

Molecular Geometry Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

Hint: Consider the repulsion between electron pairs.

What does VSEPR stand for?
Hint: Think about the principles of electron pair interactions.
 Valence Shell Electron Pair Repulsion ✓ Valence Shell Electron Pair Rotation Valence Shell Electron Pair Reaction Valence Shell Electron Pair ResonANCE
VSEPR stands for Valence Shell Electron Pair Repulsion.
Which of the following are considered electron domains?
Hint: Consider all types of electron pairs and bonds.
Lone pairs ✓ Single bonds ✓ Double bonds ✓ Triple bonds ✓
Electron domains include lone pairs, single bonds, double bonds, and triple bonds.
Single bonds ✓ Double bonds ✓ Triple bonds ✓



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Lone pairs occupy more space because they are localized on one atom and exert greater repulsive forces compared to bonding pairs, which are shared between two atoms.
ist the bond angles associated with the following molecular geometries:
lint: Think about the ideal angles for each geometry.
. Linear
180°
. Trigonal Planar
120°
. Tetrahderal
109.5°
The bond angles are 180° for linear, 120° for trigonal planar, and 109.5° for tetrahedral.
Part 2: Comprehension and Application



pair?
Hint: Consider the arrangement of electron pairs around the central atom.
LinearTrigonal PlanarTrigonal Pyramidal ✓
Bent
The molecular geometry is trigonal pyramidal.
Identify the molecular geometries that can result from sp3 hybridization.
Hint: Think about the types of geometries associated with four electron domains.
 □ Linear □ Tetrahderal ✓ □ Trigonal Pyramidal ✓ □ Bent ✓
The molecular geometries that can result from sp3 hybridization include tetrahedral, trigonal pyramidal, and bent.
Describe how the presence of lone pairs affects the bond angles in a trigonal pyramidal molecule compared to a tetrahedral molecule.
Hint: Consider the repulsion between lone pairs and bonding pairs.

Which molecular geometry is associated with a molecule that has three bonding pairs and one lone

In a trigonal pyramidal molecule, the bond angles are slightly less than 109.5° due to the greater repulsion from the lone pair compared to the tetrahedral geometry where all angles are 109.5°.

Given a molecule with the formula AX3E2, what is the expected molecular geometry?

Hint: Consider the arrangement of bonding and lone pairs.



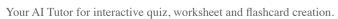
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\bigcirc	Linear
\bigcirc	Trigonal Bipyramidal
	T-shaped ✓
0	Octahedral
I	The expected molecular geometry is T-shaped.
Pro	edict the molecular geometry and bond angles for a molecule with the formula AX2E2.
Hir	t: Consider the effects of lone pairs on the geometry.
	Linear, 180°
	Bent, <120°
	Bent, <109.5° ✓
_	Trigonal Planar, 120°
	The molecular geometry is bent with bond angles less than 109.5°.
Аp	ply the VSEPR theory to predict the shape of the water molecule and explain your reasoning.
Hir	nt: Consider the number of bonding and lone pairs around the central atom.
	The water molecule is bent due to two bonding pairs and two lone pairs on the oxygen atom, which repel each other.
-	
Pa	art 3: Analysis, Evaluation, and Creation
Wł	nich of the following molecules has a trigonal planar geometry?
Hir	nt: Think about the arrangement of electron pairs around the central atom.
\bigcirc	CO2
\bigcirc	BF3 ✓



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_	NH3 H2O
I	The molecule with trigonal planar geometry is BF3.
An	alyze the following molecules and identify which have a bent geometry.
Hin	t: Consider the presence of lone pairs in the molecular structure.
	H2O ✓ CO2 SO2 ✓ CH4
	The molecules with bent geometry are H2O and SO2.
An pai	alyze the differences in molecular geometry between NH3 and CH4, focusing on the role of lone rs.
Hin	t: Consider how lone pairs affect the shape and angles.
	NH3 has a trigonal pyramidal shape due to one lone pair, while CH4 has a tetrahedral shape with no lone pairs, resulting in different bond angles.
Wr	ich molecule would likely have the smallest bond angle due to lone pair repulsion?
	t: Consider the effect of lone pairs on bond angles.
0	CH4 NH3 H2O √ BF3
	The molecule with the smallest bond angle is H2O due to the presence of two lone pairs.





th: Consider how lone pairs influence bond angles and molecular shape. Lone pairs increase bond angles. Lone pairs decrease bond angles. ✓ Lone pairs have no effect on molecular geometry. Lone pairs can cause deviations from ideal bond angles. ✓ Lone pairs decrease bond angles and can cause deviations from ideal bond angles. Lone pairs decrease bond angles and can cause deviations from ideal bond angles.
Lone pairs decrease bond angles. ✓ Lone pairs have no effect on molecular geometry. Lone pairs can cause deviations from ideal bond angles. ✓ Lone pairs decrease bond angles and can cause deviations from ideal bond angles. sign a hypothetical molecule with a trigonal bipyramidal geometry. Describe the types of atoms
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nt: Consider the arrangement of atoms in a trigonal bipyramidal structure.
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trigonal bipyramidal geometry.

Evaluate the following statements and select those that correctly describe the impact of lone pairs