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شامل

CHAPTER 3

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MCQ:

1. Which of these molecules contains the strongest hydrogen bonds?

- a) $\text{HF}_{(g)}$ b) $\text{H}_2\text{O}_{(v)}$ c) $\text{NH}_{3(g)}$ d) $\text{CH}_3\text{CH}_2\text{OH}_{(l)}$

2. The (N-H) bond in the ammonia molecule arises from the overlap of the $1s^1$ orbital of the hydrogen atom with the hybridized orbital.

- a) sp^2d b) sp c) sp^2 d) sp^3

3. What are the numbers of both sigma (σ) and pi (π) bonds in one molecule of the compound HCCCCCH_3 ?

- a) $8\pi, 6\sigma$ b) $4\pi, 7\sigma$ c) $6\pi, 4\sigma$ d) $4\pi, 8\sigma$

4. Which pair of the following molecules has the same shape of molecule?

- a) CH_4, NH_3 b) $\text{BF}_3, \text{BeF}_2$ c) $\text{H}_2\text{O}, \text{Cl}_2\text{O}$ d) $\text{H}_2\text{O}, \text{NH}_3$

5. The orbital that participates in sp^2 hybridization but does not participate in sp hybridization is

- a) $2p_z$ b) $2p_y$ c) $2p_x$ d) $2s$

6. Which of the following molecules can form both hydrogen and coordinate bonds?

- a) Cl_2 b) HCl c) CH_4 d) H_2O

7. Which of the following applies to aluminum chloride

- a) Ionic bond characteristics are clearly appears in it.
b) Its melting point is high compared to sodium chloride.
c) It sublimates at its boiling point.
d) Its melt is a good conductor of electricity.

8. Which of the following compounds contains the same number of lone pairs and bond pairs of electrons as the compound CH_3OH ?

- a) CH_3NH_2 b) N_2H_4 c) NH_4^+ d) PH_3

9. The percentage of s orbitals involved in sp^3 hybridization is equal to

- a) 100% b) 25% c) 50% d) 75%

10. The smallest total number of lone pairs and bonding pairs of electrons results in an electron pair arrangement that is

- a) Angular b) Planar Triangle c) Tetrahedral d) Linear

11. The attraction occurs between water molecules and sodium (Na^+) and chloride (Cl^-) ions because water molecules are

- a) Linear b) Polar c) Symmetrical d) Nonpolar

12. The bond present in the molecule of an element with atomic number 17 is a bond.

- a) Pure covalent b) Coordinate c) Ionic d) Polar covalent

13. The metallic bond is considered a type of bonds.

- a) Ionic b) Polar covalent c) Physical electrostatic d) Nonpolar covalent

14. What is the number of unpaired electrons in the Lewis dot structure of the N^{3-} ion?

- a) 0 b) $1e^-$ c) $2e^-$ d) $3e^-$

15. Orbital overlap occurs in the following molecules, except

- a) NaCl b) N_2 c) C_2H_4 d) NH_3

16. A central atom surrounded by four electron pairs, with two of them being bonding pairs, has an expected bond angle of

- a) 107° b) 120° c) Less than 107° d) 109.5°

17. Which of the following ions is explained by the octet rule (electronic theory of valency)?

- a) P^{+3} b) O^{+2} c) S^{+6} d) ^{+}Mg

18. Which atom bonds with two oxygen atoms to form a molecule where the central atom has no lone pairs of electrons? (Se = 34)

- a) Sulfur b) Carbon c) Selenium d) Hydrogen

19. The process of atomic orbital hybridization involves the mixing of

- a) Two similar atomic orbitals of the same atom
b) Two different atomic orbitals of two different atoms
c) Different atomic orbitals of the same atom
d) Similar atomic orbitals of two different atoms

20. All of the following compounds are polar covalent except

- a) BeBr_2 b) H_2O c) NH_3 d) HCl

21- Which of the following choices is correct?

- a- Y is a diatomic molecule, and X is a diatomic molecule
b- Z is a diatomic molecule, and X is a monatomic molecule
c- Z is a monatomic molecule, and X is a diatomic molecule
d- Y is a diatomic molecule, and X is a monatomic molecule

• "X"	" $1s^2, 2s^2, 2p^4$ "
• "Y"	" $1s^2, 2s^2, 2p^4, 3s^1$ "
• "Z"	" $1s^2, 2s^2, 2p^5$ "

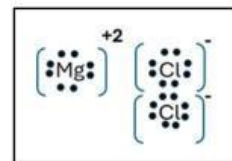
22- In the magnesium chloride compound, all of the following are correct except:

a - The sum of the electrons in the outermost main level in the ions forming the formula unit = 24.

b-Two electrons transfer from the magnesium atom to the two chlorine atoms.

c-Each magnesium atom is bonded to two chlorine atoms.

d - Lewis structure of the resulting compound as follows:

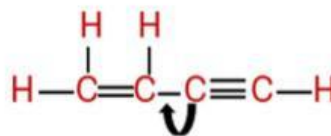


23. According to the Valence Shell Electron Pair Repulsion (VSEPR) theory, the molecule PI_3 (where $I=53$) is represented by the abbreviation:

- (a) AX_2E (b) AX_3E (c) AX_3 (d) AXE_3

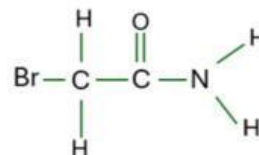
24-In the compound below, the single bond between the two carbon atoms results from the overlap of which orbitals?

- a- SP^3 with SP^3 b- SP^3 with SP
c- SP with SP^2 d- SP^3 with SP^2



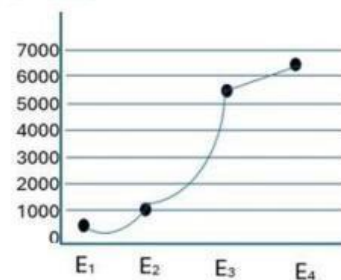
25- How many valence electrons of the atoms in this compound are not involved in bond formation?

- (a) 6 (b) 8 (c) 10 (d) 12



26-The second graph shows the ionization energies (first to fourth) of a hypothetical element W. The Lewis dot structure of element X, which follows W in the same period, is:

- $\cdot\ddot{\text{X}}\cdot$ - d $\cdot\ddot{\text{X}}\cdot$ - c $\cdot\text{X} -$ b $\cdot\text{X}\cdot$ - a



27- The number of bonds in ammonium chloride is while the number of types of these bonds is.....

- (a) 6 , 2 (b) 5 , 3 (c) 2 , 1 (d) 3 , 2

28. By dissolving potassium metal in liquid ammonia and then adding a calculated amount of oxygen, we obtain

- a- Na_2O b- NaO_2 c- Na_2O_2 d- NaOH

29-The electronic configuration that represents the outer electronic structure of $_{11}\text{Na}$ in the sodium chloride compound NaCl



30- Compounds (X) and (Y) are water-insoluble hydroxides. Based on the following observations, identify the molecular formulas of compounds (X) and (Y):

Compound (X): Is blue and becomes black upon heating.

Compound (Y): Is gelatinous white and dissolves in caustic soda solution.

What are the correct molecular formulas of compounds (X) and (Y)?

X:.....

Y:.....