

Name:

Period:

Seat#:

Purpose: To construct a series of compounds using the VSEPR model and to use your model to determine the type of bonding and hybridization, and the geometry around each **central** atom.

Background: The VSEPR model is based on the premise that electron pairs around a central atom will position themselves to allow for maximum separation. Instead of writing an actual Background Paragraph, just answer these questions below.

- 1) What does VSEPR stand for?
- 2) Name the seven different structural shapes
- 3) Explain why pairs of electrons around a central atom repel each other.

Materials:

- Styrofoam Balls - 2 different colors of Playdough - Protractor - Toothpicks - Color pencils/markers

Procedure: (*Steps with a * should be completed before you get to class. Steps with a ** should be completed after class.*)

1. * Draw Lewis Structure
2. * Determine the following for each atom:
 - a. Number of lone pairs and bond pairs around the central atom.
 - b. AXE formula (A center atom, X bonded atoms, E lone pairs)
 - c. Steric Number
3. * Using the information from Step 2 and a VSEPR chart (which should be memorized!), determine the following:
 - a. Electronic Geometry (*linear, trigonal planar, tetrahedral, trigonal bi-pyramidal, or octahedral*)
 - b. Molecular Geometry (*linear, trigonal planar, trigonal pyramidal, tetrahedral, bent, trigonal bi-pyramidal, or octahedral*)
 - c. Bond angle between the atoms attached to the central atom. (Based on the molecular geometry)
 - d. Type of hybridization of the central atom in each molecule – if any (sp , sp^2 , sp^3 , sp^3d)
4. Construct a 3D model for each compound or ion with the provided materials.
 - a. Use the Styrofoam balls as the center atoms (A), the Playdough for your outer atoms (X), and plain toothpicks as lone pairs (E).
 - b. Use one toothpick for single bonds, two toothpicks for double bonds, and three toothpicks for triple bonds.
 - c. Use your protractor to get the bond angles as close as possible – it's hard to do with playdough and toothpicks, that's ok!
 - d. Have someone from your group take a photo of your models, use the index cards to label each model.
 - i. ** Add photos to a Google Doc that will be turned in as a GROUP assignment! Detailed instructions will be given in class.
5. * or ** depending on timing in class - Sketch a 3D picture of your model.
 - a. Needs to show effort, be neat, accurate representation of bond angles, etc.

Dougherty Valley HS Chemistry
 Bonding and Structure – Molecular Geometry Activity

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
NO_3^-					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
SiCl_4					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
CO_2					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Dougherty Valley HS Chemistry
 Bonding and Structure – Molecular Geometry Activity

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
NCIH ₂					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
XeF ₄					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
CH ₂ O					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Dougherty Valley HS Chemistry
 Bonding and Structure – Molecular Geometry Activity

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
SF ₆					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
BF ₃					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
NO ₂ ⁻					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Dougherty Valley HS Chemistry
 Bonding and Structure – Molecular Geometry Activity

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
SF ₄					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
C/F ₃					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
BrF ₅					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Dougherty Valley HS Chemistry
 Bonding and Structure – Molecular Geometry Activity

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
N ₂					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Molecular Formula	AXE Formula	Lewis Structure	Electronic Geometry	Bond Angle	3D Sketch
NH ₄ ⁺					
# Bond Pairs	Steric Number		Molecular Geometry	Hybridization	
# Lone Pairs					

Done early? You can try doing these too!

CCl₄, NH₃, H₂O, SCl₂, I₃⁻, SO₂, ICl₄⁻, AsF₅, IF₄⁺, H₃O⁺, TeF₅⁻, HCN, IOF₅, BrF₃, SO₄²⁻, CO₃²⁻

Please clean up!

Put the playdough away in the cans, close the lids tightly.

Put toothpicks and Styrofoam balls back in the correct weigh boats.

Put everything back on the tray.