	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**DEPARTMENT OF SCIENCE -2024-25** **SUBJECT: CHEMISTRY**	**DATE: 03/09/2024**
Worksheet No: 04 with answers	**TOPIC: CHEMICAL BONDING AND MOLECULAR STRUCTURE**	**A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS

1. What is the formal charge of carbon in carbon monoxide?

i) 0 ii) +1 iii) -1 iv) +2

2. There are …… electrons around sulphur in SF_6.

i) 8 ii) 10 iii) 6 iv) 12

3. The energy required to completely separate one mole of a solid ionic compound into gaseous constituent ions is called …….

i) Lattice enthalpy ii) Ionisation enthalpy

iii) Electron gain enthalpy iv) Bond dissociation enthalpy

4. Isoelectronic molecules and ions have identical bond orders. What is the bond order of F_2 and O_2^{2-}?

i) 1 ii) 1.5

iii) 2 iv) 3

5. Identify the non-polar molecule from the following.

i) NH_3 ii) BF_3

iii) NF_3 iv) H_2O

6. Among alkali metal chlorides, the most covalent compound is …….

i) LiCl ii) NaCl

iii) KCl iv) RbCl

7. Which of the following cations has most polarizing power?

i) Na^+ ii) Mg^{2+}

iii) K^+ iv) Ca^{2+}

8. Identify the molecule which is not linear.

i) CO_2 ii) $BeCl_2$

iii) H_2S iv) $HgCl_2$

9. Hybridisation in NH_3 is …….

i) sp ii) sp^2

iii) sp^3 iv) sp^3d

10. Which of the following diatomic molecules is paramagnetic in nature?

i) H_2 ii) N_2

iii) He_2 iv) O_2

Read the given passage and answer the questions that follow:

Lewis concept is unable to explain the shapes of molecules. This theory provides a simple procedure to predict the shapes of covalent molecules. Sidgwick and Powell in 1940, proposed a simple theory based on the repulsive interactions of the electron pairs in the valence shell of the atoms. It was further developed and redefined by Nyholm and Gillespie. The shape of a molecule depends upon the number of valence shell electron pairs (bonded or nonbonded) around the central atom.

11. Arrange the following molecules in the increasing order of bond angle.

$BeCl_2$, BCl_3, CH_4

12. Write the decreasing order of repulsive interaction of electron pairs.

13. ClF_3 has bent T shape. Explain.

14. Predict the bond angle and shape of CCl_4.

Assertion – Reasoning Questions

15. **Assertion**: PCl_5 has trigonal bipyramidal shape.

Reason: There are 4 bond pairs and 1 lone pair around phosphorus in PCl_5.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

c) Assertion is correct, but reason is wrong statement.

d) d) Assertion is wrong, but reason is correct statement.

16. **Assertion**: He_2 molecule is unstable and does not exist.

Reason: Bond order of He_2 is zero.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

c) Assertion is correct, but reason is wrong statement.

d) Assertion is wrong, but reason is correct statement.

17. **Assertion**: O_2 molecule is paramagnetic in nature.

Reason: Bond order of O_2 is two.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

c) Assertion is correct, but reason is wrong statement.

d) Assertion is wrong, but reason is correct statement.

18. **Assertion**: KBr is more covalent than KI.

Reason: Due to the larger size of I^-, more polarization takes place in KI.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

c) Assertion is correct, but reason is wrong statement.

d) Assertion is wrong, but reason is correct statement.

Question – Answer Type:

19. Define bond order. What is the bond order of N_2? **1**

20. Which is stronger; Sigma bond (σ) or Pi bond (π)? Give reason. **1**

21. Define Hybridisation. What is the hybridisation in BCl_3? **2**

22. Which is more polar, NF_3 or NH_3? Explain. **2**

23. Draw the resonance structures of CO_3^{2-} **2**

24. Write the three conditions for the combination of atomic orbitals in Molecular orbital theory. **3**

25. Draw the Lewis structures of: **3**

i) CN^- ii) NO_2^- iii) O_3

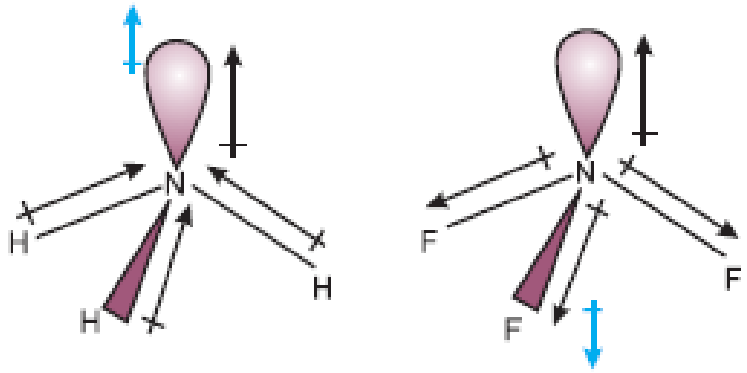
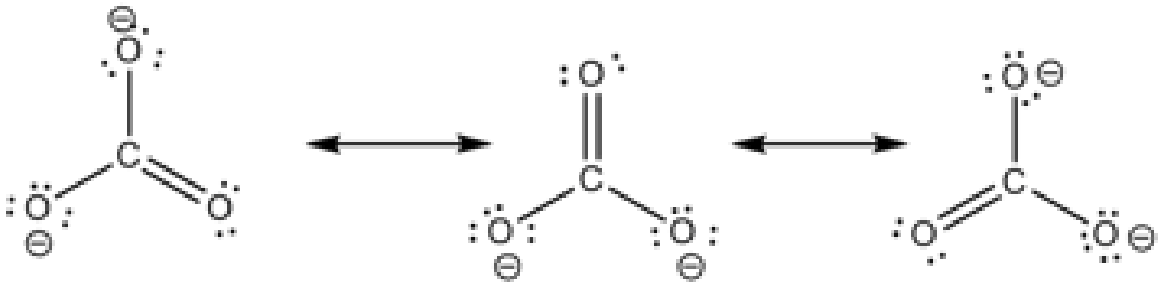
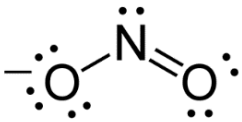
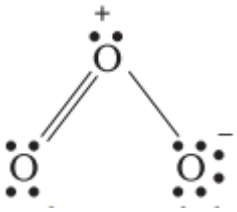
26. a) Explain the Hybridisation in $BeCl_2$. Predict its shape and bond angle. **5**

b) Complete the following table:

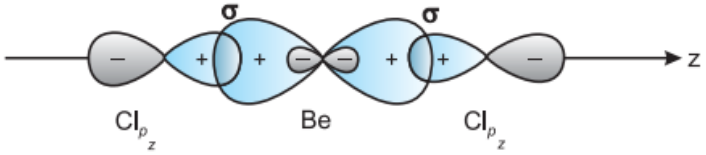
COMPOUND	SHAPE	BOND ANGLE
H_2O		
NH_3		
BCl_3		

ANSWERS

1.	iii) -1
2.	iv) 12
3.	i) Lattice enthalpy
4.	i) 1
5.	ii) BF_3
6.	i) LiCl
7.	ii) Mg^{2+}
8.	iii) H_2S
9.	iii) sp^3
10.	iv) O_2
11.	$CH_4 < BCl_3 < BeCl_2$
12.	Lone pair – Lone pair > Lone pair – Bond pair > Bond pair – Bond pair
13.	Two lone pairs are at equatorial positions. Due to lp-lp and lp-bp repulsions, the most stable shape is bent T.
14.	109.5^0, Tetrahedral.
15.	c) Assertion is correct, but reason is wrong statement.
16.	a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
17.	b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
18.	d) Assertion is wrong, but reason is correct statement.
19.	Bond order is the number of bonds between the two atoms in a molecule. Bond order of N_2 is 3
20.	Sigma bond is stronger than pi bond as extend of atomic orbital overlapping is more in sigma bond.
21.	Hybridisation is the process of intermixing of the orbitals of slightly different energies so as to redistribute their energies, resulting in the formation of new set of orbitals of equivalent energies and shape. Hybridisation in BCl_3 is sp^2

22.	 In the case of NH_3, the orbital dipole due to lone pair is in the same direction as the resultant dipole moment of the N – H bonds, whereas in NF_3, the orbital dipole is in the direction opposite to the resultant dipole moment of the three N–F bonds.
23.	
24.	i) The combining atomic orbitals must have the same or nearly the same energy. ii) The combining atomic orbitals must have the same symmetry about the molecular axis. iii) The combining atomic orbitals must overlap to the maximum extent.
25.	i)  ii)  iii) 
26.	a) Hybridisation in $BeCl_2$ is sp $_4$Be – Ground state – $1s^2 2s^2$ - Excited state - $1s^2 2s^1 2p^1$

One 2s orbital and one 2p orbital overlap to form two sp hybrid orbitals.
These hybrid orbitals contain one electron each.
They overlap with 3p orbital of chlorine to form two Be-Cl sigma bonds.



Shape is Linear and bond angle is 180^0

b)

COMPOUND	SHAPE	BOND ANGLE
H_2O	Bent	104.5^0
NH_3	Trigonal pyramidal	107^0
BCl_3	Trigonal planar	120^0

Prepared by *Mr Anoop Stephen*	*Checked by* *HoD Science*