

# 國立高雄師範大學 103 學年度學士班轉學生招生考試試題

系所別：化學系三年級

科 目：分析化學

※注意：1.不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，於本試題上作答者，不予計分。

2.限用藍色或黑色之鋼筆、原子筆作答，以鉛筆或其他顏色作答者不予計分。

1. Calculate the dissociation constant  $K_{HP}$  for the weak acid HP if the cell SCE || HP(0.010 M, NaP(0.040 M) | Pt, H<sub>2</sub> (1.00 atm) develops a potential of 0.591 V.  
(The potential of the saturated calomel electrode is 0.244 V at 25°C.) (10%)
2. A solution of sodium thiosulfate was standardized by dissolving 0.1210 g KIO<sub>3</sub> (214.00 g/mol) in water, adding a large excess of KI, and acidifying with HCl. The liberated iodine required 41.64 mL of the thiosulfate solution to decolorize the blue starch/iodine complex. Calculate the molarity of the Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. (10%)
3. Write *mass-balance* and *charge-balance* expressions for a solution that is (a) 0.35 M in NH<sub>3</sub>, (b) 0.20 M in Na<sub>2</sub>HPO<sub>4</sub> (10%)
4. A 0.7121 g sample of a wheat flour was analyzed by the Kjeldahl method. The ammonia formed by addition of concentrated base after digestion with H<sub>2</sub>SO<sub>4</sub> was distilled into 25.00 mL of 0.04977 M HCl. The excess HCl was then backtitrated with 3.97 mL of 0.04012 M NaOH. Calculate the percent protein in the flour. (The content of nitrogen in protein is 5.70 %.) (10%)

(背面有題 續翻背面)

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5. A solution contains  $\text{NaHCO}_3$ ,  $\text{Na}_2\text{CO}_3$ , and  $\text{NaOH}$ , either alone or in permissible combination. Titration of a 50.0-mL portion to a phenolphthalein end point requires 22.1 mL of 0.100 M  $\text{HCl}$ . A second 50.0-mL aliquot requires 48.4 mL of the  $\text{HCl}$  when titrated to a bromocresol green end point. Deduce the composition, and calculate the molar solute concentrations of the original solution. ( 10% )
  
6. Describe the preparation of 100 mL of 6.0 M  $\text{HCl}$  from a concentrated solution that has a specific gravity of 1.18 and is 37% (w/w)  $\text{HCl}$  (36.5 g/mol). ( 10% )
  
7. Name three types of systematic errors. ( 10% )
  
8. The following results were obtained in the replicate determination of the lead content of a blood sample: 0.752, 0.756, 0.752, 0.751, and 0.760 ppm  $\text{Pb}$ . Calculate (a) the mean (b) the standard deviation (c) relative standard deviation (RSD) (d) the spread ( 10% )
  
9. What is a buffer solution, and what are its properties? ( 10% )
  
10. Please define the following term: ( 10% )
  - (a) amphiprotic species
  - (b) leveling solvent
  - (c) common-ion effect