St John Baptist De La Salle Catholic School, Addis Ababa

Grade 11 Chemistry Midterm Examination

3rd Quarter

March, 2023

Name:_____ Roll Number:_____ Section:___Time Allowed: **45 minutes**

Multiple Choice Questions

1. Which of the following is characteristics of an antibonding molecular orbital?
   A. It is a molecular orbital with a high probability of finding electrons parallel to the region between the bonded atoms.
   B. It has no electrons
   C. It is a molecular orbital with a high probability of finding electrons away from the region between bonded atoms.
   D. It is a molecular orbital with a high probability of of finding electrons in the region between bonded atoms.

2. Identify the statement which is correct about the O_2 molecule and the O_2^{2-} ion.
   A. The bond order of O_2^{2-} is less than that of O_2.
   B. O_2 is diamagnetic whereas O_2^{2-} is paramagnetic.
   C. The oxygen-oxygen bond is stronger in O_2^{2-}.
   D. The number of electrons in anti-bonding orbital is less in O_2^{2-}.

3. Which one of the following represents the correct electron pair geometry and molecular geometry of Cl_2O?
   A. Linear, Linear
   B. Tetrahedral, bent
   C. Trigonal planar, T-shaped
   D. Square planar, linear

4. Which one of the following molecules is non-polar?
   A. CS_2 B. SO_2 C. $CHCl_3$ D. SF_4

5. Which of the following molecules has the shortest bond length?
   A. O_2 B. Cl_2 C. N_2 D. Br_2

6. 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^{0}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?

$$XeF_2(S) + F_2(g) \rightarrow XeF_4(s)$$

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^+