LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – **APRIL 2025**

UCH 1502 – ANALYTICAL CHEMISTRY

Date: 26-04-2025   Dept. No.   Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

	SECTION A - K1 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
1.	**State TRUE or FALSE**	**(5 x 1 = 5)**
a)	Precision represents the reproducibility of the measurements.	
b)	Potassium dichromate is a secondary standard.	
c)	In gravimetry, the precipitate is digested to increase the particle size of the precipitate.	
d)	The principle involved in column chromatography is adsorption.	
e)	The reference material in DTA is alumina.	
2.	**Choose the correct answer for the following**	**(5 x 1 = 5)**
a)	The median for 12.20,12.08,12.01,12.10 and 12.05 is (i) 12.20 (ii) 12.08 (iii) 12.01 (iv) 12.05	
b)	The pH of 0.0001 N HCl is (i) 4 (ii) 3 (iii) 2 (iv) 1	
c)	Which of the following is an example of adsorption indicator? (i) Eosin (ii) Phenolphthalein (iii) Methyl red (iv) Ninhydrin	
d)	Paper chromatography is a type of --------------- chromatography. (i) adsorption (ii) partition (iii) stationary (iv) all the above	
e)	In thermogravimetric analysis, the property measured is (i) change in weight (ii) heat evolved (iii) heat absorbed (iv) change of temperature	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**Match the following**	**(5 x 1 = 5)**
a)	Indeterminate error ---- Alumina	
b)	EBT ---- Heat evolved or absorbed	
c)	Gravimetry ---- Random error	
d)	TLC ---- Estimation of Zinc	
e)	DTA ---- Weight of precipitate	
4.	**Define the following**	**(5 x 1 = 5)**
a)	Tartar emetic	
b)	Molarity	
c)	Gravimetric factor	
d)	R_f value	
e)	DTG	

	SECTION B - K3 (CO2)	
	Answer any TWO of the following	**(2 x 10 = 20)**
5.	Calculate the mean, median, standard deviation, average deviation and coefficient of variation for the following titre values: 19.6, 20.5, 19.2, 19.0, 19.8, 21.2 and 20.4 mL.	
6.	a) Examine the acid-base theory of indicators. b) Explain a suitable titrimetric method for the estimation of Zn using EDTA as a titrant.	(5+5)
7.	a) Examine the column chromatographic technique for the separation of components. b) Illustrate the various factors affecting the solubility of a compound.	(5+5)
8.	a) Mention the advantages and disadvantages of using organic precipitants in gravimetric analysis. b) Enumerate the biochemical effects of lead and mercury.	(5+5)
	SECTION C – K4 (CO3)	
	Answer any TWO of the following	**(2 x 10 = 20)**
9.	a) What are the general rules to be followed in the storage and handling of acids? b) Analyze the TGA curve of calcium oxalate monohydrate.	(5+5)
10.	a) 25 mL of 0.1 N hydrochloric acid is exactly equivalent to 20 mL of NaOH solution. Determine the concentration of NaOH. b) Calculate the pH of the solution obtained by mixing 6.8 g of acetic acid and 8.2 g of sodium acetate and making the volume equal to 250 mL. The dissociation constant of acetic acid is 1.75 x 10^{-5} at 298 K.	(5+5)
11.	a) Infer the various mechanisms by which contamination by co-precipitation can occur during precipitation. b) Illustrate Von-Weimarn ratio.	(5+5)
12.	Outline the principle, technique and applications of ion-exchange chromatography.	
	SECTION D – K5 (CO4)	
	Answer any ONE of the following	**(1 x 20 = 20)**
13.	a) Summarize the importance of MSDS of a chemical. b) Discuss the different types of titrations with suitable examples.	(10+10)
14.	a) Determine the molar solubility of $PbSO_4$ if the solubility product is 1.6 x 10^{-8} mol^2 Lit^{-2}. b) Write and explain the principle involved in steam and fractional distillation techniques for the purification of liquids. c) Sketch and explain TGA curve of silver nitrate.	(5+10+5)
	SECTION E – K6 (CO5)	
	Answer any ONE of the following	**(1 x 20 = 20)**
15.	a) Explain the different types of errors and formulate various methods of minimizing errors. b) Distinguish molarity from molality. Calculate the normality and molarity of a solution containing 12.6 g of oxalic acid dihydrate crystals dissolved in 500 mL of water.	(10+10)
16.	a) Write the principle and procedure involved in the estimation of chloride ions by Volhard's method. b) Summarise the principle and instrumentation involved in DTA technique.	(10+10)