What is hybridization?

Worksheet

Hybridization combines pure atomic orbitals into hybrid orbitals (sp, sp, sp, dsp, dsp) oriented toward specific bond angles and molecular shapes, improving bonding overlap.

Questions

1. Boron in BF forms 3 equivalent B-F bonds at 120 angles. What is the hybridization?

A) sp
B) sp
C) sp
D) dsp

2. How many hybrid orbitals are formed in sp hybridization?

A) 2
B) 3
C) 4
D) 6

3. In acetylene (HCCH), each carbon uses sp hybridization. What bond angle?

A) 109.5
B) 120
C) 180
D) 90

4. Why do hybrid orbitals form better bonds than pure orbitals?

A) They have higher energy
B) They overlap more effectively
C) They have lower energy
D) They don't-pure orbitals are better

5. Carbon in methane (CH) forms 4 equivalent C-H bonds at 109.5 angles. What is the hybridization?

6. Ethene (CH) has each carbon forming a double bond with the other and 2 single bonds to hydrogens, with 120 angles. What hybridization?

7. Carbon in acetylene (HCCH) forms a triple bond using 1 s and 1 p orbital, with 180 angle. What is the hybridization?

8. Define: What is hybridization?

9. Define: What is sp hybridization?

10. Define: What is sp hybridization?

Answer Key

1. B) sp - 3 electron domains 3 hybrid orbitals sp hybridization with 120 angles.

2. C) 4 - sp = 1 s + 3 p = 4 total orbitals 4 hybrid orbitals.

3. C) 180 - sp hybridization linear geometry 180 bond angle.

4. B) They overlap more effectively - Hybrid orbitals are oriented for maximum overlap with adjacent atoms, creating stronger bonds.

5. Carbon has 1 s orbital and 3 p orbitals All 4 orbitals mix to form 4 sp hybrids Each hybrid points to a H atom at 109.5 (tetrahedral)

6. Each carbon uses 1 s orbital and 2 p orbitals 3 orbitals mix to form 3 sp hybrids The remaining p orbital forms the bond Triple geometry with 120 angles

7. Each carbon uses 1 s orbital and 1 p orbital 2 orbitals mix to form 2 sp hybrids Two remaining p orbitals form two bonds Linear geometry with 180 angle

8. The mixing of atomic orbitals to create new hybrid orbitals with different energies and orientations.

9. Mixing of 1 s and 3 p orbitals to create 4 equivalent hybrid orbitals oriented tetrahedrally (109.5).

10. Mixing of 1 s and 2 p orbitals to create 3 equivalent hybrid orbitals oriented trigonally (120).