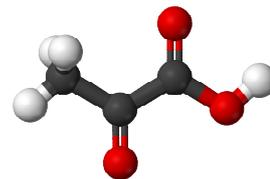


Name: _____ Date: _____
Chemistry

Class Notes

VSEPR Theory



There are two theories that describe covalent bonding. The **valence shell electron pair repulsion** (VSEPR) theory and the valence bond theory. The VSEPR theory helps to explain and predict the shapes of polyatomic ions and molecules but not how the bonds are formed. The **valence bond theory** explains how covalent bonding takes place by the combining of orbitals to create new orbitals with different shapes. Together, these two ideas help us understand the bonding, shapes and properties of many molecular substances and polyatomic ions.

Note: Ionic compounds do not form molecules. Ionic compounds are crystalline solids represented by formula units. A formula unit is the smallest ratio of the elements in an ionic compound,

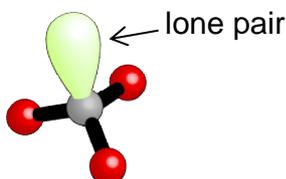
VSEPR Theory

The valence shell electron pair repulsion theory describes how the molecule or polyatomic ion shape is formed by the repulsion of the bonds and electron pairs (lone pairs). Remember bonds and electron pairs are both made of electrons and all electrons are negative which means bonds and electron pairs will repel each other. In doing so, the bonds and electron pairs will move as far away from each other as possible to create a more stable form, thus creating two types of geometry: electronic geometry and molecular geometry.

The **electronic geometry** is the shape formed by the arrangement of electron dense regions around a central atom. Since bonds are electrons this geometry includes both bonds and lone pairs. The **molecular geometry** is the shape formed only by the bonds and excludes the electron pairs.



electronic geometry



tetrahedral

molecular geometry



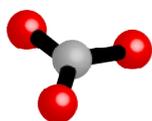
bonds only

trigonal pyramidal

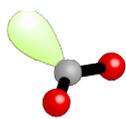
ELECTRONIC AND MOLECULAR GEOMETRIES

Molecules and polyatomic ions have definite shapes.

Trigonal Planar



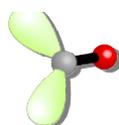
AB_2E_1



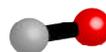
Angular



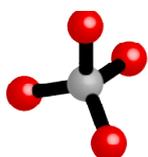
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Linear



Tetrahedral



AB_3E_1



Trigonal Pyramidal



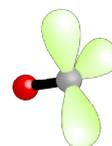
AB_2E_2



Angular



AB_1E_3



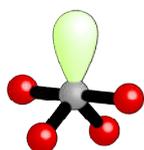
Linear



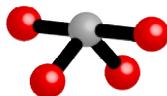
Trigonal Bipyramidal



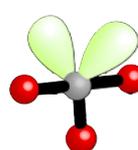
AB_4E_1



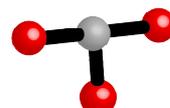
Seesaw



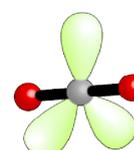
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T-shaped



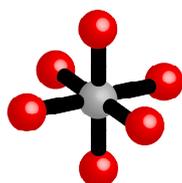
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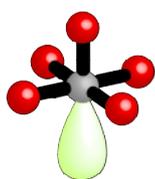
Linear



Octahedral



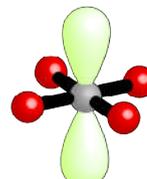
AB_5E_1



Square Pyramidal



AB_4E_2



Square Planar

