Inorganic Chemistry 7th edition Weller Test Bank

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Correct answers are marked with an asterisk*

1. Find the correct statement related to the Lewis structures:
*a. Lewis structure does not show the actual structure of the chemical species, it shows only the pattern of bonding and non-bonding electron pairs.
b. The atoms of higher electronegativity is taken as a central atom of polyatomic species because it has to accommodate all electron pairs that are not placed in the bonds.
c. Lewis structure provides a very detailed information on bonding and structure.

2. According to the VSEPR theory, the following can be said for XeF_4 with two lone electron pairs on Xe atom and four Xe–F bonds:
a. The molecular geometry is octahedral with lone electron pairs located on the equatorial plane.
*b. The molecular geometry is square planar with two lone electron pairs on the opposite sides of the molecular plane.
c. The molecular geometry is see-saw and two lone electron pairs are at 90° to each other and all other Xe–F bonds.

3. SF_6 molecule has no lone electron pairs on sulfur. Determine: (i) the number of electrons around sulfur, (ii) the geometry of this molecule and (iii) hybridization scheme on sulfur:
*a. (i) twelve electrons, (ii) octahedral geometry, (iii) sp^3d^2
b. (i) eight electrons, (ii) octahedral geometry, (iii) sp^3d^2
c. (i) six electrons, (ii) square pyramid, (iii) sp^2d^2

4. According to the VSEPR model:
a. The shape of the molecule is based on how regions of electron density are arranged in 3D space.
*b. The shape of the molecule is based on the arrangement of atoms in 3D space, and not on the arrangement of regions of electron density.
c. The shape of the molecule is based on both the arrangement of atoms in 3D space and the arrangement of regions of electron density.

5. According to the molecular orbital theory:
a. molecular orbitals are products of vawefunctions describing the atomic orbitals; two atomic orbitals produce only one molecular orbital
*b. bonding molecular orbitals are lower in energy than the atomic orbitals they were formed from, while antibonding molecular orbitals have greater energy than the original atomic orbitals.
c. Sigma molecular orbitals are always centrosymmetric and cannot have any nodes.

6. If atom A has an s valence orbital and atom B has one s and three p valence orbitals with p orbitals being close in energy to A's s orbital, how many molecular orbitals can be formed for the AB molecule?
a. A total of five MOs: two bonding, two antibonding and one non-bondiong

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b. A total of four MOs: two bonding and two antibonding
*c. A total of five: one bonding, one antibonding and three non-bonding.

7. Based on the molecular orbital theory, what can we say about the first ionization energy for H_2 molecule?
a. It is lower than the first ionization energy of H atom.
*b. It is higher than the first ionization energy of H atom.
c. It is about the same as the first ionization energy of H atom.

8. Find the correct statement relating to bond order, bond length and bond strength:
a. Generally, high bond order indicates high bond strength and long bond.
*b. Generally, lower bond orders result in longer, weaker bonds.
c. There is no general relationship between bond order and bond strength and length.

9. What is a catalytic cycle?
a. It is a cycle of reactions that shows the interconversion of catalyst to products.
b. It is an energy diagram that shows the changes in energy between catalysed and uncatalyzed reaction.
*c. It is a sequence of reactions that converts the reactants into products, with the catalyst being regenerated after the cycle.

10. We can say that a catalyst is selective if:
a. it prefers one reactant over another
*b. it gives a high yield of a desired product with a small amount of side product(s).
c. it is very selective for one functional group only.

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