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B – 4725

Reg. No. :

Name :

First Semester M.Sc. Degree Examination, January 2017

Branch : Chemistry

**CH/CL/CA/CM 211 : INORGANIC CHEMISTRY – I
(2013 Admission Onwards)**

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **two** among (a), (b) and (c) from **each** question and **each** question carries **2** marks.

- a) Iodine is almost insoluble in water, but it dissolves readily in aqueous solution of KI. Why ? Explain.

b) What are silicones ? What are the causes for the strength of silicones ?

c) Distinguish between isopoly and heteropoly acids of Molybdenum with suitable examples.
- a) Account for the fact that mode of splitting of 'd' orbitals in an octahedral field is just reverse of that in a tetrahedral field.

b) Explain why stepwise equilibrium constant values decrease as the number of ligands attached to the metal increase.

c) $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$ is slightly distorted tetragonal. Why ?
- a) What do you mean by confidence intervals ? Explain.

b) An ore analysis gave the following results for its Fe content : 12.3, 13.1, 12.8, 12.7, 11.6, 11.2 and 11.8 mg/g. Calculate the mean and standard deviation.

c) What is meant by 'Aging' of precipitates ?
- a) What are Zero dimensional nanoparticles ? Give examples.

b) Give the principle of X-ray diffraction and explain how it can be used for the size determination of nano particles ?

c) Explain how optical properties of quantum dots are related to quantum confinement effect ?

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5. a) Write down the chemistry of photochemical smog.
b) Give the photochemical reaction for the formation of ozone in the stratosphere.
c) How can you determine the cation exchange capacity of soil ? (10×2= 20 Marks)

SECTION - B

Answer either (a) or (b) of each question and each question carries 5 marks.

6. a) Give an account of stability and properties of Astatine.
b) What are Nitrides ? Quoting suitable examples give their classification and structure.
7. a) Brief any one method for the determination of stability constant.
b) How does the concept of CFSE useful in explaining the variation of hydration enthalpy of M^{2+} ions of first row transition metals.
8. a) Give a brief note on 'Scatter diagram' and its significance.
b) Distinguish between coprecipitation and postprecipitation with suitable examples.
9. a) Describe the synthesis, properties and applications of fullerenes.
b) Brief the lithographic process in the fabrication of nano materials.
10. a) List out the major air pollutants. Outline how they affect human health ?
b) Describe how can you quantify soil acidity ? (5×5= 25 Marks)



SECTION - C

Answer any three questions. Each question carries 10 marks.

11. i) Describe the preparation, structure and bonding of Noble gas compounds.
ii) Explain the classification and structure of silicates.
 12. i) Distinguish stepwise and overall formation constants. The octahedral amine complex can be prepared by using a solution of ammonia which has been supersaturated with ammonia gas such that $\log \beta_4 = 7$, $\log k_5 = 0.85$ and $\log k_6 = 0.42$. Calculate the overall β_6 for $[\text{Ni}(\text{NH}_3)_6]^{2+}$
ii) Explain the splitting of 'd' orbitals in tetragonal, bipyramidal and square pyramidal fields.
 13. i) What is meant by 'Error' ? What are the methods to minimize it ?
ii) What are chelometric titrations ? Discuss about their applications in quantitative analysis.
 14. Outline the idea of characterization of nanomaterials using SEM, TEM and STM techniques.
 15. Describe the chemistry of processes in hydrosphere. (10x3 = 30 Marks)
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