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B.Sc. RNLKWC-/DSE-2T/22

2022

Chemistry

B.Sc. Fifth Semester End Examination - 2022

PAPER - DSE-2T

Full Marks : 40

Time : 2 hours

*The figures in the right-hand margin indicate marks.  
Candidates are required to give their answers in their own  
words as far as practicable.  
Illustrate the answers wherever necessary.*

**Group-A**

1. Answer any five questions :- 2×5=10
- a) Write down the balanced equation when solid Ammonium Nitrate is thermally decomposed and also calculate the % of mass loss during the thermal decomposition by TGA technique. 2
- b) Draw and explain the conductometric titration curve for KCl vs AgNO<sub>3</sub> titration. 2

*(Turn Over)*

( 2 )

- c) Differentiate linear chromatography & non linear chromatography. 2
- d) Discuss the principle of flame atomic emission spectroscopy. 2
- e) Define the term "extraction coefficient". 2
- f) What are the essential criteria for the selection of a suitable solvent for paper chromatography? State with a proper explanation. 2
- g) State the limitations of Beer's law in spectrophotometry. 2
- h) Trans-stilbene absorbs at higher wave length than its cis-isomer in UV-Spectroscopy –Explain. 2

**Group - B**

**Answer any four questions : 4×5=20**

2. a) Draw the thermogram for complete thermal decomposition of a mixture of 80 mg calcium oxalate and 80 mg Barium Oxalate mixture to 1200°C. (Atomic mass of Ba = 137) 2

( 3 )

- b) Calculate the total amount of mass loss for the above mentioned case. 2
- c) Define chiral solvent with an example. 1
3. a) Construct the cell for the potentiometric titration of Ferrous ion by Potassium Dichromate solution and establish the eqn<sup>n</sup> to determine the cell potential using Saturated Calomel Electrode as reference electrode. 1+2
- b) Draw the potentiometric titration curve for the said titration. 1
- c) How the dynamic inert atmosphere influence thermal decomposition in TGA. 1
4. a) What is ideal and nonideal chromatography? 2
- b) A solid sample of Na[Fe(EDTA)(H<sub>2</sub>O)] showed 5.6% weight loss at 120°C in TGA. Identify the product and prove the mass loss. 2
- c) What do you mean by isobestic point? 1

( 4 )

5. a) Compare the operations at a single-beam spectrophotometer and double beam spectrophotometer. 3
- b) Write down the principle of ion-exchange chromatography.
6. a) Calculate the frequency at C-H stretching vibration from the following data – 2
- $K = 5 \times 10^5 \text{ gm/sec}^2$
- Mass of 'C' atom =  $20 \times 10^{-24}$  gm
- Mass of 'H' atom =  $1.6 \times 10^{-24}$  gm
- b) Among  $\text{H}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{HCl}$  and  $\text{CO}_2$  which will be IR active and why? 1
- c) Why KBr pellets are used to measure IR spectra in solid state? 2
7. a) The absorbance of a Copper Sulphate solution containing 0.5000 mgCu/ml was reported as 0.3500 at 440 nm.
- (i) Calculate the specific absorptivity, including units of Copper Sulphate on the assumption that a 1.00 cm cuvette was used.  $1\frac{1}{2}$

( 5 )

- (ii) What will be the absorbance if the solution is diluted to twice its original volume?  $1\frac{1}{2}$
- (b) What are the effects of conjugation and aromaticity on UV-V is absorption spectroscopy? 2

**Group - C**

**Answer any one question :  $1 \times 10 = 10$**

8. a) Distinguish between end point and equivalence point. 2
- b)  $\text{p}^{\text{H}}$  metric titration is called as potentiometric  $\text{p}^{\text{H}}$  metric titration – prove this for a strong acid & weak base titration. 4
- c) Write a short note on sampling. 2
- d) What are systematic and random errors. 2
9. a) Write down the differences between Job's method and mole ratio method. 2
- b) What will be conductometric titration curve-nature when dil acetic acid is titrated with ammonia. 2

( 6 )

- c) How does fast LC differ from conventional HPLC. 2
- d) The test score at a chemistry clan with 800 students are distributed normally with a mean of 75 and a standard deviation at 7. Draw the distribution curve & find has many students score between 61 and 89. 2
- e) Give an example of masking agent in complexometric titration. How does it function? 2