M.Sc. - Chemistry
I Semester End Examination - May 2022
Analytical Chemistry

Course Code: MCH104T **QP Code: 11010**
Time: 3 hours **Total Marks: 70**

Instruction: *Answer Question* ***No.1*** *and any* ***FIVE*** *of the remaining.*

1. Answer any ***TEN*** questions **(2×10 =20)**

a) what is a material safety data sheet?

b) How do you handle liquid bromine in the laboratory?

c) In an experimental determination, concentrations of iron in a given sample was found to be 20.17ppm. Taking the accepted value as 20.00ppm, calculate the absolute as well as the relative error as percent.

d) What is Von wiemarn ratio? Define the terms in it.

e) List the variables that influence the behavior of acid base indicators

f) Define the term co-precipitation and post precipitation

g) Calculate ε value when a coloured complex having an absorbance value of 0.362 in a 2 cm cell (concentration = 4.28×10^{-4} M).

h) What is Ringbom plot? Write its significance.

i) Double beam instrument are superior than single beam instruments. Give reason

j) In solvent extraction of uranium with 8-hydroxyquinoline in chloroform the volumes of the aqueous and organic phase were 25 ml when the % of extraction was 99.8. Calculate the distribution ratio

k) Define R_f value. Mention its significance

l) How SCFC is superior to HPLC and GC

2. a) What measures are taken for the safe disposal of chemical wastes?

b) Explain the Gaussian curve for random error distribution. List out its properties.

(5+5=10)

3. a) In a set of measurements, following concentrations of Fe (ppm) were reported: 20.2, 20.4, 20.3, 20.1, 19.9, 20.0 and 19.8. Calculate (i) average deviation from mean (ii) standard deviation (iii) relative standard deviation and (iv) coefficient of variation.

b) What are F-test and t-test? Write their significance. **(6+4=10)**

4. a) Write an expression for the conditional stability constant. How does it vary with pH and temperature?

b) Propose a complexometric method for the determination of individual components in a solution of In^{3+}, Zn^{2+} and Ca^{2+}. Write the equations for the reaction involved and calculations involved. **(5+5=10)**

5. a) Why EBT indicator has been used in complexometric titrations involving EDTA as a titrant? What are its merits?

b) 50.0 mL of 0.100 M NaCl solution is titrated with 0.100 M $AgNO_3$. Calculate the chloride ion concentration at intervals during the titration and plot pCl vs. milliliters of $AgNO_3$. pCl = -log [Cl^-], and Ksp for AgCl = 1 x 10^{-10} **(5+5=10)**

6. a) Briefly describe the different types of transitions that occur in most molecules

b) Describe the double beam instrument of UV visible spectrometer with a neat diagram. **(5+5=10)**

7. a) Describe the standard addition method for measuring concentration of an unknown. What are the advantages of this method of calibration?

b) Write Van Demeter equation. Explain the instrumentation and working principle of GC. **(5+5=10)**

8. a) Describe any two extraction methods in solvent extraction.

b) Discuss the principle, methodology and applications of thin layer chromatography. **(5+5=10)**

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