

10B – LEWIS STRUCTURES AND VSEPR

Part 1 Analysis – Lewis structures of atoms

Table 1 – Lewis structures of atoms

Atom Symbol (draw Lewis structure here)	Total number of electrons in atom	Number of valence electrons	Number of lone pairs of electrons	Number of unpaired electrons	Number of bonds that can form	Model color for atom	Number of holes on model atom
H							
C							
N							
O							
P							
Cl							

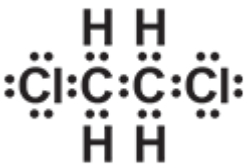



Part 1 Questions – Lewis structures of atoms

1. What is the relationship between bonds that can form and holes on the model atom?
2. Can different atoms have the same number of valence electrons? Use examples from your data table and explain how this is possible according to the periodic table.

3. Carbon is a key element in the formation of living things. Why is the number of bonds carbon makes important for living things?
4. Does the absence of holes on an atom always indicate the presence of lone pairs of electrons? Why or why not?

Part 2 Analysis – Lewis Structures of molecules

Table 2 – Lewis structures of molecules

Lewis Structure				
Structural formula				
Chemical Formula				

Part 2 Questions – Lewis structures of molecules

1. Which gives the most information about valence electrons, the Lewis structure or the molecular model?
2. Which gives the most information about the 3D structure of the molecule, the Lewis structure or the molecular model?

Part 3 Analysis – VSEPR

Table 3 – VSEPR

Chemical formula	Lewis Structure	Number of bonding electron domains	Number of non-bonding electron domains	Molecular shape of central atom
H ₂ O				
PCl ₃				
CO ₂				
CH ₄				
CH ₂ O				

Part 3 Questions – VSEPR

1. Molecules with 2 bonding electron domains on the central atom can be either linear or bent. Which molecules from Table 3 have 2 bonding electron domains? Which is linear and which is bent?

2. Molecules with 3 bonding electron clouds can be trigonal planar (flat) or trigonal pyramidal. Which molecules from Table 3 have 3 bonding electron domains? Which is trigonal planar, and which is trigonal pyramidal?
3. Compare the Lewis structures of the molecules you built. What causes the shape of a central atom to change from linear to bent, or from planar to pyramidal? Explain your answer.
4. Molecules with 4 bonding electron domains and 0 non-bonding electron domains have a tetrahedral shape. Which molecules from Table 3 have a tetrahedral shape?
5. For the molecule below, identify the geometry of each of the four central atoms (N, C, C, O) based on the electron domains. Verify your answer by building the molecule.

