

Test Paper
Subject : Chemistry
Chemical Bonding and Molecular Structure

Q1. Explain the non linear shape of H_2S and nonpolar shapes of PCl_3 using valence shell electron pair repulsion theory.

Q2. Using molecular orbital theory, compare the bond energy and magnetic characters of O_2^+ and O_2^- species.

Q3. Explain the shape of BrF_5 .

Q4. Explain why PCl_5 is trigonal bipyramidal whereas IF_5 is square pyramidal.

Q5. Write Lewis structure of the following compounds and show a formal charge on each atom. HNO_2 , NO_2 , H_2SO_4

Q6. Give reasons for the following :

- 1) Covalent bonds are directional bonds while ionic bonds are non directional.
- 2) Water molecules have a bent structure whereas carbon dioxide molecules are linear.
- 3) Ethyne molecules are linear.

Q7. Group the following as linear and non-linear molecules. H_2O , HOCl , BeCl_2 , Cl_2O

Q8. Elements X, Y and Z have 4, 5, 7 valence electrons respectively

- 1) Write the molecular formula of the compounds formed by these elements individually with hydrogen.
- 2) Which of these compounds will have the highest dipole moment?

Q9. Draw the resonating structure of:

- 1) Ozone molecule
- 2) Nitrate ion

Q10. Predict the shapes of the following molecules on the basis of hybridization-

BCl_3 , CH_4 , NH_3 , CO_2

Q11. Match the following:

1. SF ₄	a) sp ³ d ²
2. IF ₅	b) d ² sp ³
3. NO ₂ ⁺	c) sp ³ d
4. NH ₄ ⁺	d) sp ³
	e) sp
Geometry / Shapes	
1. H ₃ O ⁺	a) Linear
2. HC ≡ CH	b) Angular
3. ClO ₂ ⁻	c) Tetrahedral
4. NH ₄ ⁺	d) Trigonal bipyramidal
	e) Pyramidal
Bond Order	
1. NO	a) 1.5
2. CO	b) 2.0
3. O ₂ ⁻	c) 2.5
4. O ₂	d) 3.0
Examples	
1. Hydrogen bond	a) C
2. Resonance	b) LiF
3. Ionic Solid	c) H ₂
4. Covalent Solid	d) HF
	e) O ₃

Q12. Use the molecular orbital energy level diagram to show that N₂ would be expected to have a triple bond, F₂O single bond and Ne₂, no bond

Q13. Give reason, Are oxygen molecules paramagnetic in nature? Why?

*****All The Best*****