MANIPAL
ACADEMY of HIGHER EDUCATION
(Institution of Eminence Deemed to be University)

DEPARTMENT OF SCIENCES, I SEMESTER M.Sc. (Chemistry)
END SEM EXAMINATIONS, NOVEMBER 2023
SUBJECT: Inorganic Chemistry-1
[CHM 5101]
(CHOICE BASED CREDIT SYSTEM - 2021)

Time: 3 Hours | Date: 29/11/2023 | MAX. MARKS: 50

Note (i) Answer ALL questions
(ii) Draw diagrams, and write equations wherever necessary

		Marks	CO	BL
1A	(i)Explain the hybridization of BeF_2 molecule	2	1	2
	(ii)Find out the number of lone pairs of electrons and geometry of the following molecules (a)NO_2^+ (b) CCl_4 (c)PH_3	3	1	3
1B	Calculate the bond order and compare the stabilities of Be_2, O_2^- and N_2 molecules by using MOT theory.	3	1	2
1C	Arrange the following ionic compounds in the ascending order of their covalent character and justify your answer. NaBr, NaCl, NaF, NaI	2	1	2
2A	(i)Calculate the Lattice energy of the RbBr structure with the help of the Born Lande equation for the following data: $R_{Rb^+} = 0.265$ A°, $R_{Br^-} = 0.94$ A°, Modelung Constant (A) = 1.75	3	1	3
	(ii) Compare the absorption spectra of complexes of d and f block elements.	2	3	2
2B	Explain the variation of atomic size of 3d block elements along the period in the periodic table.	3	3	3
2C	Justify your answer for the following statements: (i) The melting point of the MgF_2 compound is higher than BeF_2	1	1	2
	(ii) The PCl_5 molecule is nonpolar in nature.	1	1	2
3A	(i) Explain the extraction of lanthanides by complex formation method.	3	3	2
	(ii) Give reason: The magnetic properties of lanthanides are higher than actinides.	2	3	2
3B	Explain the varies steps followed in gravimetric titration. In the analysis of 0.7011 g of an impure chloride containing sample, 0.9805 g of AgCl were precipitated. What is the percentage by mass chloride in the sample?	3	2	2

<table>
<tr><td>3C</td><td>What will be the pH of the solution when 25 mL of 0.1 M NaOH is added to 50 mL of 0.1 M HCl solution?</td><td>2</td><td>2</td><td>3</td></tr>
<tr><td>4A</td><td>Consider the time series data given below:
<table>
<tr><td>x_i</td><td>8</td><td>3</td><td>2</td><td>10</td><td>11</td><td>3</td><td>6</td><td>5</td><td>6</td><td>8</td></tr>
<tr><td>y_i</td><td>4</td><td>12</td><td>1</td><td>12</td><td>9</td><td>4</td><td>9</td><td>6</td><td>1</td><td>14</td></tr>
</table>
Use the least square method to determine the equation of line of best fit for the data and then plot the line. What are the limitations for the Least-Square Method.</td><td>5</td><td>2</td><td>3</td></tr>
<tr><td>4B</td><td>Define complexometric titration. Explain the classification of complexometric titration with an example, for each.</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>4C</td><td>(i)Write the reaction conditions of ammonoacids and ammonobases for the following:
i) Protolysis iii) Ammonolysis</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>5A</td><td>(i) How is interstitial and saline hydride prepared? Write any two properties of each.
(ii) Describe any two methods of preparation of hydrogen peroxide. Write its any two applications.</td><td>5</td><td>4</td><td>2</td></tr>
<tr><td>5B</td><td>(i) What are zeolites? How are they classified?
(ii) Give reason- Interhalogen compounds are more reactive than halogen.</td><td>3</td><td>4</td><td>2</td></tr>
<tr><td>5C</td><td>Differentiate between ortho and para of p- hydrogen.</td><td>2</td><td>4</td><td>2</td></tr>
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