**VSEPR**Unit 5 Page 21

**Learning Target:**

**I** **can** predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion theory

**Criteria for Success:**

**I can** explain VSEPR theory

**I can** predict the electron geometry or molecular geometry of a molecule using VSEPR theory for linear, trigonal planar, or tetrahedral electron pair geometries.

**Notes**

**VSEPR Theory**

1. V\_\_\_\_\_\_\_\_ S\_\_\_\_\_\_\_ E\_\_\_\_\_\_\_\_\_ P\_\_\_\_\_\_\_ R\_\_\_\_\_\_\_\_ (VSEPR) theory is a model used to predict the \_\_\_\_\_\_\_\_\_\_\_\_of individual molecules from the number of electron pairs surrounding their central atoms.
2. The premise of VSEPR is that the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ surrounding an atom tend to repel each other, and will therefore adopt an arrangement that\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ this repulsion. This will determine the \_\_\_\_\_\_\_\_ of the molecule.
3. The\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ will arrange themselves as far as possible from each other.
4. \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ repel themselves more than bonding pairs.
5. \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ bonds are treated as one pair or region.
6. The "\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_" of electron counting is commonly used when applying the VSEPR theory.
7. The A represents the \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ and always has an implied subscript one.
8. The X represents the number of \_\_\_\_\_\_\_\_\_\_\_\_ that are bonded to the central atom.
9. The E represents the number of \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ electrons surrounding the central atom.
10. Based on the steric number and distribution of X's(\_\_\_\_\_\_\_) and E's(\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_), VSEPR theory predicts the \_\_\_\_\_\_\_\_\_ of the molecules.

**Geometry of Molecules**

1. **1.** \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ is the geometry of the molecules describes the arrangement of \_\_\_\_\_\_\_ the atoms and lone pair electrons around the central atom.

**2.** \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ describes only the\_\_\_\_\_\_\_\_\_\_\_ around the central atom.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Molecule Type** | **Shape**[[10]](http://en.wikipedia.org/wiki/VSEPR_theory#cite_note-PetrucTable-10) | **Electron arrangement†**[[10]](http://en.wikipedia.org/wiki/VSEPR_theory#cite_note-PetrucTable-10) | **Geometry‡**[[10]](http://en.wikipedia.org/wiki/VSEPR_theory#cite_note-PetrucTable-10) | **Examples** |
| **AX2E0** | [Linear](http://en.wikipedia.org/wiki/Linear_(chemistry)) | [AX2E0-3D-balls.png](http://en.wikipedia.org/wiki/File:AX2E0-3D-balls.png) | [Linear-3D-balls.png](http://en.wikipedia.org/wiki/File:Linear-3D-balls.png) | [BeCl2](http://en.wikipedia.org/wiki/Beryllium_chloride), [HgCl2](http://en.wikipedia.org/wiki/Mercury(II)_chloride), [CO2](http://en.wikipedia.org/wiki/Carbon_dioxide) |
| **AX2E1** | [Bent](http://en.wikipedia.org/wiki/Bent_(chemistry)) | [AX2E1-3D-balls.png](http://en.wikipedia.org/wiki/File:AX2E1-3D-balls.png) | [Bent-3D-balls.png](http://en.wikipedia.org/wiki/File:Bent-3D-balls.png) | [SO2](http://en.wikipedia.org/wiki/Sulfur_dioxide) [O3](http://en.wikipedia.org/wiki/Ozone), [CCl2](http://en.wikipedia.org/wiki/Dichlorocarbene) |
| **AX3E0** | [Trigonal planar](http://en.wikipedia.org/wiki/Trigonal_planar) | [AX3E0-3D-balls.png](http://en.wikipedia.org/wiki/File:AX3E0-3D-balls.png) | [Trigonal-3D-balls.png](http://en.wikipedia.org/wiki/File:Trigonal-3D-balls.png) | [BF3](http://en.wikipedia.org/wiki/Boron_trifluoride), [SO3](http://en.wikipedia.org/wiki/Sulfur_trioxide) |
| **AX3E1** | [Trigonal pyramidal](http://en.wikipedia.org/wiki/Trigonal_pyramid_(chemistry)) | [AX3E1-3D-balls.png](http://en.wikipedia.org/wiki/File:AX3E1-3D-balls.png) | [Pyramidal-3D-balls.png](http://en.wikipedia.org/wiki/File:Pyramidal-3D-balls.png) | [NH3](http://en.wikipedia.org/wiki/Ammonia), [PCl3](http://en.wikipedia.org/wiki/Phosphorus_trichloride) |
| **AX4E0** | [Tetrahedral](http://en.wikipedia.org/wiki/Tetrahedral_molecular_geometry) | [AX4E0-3D-balls.png](http://en.wikipedia.org/wiki/File:AX4E0-3D-balls.png) | [Tetrahedral-3D-balls.png](http://en.wikipedia.org/wiki/File:Tetrahedral-3D-balls.png) | [CH4](http://en.wikipedia.org/wiki/Methane),  [TiCl4](http://en.wikipedia.org/wiki/Titanium_tetrachloride), [XeO4](http://en.wikipedia.org/wiki/Xenon_tetroxide) |
| **AX4E2** | [Square planar](http://en.wikipedia.org/wiki/Square_planar_molecular_geometry) | [AX4E2-3D-balls.png](http://en.wikipedia.org/wiki/File:AX4E2-3D-balls.png) | [Square-planar-3D-balls.png](http://en.wikipedia.org/wiki/File:Square-planar-3D-balls.png) | [XeF4](http://en.wikipedia.org/wiki/Xenon_tetrafluoride) |
| **AX5E0** | [Trigonal bipyramidal](http://en.wikipedia.org/wiki/Trigonal_bipyramidal_molecular_geometry) | [Trigonal-bipyramidal-3D-balls.png](http://en.wikipedia.org/wiki/File:Trigonal-bipyramidal-3D-balls.png) | [Trigonal-bipyramidal-3D-balls.png](http://en.wikipedia.org/wiki/File:Trigonal-bipyramidal-3D-balls.png) | [PCl5](http://en.wikipedia.org/wiki/Phosphorus_pentachloride) |
| **AX6E0** | [Octahedral](http://en.wikipedia.org/wiki/Octahedral_molecular_geometry) | [AX6E0-3D-balls.png](http://en.wikipedia.org/wiki/File:AX6E0-3D-balls.png) | [Octahedral-3D-balls.png](http://en.wikipedia.org/wiki/File:Octahedral-3D-balls.png) | [SF6](http://en.wikipedia.org/wiki/Sulfur_hexafluoride), [WCl6](http://en.wikipedia.org/wiki/Tungsten_hexachloride) |