LEARNING AS ONE NATION

Expanded Project

SHS LEARNING ACTIVITY

Name: _____ **Score/Mark:** _____

Grade and Section: _____ **Date:** _____

Strand: ☐ STEM ☐ ABM ☐ HUMSS ☐ ICT (*TVL Track*)

Subject: *Physical Science (Chemistry)*

Type of Activity: ☑ Concept Notes ☐ Skills: Exercise/Drill ☐ Illustration ☐ Performance Task ☐ Essay/Report ☑ Others: Hands-on Exercises

Activity Title: **LA08: Molecular Geometry – The VSEPR Theory**

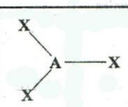
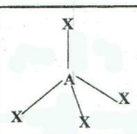
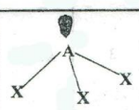
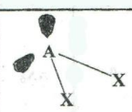
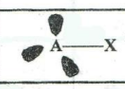
Learning Targets:
1) To explain the geometry of molecules.
2) To construct a molecular model.

References: (*Author, Title, Pages*)
1) Chang, R. *Chemistry*, 7th edition, pp. 369–380;
2) Magalona, M. L. *CVIF–DLP Learning Activities*

Molecular geometry – three-dimensional arrangement of atoms in a molecule.
- has a significant influence on the physical and chemical properties of molecules like melting point, boiling point, and reactivity.

Valence Shell Electron Pair Repulsion (VSEPR) Theory
- can be used to predict the geometry of molecules using Lewis structures.
- basis is the assumption that **electrons**, specifically those in the **valence shell**, **repel** each other.
- accounts the **geometric arrangements** of electron pairs around a central atom to minimize electrostatic repulsion, of which there are two types: i) **lone pairs** of electrons (**not in a bond**) and ii) **electrons in a bond**.
- double bonds (**=**) and triple bonds (**≡**) are treated like single bonds (**–**) for simplicity.

Summary of selected molecular geometries

Number of electron pairs	Number of lone pairs	Type of molecule	Geometry or Shape	Diagram	Example
2	0	AX_2	Linear	X—A—X	$BeCl_2$
3	0	AX_3	Trigonal Planar		BF_3
3	1	AX_2E	V-shaped		SO_2
4	0	AX_4	Tetrahedral		CCl_4
4	1	AX_3E	Trigonal Pyramidal		NH_3
4	2	AX_2E_2	V-shaped		H_2O
4	3	AXE_3	Linear		ICl

Legend:
A: *Central Atom* **X**: *Surrounding/Neighbor Atom* **E**: *Lone Electron Pair*

Hands-on Exercises:

Using materials such as clay, small styro balls, or any recyclable circular objects at home (at least two different sizes and/or in two different colors) and toothpicks or sticks, familiarize yourself with the geometries of molecules by creating models of each type of molecule.

Note that with the presence of lone electron pairs (**E**), the bonding electrons (in sticks) are pushed far away due to repulsion, thus resulting in a 'bent' configuration.

Submit one model of your liking for evaluation to your expert teacher.