

St John Baptist De La Salle Catholic School, Addis  
Ababa

Grade 11 Chemistry Midterm Examination  
3<sup>rd</sup> Quarter

March, 2023

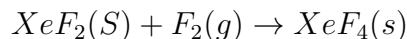
Name: \_\_\_\_\_ Roll Number: \_\_\_\_\_ Section: \_\_\_\_\_ Time Allowed: **45 minutes**

**Multiple Choice Questions**

- Which of the following is characteristics of an antibonding molecular orbital?
  - It is a molecular orbital with a high probability of finding electrons parallel to the region between the bonded atoms.
  - It has no electrons
  - It is a molecular orbital with a high probability of finding electrons away from the region between bonded atoms.
  - It is a molecular orbital with a high probability of of finding electrons in the region between bonded atoms.
- Identify the statement which is correct about the  $O_2$  molecule and the  $O_2^{2-}$  ion.
  - The bond order of  $O_2^{2-}$  is less than that of  $O_2$ .
  - $O_2$  is diamagnetic whereas  $O_2^{2-}$  is paramagnetic.
  - The oxygen-oxygen bond is stronger in  $O_2^{2-}$ .
  - The number of electrons in anti-bonding orbital is less in  $O_2^{2-}$ .
- Which one of the following represents the correct electron pair geometry and molecular geometry of  $Cl_2O$ ?
  - Linear, Linear
  - Tetrahedral, bent
  - Trigonal planar, T-shaped
  - Square planar, linear
- Which one of the following molecules is non-polar?
  - $CS_2$
  - $SO_2$
  - $CHCl_3$
  - $SF_4$
- Which of the following molecules has the shortest bond length?
  - $O_2$
  - $Cl_2$
  - $N_2$
  - $Br_2$
- There is a strong covalent bond between the N atoms in nitrogen gas,  $N_2$ , why, then, does nitrogen have such a low boiling point of  $-196^\circ C$ ?

- A. The bond between the N-atoms is triple.
  - B. N is very electronegative, only next to F and O.
  - C. The strong bond, at intramolecular one determines the boiling point of the substance.
  - D. Boiling point is determined by intermolecular force, which in this case is weak as the molecular is non-polar.
7. What are intermolecular forces? They are forces due to the attraction between
- A. cations and anions.
  - B. molecules.
  - C. cations and delocalized electrons.
  - D. nuclei and electron pair.
8. Which of the following belongs to chemical bonding theories?
- A. Valence bond theory and molecular orbital theory.
  - B. Kinetic-molecular theory and valence shell electron pair repulsion theory.
  - C. Valence bond theory and valence shell electron pair repulsion theory.
  - D. Molecular orbital theory and kinetic-molecular theory.
9. The hybridization of the central atom in the  $XeF_4$  molecule is
- A.  $sp^2$    B.  $sp^3$    C.  $sp^3d$    D.  $sp^3d^2$
10. The dissolution of water in octane( $C_8H_{18}$ ) is prevented by
- A. dipole-dipole attraction between octane molecules.
  - B. hydrogen bonding between water molecules.
  - C. London dispersion forces between octane molecules.
  - D. repulsion between like-charged water and octane molecules.
11. Given the following  $AF_n$  species,  $BF_3$ ,  $BeF_2$ ,  $CF_4$ ,  $NF_3$ ,  $OF_2$ , what is the correct order of the F-A-F bond angles?
- A.  $OF_2 < BeF_2 < NF_3 < BF_3 < CF_4$
  - B.  $BeF_2 < OF_2 < NF_3 < BF_3 < CF_4$
  - C.  $CF_4 < BF_3 < NF_3 < BeF_2 < OF_2$
  - D.  $OF_2 < NF_3 < CF_4 < BF_3 < BeF_2$
12. From  $CO_2$ ,  $H_2O$ ,  $BeCl_2$ , and  $N_2O$  which have the same molecular geometry?
- A.  $CO_2$ ,  $H_2O$ , and  $N_2O$
  - B.  $CO_2$ ,  $BeCl_2$ , and  $N_2O$
  - C.  $CO_2$  and  $BeCl_2$  only
  - D.  $H_2O$  and  $N_2O$  only
13. The number of resonance structures for  $CO_3^{2-}$  are:
- A. 9   B. 2   C. 3   D. 6

14. In the following equation, what type of hybridization change, if any occurs at  $Xe$  atom?



- A.  $sp^3d$  to  $sp^3d^2$     B.  $dsp^2$  to  $sp^3$     C.  $sp^3$  to  $sp^3d$     D.  $sp^3d$  to  $sp^3$
15. Which of the following is correct about the type of overlaps that describe the triple bonds in nitrogen molecule in which the orbitals of the two nitrogen are designated with the subscripts 1 and 2?
- A.  $sp_1^2 - - - - - sp_2^2$  and  $p_{x1} - p_{y1}$  and  $p_{x2} - p_{y2}$   
B.  $sp_1 - - - - - sp_2$  and  $p_{x1} - p_{y2}$  and  $p_{x2} - p_{y1}$   
C.  $sp_1^3 - - - - - sp_2^3$  and  $p_{x1} - p_{y1}$  and  $p_{x2} - p_{y2}$   
D.  $sp_1^2 - - - - - sp_2^2$  and  $p_{x1} - p_{y2}$  and  $p_{x2} - p_{y1}$
16. The dipole moment is the highest for:  
A. Trans-2-butene    B. 1,3 - dimethyl benzene    C. Acetophenone    D. Ethanol
17. Which electron is most electronegative?  
A.  $Sp^3$  hybridized    B.  $Sp^2$  hybridized    C.  $Sp$  hybridized    D.  $Sp^3d$  hybridized

## Workout

18. Write the molecular orbital diagrams for the carbide ion( $C_2^{2-}$ )
19. A neutral molecule having the general formula  $AB_3$  has two unshared pair of electrons on A. What is the hybridization of A?
20. What is the bond order of  $O_2^+$