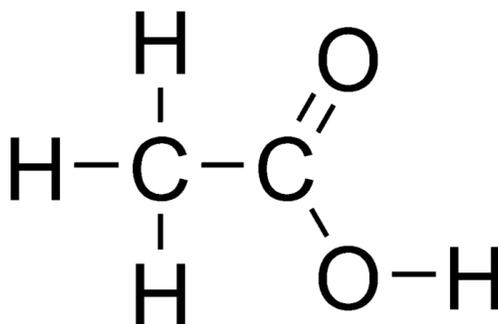


**Carboxylic Acids (R-COOH) and Esters (R-COOR')**

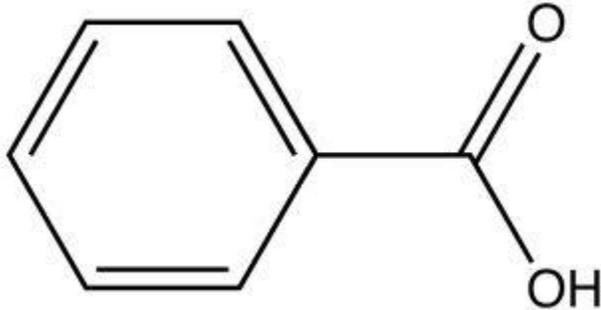
1. **Carboxylic acids** are characterized by the presence of a terminal carboxyl group. The carboxyl group is a combination of the carbonyl group and a hydroxyl group on the same C atom in an organic compound, R-COOH.

Carbonyl group	Hydroxyl group	Carboxyl group

2. Predict the polarity and water-solubility of carboxylic acids, such as ethanoic acid, aka acetic acid or vinegar, imaged below.



3. Carboxylic acids can be produced from the oxidation of an aldehyde (which (recall) was produced by the oxidation of a primary alcohol). They are named "*alkyl-oic acid*", as in

Benzoic acid	Methanoic acid
	$  \begin{array}{c}  \text{O} \\     \\  \text{H}-\text{C}-\text{O}-\text{H}  \end{array}  $

4. Some other interesting, important, or common carboxylic acids are fatty acids, vitamin C, pyruvic acid, ASA, and lactic acid.  
✓ Try p.60#1,2.
5. Show how oxidation of methanol produces methanal (formaldehyde) and then methanoic acid, or formic acid (ant juice).

6. **Esters** are characterized by an alkyl group with an attached alkylated carboxyl group. Compare a carboxyl group with an alkylated carboxyl group below.

carboxyl group	alkylated carboxyl group

7. Esters can be prepared in a condensation reaction (in which a water molecule is removed) of a carboxylic acid with an alcohol. The OH from the carboxyl group is removed with the H from the alcohol's hydroxyl group to form water. The carboxylic acid fragment is joined to the alcohol fragment across the alcohol's hydroxyl group's O atom. The resulting ester is named "*alcohol\_alkyl\_group carboxylic\_acid\_alkyl\_group-oate*".  
✓ Try p.66#11,12
8. Condense these carboxylic acids with the alcohols to form esters. Draw and name all structures.
- a) benzoic acid + ethanol  
b) octanoic acid + methanol

#### Chapter 2 Polymerization

- a) Read about the polymerization of esters to form polyester in section 2.2  
b) p.82 #1-3  
c) Use the reaction pathway on p.83 to plan a way to synthesize ethyl methanoate.