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B.Sc. Course (CBCS) Ordinance Sem-V
EXAMINATION MAY 2023
CHEMISTRY : Basic Topics In Analytical Chemistry

[Duration : 02 Hours]

[Total Marks : 60]

Instructions:

- 1) All Questions are compulsory.
- 2) Figures to the right indicate full marks
- 3) Use of non-programmable calculator is allowed
- 4) Log tables will be supplied on request.

Q.1) Answer any Four of the following:

(4×3= 12)

- i) Explain with example indirect type of EDTA titration.
- ii) Define a) Increment b) Gross Sample and c) Sub Sample
- iii) Differentiate between determinate and indeterminate error.
- iv) Briefly discuss the use of complexing agent in solvent extraction.
- v) Define stationary phase and mobile phase in thin layer chromatography.
- vi) State Ilkovic equation and explain the terms involved in it.

Q.2) A) i) Give any 3 applications of electrogravimetry.

(3)

ii) Identify the appropriate number of significant figures for the following

(3)

- a) 0.06677280 b) $(12.07 \times 10.1) / 1.07$ c) 0.396

OR

A) iii) Discuss the working of silver coulometer.

(3)

iv) Explain the factors which determine the distribution of ions between an ion exchange resin and a solution in contact with it.

(3)

B) i) Differentiate between qualitative and quantitative analysis with examples.

(3)

ii) Discuss the application of coulometry in neutralisation titration.

(3)

Q.3) A) i) Distribution coefficient of a solute between organic and aqueous phase is 85. A 50 mL of aqueous phase containing 0.2 g of solute is extracted once with 20 mL of organic solvent. Calculate the weight of the solute remained unextracted in the aqueous phase.

(3)

ii) Discuss the factors affecting column efficiency in column chromatography.

(3)

OR

A) iii) Write a note on coning and Quartering method for the sampling of solids.

(3)

iv) In a thin layer chromatographic separation the R_f value of unknown compound is found to be 0.842. The fronts due to 3 compounds A, B and C are 25, 27 and 30 cms respectively and solvent front was 35 cms. Identify the unknown compound. (3)

B) i) Sketch the neutralisation curve for the titration of 100 mL 0.1M HCl v/s 0.1M NaOH and label the equivalence point. (3)

ii) A 50 mL of aqueous phase containing 250 milligrams of solute is extracted once with 15 mL of organic solvent. The weight of the solute remained unextracted in the aqueous phase is 0.0095g. Calculate the Distribution coefficient of a solute between organic and aqueous phase. (3)

Q.4) A) Calculate the standard deviation for the percentages of carbon in steel sample & the data is as follows (6)
16.23, 16.28, 16.22, 16.30, 16.25

OR

A) Readings of the percentage of methane gas in a sample is given below. Give the measurement of variance for the data as follows (6)

4.88, 4.92, 4.86, 4.71, 4.99

B) What is meant by "completeness of precipitate"? Discuss any 3 factors which affect the solubility of precipitate. (6)

Q.5) A) i) Discuss the following steps involved in analytical process (3)
a) Defining the problem
b) Sampling

ii) Why is it necessary to remove dissolved oxygen from experimental solution before electrolysis? How it can be removed? (3)

OR

A) iii) Explain Volhard's method for the detection of end point in precipitation titration. (3)

iv) With the help of a diagram explain the apparatus used for constant current electrolysis. (3)

B) i) Explain ascending and radial development techniques in paper chromatography. (3)
ii) Explain a) multistage sampling and b) sequential sampling. (3)