

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF APPLIED CHEMISTRY  
END OF SECOND SEMESTER EXAMINATIONS - MAY 2001  
ANALYTICAL CHEMISTRY I - SCH 1206  
TIME - (2½) HOURS

**INSTRUCTIONS TO CANDIDATES**

Answer ANY FOUR questions. Each question carries 25 marks.

\*LIBRARY USE ONLY\*

- Calculate the ionic strength of a solution containing equal volumes of 1M HCl and 0.5M NaOH.
  - Calculate the hydrogen ion concentration and the pH of 0.1M  $\text{CH}_3\text{COOH}$ . Given that  $K_{\text{CH}_3\text{COOH}} = 1.74 \cdot 10^{-5}$ .
  - Using the Bronsted-Lowry theory which of the following are acids or bases:  $\text{HClO}_4$ ;  $\text{NH}_3$ ;  $\text{CO}_3^{2-}$ ;  $\text{S}^{2-}$ ;  $\text{CH}_3\text{COO}^-$ . (25 marks)
- Calculate the concentration of the products of the stepwise dissociation of 0.1M  $\text{H}_3\text{PO}_4$ . Given that:  
 $K_1 = 7.1 \cdot 10^{-3}$   
 $K_2 = 6.2 \cdot 10^{-8}$   
 $K_3 = 5.0 \cdot 10^{-13}$  (25 marks)
- What is the pH of 0.1M  $\text{Na}_2\text{HPO}_4$ .
  - Calculate and compare the pH of a solution containing 5% HCl and 5%  $\text{CH}_3\text{COOH}$ . (25 marks)
- In a complex formation reaction, calculate the equilibrium concentrations of the dissociation of 1M  $[\text{Zn}(\text{NH}_3)_4](\text{ClO}_4)_2$ .  
Given that:  $\beta_1 = 1.52 \cdot 10^2$   
 $\beta_2 = 2.69 \cdot 10^4$   
 $\beta_3 = 5.5 \cdot 10^6$   
 $\beta_4 = 5.0 \cdot 10^8$  (25 marks)

5. (a) What is a primary standard?
- (b) What is standardisation?
- (c) Calculate the solubility product of silver phosphate if the solubility is  $4,68 \cdot 10^{-6}$  Mol/L. (25 marks)

**END OF QUESTION PAPER!!!**