

## MOLECULAR MODEL KIT

Student Worksheet  
CAT. NO. MOD-1

You will construct models to understand the three dimensional arrangements of atoms in molecules using the materials in this kit.

Each packet of plastic models contains:

- 2 Black tetrahedral carbon centers
- 2 Blue tetrahedral nitrogen centers
- 6 Green univalent chlorine centers
- 4 Red diunivalent oxygen centers
- 1 Yellow diunivalent sulfur center
- 8 White univalent hydrogen centers
- 20 Plastic bond connectors
- 4 Flexible connectors

### PROCEDURE:

As directed by your teacher, you are to use the electron-dot system or the short line (-) to diagram the molecular structures following. Remember that the dot or line represents a sharing of electrons between atoms (covalent bond).

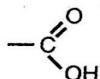
ie: Hydrogen atom H<sup>·</sup> or H-  
Oxygen atom O<sup>·</sup> or O-

1. Write the structural formula for a molecule of Methane gas (CH<sub>4</sub>) using either the dot or line method. Construct the model.
2. Do the same for the following models: You may have to take apart one model before making the next.
  - A. Methyl chloride (CH<sub>3</sub>Cl)
  - B. Water (H<sub>2</sub>O)
  - C. Hydrogen sulfate (H<sub>2</sub>S)
  - D. Carbon dioxide (CO<sub>2</sub>)
  - E. Hydrogen chloride (HCl)
  - F. Trichloromethane (CHCl<sub>3</sub>)
  - G. Ammonia (NH<sub>3</sub>)
3. Acids can donate a proton, H<sup>+</sup>, and a base can accept a proton. Use the hydrogen atom center to represent a proton. Show the reaction below by using the molecular model pieces:



Construct a model of ethanoic (acetic) acid which represents a simple organic acid. (CH<sub>3</sub>CO<sub>2</sub>H)

Note that the organic acids are characterized by the presence of the functional group -COOH as shown:



This is also known as the CARBOXYL GROUP

Thus all organic acids have the following general formula: R-COOH.