

S.No. 5689

P 16 CH 12

(For candidates admitted from 2016–2017 onwards)

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Chemistry

INORGANIC CHEMISTRY – I

Time : Three hours

Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$)

Answer ALL questions.

1. How will you differentiate borazine from benzene?
2. What are the uses of silicon nitrides?
3. What are step-wise and over-all formation constants? How are they related?
4. Among $[\text{Na}(\text{H}_2\text{O})_n]^+$ and $[\text{Mg}(\text{H}_2\text{O})_n]^+$, which is more labile and why?
5. In general, $\Delta_o > \Delta_t$ – Why?
6. Calculate the spin only magnetic moment of $[\text{CoF}_6]^{3-}$.

7. Complete the following reaction and justify your answer. $[\text{PtCl}_3(\text{CO})]^- + \text{py} \rightarrow ?$
8. What are stereoisomers? How is their inter conversion effected?
9. Why charge transfer transition produces intense colour?
10. What is the use of Reinecke's salt?

SECTION B — (5 × 5 = 25)

Answer ALL questions, choosing either (a) or (b).

11. (a) Write a note on the structure of molecular sulfides.

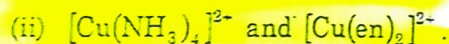
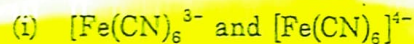
Or

- (b) Explain bonding in diborane.

12. (a) Explain the labile and inert nature of octahedral complexes on the basis of CFT.

Or

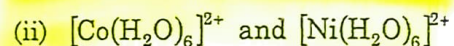
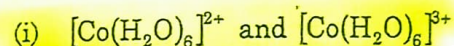
- (b) Among the following pairs of complexes, which is relatively more stable? Explain why?



13. (a) According to CFT, the M-L bond is purely ionic. Give examples for and against this statement.

Or

- (b) Among the following pairs of complexes, which one will exhibit relatively higher crystal field splitting? Explain why?



14. (a) Explain polarization theory of trans effect.

Or

- (b) What do you mean by template effect? Explain any two application of it.

15. (a) Explain the photochemistry of metal carbonyl compounds with a suitable example.

Or

- (b) Explain the mechanism of ligand field photochemistry of a Cr(III) complex.

S.No. 5691

3/5/19 - FN

P 16 CH 21

(For candidates admitted from 2016-2017 onwards)

M.Sc. DEGREE EXAMINATION, APRIL 2019.

Chemistry

INORGANIC CHEMISTRY - II

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20)

Answer ALL questions

1. What are the basic features of ion pumps?
2. What is the chemical reaction that occurs during photosynthesis?
3. Which helical segment is the proximal histidine connected to in heme?
4. How do you differentiate between heme and non-heme proteins? Give suitable examples.
5. Define chelation with suitable example.
6. What is cancer? What are the main causes of cancer?

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

- (a) Explain resonance effect. How does it affect the reactivity of a molecule? (6 + 4)
- (b) What are Lewis acids and bases?
- (a) Explain the NMR concept of aromaticity and antiaromaticity. (5 + 5)
- (b) Give the synthesis, reactivity and applications of pyrazole.
- (a) Describe the optical isomerism exhibited by spiranes. (5 + 5)
- (b) Illustrate the stereochemistry of addition reactions with an example.

Explain the following : (6 + 4)

- (a) Energy transfer and its importance.
- (b) Barton reaction.
- (a) Draw the energy profile diagrams of SN^1 and SN^2 reactions. (3 + 3 + 4)
- (b) Differentiate between transition state and intermediate.
- (c) Discuss Hammond's postulate.

S.No. 2112 . 15/11/16 FV P 8 CH 2/P 8 OC 2

(For candidates admitted from 2008–2009 onwards)
M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

Chemistry/Organic Chemistry
INORGANIC CHEMISTRY – I

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 2 = 20$)

Answer ALL questions.

1. Discuss the structure of diborane.
2. What are super conductors?
3. Define coordinate bond.
4. What do you mean by chelation?
5. Give the limitations of valence bond theory.
6. Define CFSE.
7. What are labile and inert complexes?
8. State Template effect.

9. What are photochemical reactions? Give examples.

10. What is photo reduction reaction?

PART B — ($5 \times 5 = 25$)

Answer ALL questions.

11. (a) Discuss the preparation and properties of borazine.

Or

(b) Explain the chemistry of disilane.

12. (a) Discuss the factors affecting the formation of complex ion.

Or

(b) Give an account on forced configurations.

13. (a) What is spectrochemical series? Give its significance.

Or

(b) Write notes on Nephelauxetic effect.

14. (a) What are aquation reactions? Explain with example.

Or

(b) Explain the mechanism of bimolecular nucleophilic substitution reaction in an octahedral complex.

15. (a) Explain the emission and redox properties of ruthenium – polypyridine complexes.

Or

(b) Discuss the photo chemistry of organo metallic compounds with example.

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

16. Discuss the preparation, properties and uses of S_4N_4 .

17. Explain the methods for the determination of formation constants.

18. Describe the splitting of d-orbitals in an octahedral complex based on CFT.

19. Discuss the theories of trans effect.

20. Explain the photo chemistry of Co(III) and Cr(III) complexes.

S.No. 2129 16/11/16 FJ

P 16 CH 12

(For candidates admitted from 2016-2017 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

Chemistry — Major

INORGANIC CHEMISTRY — I

Time : Three hours

Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$)

Answer ALL questions.

1. What are carboranes? Give example.
2. How will you synthesis cyclic phosphazene $N_4P_4Cl_8$?
3. Among the ligands ammonia, ethylenediamine and cyclam, which forms most stable complex with a metal ion? Why?
4. State and explain Beer- Lambert's law.
5. Calculate octahedral site stabilization energy for Fe^{2+} .
6. $[Co(NH_3)_4Cl_2]^+$ exists in two colors. Give reason.

The rate constant for hydrolysis in basic solution is often a million times that found for acidic solutions — comment.

8. Distinguish between 'trans effect' and 'trans influence'.

9. What will happen when UV light irradiated on $M(CO)_5$: where $M = Fe$ or Ru ?

10. List out the difference between the charge transfer reaction and electron transfer reaction.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Explain Wade's rule with examples.

Or

(b) Write notes on (i) Lattice energy (ii) solid-solid reaction.

12. (a) Write a note on forced configuration.

Or

(b) For the equilibrium $Ag^+ + NH_3 \rightleftharpoons [Ag(NH_3)]^+$, $\Delta H^0 = -21.4 \text{ KJ mol}^{-1}$ and $\Delta S^0 = 8.66 \text{ JK}^{-1} \text{ mol}^{-1}$. Calculate the formation constant.

13. (a) Explain the factors that affect the magnitude of $10Dq$.

Or

(b) Give MO diagram for a tetrahedral complex that has only sigma bonding.

14. (a) Compare outer sphere and inner sphere electron transfer reaction mechanisms in metal complexes.

Or

(b) Describe the kinetics and mechanisms of aquation reactions in the substitution of octahedral $Co(III)$ complexes in aqueous medium.

15. (a) Explain with suitable examples the photochemical reactions of metal carbonyl compounds.

Or

(b) Discuss the various electronic transitions in metal complexes.

S.No. 2112 . (511)16 F₂ P 8 CH 2/P 8 OC 2

(For candidates admitted from 2008–2009 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

Chemistry/Organic Chemistry

INORGANIC CHEMISTRY – I

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 2 = 20$)

Answer ALL questions.

1. Discuss the structure of diborane.
2. What are super conductors?
3. Define coordinate bond.
4. What do you mean by chelation?
5. Give the limitations of valence bond theory.
6. Define CFSE.
7. What are labile and inert complexes?
8. State Template effect.

9. What are photochemical reactions? Give examples.
10. What is photo-reduction reaction?

PART B — 1 x 10 = 10

Answer ALL questions.

11. a. Discuss the preparation and properties of CrCl_3 .
- b. Explain the chemistry of disilane.
12. a. Discuss the factors affecting the formation of complex ion.

Or

- b. Give an account on forced configurations.
13. a. What is spectrochemical series? Give its significance.
- b. Write notes on Nephelauxetic effect.
14. a. What are aquation reactions? Explain with example.

Or

- b. Explain the mechanism of bimolecular nucleophilic substitution reaction in an octahedral complex.

2

S.No. 2112

15. (a) Explain the emission and return process in Ti^{3+} - polypyridine complexes.

b. Discuss the photo chemistry of Ti^{3+} complexes with example.

PART C — 1 x 10 = 10

Answer any THREE questions.

16. Discuss the preparation, properties and use of SnCl_4 .
17. Explain the methods for the determination of formation constants.
18. Describe the splitting of d-orbitals in an octahedral complex based on CFT.
19. Discuss the theories of trans effect.
20. Explain the photo chemistry of Co^{3+} complexes.

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

16. Explain structure and bonding in B_2H_6 .
17. Explain any two methods of detection of complex formation in solution with an example each.
18. Explain bonding in hexamminecobalt(III) ion on the basis of MOT.
19. Explain any four reactions of coordinated ligand with suitable example.
20. Explain photo-physics and photo-chemistry of Ru-polypyridine complex.

Simple
MOT for σ and π bond only

S.No. 8173 20/11/17 F N P 16 CH 12

(For candidates admitted from 2016-2017 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

Chemistry

INORGANIC CHEMISTRY — I

Time : Three hours

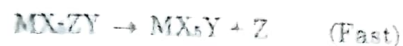
Maximum : 75 marks

PART A — ($10 \times 2 = 20$)

Answer ALL questions.

1. How will you prepare S_4N_4 ? Draw its structure.
2. What are high temperature super conductors? Give an example.
3. What do you mean by chelation and chelate effect?
4. The $\log \beta$ values of $[Fe(CN)_6]^{3-}$ and $[Fe(CN)_6]^{4-}$ are 31 and 8.3, respectively. Why?
5. Calculate the spin only magnetic moment of $[Co(NH_3)_6]^{2+}$.
6. Sketch the crystal field splitting in tetrahedral ligand field.

7. Write a rate equation for the following reaction.
What is the order of the reaction?



8. What is meant by template synthesis?

9. What do you mean by charge transfer transition?

10. What do you mean by chemical actinometry? Give an example.

PART B — (5 × 5 = 25)

Answer ALL questions.

11. (a) Write a note on Wade's rules with examples.

Or

- (b) Write a note on photographic process.

12. (a) What do you mean by stepwise and overall formation constants? How are they related?

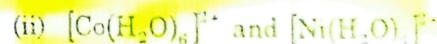
Or

- (b) Explain photometric method of determination of stability constant of complexes.

13. (a) What are the important postulates of CFT? What are the limitations of CFT?

Or

- (b) Among the following pairs of complexes, which one will exhibit relatively higher crystal field splitting? Explain why?



14. (a) Explain the dissociation mechanism of substitution reaction in octahedral complexes.

Or

- (b) Explain the mechanism of rearrangement reaction in six coordinated complexes with an example.

15. (a) Write a note on charge transfer transitions in complexes.

Or

- (b) Explain the mechanism of CTM.

S.No. 1189 27/11/18 P 16 CH 12

(For candidates admitted from 2016-2017 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2018.

Chemistry

INORGANIC CHEMISTRY — I

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 2 = 20$)

Answer ALL questions.

1. What is meant by Superconductor?
2. Discuss the structure of S_4N_4 .
3. What is meant by statistical effect? Give two examples.
4. What is meant by coordination compound? Give one example.
5. Give the limitations of CFT.
6. Calculate the CFSE value of $[Ni(NH_3)_6]^{2+}$.
7. What is meant by acid hydrolysis? Give one example.

8. What is meant by template effect?
9. Give any three examples for photochemical reactions of cobalt (III) complexes.
10. What is the reason for the colour of KMnO_4 ? Explain shortly.

PART B — ($5 \times 5 = 25$)

Answer ALL questions.

11. (a) Explain the structure of P_4S_{10} .
Or
(b) Shortly discuss about solid state reactions with examples.

12. (a) How photometric method can be used to determine the formation constant? Explain.

Or

- (b) How pH metric method can be used to determine the formation constant? Explain.

13. (a) Discuss shortly about Nephelauxetic effect.

Or

- (b) Explain the splitting of d-orbital under octahedral crystal field.

14. (a) Explain the trans effect and its application.

Or

- (b) Shortly discuss about rearrangement of four complexes.

15. (a) Explain the photochemistry of complexes.

Or

- (b) Shortly discuss about Reineck chemical actinometer.

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

16. Derive Kapustinskii equation and its applications.

17. How will you determine overall formation constant? Explain.

18. Give the evidences for CFSE.

19. Explain the inner sphere and outer sphere mechanism with examples.

20. Briefly discuss about the photochemistry of ruthenium and chromium(III) complexes.

(For candidates admitted from 2016-2017 onwards)

M.Sc. DEGREE EXAMINATION, APRIL 2017.

Chemistry

INORGANIC CHEMISTRY – I

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20)

Answer ALL questions.

1. Give Born-Landé equation for lattice energy.
2. Which is called as inorganic benzene? Why it is called so?
3. Explain the term "chelate effect".
4. Distinguish step-wise and overall formation constant.
5. $[\text{NiCl}_4]^{2-}$ has T_d geometry while $[\text{PtCl}_4]^{2-}$ adopts square planar geometry. Reason out.
6. CuCl_2 exists but AuCl_2 does not exist. Why?
7. Comment on 'Kurnako test'.

8. State and explain lability and inertness of coordination complexes.

9. What is delayed fluorescence?

10. What do you mean by MLCT bands?

SECTION B — (5 × 5 = 25)

Answer ALL questions.

11. (a) Discuss the structure of tetraborane.

Or

(b) Give an account of high T_c superconductors.

(a) Describe with principles the Job's method of determining stability constant of a complex.

Or

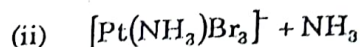
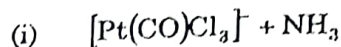
(b) Explain the pH metric method of determining stability constant of a complex.

3. (a) State and explain Jahn-Teller theorem. Also predict the splitting of metal d orbitals in $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$.

Or

(b) Explain why nickel ferrite has inverse spinel structure.

14. (a) Predict the products and justify your answer



Or

(b) Write briefly on template effect over macrocyclic ligands.

15. (a) Discuss the photochemistry of Cr(II) complexes.

Or

(b) Explain the various photophysical and photochemical processes of coordination compounds.

SECTION C — (3 × 10 = 30)

Answer any THREE questions.

16. Give an account of phosphorus sulphides.

17. Explain the various factors that affect the stability of complexes.

18. Identify ligand group orbitals and illustrate how they are used in the construction of MO diagram for an octahedral complex.

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M.Sc. DEGREE EXAMINATION, APRIL 2019.

Chemistry

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Answer ALL questions.

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2. What are the uses of silicon nitrides?
3. What are step-wise and over-all formation constants? How are they related?
4. Among $[\text{Na}(\text{H}_2\text{O})_n]^+$ and $[\text{Mg}(\text{H}_2\text{O})_n]^+$, which is more labile and why?
5. In general, $\Delta_o > \Delta_t$ – Why?
6. Calculate the spin only magnetic moment of $[\text{CoF}_6]^{3-}$.

7. Complete the following reaction and justify your answer. $[\text{PtCl}_4(\text{CO})]^- + \text{py} \rightarrow ?$
8. What are stereoisomers? How is their inter conversion effected?
9. Why charge transfer transition produces intense colour?
10. What is the use of Reinecke's salt?

SECTION B — (5 × 5 = 25)

Answer ALL questions, choosing either (a) or (b).

11. (a) Write a note on the structure of molecular sulfides.

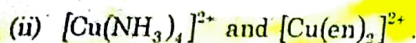
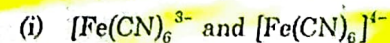
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- (b) Explain bonding in diborane.

12. (a) Explain the labile and inert nature of octahedral complexes on the basis of CFT.

Or

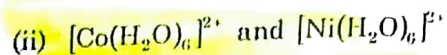
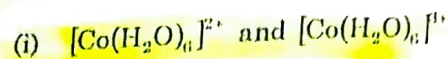
- (b) Among the following pairs of complexes, which is relatively more stable? Explain why?



13. (a) According to crystal field theory, Cr^{3+} is purely ionic. Give examples for and against this statement.

Or

- (b) Among the following pairs of complexes, which one will exhibit relatively higher crystal field splitting? Explain why?



14. (a) Explain polarization theory of trans effect.

Or

- (b) What do you mean by template effect? Explain any two application of it.

15. (a) Explain the photochemistry of metal carbonyl compounds with a suitable example.

Or

- (b) Explain the mechanism of ligand field photochemistry of a Cr(III) complex.

SECTION C — ($3 \times 10 = 30$)

Answer any THREE questions.

Explain structure and bonding in phosphazene.

Explain potentiometric and pH metric methods of determination of formation constant of complexes.

Sketch the MO diagram for an octahedral complex and label the orbitals. Compare the magnetic properties of $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Co}(\text{NH}_3)_6]^{3+}$ using the MO diagram.

Explain the mechanism of $\text{S}_{\text{N}}1\text{CB}$ reaction.

Explain Adamson's rules with examples.
