\text{CrO}_4$   $K_{sp} = 1.2 \times 10^{-12}$ ; Ag:108, Cr:52, O:16)
6. Titration of the  $\text{I}_2$  produced from 0.1045 g of primary standard  $\text{KIO}_3$  required 30.72 ml of sodium thiosulfate. (MW:  $\text{KIO}_3 = 214$ ) (Na=23, S=32, O=16)  
$$\text{IO}_3^- + 5 \text{I}^- + 6\text{H}^+ \rightarrow 3 \text{I}_2 + 3 \text{H}_2\text{O}$$
$$\text{I}_2 + 2 \text{S}_2\text{O}_3^{2-} \rightarrow 2\text{I}^- + \text{S}_4\text{O}_6^{2-}$$

Calculate the molarity of the  $\text{Na}_2\text{S}_2\text{O}_3$ ?
7. Calculate the pH of the solution that contains 6.00% (w/w)  $\text{NaOH}$  and has a density of 1.098 g/ml.
8. What is the ionic strength of a solution that is 0.2 M in  $\text{KNO}_3$  and 0.2 M in  $\text{K}_2\text{SO}_4$ ?

9. Please draw the schematic diagram of GC/MS spectrometer and also give the description of the instrument.

10.



(atomic wt.: C:12, H:1, O: 16, F:19) One compound shown in above figure was injected to GC/MS. The mass diagram shows that  $m/z = 50, 51, 77, 100, 105$  and 536. Please give their respective fragments?

[e.g.: when  $m/z = 50$ : fragments:  $\text{CF}_2^+$ ]