

[This question paper contains 3 printed pages.]

Sr. No. of Question Paper : 6993

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Your Roll No.....

Unique Paper Code : 217367

Name of the Course : B.Sc. (Prog.) App. Phy. Sc. – Analytical Chemistry

Name of the Paper : ACPT – 303 – Analytical Chemistry – III

Semester : III

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all.
3. **All** questions carry equal marks.
4. Use of scientific calculator/log tables is permitted.

1. (i) Explain why a solution of weak base and its salt behave as a buffer whereas a solution containing a strong base and its salt does not ?
(ii) What is the principle underlying gravimetric analysis ?
(iii) What are acid-base indicators ? What is meant by the useful range of an indicator ?
(iv) Define the terms solubility and solubility product of a substance.
(v) Why is digestion carried out prior to filtration in gravimetric analysis ?

(5×3=15)

2. (i) Calculate the potential at 25°C of a cell consisting of saturated calomel electrode (SCE) and a Platinum wire indicator electrode dipping in a titration vessel that initially contains 100 ml of Fe^{2+} , after the addition of 50,

P.T.O.

90, 99, 99.9, 100, 100.1, 101, 110 and 190 ml of Ce^{4+} solution. Given that $E^\circ_{\text{Fe}^{3+}/\text{Fe}^{2+}} = 0.75 \text{ V}$ and $E^\circ_{\text{Ce}^{4+}/\text{Ce}^{3+}} = 1.45 \text{ V}$.

- (ii) Plot the titration curve for the above titration and briefly describe how it can be used to ascertain the most suitable indicator to be used in a given titration and to compute the titration error. (10,5)
3. (i) What are the various types of metal ion indicators used in Redox titrations? Give one example of each type.
- (ii) 25 ml of 0.01 M AgNO_3 solution is mixed with 25 ml of 0.0005 M aqueous NaCl solution. Determine if the precipitate of AgCl will be formed. Given $K_{\text{sp}}(\text{AgCl}) = 1.7 \times 10^{-10} \text{ M}^2$.
- (iii) What do you understand by the term Hardness of water? Explain how it can be estimated complexometrically?
- (iv) Explain briefly Mohr's Method for volumetric estimation of Chloride ions. (4,3,4,4)
4. (i) Explain why Phenolphthalein is not a suitable indicator for titrating a weak base against a strong acid?
- (ii) What would be the pH of a solution obtained by mixing 5 gram of acetic acid and 7.5 gram of sodium acetate and making the volume equal to 500 ml? Dissociation constant of acetic acid at 25°C is 1.75×10^{-5} .
- (iii) Differentiate between Iodimetry and Iodometry. Explain briefly how Copper can be estimated Iodimetrically. Write all the stoichiometric equations involved. (4,4,7)
5. (i) What are Primary and secondary standards in volumetric analysis?
- (ii) Define masking and Demasking agent? Write one example of each.

(iii) Define the three types of rotor and discuss their advantage one over other.

(iv) What Is Centrifugation ? What is the working principle of a centrifuge ?

(3,4,4,4)

6. (i) What are the conditions of mixed crystal formation ?

(ii) Define Fly Ash and how it can be controlled ?

(iii) Propose a method to control SO_2 emission.

(5,6,4)