

Molecular Geometry Quiz Answer Key PDF

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Which molecular geometry is characterized by a central atom with five bonding pairs?

A. Trigonal Bipyramidal ✓

B. Octahedral

C. Square Planar

D. Linear

What is the molecular geometry of carbon dioxide (CO₂)?

A. Bent

B. Trigonal Planar

C. Linear ✓

D. Tetrahedral

Describe the difference between electron pair geometry and molecular geometry.

The difference between electron pair geometry and molecular geometry is that electron pair geometry includes all electron pairs (bond and lone pairs) around the central atom, whereas molecular geometry only considers the arrangement of the bonded atoms.

In VSEPR theory, what is the effect of lone pairs on bond angles?

A. Lone pairs increase bond angles

B. Lone pairs have no effect on bond angles

C. Lone pairs decrease bond angles ✓

D. Lone pairs double bond angles

Which of the following molecules has an octahedral geometry?

A. SF₆ ✓

- B. PCl_5
- C. XeF_4
- D. CH_4

Discuss how molecular geometry affects the polarity of a molecule.

The polarity of a molecule is significantly affected by its molecular geometry, as the shape determines how bond dipoles are oriented and whether they cancel each other out.

Which of the following are considered when determining molecular geometry? (Select all that apply)

- A. Number of bonding pairs ✓**
- B. Number of lone pairs ✓**
- C. Electronegativity ✓**
- D. Atomic mass

What are the effects of lone pairs on molecular geometry? (Select all that apply)

- A. They increase bond angles
- B. They cause deviations from ideal geometry ✓**
- C. They have no effect on geometry
- D. They reduce bond angles ✓**

Which molecules have a bent shape? (Select all that apply)

- A. H_2O ✓**
- B. CO_2
- C. SO_2 ✓**
- D. NH_3

Which theory is primarily used to predict molecular geometry?

- A. Quantum Theory
- B. VSEPR Theory ✓**
- C. Molecular Orbital Theory
- D. Kinetic Molecular Theory

Which of the following shapes does water (H₂O) have?

- A. Linear
- B. Bent ✓**
- C. Trigonal Planar
- D. Tetrahedral

What is the bond angle in a tetrahedral molecule?

- A. 90°
- B. 109.5° ✓**
- C. 120°
- D. 180°

Which of the following molecules have a linear geometry? (Select all that apply)

- A. CO₂ ✓**
- B. HCN ✓**
- C. H₂O
- D. BeCl₂ ✓**

Provide an example of a molecule with a seesaw geometry and explain the factors that lead to this shape.

Sulfur tetrafluoride (SF₄) is an example of a molecule with a seesaw geometry, which is caused by one lone pair of electrons on the central sulfur atom that repels the bonding pairs, resulting in a distorted tetrahedral shape.

Why do lone pairs have a greater repulsive effect on bond angles compared to bonding pairs?

Lone pairs have a greater repulsive effect on bond angles compared to bonding pairs because they are localized around a single atom and occupy more space, resulting in increased repulsion.

How does the presence of lone pairs influence the physical properties of a molecule, such as boiling point?

The presence of lone pairs generally increases the boiling point of a molecule due to enhanced intermolecular forces, such as hydrogen bonding.

Explain how VSEPR theory is used to predict the shape of a molecule.

VSEPR (Valence Shell Electron Pair Repulsion) theory is used to predict the shape of a molecule by analyzing the number of bonding and lone pairs of electrons around the central atom, which arrange themselves in a way that minimizes repulsion, resulting in specific molecular geometries.

Which of the following molecules exhibit trigonal bipyramidal geometry? (Select all that apply)

- A. PCl_5 ✓
- B. SF_4 ✓
- C. ClF_3
- D. XeF_2

What are the characteristics of a trigonal planar molecule? (Select all that apply)

- A. 120° bond angles ✓
- B. Three bonding pairs ✓
- C. One lone pair
- D. Flat shape ✓

Which of the following molecules has a trigonal pyramidal shape?

- A. BF_3
- B. NH_3 ✓
- C. CH_4
- D. H_2O