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Organic Chemistry

Why study organic chemistry?

Organic chemistry is everywhere! All living things are made of organic compounds, like food and humans. Also without the study of organic chemistry modern day life would be very different. For example, most medicines are made of organic compounds such as antibiotics, anticancer drugs, painkillers etc.

What is organic chemistry?

Organic chemistry is the study of compounds that contain carbon. However, there are some examples of compounds that have carbon but are inorganic. Ex. CO_2, CO, and carbonates (CO_3^{2-}).

Carbon is a very versatile element because it can have four bonds, so it can create bonds with many different elements. Generally, in organic compounds carbon atoms will be bonded to a hydrogen atom, but they can easily form bonds with nitrogen, oxygen, sulfur, phosphorous, and nitrogen.

Is it organic or inorganic?

Table 5.7 Comparing Formulas of Organic Compounds and Inorganic Compounds

Organic: Must Contain Carbon		Inorganic Containing Carbon
CH_4	methane (a hydrocarbon)	$CaCO_3$, Na_2CO_3 (carbonates)
CH_3CH_2OH	ethanol (an alcohol)	Al_4C_3, SiC (carbides)
C_6H_5COOH	benzoic acid (an organic acid)	CO, CO_2 (oxides)
$K_2HC_6H_5O_7$	potassium citrate (an organic salt)	**Inorganic Not Containing Carbon**
$C_8H_{10}N_4O_2$	caffeine (a stimulant)	$FeCl_2$
$CH_3(CH_2)_nCH_3$	polyethylene (a plastic) where $n = 5000$ approximately and the CH_2 unit repeats about 5000 times	$(NH_4)_2SO_3$
		PBr_3

Name: _____
Date: _____ Blk: __

What difference do you notice between the organic compounds and the inorganic compounds?

_____

_____

_____

Important:

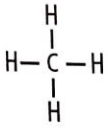
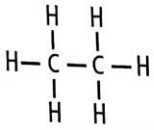
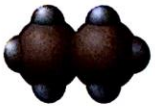
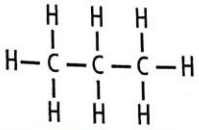
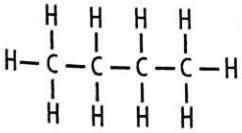
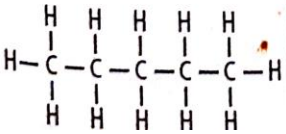
In organic chemistry, the hydrogen will always go after the carbon when writing formulas. For example, methane is always CH_4 and never H_4C.

What type of compound has hydrogen at the front of the formula? _____

Hydrocarbons

A hydrocarbon is an organic compound that only contains carbon and hydrogen. Hydrocarbons are the simplest examples of organic compounds.

Table 5.8 The First Five Hydrocarbons

Name	Molecular Formula	Structural Formula	Shortened Structural Formula	Space-Filling Model	Common Uses
methane	CH_4		CH_4		• Natural gas heaters
ethane	C_2H_6		CH_3CH_3		• Manufacturing plastic
propane	C_3H_8		$CH_3CH_2CH_3$		• Camp fuel
butane	C_4H_{10}		$CH_3CH_2CH_2CH_3$		• Hand-held lighters
pentane	C_5H_{12}		$CH_3CH_2CH_2CH_2CH_3$		• Component of gasoline

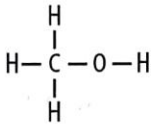
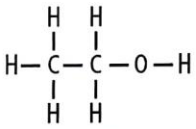
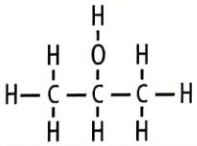
Note: all hydrocarbons are flammable, which is why they tend to be used as fuels.

Name: _____
Date: _____ Blk: __

Alcohols

Alcohols are another type of organic compound. They are very similar to hydrocarbons, but they contain carbon, hydrogen, and oxygen.

Table 5.9 Some Common Alcohols

Name	Molecular Formula	Structural Formula	Shortened Structural Formula	Space-Filling Model	Common Use
methanol	CH_4O		CH_3OH		• Solvent
ethanol	C_2H_6O		CH_3CH_2OH		• Fuel
isopropyl alcohol	C_3H_8O		$(CH_3)CH_2OH$		• Sterilizer • Cleaner

What pattern do you notice about the naming of alcohols?

_____

_____