Name: _____ Date:_____ Hour: _____

Molecular Polarity Lab
https://goo.gl/zQkLwf

Go to the website listed above. Click the play symbol on the simulation.

Part 1: Two Atom Investigation

- ❏ Click the keep the box for bond dipole checked and check the boxes to show the partial charges and the bond character
- ❏ Keep the electronegativity of A at low and increase and decrease the electronegativity of atom B. Observe the arrow, partial charge and bond character. Fill in the following observation

  As the electronegativity of atom B increases the...

  arrow _____

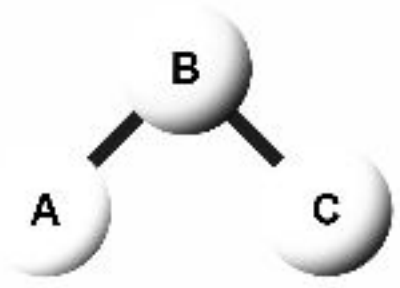
  partial charges _____

  bond character _____

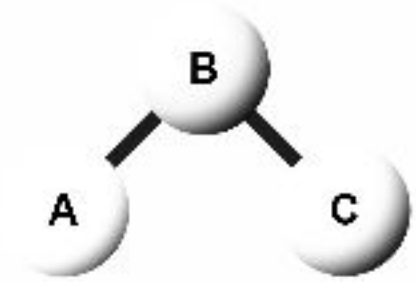
- ❏ Now put the electronegativity for A to the middle and vary the electronegativity of B and observe the results.
  Fill in the following information.
  - The polarity arrow always points to the _____ electronegative atom.
  - The partial positive charge is always on the _____ electronegative atom.
  - The larger the electronegativity difference the more _____ the bond character.

Part 2: Three atom Investigation

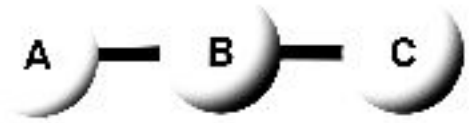
- ❏ Keep the original "bent" arrangement of atoms and set the electronegativities of A and C to low and B to middle. Click to show the bond dipoles, molecular dipoles and partial charges.
  - ❏ Draw the bond dipoles on the bonds in the diagram
  - ❏ In a different color show the overall molecular dipole in the diagram
  - ❏ Draw the partial charge symbols in another color in the diagram.
  - ❏ Click the electric field on. Describe what happened to the molecule - be very specific.



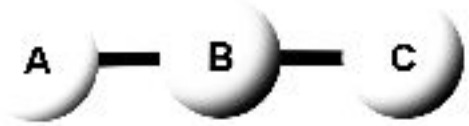
- Click the reset button.  Keep the "bent" arrangement of atoms and set the electronegativities of A and C to high and B to middle. Click to show the bond dipoles, molecular dipoles and partial charges.
  - Draw the bond dipoles on the bonds in the diagram
  - In a different color show the overall molecular dipole in the diagram
  - Draw the partial charge symbols in another color in the diagram.
  - Click the electric field on. Describe what happened to the molecule - be very specific.



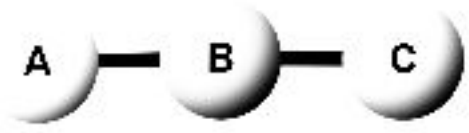
- Click the reset button.  Change the arrangement of atoms to a "linear" arrangement (see below) and set the electronegativities of A and C to high and keep B to middle. Click to show the bond dipoles, molecular dipoles and partial charges.
  - Draw the bond dipoles on the bonds in the diagram
  - In a different color show the overall molecular dipole in the diagram
  - Draw the partial charge symbols in another color in the diagram.
  - Click the electric field on. Describe what happened to the molecule - be very specific.



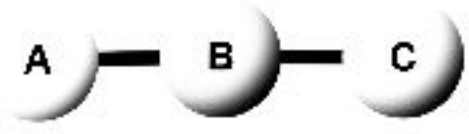
- Take off the electric field. Rotate the molecule to keep the "linear" arrangement (see below) and set the electronegativities of A to high, keep B to middle and set C to low. Click to show the bond dipoles, molecular dipoles and partial charges.
  - Draw the bond dipoles on the bonds in the diagram
  - In a different color show the overall molecular dipole in the diagram
  - Draw the partial charge symbols in another color in the diagram.
  - Click the electric field on. Describe what happened to the molecule - be very specific.



- ❏ Take off the electric field. Rotate the molecule to keep the "linear" arrangement (see below) and set the electronegativities of A and C to low and keep B to middle and set C to low. Click to show the bond dipoles, molecular dipoles and partial charges.
  - ❏ Draw the bond dipoles on the bonds in the diagram
  - ❏ In a different color show the overall molecular dipole in the diagram
  - ❏ Draw the partial charge symbols in another color in the diagram.
  - ❏ Click the electric field on. Describe what happened to the molecule - be very specific.



- ❏ Take off the electric field. Rotate the molecule to keep the "linear" arrangement (see below) and set the electronegativities of A, Band C to middle. Click to show the bond dipoles, molecular dipoles and partial charges.
  - ❏ Draw the bond dipoles on the bonds in the diagram
  - ❏ In a different color show the overall molecular dipole in the diagram
  - ❏ Draw the partial charge symbols in another color in the diagram.
  - ❏ Click the electric field on. Describe what happened to the molecule - be very specific.



Summary

Summarize what you learned by answering the following questions.

1. Which way do the bond arrows point?

2. Can a molecule have bond dipoles but not have a molecular dipole? Explain.

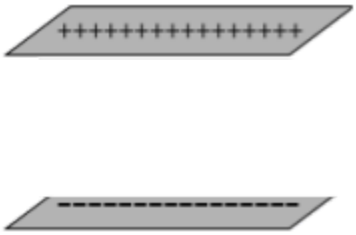
3. What happens when a molecule with a dipole is put in an electric field? Be specific.

Part 3: Real Examples

You will now apply what you learned to real molecules. The real molecules does not work on the simulation so just apply what you know.

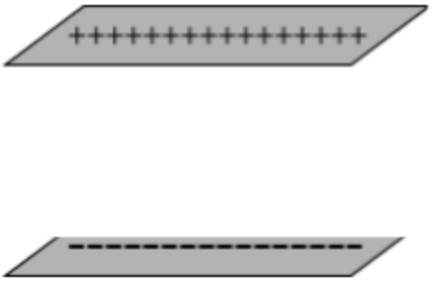
HF - The ball and stick structure for HF is shown. Answer the following and do what is asked

- ❏ Which atom is more electronegative? _____
- ❏ Draw a bond polarity arrow (bond dipole)
- ❏ Draw the partial charges on the molecule
- ❏ Would you expect this to move in an electric field? Draw it in the field provided.



H_2O - The ball and stick structure for H_2O is given. Answer the following and do what is asked.

- ❏ Which atom is more electronegative? _____
- ❏ Draw a bond polarity arrow (bond dipole)
- ❏ Place partial charges on the molecule
- ❏ In a different color draw a molecular dipole arrow.
- ❏ Would you expect this to move in an electric field? Draw it in the field provided.



CO_2 - The ball and stick structure for CO_2 is given. Answer the following and do what is asked.

- ❏ Which atom is more electronegative? _____
- ❏ Draw a bond polarity arrow (bond dipole)
- ❏ Place partial charges on the molecule
- ❏ In a different color draw a molecular dipole arrow.
- ❏ Would you expect this to move in an electric field? Draw it in the field provided.