

VSEPR - TAKING A PBL APPROACH

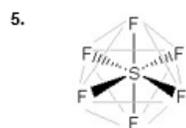
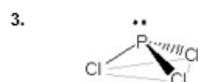
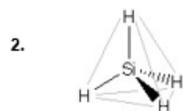
JANE KENNEDY (/USERS/JANE-KENNEDY)

I wanted an activity for students that would get them thinking about the shapes of molecules - and how they could connect this to their prior knowledge of Lewis diagrams and chemical bonding. I use a CPGS model in my classroom where students work in group with defined roles to assure accountability (Recorder, speaker, motivator/ time checker).

VSEPR THEORY: THE SHAPES OF MOLECULES

Warm Up

For this activity you need to work with a partner. The diagrams below show the 3 dimensional shapes of some different molecules. Your job is to describe the diagrams to your partner such that they can draw exact copies without seeing the original diagram. Good luck!



I had student begin with a warm up activity using white boards, and then used a video from Socratic (Tyler DeWitt) to introduce VSEPR shapes for linear, trigonal planar and tetrahedral molecules. I wanted them to learn about how to take notes from a video - I modeled this for them by creating a series of knowledge based questions that would assist in this.

Note:

In 1957 Ronald Gillespie brought new ideas about molecules to McMaster University in Hamilton and indeed the world! He, and a colleague, Ronald Nyholm, developed a model for predicting the shapes of molecules. This theory is called VSEPR theory

Video: As you watch the video fill in the blanks or circle the correct answers

1. VSEPR Theory stands for: _____

2. The fundamental principle of VSEPR is that pairs electrons pairs **attract / repel**
3. The atom in the centre of a molecule is referred to as the **central / middle atom**
4. The VSEPR shape of 3 atoms is _____; bond angles: _____
5. **T or F** It does not matter if the bonds between atoms are single, double or triple
6. **T or F** Carbon dioxide is an example of a linear VSEPR shape
7. **T or F** Beryllium and Boron are exceptions to the octet rule
8. The VSEPR shape of 4 atoms is _____; bond angles: _____
9. **T or F** CH_2O is an example of a Trigonal|Planar VSEPR shape
10. **T or F** Sulphur dioxide is a linear molecule
11. The shape of a molecule of SO_2 is _____. This is because one of the pairs on the central atom is a _____ instead of a bonding pair
12. **T or F** Lone pairs of electrons decrease the bond angle
13. The VSEPR shape of 4 atoms around the central atoms is _____.
The bond angles are _____
14. The VSEPR shape of NH_3 is _____ (bond angles _____).
15. **T or F** Water is an example of a tetrahedral molecule

I wanted students to learn how to represent their 2D Lewis structures in a 3D way - and then learn the conventions used in VSEPR for both inorganic and organic molecules.

Following the video, I had students use PHET - an online physics simulation to determine the names, bond angles, shapes and effect of lone pairs on the central atom: I had them compare this to their initial ideas and drawings.

Activity:

Draw Lewis diagrams for the compounds in the table below

Using PHET – a molecule modeling program - you will determine the VSEPR shapes and diagrams of molecules. Then, you will answer the questions on the next page.

| Molecular Formula & chemical name | Lewis diagram | AXE notation and name of shape | VSEPR diagram |
|--|---------------|--------------------------------|---------------|
| CS ₂ Carbon (IV) sulphide | | | |
| SO ₂ Sulphur dioxide | | | |
| SO ₃ Sulphur trioxide | | | |
| CCl ₄ Carbon (IV) chloride | | | |
| NH ₃ Ammonia | | | |
| H ₂ S Hydrogen disulphide | | | |



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COMMENTS



Varsha Patel

July 3 at 2:48pm

Hi Jane,

I like your activity and was wondering if you could create a Word document so that I can effectively save it for future reference. Thank you.

 [Permalink \(/comment/357#comment-357\)](/comment/357#comment-357)

RESOURCES

 [PHET \(https://phet.colorado.edu/en/simulation/molecule-shapes\)](https://phet.colorado.edu/en/simulation/molecule-shapes)

ELEMENT

 [Critical Thinking \(/expert-elements/critical-thinking\)](/expert-elements/critical-thinking)



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