Warm Up to Science

TEKS-Based Engagement Activities

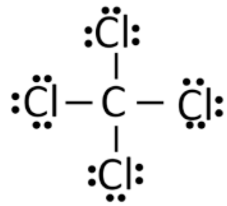
Chemistry

region4®

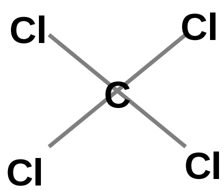
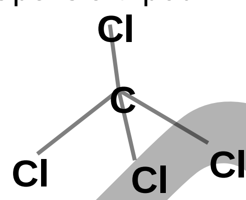
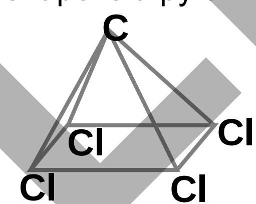
TEKS C.7: The student knows how atoms form ionic, metallic, and covalent bonds.
Student Expectation C.7E: The student is expected to predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.

Answer
Augie has the right idea. There are four pairs of electrons surrounding the central atom, and the tripod shape maximizes the distance between the electron pairs in the bonds.

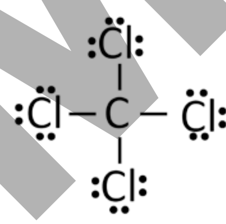
Teacher Notes
Students often struggle with translating a two-dimensional structural diagram to a three-dimensional shape. This is particularly problematic with the tetrahedral electron pair geometry. Since the bent, trigonal pyramidal, and tetrahedral molecular geometries all depend on the tetrahedral electron pair geometry, it is important that students understand how the molecular shapes relate back to the foundational tetrahedron. Students need to see and build models of compounds with the tetrahedron electron pair geometry and be able to see the effect that zero, one, or two lone pairs of electrons has on perceiving the molecular shape. Consider using balloons, gumdrops and toothpicks, and/or ball-and-stick models.



Three students in a lab group are discussing what shape the molecule above would take in real life. They know that the valence shell electron pairs around the central atom repulse each other, but they are not sure how that affects the structure of the molecule. Here's what they predicted.

Nick	Augie	Barry
I think the molecular shape is a flat square. 	I think the molecular shape is a tripod. 	I think the molecular shape is a pyramid. 

With which student do you agree the most? Explain why you agree.



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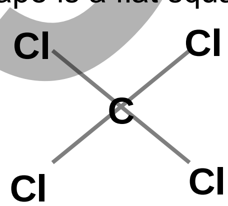
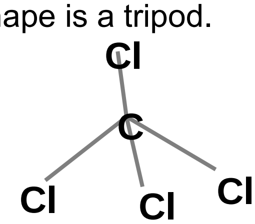
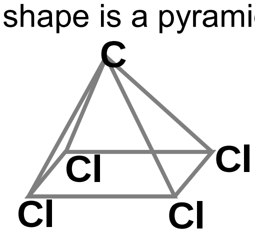
I think the molecular shape is a flat square. 	I think the molecular shape is a tripod. 	I think the molecular shape is a pyramid. 

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