

Number of Valence Electrons:

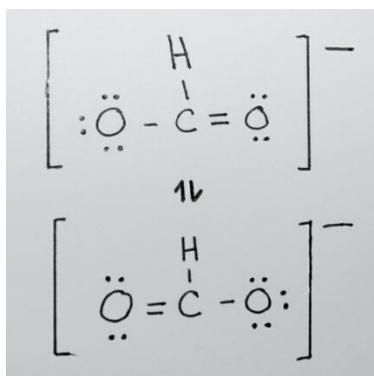
- How many valence electrons does CHO_2^- have? Use the periodic table to calculate the total and record your answer in **Data Table 1**.

Answer: 18 electrons. Carbon is in group IV of the periodic table; hydrogen is in group I; oxygen is in group VI. The negative charge indicates the presence of an additional electron. Thus, $\text{C} + \text{H} + \text{O}_2 + \text{e}^- = 4 + 1 + (2)6 + 1 = 18$ The total number of valence electrons in CHO_2^- is 18.

Lewis Structures:

- What is the Lewis structure for CHO_2^- ? Practice drawing the Lewis structure. Take a photo of the drawing and upload the image into **Photo 1**. (Hint: CHO_2^- has resonance structures, and there are two forms of the drawn molecule. Draw both structures.)

Answer:



VSEPR Models:

- Use your molecular modeling kit to create a CHO_2^- molecule. Although the molecule has two Lewis structures, you only need to build one molecule. After you have created the model, take a photo and insert the image into **Photo 2**.

Note: Consult Table 1 above to determine which pieces represent the C, H, and O atoms. To create a double bond, use **TWO** of the long, flexible gray connectors. To create a single bond,

use one of the short, inflexible connectors. Pink paddles represent lone pairs. The completed molecule should have no “open” or unfilled holes.

Answer:



Atoms:

- How many bonds and electron pairs surround the central atom? Record your answer in **Data Table 1**. If there is more than one interior atom, list each.

Answer: There is only one central (or interior) atom in this molecule. The carbon atom in the middle is the central atom- it is surrounded by two oxygen atoms and one hydrogen atom.

Carbon is surrounded by a total of three bonds: 1 double bond + 2 single bonds. A double bond contains 4 electrons; a single bond contains 2 electrons. There are no lone pairs around the carbon atom.

Since the molecule only has one central atom, only one description is needed.

Geometry:

- Identify the molecular geometry of the molecule. Refer to Figure 11 as needed.
Record your answer in **Data Table 1**.

Answer: Trigonal planar

The central atom of CHO_2^- is carbon. By comparing the structure around the carbon atom to the diagrams in Figure 11, it may be concluded that the molecular geometry is trigonal planar. Note that lone pairs (pink paddles) are disregarded when determining the molecular geometry.

Since the molecule only has one central atom, there is only one geometry. For molecules with more than one internal atom, more than one geometry must be identified.