

# INORGANIC CHEMISTRY QUESTION BANK FOR BSC 1<sup>st</sup> YEAR STUDENTS

## Short answer type (2 – 4 marks each)

- 1) Write Schrödinger wave equation. Write three quantum number obtained from it.
- 2) Which element has higher value of electron affinity, F or Cl? Why?
- 3) Which of the two  $\text{SnCl}_4$  or  $\text{SnCl}_2$  is ionic? Justify your answer.
- 4) Discuss structure of  $\text{H}_3\text{O}^+$  on the basis of VSEPR theory.
- 5) Discuss the structure of  $\text{XeO}_3$ .
- 6) What is difference between intrinsic & extrinsic defects? Explain with example.
- 7) Explain the term bond energy with example.
- 8) Write a note on Froth flotation method.
- 9) Write a note on Aufbau's principle.
- 10) The atomic radius decreases gradually on moving left to right in any period. Explain?
- 11) Nitrogen can form  $\text{NCl}_3$  while phosphorus can form  $\text{PCl}_5$  as well as  $\text{PCl}_3$ . Explain?
- 12) Write down the molecular orbital electronic configuration of  $\text{C}_2$  &  $\text{NO}$  molecules.
- 13) What do you understand by multi centre Bond? Explain with example?
- 14) Differentiate between sigma bond &  $\pi$  bond giving examples.
- 15)  $\text{SiCl}_4$  hydrolysis while  $\text{CCl}_4$  does not. Explain?
- 16) Differentiate between Calcination & roasting.
- 17) Explain Hund's rule of maximum multiplicity.
- 18) Write a short note on electron affinity.
- 19) Differentiate with example between intermolecular & intramolecular hydrogen bonding.
- 20) Explain  $\text{sp}^3$  hybridization with suitable examples.
- 21)  $\text{H}_3\text{PO}_4$  is tribasic while  $\text{H}_3\text{PO}_3$  is dibasic. Explain?
- 22) Discuss structure & geometry of  $\text{XeF}_4$ ?

- 23) Give Industrial use of Fluorocarbons.
- 24) Write a short note on Heisenberg uncertainty principle.
- 25) Explain why size of  $\text{Na}^+$  ion is smaller than Na & that of  $\text{Cl}^-$  ion is bigger than Cl.
- 26) Define bond energy.
- 27) What are Clathrates?
- 28) Discuss structure of  $\text{IF}_5$ .
- 29) Explain purpose of roasting of an ore.
- 30) Explain spin quantum number?
- 31) What is meant by covalent bond?
- 32) Nitrogen is a gas, while phosphorus is solid. Explain?
- 33) Explain the term smelting.
- 34) What do you understand by dual nature of electron?
- 35) Explain principal quantum number.
- 36) Why is first ionisation potential of nitrogen is greater than that of oxygen?
- 37) Explain geometry of  $\text{NH}_3$  molecule.
- 38) What are electron deficient molecules?
- 39) Why are elements of first group of periodic table are called the alkali metals?
- 40) What do you understand by atomic number? How is it different from mass number?
- 41) What is meant by group & period of periodic table?
- 42) How does atomic size of elements vary in periodic table & why?
- 43) Explain the geometry of  $\text{H}_2\text{O}$  molecule?
- 44) What do you understand by van der walls force?
- 45) What is meant by diagonal relationship?
- 46) Why is  $\text{B}(\text{OH})_3$  acidic?
- 47) Explain the term calcination.

- 48) Size of anion is always bigger than parent atom. Explain.
- 49) Explain  $sp^2$  hybridization with suitable example.
- 50) An orbital cannot accommodate more than two electrons. Justify the statement.
- 51) Nitrogen is electronegative element, however its electron affinity is virtually zero. Explain?
- 52) Explain geometry of hydronium ion.
- 53) Explain the Frenkel defect of ionic crystal.
- 54) Derive de Broglie's equation for dual nature of matter.
- 55) Define lattice energy.
- 56) The chloride of  $Hg^{+}$  is covalent while fluoride is ionic. Explain?
- 57) Define atomic radius. Mention briefly, how does it effect ionization potential?
- 58)  $H_2S$  is heavier than  $H_2O$  molecule however  $H_2S$  is gas while  $H_2O$  is liquid. Explain?
- 59) Find out value of all the quantum numbers for last electron of Cr.
- 60) Describe schottky defect found in ionic crystals.
- 61)  $H_2O$  is linear molecule. Justify your answer?

### **Long answer type (5 - 10 marks each)**

- 1) What is Born-Haber Cycle? How does it explain stability of ionic compounds?
- 2) Write short note on following:
  - a. Complex formation tendency of alkali metals.
  - b. Biological importance of Calcium & Magnesium.
- 3) Explain inert pair effect, Catenation, & diagonal relationship with respect to p block elements.
- 4) Differentiate between following:
  - a. Minerals & Ores
  - b. Calcination & roasting
  - c. VBT & MOT
- 5) (a) What is ionization potential? What are factor influencing ionization potential of

anelement.

- 6) (b) The ionization potential decreases with increase in atomic number in any group. Explain ?
- 7) Describe free electron theory of metallic bonding. Explain how this theory successfully explained properties of metals.
- 8) (a) Discuss preparation, property & use of fluorocarbons.
- 9) (b) Discuss structure & geometry of  $\text{IF}_7$ .
- 10) Define electronegativity. Name the factors which influence its value & also explain how do they influence it. How is the value of electronegativity of any elements determined with the help of Mulliken's scale ?
- 11) (a) Write a note on role of  $\text{Na}^+$  &  $\text{K}^+$  ions in human body.
- 12) (b) Describe Fajan's rule with suitable example.
- 13) Discuss structure of following compounds: **a).**  $\text{XeOF}_2$  **b).**  $\text{BrF}_3$  **c).**  $\text{IF}_7$
- 14) Discuss preparation & properties of diborane. Describe its structure & give additional facts which support the bridge structure.
- 15) What is VSEPR theory ? How it is useful in explaining the geometry of molecules?
- 16) With the help of this theory explain the geometry of  $\text{NH}_3$  &  $\text{H}_2\text{O}$  molecules?
- 17) (a) What are interhalogen compounds? Give shape & structure of  $\text{IF}_3$ ,  $\text{ICl}_4^-$  &  $\text{ClF}_5$ .  
(b) Interhalogen compounds are more reactive than halogens. Why?
- 18) (a) Give names & formula of ores of Beryllium.  
(b) How the metal is extracted from one of its ore?
- 19) (a) Sketch the shapes of various d orbitals.  
(b) Explain the term electronegativity & discuss its periodicity in periodic table.
- 20) Discuss structure of following:  
(a)  $\text{XeF}_4$  (b)  $\text{XeF}_6$
- 21) (a) Discuss the complexation tendencies of Be.  
(b) Write a short note on carbides.
- 22) Describe method of extraction of lithium from one of its ore.

- 23) Give an account of hydrogen bond & its significance.
- 24) Discuss alkyl & aryls of s block elements.
- 25) Discuss in detail the structure of diborane.
- 26) Discuss the important features of MOT for covalent molecules & draw Mo diagram for Oxygen molecule.
- 27) Write short note on following:
- 28) Electron affinity & factor affecting its value (b) oxy acids of nitrogen
- 29) Discuss the physical & chemical properties of s block elements & their position in the periodic table.
- 30) Discuss VBT theory for covalent molecules. Mention its limitations.
- 31) Write short note on following:
- discuss structure of diborane
  - radius ratio rule & structure of ionic solids
- 32) Discuss p block elements on basis of electronic configuration, position in periodic table, Electronegativity & its variation, oxidation state & its variation.
- 33) Explain the structure of xenon compounds with oxygen & fluorine, naming  $\text{XeOF}_4$ ,  $\text{XeOF}_2$  &  $\text{XeF}_4$ . Explain the process of hybridization giving electronic configuration of central atom, type of hybridization & geometry of molecule in each case.

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