



The **valence shell electron pair repulsion (VSEPR) model** described here focuses on the bonding and nonbonding electron pairs present in the outermost ("valence") shell of an atom that connects with two or more other atoms. These electrons occupy regions of space which we can visualize as **electron clouds**— regions of negative electric charge, also known as **orbitals**.

The covalent model of chemical bonding assumes that the electron pairs responsible for bonding are concentrated into the region of space between the bonded atoms. The fundamental idea of VSEPR theory is that these regions of negative electric charge will repel each other, causing them (and thus the chemical bonds that they form) to stay as far apart as possible. If the central atom also contains one or more pairs of **nonbonding** electrons, these additional regions of negative charge

VSEPR Molecular Shape Table

| Total # e ⁻ pairs on central atom (electron domains) | # atoms bonded to central atom | # lone pairs on central atom | geometry | Name of shape | example |
|---|--------------------------------|------------------------------|--------------------------------|------------------------|-------------------|
| 2 | 2 | 0 | AX ₂ | Linear | BeF ₂ |
| 3 | 3 | 0 | AX ₃ | Trigonal planar | BF ₃ |
| 3 | 2 | 1 | AX ₂ E ₁ | Angular | SnCl ₂ |
| 4 | 4 | 0 | AX ₄ | Tetrahedral | CCl ₄ |
| 4 | 3 | 1 | AX ₃ E ₁ | Pyramidal | NH ₃ |
| 4 | 3 | 0 | AX ₃ | Trigonal planar | SO ₃ |
| 4 | 2 | 2 | AX ₂ E ₂ | Angular | H ₂ O |
| 4 | 2 | 1 | AX ₂ E ₁ | Angular | SO ₂ |
| 4 | 2 | 0 | AX ₂ | Linear | CO ₂ |
| 5 | 5 | 0 | AX ₅ | Trigonal bipyramidal | PCl ₅ |
| 5 | 4 | 1 | AX ₄ E ₁ | Seesaw | SF ₄ |
| 5 | 3 | 2 | AX ₃ E ₂ | T-shaped | ClF ₃ |
| 5 | 2 | 3 | AX ₂ E ₃ | Linear | XeF ₂ |
| 6 | 6 | 0 | AX ₆ | Octahedral | SF ₆ |
| 6 | 5 | 1 | AX ₅ E ₁ | Square-based Pyramid | IF ₅ |
| 6 | 4 | 2 | AX ₄ E ₂ | Square planar | XeF ₄ |
| 7 | 7 | 0 | AX ₇ | Pentagonal bipyramidal | IF ₇ |

