

1. Resonance bonding \_\_\_\_\_.
- (A) involves electrons shifting back and forth between two atoms  
 (B) is represented in a single Lewis dot diagram  
 (C) involves delocalized electrons  
 (D) occurs in different isomers
2. Which statement is untrue? The formal charge in a Lewis dot diagram \_\_\_\_\_.
- (A) is determined by splitting each bond attached to an atom  
 (B) depends on how many electrons the atom brought to the Lewis dot diagram  
 (C) is the most minimal in the most stable atomic configuration  
 (D) represents the electrical charge on each atom in the molecule
3. In a Lewis dot diagram, \_\_\_\_\_.
- (A) the central atom is the most electronegative  
 (B) unshared electron pairs are omitted  
 (C) only the valence electrons are depicted  
 (D) the hybrid subshells are depicted
4. In an  $sp^3$  hybrid orbital \_\_\_\_\_.
- (A) the S and a P orbital are made into 3 new orbitals  
 (B) the S and three P orbitals are made into four new orbitals  
 (C) the S and three P orbitals remain where they are but act as one orbital  
 (D) one S and one P orbitals form one new orbital between the remaining two P orbitals
5. Valence-shell electron-pair repulsion (VSEPR) explains how unshared electrons cause the intramolecular bonds to \_\_\_\_\_.
- (A) bend away from the unshared electrons  
 (B) bend toward the unshared electrons  
 (C) shorten  
 (D) lengthen
6. The angle between  $sp^3$  hybrid bonds is \_\_\_\_\_.
- (A)  $104.5^\circ$   
 (B)  $107^\circ$   
 (C)  $109.5^\circ$   
 (D)  $120^\circ$
7. The carbon atoms in graphite bond to each other \_\_\_\_\_.
- (A) in rigid three-dimensional lattices  
 (B) in long parallel chains with no bonding between chains  
 (C) in broad flat sheets that slide over one another  
 (D) as interlocking Bucky balls

8. Which statement about orbitals is untrue?

- (A) the 2p orbital has 4 slots for electrons
- (B) the 3s orbital is spherical in shape
- (C) there is no p subshell in shell 1
- (D) there is no d subshell in shell 2

9. Which molecule contains one pair of unshared valence electrons?

- (A) water
- (B) ammonia
- (C) methane
- (D) hydrogen bromide

10. How many resonance structures can a phosphate ion ( $\text{PO}_4^{3-}$ ) form?

- (A) 1
- (B) 2
- (C) 3
- (D) 4