

# Get Ready to Crack CSIR NET 2021 (Most Important Questions of Inorganic Chemistry )



## Important Questions of Inorganic Chemistry

1. It is given that  $D(\text{H-H})$  and  $D(\text{F-F})$  in  $\text{H}_2$  and  $\text{F}_2$  are 436 and 158 kJ/mol, calculate the bond dissociation enthalpy of HF (in kJ/mol).
  - A. 250
  - B. 297
  - C. 300
  - D. 350
2.  $[\text{NO}_3]^-$  has  $D_{3h}$  symmetry. Predict its structure.
  - A. Planar
  - B. Non-planar
  - C. cannot predict.
  - D. None of the above
3. Predict the structure of  $[\text{NO}_2]^+$  ion using VSEPR theory.
  - A. Bent
  - B. Linear
  - C. Pyramidal
  - D. Planar
4. The structure of unit cell for sodium chloride is consistent with:
  - A. NaCl
  - B.  $\text{Na}_2\text{Cl}$
  - C.  $\text{NaCl}_2$
  - D. Not fixed
5. Identify the mixture of solvents in which intermolecular hydrogen bonding will take place.
  - A. EtOH and  $\text{H}_2\text{O}$
  - B.  $\text{Et}_2\text{O}$  and THF
  - C.  $\text{EtNH}_2$  and  $\text{Et}_2\text{O}$
  - D. None of the above
6. A cryptand is:
  - A. monocyclic ligand
  - B. Bicyclic ligand
  - C. Polycyclic ligand
  - D. None of the above
7. The structure of dimer of  $\text{BeCl}_2$  is:

A. Trigonal planar

B. Linear

C. Tetrahedral

D. Bent

8. Thermal decomposition of magnesium carbonate takes place at:

A. 1173 K

B. 813 K

C. 1633 K

D. 1563 K

9. For sesquihydrate, n is:

A.  $1/2$

B.  $3/2$

C. 1

D.  $5/2$

10. How many cage isomers are possible for  $C_2B_4H_6$ ?

A. 1

B. 2

C. 3

D. 4

## Answer Keys

1.B

6.C

2.A

7.A

3.B

8.B

4.A

9.B

5.A

10.B

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## Solutions

**Solution 1.** Calculate bond dissociation enthalpy of HF as:

$$\begin{aligned} D(\text{H-F}) &= 1/2[D(\text{H-H})+D(\text{F-F})] \\ &= 1/2(436+158) \\ &= 297 \end{aligned}$$

**Solution 2.** It is given that  $[\text{NO}_3]^-$  has  $D_{3h}$  symmetry which means it must be planar having bond angle of  $120^\circ$  and distance between N-O will be equal.

**Solution 3.** N contains five valence electrons. If positive charge is allowed to localise on N, it will become  $\text{N}^+$  which indicates the presence of 4 valence electrons. O needs two electrons to complete its octet. All the 4 electrons of N will be used in bonding which results in formation of two double bonds. Due to absence of lone pairs on N,  $[\text{NO}_2]^+$  will be linear.

**Solution 4.** The number of sodium and chloride ions belongs to the unit cell are:

Site  $\text{Na}^+$   $\text{Cl}^-$

Central 1 0

Face 0 3

Edge 3 0

Corner 0 1

For both ions, total is 4, so, formula will be NaCl.

**Solution 5.** When H is bonded to more electronegative atoms like N, F or O, formation of hydrogen bonding takes place. Among the given options, intermolecular hydrogen bonding is possible only in option A.

**Solution 6.** A cryptand is considered as a polycyclic ligand in which cavity is present. When ligand is coordinated with a metal ion, the complex ion is known as cryptate.

**Solution 7.** Each Be atom has tendency to accommodate 8 electrons in its valence shell. In monomer of  $\text{BeCl}_2$ , only four valence electrons are associated with each Be atom due to which it can accept one or two lone pair of electrons. Each Cl atom contains three lone pair electrons. This arrangement gives  $\text{BeCl}_2$  dimer trigonal planar shape.

**Solution 8.** Down the group, thermal stability increases because of decrease in polarizing power of cation. So, according to this, B is the correct option.

**Solution 9.** If the value of n is  $3/2$ , it is known as sesquihydrate.

**Solution 10.**  $\text{C}_2\text{B}_4\text{H}_6$  has a closo cage structure and it will adopt octahedron shape. In octahedron, all vertices are equal due to which means that two arrangements are possible which results in two cage isomers.

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