
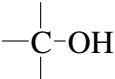

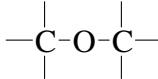
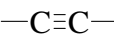
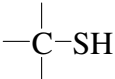
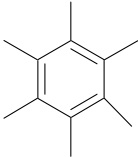

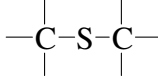

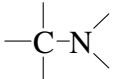
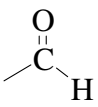
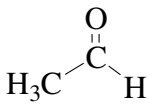
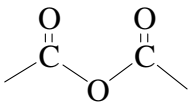
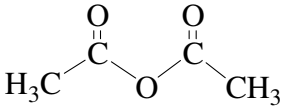
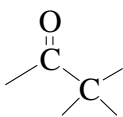
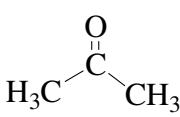
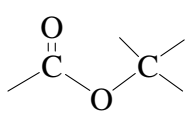
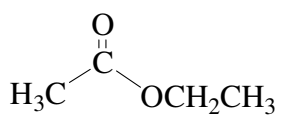
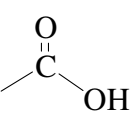
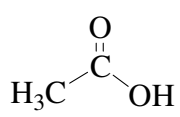
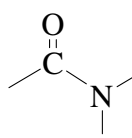
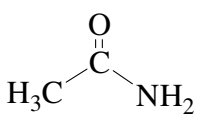
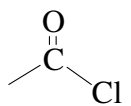
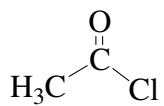
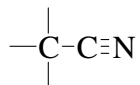
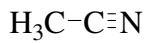


Functional Groups

A **functional group** is a defined grouping of atoms in an organic molecule. A given functional group exhibits a characteristic set of chemical properties, which are largely independent of the rest of the structure of the molecule in which it is found. As a consequence, an understanding of the chemical behavior of the functional groups allows one to predict the reactivity of a wide variety of organic molecules.

We will encounter numerous functional groups throughout our study of organic chemistry. A few of the more important ones are listed in the table below (continued on the next page). At this stage, it is most important for you to learn to recognize the general structures associated with these functional groups. In each case, a simple example is provided as an illustration. (Note: A line indicates a single bond to carbon or hydrogen.)

| <u>Functional Group – General Structure</u> | <u>Example</u> | <u>Functional Group – General Structure</u> | <u>Example</u> |
|---|---|--|--|
|  | CH ₃ CH ₃ |  | CH ₃ CH ₂ OH |
| Alkane | Ethane | Alcohol | Ethanol |
|  | CH ₂ =CH ₂ |  | CH ₃ OCH ₂ CH ₃ |
| Alkene | Ethylene | Ether | Ethyl methyl ether |
|  | H-C≡C-H |  | CH ₃ CH ₂ SH |
| Alkyne | Acetylene | Thiol | Ethanethiol |
|  |  |  | CH ₃ SCH ₃ |
| Aromatic Ring (Arene) | Benzene | Sulfide | Dimethyl sulfide |
|  | CH ₃ CH ₂ Br |  | CH ₃ CH ₂ NH ₂ |
| (X = F, Cl, Br, I) | | Amine | Ethylamine |
| Alkyl Halide | Ethyl bromide | | |

| <u>Functional Group – General Structure</u> | <u>Example</u> | <u>Functional Group – General Structure</u> | <u>Example</u> |
|---|--|---|--|
|  Aldehyde |  Acetaldehyde |  Acid anhydride |  Acetic anhydride |
|  Ketone |  Acetone |  Ester |  Ethyl acetate |
|  Carboxylic acid |  Acetic acid |  Amide |  Acetamide |
|  Acid chloride |  Acetyl chloride |  Nitrile |  Acetonitrile |

Since the ability to recognize these functional groups, particularly when they are incorporated into a larger, more complicated molecule, is so important, you should learn the names and general structures of all of the functional groups on this handout as soon as possible.