

Unit - I → Non-Transition Elements Inorganic

1 Mark

1. Usually boron does not form cation, why?
- April 2018
2. Define the term carborane?
- March 2016
3. Mention any two polymorphs of carbon?
- Dec. 2016
4. Which silicates not share their corners?
- Dec. 2016
5. Give any two difference of alpha sulphur & monoclinic sulphur?
- April 2015
6. Define the term phosphazenes?
- Nov 2014, 2008
7. At which temperature the phosphorous rock is heated with coke & sand to form white phosphorous?
- Nov. 2019
8. What does diborane reacts with
i) ammonia and ii) trimethyl boron
9. Write a note on carboranes - 4 Mark

- 4 MARK

10. Explain peroxo compound of boron
11. Properties of non-transition elements
- March 2016
12. Sketch the molecule B_2H_6 and describe its structure & synthesis
- Dec 2016
13. What are different polymorphs of sulphur. Discuss their structure in short.
- Dec 2016
14. What are carbides & describe shortly the covalent carbides.
- Dec 2016
15. Polymorphism in sulphur
- Oct 2015, April 2014
16. Polymorphism of carbon and sulphur
17. What are carbides. How they are prepared and draw the structure of Al_4C_3 carbides
- Oct 2015
18. What is polymorphism? explain allotropes of carbon and phosphorus
- Oct 2015, Nov 2014

19. Describe the synthesis, properties and structure of carborane?
20. Give the example of phosphazenes, How are they made and what are the structures
- April 2014
- 8 Mark
21. Describe the method of synthesis, properties and structure of carborane and borazenes
- April 2018
22. Write a brief account on preparation, properties and structure of carboranes and silicates
- March 2016
23. Give detailed classification of silicates with illustrative example.
- Dec. 2016
24. What are silicates, what are their types?
Discuss structure and bonding in a ring silicate
- Octo 2015, April 2014
25. Describe the synthesis, properties and structure diborane and borazine
- Octo 2015, April 2014

unit II A) Stereochemistry & Bonding in Main group compounds

1m Questions

- Q Define $P\pi-P\pi$ bonding (2015)
- Q Draw the structure of XeO_3 using VSEPR theory? (2015)
- Q Who developed VSEPR theory? (2013, 2015)
- Q Predict the no. of lone pairs in BrF_3 & PCl_5 using VSEPR theory. (2015)
- Q What is $d\pi-d\pi$ bonding (2013)
- Q Predict the no. of lone pair of electrons in SF_6 & IF_3 molecule. (2013)
- Q Write a Bent Rule (2013)
- Q Write hybridisation & geometry of XeO_4 molecule. (2013)
- Q Name the molecules in which $P\pi-P\pi$ bonding involved (2012)
- Q Define the term hybridization. (2012)
- Q Although the formation of ammonia & water molecule involve sp^3 hybridization their bond angles are shorter than the normal tetrahedral angle. Why? (2012)
- Q If NO_2 molecule is angular in shape then write its bond angle & bond length. (2014)
- Q Write the name & geometry of SO_3^{2-} ion. (2015)
- Q Write the Boiling point of ammonia (NH_3). (2015)
- Q What is the geometry of molecules which possesses sp^3d^2 hybridization
- Q Bond angle $H-N-H$ in ammonia molecule is _____. (2013) (2013)

4 m Questions

- Q Explain some simple reactions of covalently bonded molecules with suitable examples. (2012, 2015)
- Q Write note on $p\pi-d\pi$ & $d\pi-d\pi$ bonding (2015, 2012, 2013, 2013 sem I)
- Q Write note on $d\pi-d\pi$ bonds. (2013)
- Q Write short note on Bent rule. (2012, 2013)
- Q Explain the following terms (2012, 2013(ii))
- Drawbacks of VSEPR theory
 - Energies of hybridization
- Q Explain the $d\pi-d\pi$ bonding involved in molecule give some examples.
- Q Short note on Energies of hybridization (2013) (2012)
- Q Explain the hybridization involving in 'f' orbitals with suitable examples. (2013)
- Q Explain the following bondings involved in the molecule with suitable examples. (2013 sem I)
- $p\pi-p\pi$
 - $d\pi-d\pi$
- Q In IF_7 and XeF_4 , both I and Xe undergoes sp^3d^2 hybridization. Discuss & compare structure & bonding in IF_7 and XeF_6 . (2013)

8 m Questions

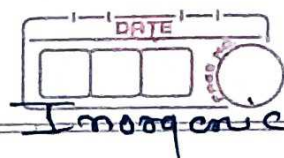
- Q Explain the following with VSEPR theory. (2015)
- Trends of repulsive interaction between bond pairs and lone pairs of electrons.
 - CH_4 , NH_3 , H_2O involve sp^3 hybridization, but bond angles in these molecules are different.
- Q a) Discuss the assumptions of VSEPR theory with illustrations. (2013 sem I)
- b) Explain Bent rule with suitable examples.

(2013, 2012 (1m), 2013 (4m), 2015 (4m), 2012)

Q What is VSEPR theory? Describe the formation of tetrahedral structure for the CH_4 , NH_3 & H_2O molecule but show different bond angles, Explain on the basis of VSEPR theory?

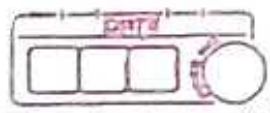
Q Discuss the VSEPR theory. Illustrate carefully that VSEPR has to be combined with the concept of hybridization to account for the geometry of covalent molecule. (2012)

II (B) - Non Aqueous Solvents



Q.1 Answer in one sentence. (1 Mark)

- ① Define - lanthanide contraction.
- ② Define - carborane.
- ③ The reduction potential of elemental fluorine is higher as compared to other halogen why?
- ④ Phosphorous rock is heated at 1733 K with coke and sand to form _____ (2016, 2014)
- ⑤ In lanthanide series on moving from left to right across period, the covalent and ionic radii decrease? why? (2016, 2014)
- ⑥ Write general electronic configuration of actinides?
- ⑦ Any two industrial uses of anhydrous sulphuric acid?
- ⑧ Self ionization rean involving NH_3 solvent?
- ⑨ SF_6 is known, while SCl_6 is not known. why?
- ⑩ Half life time of ^{232}Th and ^{238}U .
- ⑪ How many corners of SiO_4 , tetrahedron are shared in three dimensional silicates?
- ⑫ How red phosphorous is produced from white phosphorous?
- ⑬ why lanthanide are coloured? if they contain unpaired electron?
- ⑭ Write a reaction of dinitrogen tetroxide (N_2O_4).
- ⑮ Define - $p\pi-d\pi$ bonding.
- ⑯ Compton effect?
- ⑰ Function of Hemoglobin?
- ⑱ Draw a structure of XeO_3 using VSEPR theory?
- ⑲ $\text{K}_2\text{Cr}_2\text{O}_7$ is coloured? why?
- ⑳ Function of sodium and potassium in biological system?
- ㉑ Geometry of molecule poses sp^3d^2 hybridisation?



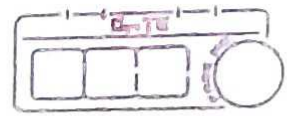
Q.2 Short Note or 4 Mark question.

- ① Write the physical and chemical characteristics of liquid ammonia?
- ② Explain -
 - ① Autoionization reacⁿ of ammonia and Sulphuric acid?
 - ② classification of solvent

2015, 2016

- ③ Physical and chemical properties of liquid ammonia?
- ④ Explain and state Bent rule with illustrative example?
- ⑤ $p\pi - d\pi$ and $d\pi - p\pi$ bonding?
- ⑥ Explain -
 - ① Auto-ionisation in NH_3 and H_2SO_4
 - ② Physical properties of dinitrogen tetroxide?

- ⑦ Walsh diagram?
- ⑧ Properties of dinitrogen tetroxide and reacⁿ involved it?
- ⑨ Explain the various equilibria in anhydrous sulphuric acid?
- ⑩ Write note on - liquid dinitrogen tetroxide?
- ⑪ Li metal complex.



Q.3 Long answer question (8 mark)

- ① Types of reaction in solvent? explain with example?
- ② Explain VSEPR theory?
- ③ Types of solvent? discuss various reaction that occur in the non-aqueous solvent?
- ④ How does diborane react with i) ammonia
ii) trimethyl boron.
- ⑤ What is non-aqueous solvent? Explain the use of H_2SO_4 as acid solvent and NH_3 as base solvent.

Unit-III
f Block elements (Lanthanides and Actinides)

PAGE NO.:

DATE: / /

- 1) What is lanthanoid contraction? April-2018, Dec-2016
- 2) "In lanthanides series on moving from left to right across a period, the covalent and ionic decreases" Why? March-2016, Nov-2014
- 3) "The spectral lines from the actinides are 10 times as intense as lanthanides" Why? October-2015, April 2015, April 2014
- 4) Which is rapid method for separation of lanthanides? October-2015, April-2015
- 5) Write general configuration of lanthanides
Nov. -2014, 2012
- 6) "The heavier lanthanide metal are less reactive than lighter lanthanide metals" Why? Nov 2014
- 7) "Cesium can be separated from lanthanide mixtures quite easily" Why?
April 2014
- 8) Name the modern method used for separation of lanthanides?
March-2018

- 1) Actinides have greater tendency to form complexes than lanthanides. Explain April-2018
- 2) Explain the spectral and magnetic properties of actinides-April 2018
March-2016
- 3) Describe the various modern methods used for the separation of lanthanides April-2018
- 4) How actinides separated by solvent extraction method
March-2016, April-2015
- 5) What are actinides? Write the name and electronic configuration of actinides? What are application of actinides? March 2016
- 6) Write note on. a) production of lanthanide metals
March 2016, April-2015
- 7) Name the lanthanide elements in correct order, give their chemical symbols and electronic configuration and mention at least four application of Lanthanide elements. - December 2016
- 8) What is lanthanide contraction and what are its consequences? - 2016
- 9) What are problems in the separation of lanthanides from one another? Discuss the modern methods for the separation of lanthanides?
December-2016, April 2014, 2009
- 10) Write note on. a) use of lanthanides as shift reagent
December-2016, April 2014
- 11) Why separation of lanthanides is difficult? Discuss solvent extract methods for their separation from one another?
April-2015
- 12) Describe spectral and magnetic properties of lanthanides. What are application of lanthanide ~~contraction~~ compounds? - Nov. 2014, 2009
- 13) What are difficulties in separation of lanthanides elements? Explain ion exchange method for the separation of lanthanide-Nov. 2014
- 14) What are magnetic properties of lanthanides? Illustrate your answer with examples - April-2014
- 15) Discuss the oxidation states and application of lanthanides-2012

- 16) What are the problems in the separation of lanthanides from one another? Discuss the modern methods for the separation of lanthanides? - December 2016, April 2014, 2009
- 16) What are the problems encountered in separation of actinides from one another? Discuss the ion exchange solvents extraction methods for the separation of actinides? - 2012, 2009
- 17) What is lanthanide contraction? How would you account for it? What are the important consequences? - 2011, 2010
- 18) Describe briefly the various methods used for the separation of the lanthanide. Which method is more preferable? - 2011
- 19) What are actinides? Why are they so called? Give their electronic configuration. Write the important properties and uses of uranium? - 2010
- 20) Explain the magnetic properties of lanthanides and actinides. Comment on organometallic chemistry of f-block elements. Give use of lanthanide and actinide compounds in industry. - 2010
- 21) Mention the use of lanthanides and their salts.
- 22) Write note on
a) application of lanthanides - 2009
- 23) Explain organometallic chemistry lanthanides and actinides - 2009
- 24) Explain the application of lanthanides and actinides compounds in industry - 2009

Solid State Chemistry

Rajdhani

- 1 Mark

DATE / /

Q. What is the position of Fermi energy level in intrinsic semiconductor?

March - 2016

Q. When does an intrinsic semiconductor behave as an insulator?

March - 2016

Q. Plot a graph of resistance versus temp. for semiconducting material.

April - 2015, Nov. - 2014

Q. Write two examples of p-type semiconductor.

April - 2015, Nov. - 2014

Q. Define insulator.

April - 2015

Q. In p-type semiconductors where are the acceptor atoms located?

October - 2017

Q. Which equation is used to calculate the conductivity of a semiconductor?

Oct. - 2017

Q. Write the names of the methods used for the preparation of semiconductors.

Oct. - 2017

Q. What is the characteristic difference between metals and semiconductors from the consideration of temp. coefficient of resistivity?

December - 2016

Q. What is the approximate range of resistivity of an insulator at 20°C?

December - 2016

- Q. Name the methods used for the synthesis & purification of Semiconducting material.
December - 2016.
- Q. "Insulator are bad conductors of electricity." Why?
Oct. - 2015
- Q. Define intrinsic semiconductor.
Nov. - 2014
- Q. Write expression for effective magnetic moment of complexes.
Nov. - 2013
- Q. Define the term mobility of electrons.
March - 2016.

Q. Name the methods used for the synthesis & purification of Semiconducting material.

December - 2016,

Q. "Insulator are bad conductors of electricity." Why?

Oct. - 2015

Q. Define intrinsic Semiconductor.

Nov. - 2014

Q. Write expression for effective magnetic moment of complexes.

Nov. - 2013

Q. Define the term mobility of electrons.

March - 2016.

- Q. How high purity semiconducting material are synthesized? Explain one method in detail.
March - 2016.
- Q. Why an increase in temperature decreases the resistivity of a semiconductor & increases the resistivity of metals (conductors).
March - 2016, Nov. - 2014
- Q. Discuss temp. dependent conductivity of conductor & semiconductor.
March - 2016 April - 2015.
- Q. Write Note - Intrinsic & extrinsic Semiconductors.
April - 2015
- Q. Explain zone refining method for synthesis of semiconducting material.
Nov. - 2013, Oct. - 2015
- Q. Distinguish betⁿ conductor, insulator & semiconductor on the basis of band diagram, Why the conductivity of a conductor decreases with increase in temp.
December - 2016
- Q. obtain an expression for a carrier density of an intrinsic semiconductor?
December - 2016
- Q. How is the band model helpful in explaining the various properties of semiconductors & insulators.
December - 2016.

Q. Describe the conduction mechanism in intrinsic & extrinsic semiconductor.

March - 2016

Q. Discuss the behavior & properties of conductors, semiconductors & insulators on the basis of band model.

April - 2015

Q. Discuss intrinsic & extrinsic semiconductor. What is the effect of dopant on conduction mechanism of semiconductor?

Nov - 2013

Q. Use energy level diagrams & the band theory to explain the difference betⁿ conductors, insulators & semiconductors.

Oct. - 2017

Q. Explain in detail different types of semiconductors with suitable examples.

Oct. - 2017

Q. Diagrammatically show the energy levels of pure semiconductors, semiconductors with donor & acceptor levels. Explain dependence of conductivity of semiconductor on temp.

December - 2016. Nov - 2014

Q. Explain energy level diagram in pure semiconductor & impure semiconductor with the presence of acceptor as well as donor levels.

Oct. - 2015

Bioinorganic Chemistry

- 1 Mark

Rajdhani

DATE / /

Q. What are cytochromes?

March - 2016

Q. How many electrons required for nitrogen fixation?

April - 2015, Oct. - 2017

Q. Write the list of trace elements in biological process.

April - 2015, Oct. - 2015, Nov. - 2013

Q. What is the function of myoglobin?

Oct - 2017

Q. What is the function of haemoglobin in biological system?

December - 2016, Nov. - 2014, Oct - 2015

Q. What do you understand by essential & trace elements in biological system? Give suitable examples.

March-2016, Nov.-2013, December-2016

Q. Write a short note - Nitrogen fixation in soil.

March-2016

Q. What is the function of cytochrome P-450?

Oct.-2017

Q. Explain the process of biological nitrogen fixation briefly.

Oct.-2017, Nov.-2014, Oct.-2015

Q. Write note - Role of metal ions in biological process.

Oct.-2017

Q. Write note - Metalloproteins

December-2016