



Molecular Geometries

Science Study Guide Version 3.1

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Molecular geometry describes the shapes that atoms make when they bond. You may find it helpful to look up diagrams of these shapes.

VSEPR: Valence Shell Electron Pair Repulsion theory, which predicts the ways in which the atoms in a compound connect to each other.

Steric number: The combined number of atoms and lone pairs bonded to a central atom.

Geometry	Steric Number	Details
<u>linear</u>	2 or 5	with a steric number of five, has two bonds and three lone pairs; bond angle of 180° ; an example is carbon dioxide (CO_2)
<u>trigonal planar</u>	3	steric number of three; bond angle of 120°
<u>bent</u>	3 or 4	with a steric number of three (two bonds and one lone pair), has a bond angle of 120° ; with a steric number of four (two bonds and two lone pairs), has a bond angle of 109.5° ; a very common example of the former is water (H_2O)
<u>tetrahedral</u>	4	bond angle of 109.5° ; examples include methane (CH_4) and ammonium (NH_4^+)
<u>trigonal pyramidal</u>	4	three bonds and one lone pair; bond angle of 109.5° ; an example is ammonia (NH_3)
<u>trigonal bipyramidal</u>	5	bond angles of 90° and 120°
<u>seesaw</u>	5	four bonds and one lone pair; bond angles of 90° and 120°
<u>T-shaped</u>	5	three bonds and two lone pairs; bond angle of 90°
<u>octahedral</u>	6	bond angle of 90°
<u>square pyramidal</u>	6	five bonds and one lone pair; bond angle of 90°
<u>square planar</u>	6	four bonds and two lone pairs; bond angle of 90° ; an example is xenon tetrafluoride (XeF_4)