Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: 2020-21, S.Y.M.SC, Analytical Chemistry	**School of Science**	**Department: Chemistry**
Course Code: CHS-619	**Course Title: Introduction to Analytical Chemistry**	**Semester : III**
Day : Friday **Date : 18.12.2020**	**End Semester Examination**	**Time: 2 hrs.** **Max Marks : 50**

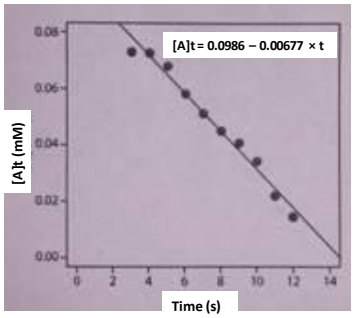
Question Paper

Instructions: 1) All Questions are compulsory.

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)–**			
a)	i) Calculate the pH value of a 0.1M HCl and 0.01M NaOH solution. ii) Calculate the pH and pOH of a solution obtained by mixing 25 ml of 0.2M HCl with 50 ml of 0.25M NaOH (The value of Kw=$1x10^{-14}$)	8	3	1
b)	i) What is the strength in gram per liter of the solution of 95wt%. H_2SO_4 having sp. gravity 1.84. ii) Calculate what is the strength of sulphuric acid solution in gram per liter if 10.8 ml H_2SO_4 is neutralized by 18 ml 0.6 N NaOH solutions?	8	3	1
c)	Write a short note on Stop flow analyser and determine the concentration of nitromethane, CH_3NO_2, from the kinetics of its decomposition reaction. In the presence of excess base the reaction is pseudo-first-order in nitromethane. For a standard solution of 0.0100 M nitromethane, the concentration of nitromethane after 2.00 s is 4.24×10^{-4} M. When a sample that contains an unknown amount of nitromethane is analyzed, the concentration of nitromethane remaining after 2.00 s is 5.35×10^{-4} M. What is the initial concentration of nitromethane in the sample?	8	2	2
Q.2	**Answer the following (any two) –**			
a)	i) The concentration of thiocyanate, SCN^-, is determined from the pseudo-first-order kinetics of its reaction with excess Fe^{3+} to form a reddish-colored complex of $Fe(SCN)^{2+}$. The reaction's progress is monitored by measuring the absorbance of $Fe(SCN)^{2+}$ at a wavelength of 480 nm. When using a standard solution of 0.100 M SCN^-, the concentration of $Fe(SCN)^{2+}$ after 10 s is 0.0516 M. The concentration of $Fe(SCN)^{2+}$ in a sample that contains an unknown amount of SCN^- is 0.0420 M after 10 s. What is the initial concentration of SCN^- in the sample?	8	4	2

ii) The data shown in the following table was collected for a reaction that is known to be pseudo-zero-order in analyte. Determine the initial concentration of analyte in the sample and the rate constant for the reaction?

Time (s)	[A]t	Time (s)	[A]t (mM)
3	0.0731	8	0.0448
4	0.0728	9	0.0404
5	0.0681	10	0.0339
6	0.0582	11	0.0217
7	0.0511	12	0.0143

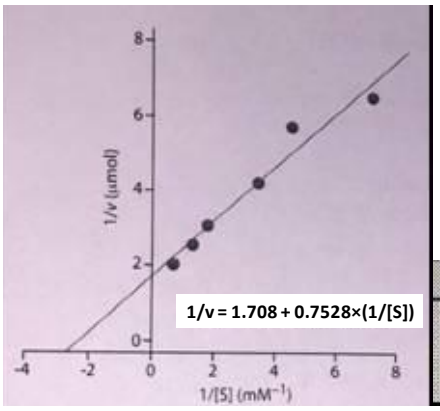


b) The normality of a solution is determined by four separate titrations. The results being 0.2041, 0.2049, 0.2039 and 0.2043. Calculate the mean, median, standard deviation, variance and coefficient of variance. 8 3 3

c) Discuss the Sample Definition of Liquids and Gases in Automatic Sampling and explain the Discrete Clinical Analyzers with suitable diagram. 8 3 4

Q.3 Answer the following (any two) –

a) Write the final equation and explain the names of the terms involved in the following enzyme catalyzed reaction. The reaction between nicotineamide mononucleotide and ATP to form nicotineamide–adenine dinucleotide and pyrophosphate is catalyzed by the enzyme nicotinamide mononucleotide adenylyltransferase. The following table provides typical data obtained at a pH of 4.95. The substrate, S, is nicotinamide mononucleotide and the initial rate, v, is the mmol of nicotinamide–adenine dinucleotide formed in a 3-min reaction time. Determine values for Vmax and Km. 9 4 2



[S] (mM)	v (µmol)	[S] (mM)	v (µmol)
0.138	0.148	0.560	0.324
0.220	0.171	0.766	0.390
0.291	0.234	1.460	0.493

b)	i) The chloride content of water samples was determined a very large number of times using a particular method and the standard deviation found to be 7 ppm. Further analysis of a chloride sample gave experimental value of 350 ppm for a single determination, for the determination of mean of two replicates and the mean of four replicates. Calculate the confidence limit at 95% probability level. ii) Find the Dixon's Q test for the determination of pesticide in river water at the 95% confidence level for the following four replicate values. 0.380, 0.400, 0.413, 0.411 µg dm^{-3}	9	3	3
c)	Take an account of use of robotics in chemical analysis in automated method, and explain the flow injection titration with schematic diagram	9	3	4

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