

LEWIS STRUCTURES WITH RESONANCE

EVIDENCE NOTEBOOK

KEY IDEAS

1. Bond lengths and strengths

a. Complete the table below for a carbon-carbon bond:

Bond Type	Length (pm)	Bond Energy (kJ/mol)	Visual Illustration
Single			
Double			
Triple			

b. (Circle the best choice) Single bonds are shorter | longer than double bonds and have more | less energy.

c. (Circle the best choice) Triple bonds are shorter | longer than double bonds and have more | less energy.

2. Carbonate CO_3^{2-} example

a. Draw the Lewis Structure for carbonate CO_3^{2-} (try to do this before looking at the answer on the video):

b. In terms of length and strength, the diagram above indicates that one carbon-oxygen bond is shorter | longer and has more | less energy than the other two carbon-oxygen bonds.

c. In this case, the Lewis Structure does not model the proper characteristics of CO_3^{2-} . In reality, all three carbon-oxygen bonds:

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- d. The actual length of the carbon-oxygen bond in CO_3^{2-} is shorter | longer than a single bond AND shorter | longer than a double bond.
- e. The actual strength of the carbon-oxygen bond in CO_3^{2-} has more | less energy than a single bond AND more | less energy than a double bond.
- f. Illustrate the proper model for CO_3^{2-} that includes resonance:

3. Resonance

- a. Resonance is an illustration of all of the possible ways that the _____ could be distributed.
- b. Resonance illustrates that all of the different electron configurations actually exist at once. This is represented with a _____ between the different diagrams.
- c. Resonance can only occur when there are _____ or _____ bonds. They can not occur when there are only _____ bonds in the molecule.
- d. If you can rearrange the electrons to illustrate different bonds on different atoms, you must draw _____ of the variations and add a _____ between the pictures to represent resonance.

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GUIDED PRACTICE

Try to solve the following before viewing the answers on the video

1. Nitrite NO_2^-

2. Nitrate NO_3^-

3. Ozone O_3

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CHECKPOINTS

1. SO_2

2. CH_2N_2 (Hint, the structure's order looks like: CH_2-N-N)

3. $C_3H_5^-$ (Hint, the structure's order looks like: $CH_2-CH-CH_2$)