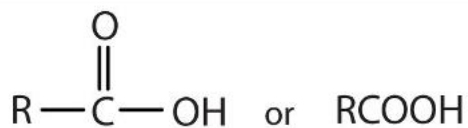
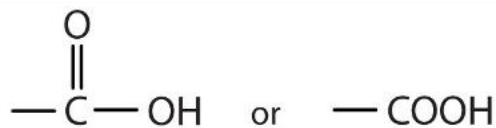


HW 22

Carboxylic acids – organic compounds containing carboxyl group COOH, note that the central carbon of the functional group is doubly bonded to the oxygen atom and singly bonded to hydroxyl group.

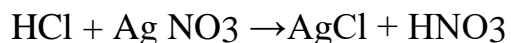
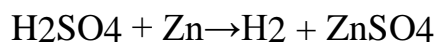


A carboxylic acid



A carboxyl group

Remember that **Acids** can provide H^+ (proton) for reactions with other compounds.

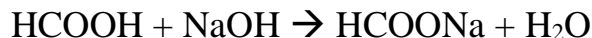


In water solution acids dissociate:



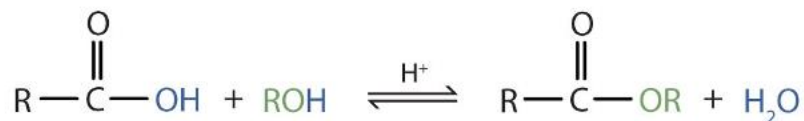
Acids undergo neutralization reaction with bases, the products of this reaction water and corresponding salt.

Carboxylic acids as well as inorganic acids provide proton for chemical reactions. In the solution carboxylic acids will undergo ionization with the formation of proton and negatively charged ion. This proton comes from **OH** group, and carboxylic acid will participate in all reactions typical for acids. For example, neutralization reaction will look like this:



The product of the reaction is corresponding salt, it is ionic compound, generally charges are indicated HCOO^-Na^+

One of the specific reactions for carboxylic compounds – esterification reaction



R in organic chemistry represent “the rest of the molecule, part of the molecule that is outside of the functional group (it can be any alkyl group, benzene ring etc.)

Esterification reaction – reaction between carboxylic acid and alcohol, the product is ester, the products have very distinct smell, it can smell like different fruits.

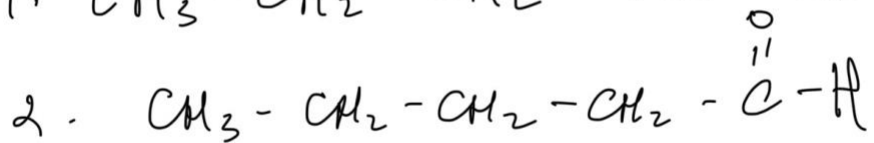
The names and chemical formulas for carboxylic acids you can see in the following table:

Formula	Common Name	Source	IUPAC Name	Melting Point	Boiling Point
HCO ₂ H	formic acid	ants (L. formica)	methanoic acid	8.4 °C	101 °C
CH ₃ CO ₂ H	acetic acid	vinegar (L. acetum)	ethanoic acid	16.6 °C	118 °C
CH ₃ CH ₂ CO ₂ H	propionic acid	milk (Gk. protus prion)	propanoic acid	-20.8 °C	141 °C
CH ₃ (CH ₂) ₂ CO ₂ H	butyric acid	butter (L. butyrum)	butanoic acid	-5.5 °C	164 °C
CH ₃ (CH ₂) ₃ CO ₂ H	valeric acid	valerian root	pentanoic acid	-34.5 °C	186 °C
CH ₃ (CH ₂) ₄ CO ₂ H	caproic acid	goats (L. caper)	hexanoic acid	-4.0 °C	205 °C
CH ₃ (CH ₂) ₅ CO ₂ H	enanthic acid	vines (Gk. oenanthe)	heptanoic acid	-7.5 °C	223 °C
CH ₃ (CH ₂) ₆ CO ₂ H	caprylic acid	goats (L. caper)	octanoic acid	16.3 °C	239 °C
CH ₃ (CH ₂) ₇ CO ₂ H	pelargonic acid	pelargonium (an herb)	nonanoic acid	12.0 °C	253 °C
CH ₃ (CH ₂) ₈ CO ₂ H	capric acid	goats (L. caper)	decanoic acid	31.0 °C	219 °C

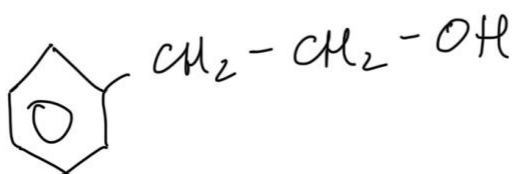
Remember that typical writing for carboxylic acids goes like this RCOOH, formic acid HCOOH, acetic acid CH₃COOH, C₂H₅COOH propanoic acid etc.

Questions:

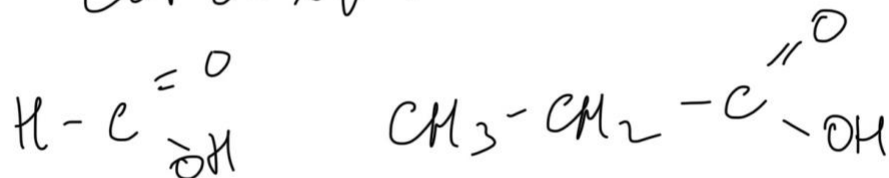
I. Draw the condensed structural formula of the carboxylic acid formed by the oxidation of the following substances



3.



II Write ionization equation for the following carboxylic acids in water



III Write neutralization reaction for the same acids. (see II)