Organic Chemistry Lesson 2

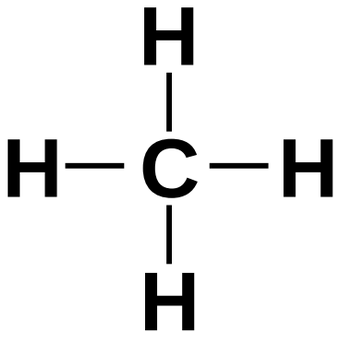
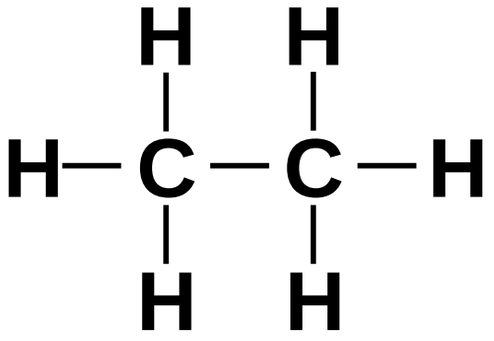
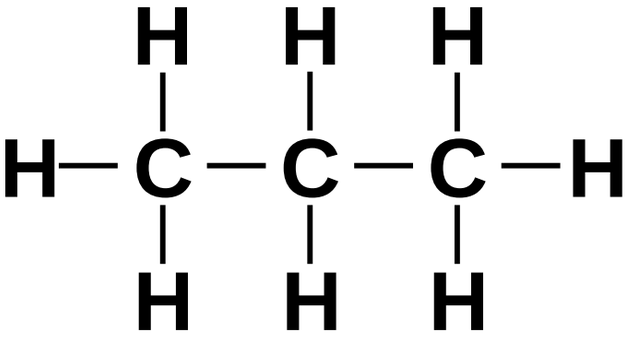
Alkanes

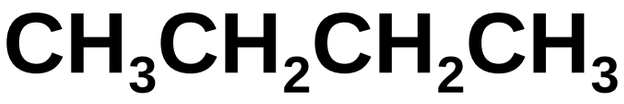
Primary Learning Goals

I can use IUPAC conventions to write systematic names and draw structures for alkanes and alkyl halides.

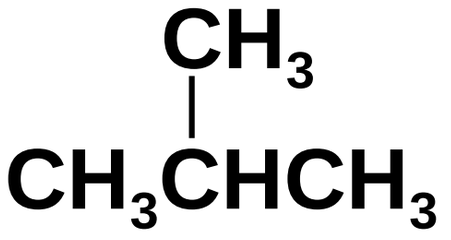
I can name, describe, and recognise various chemical reactions involving alkanes, and predict the products of these reactions.

STRUCTURE AND NOMENCLATURE OF ALKANES

STRUCTURE			
CONDENSED STRUCTURE	CH_4	CH_3CH_3	$CH_3CH_2CH_3$
FORMULA	CH_4	C_2H_6	C_3H_8
NAME	**methane**	**ethane**	**propane**



C_4H_{10}

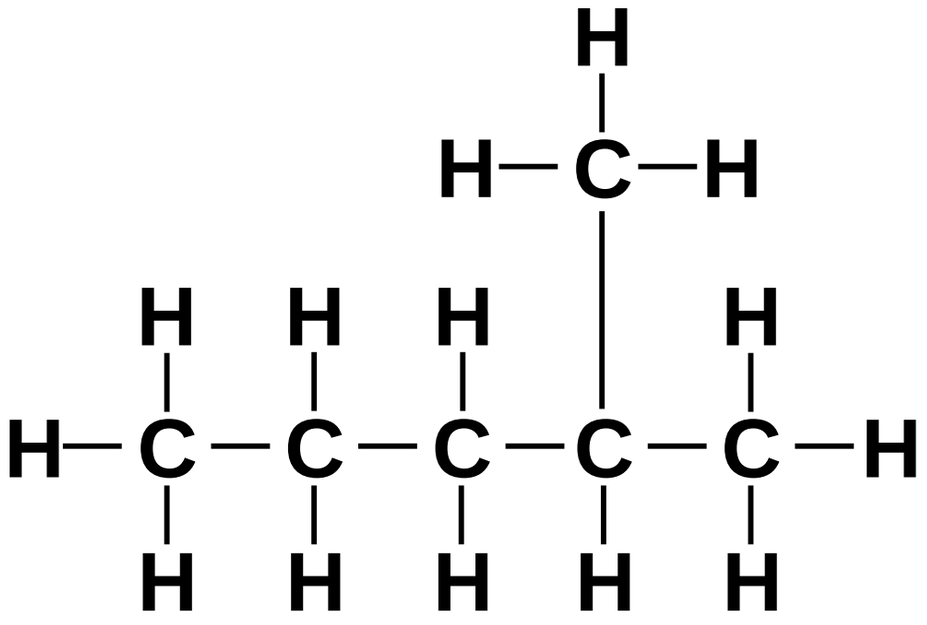


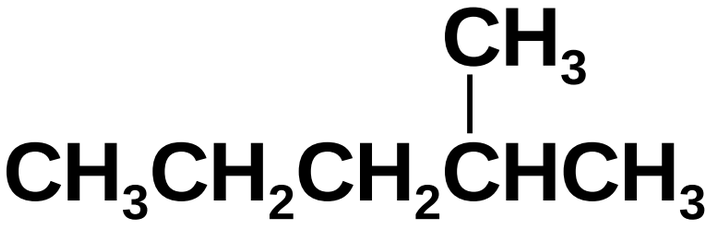
C_4H_{10}

STRUCTURAL ISOMERS

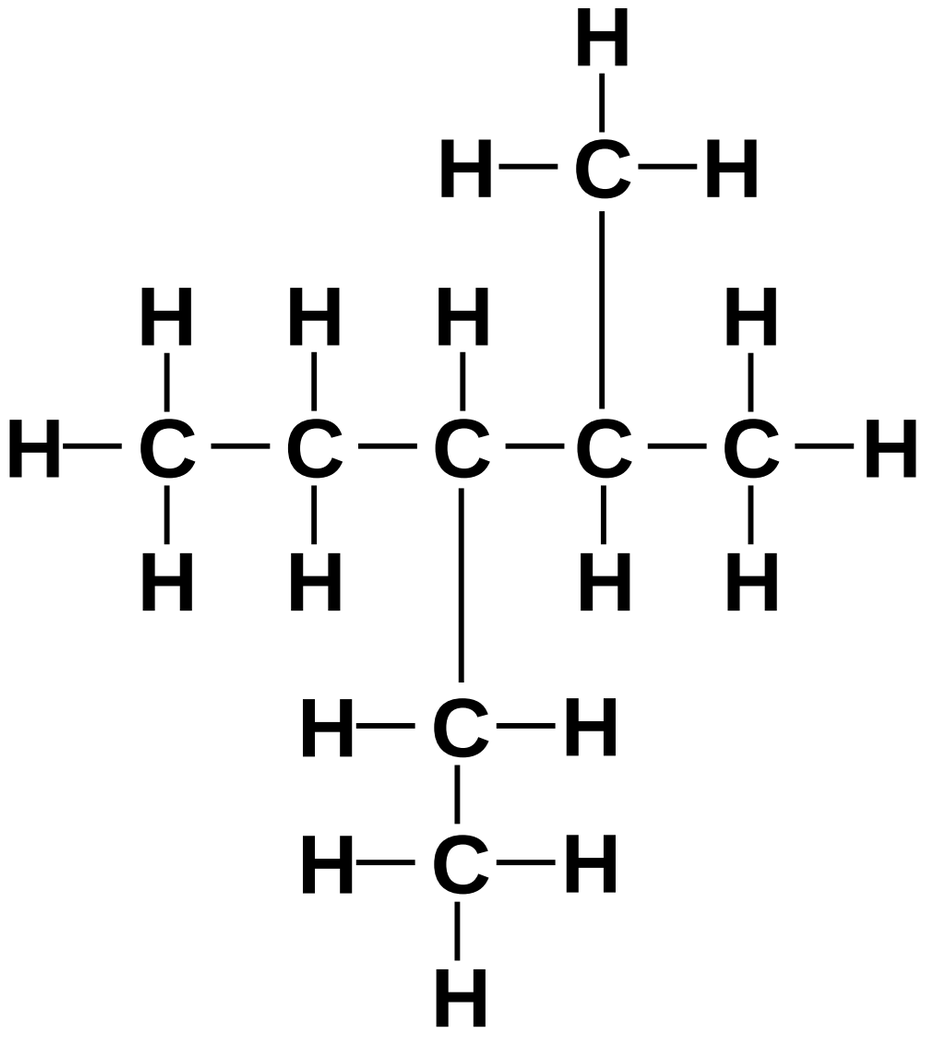
Same formula; different structures.

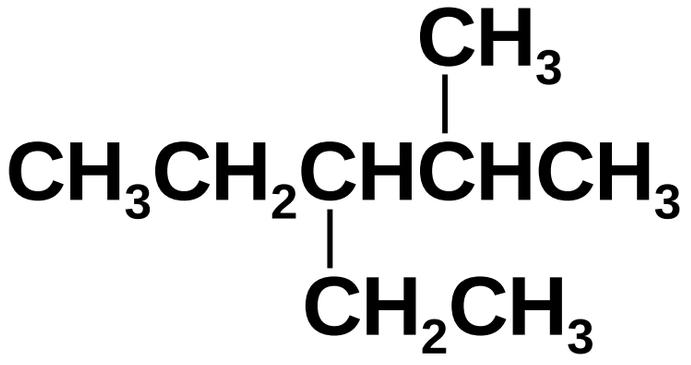
1 C	**meth-**
2 C	**eth-**
3 C	**prop-**
4 C	**but-**
5 C	**pent-**
6 C	**hex-**
7 C	**hept-**
8 C	**oct-**
9 C	**non-**
10 C	**dec-**



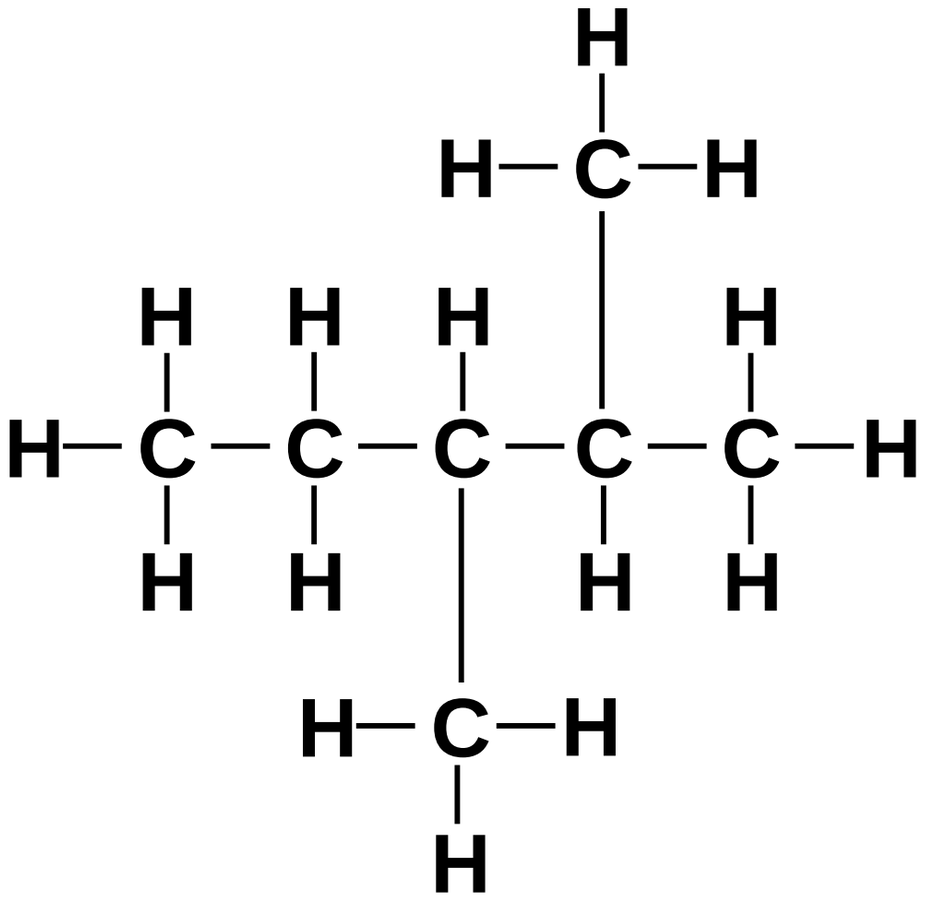


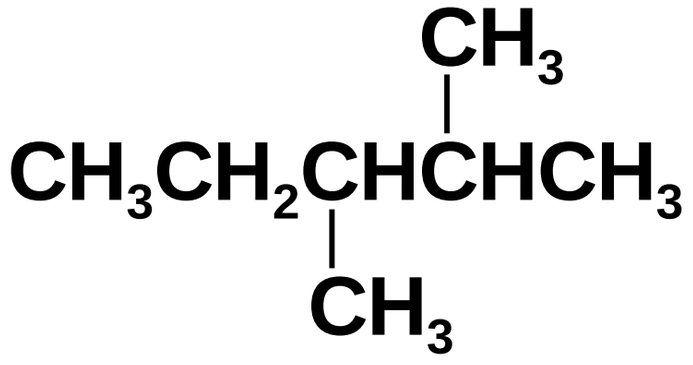
2-methylpentane



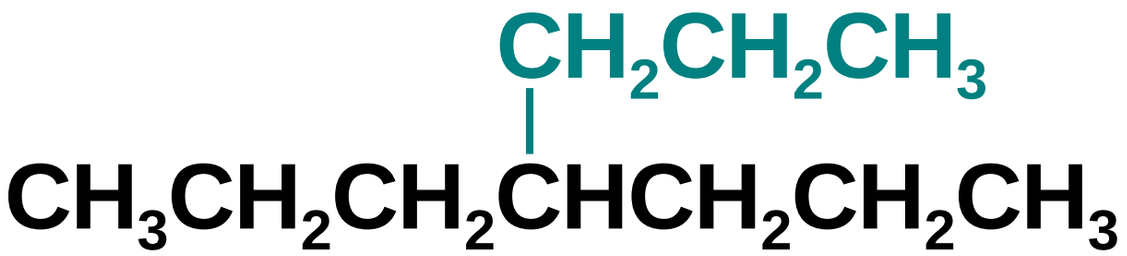


3-ethyl-2-methylpentane

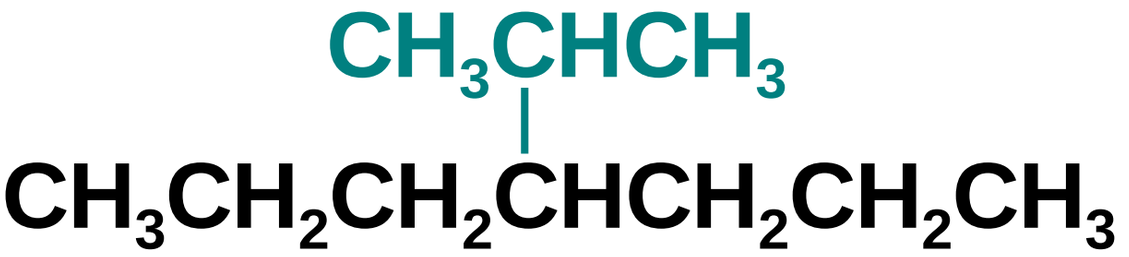




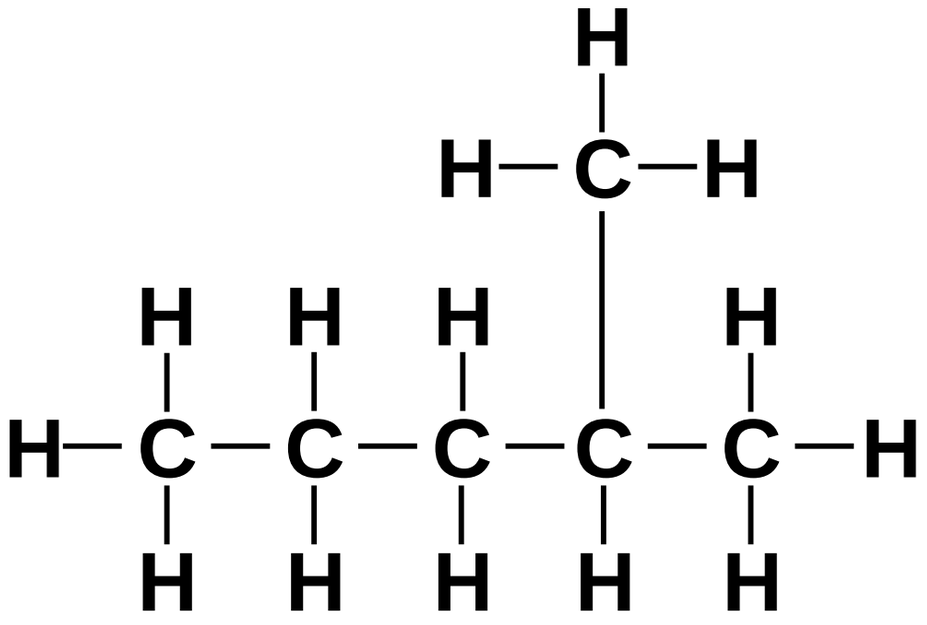
2,3-dimethylpentane

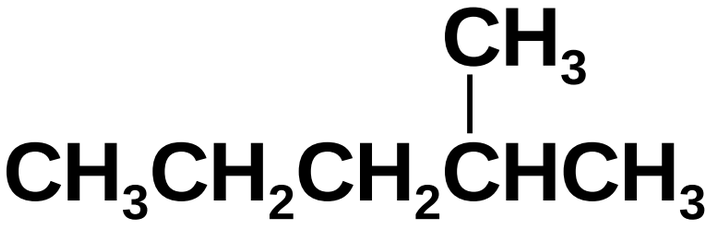


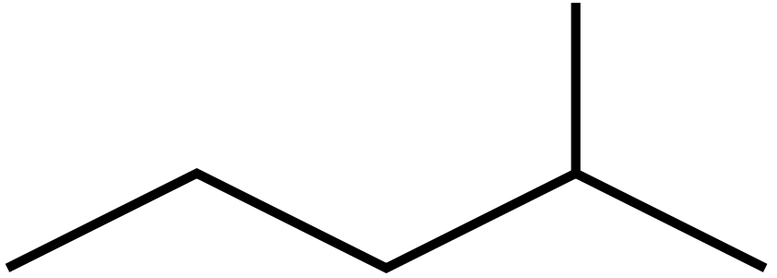
4-propylheptane

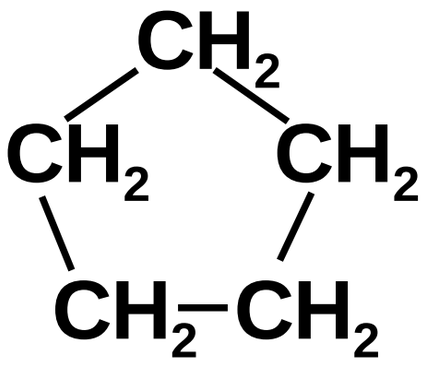


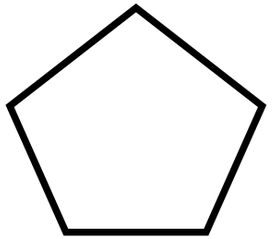
4-isopropylheptane



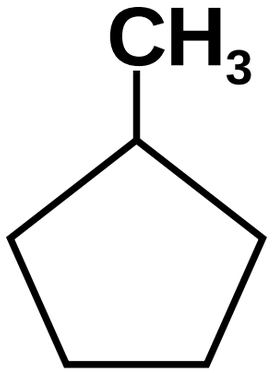

CH3
CH3CH2CH2CHCH3



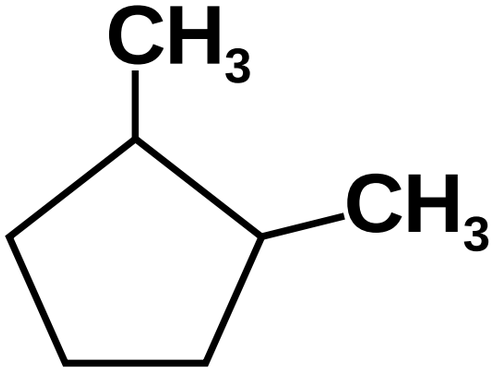




cyclopentane



methylcyclopentane



1,2-dimethylcyclopentane

REACTIONS INVOLVING ALKANES

1. Combustion

Reaction with oxygen to produce carbon dioxide and water

example: combustion of ethane

$$C_2H_6 + \frac{7}{2} O_2 \longrightarrow 2\,CO_2 + 3\,H_2O$$

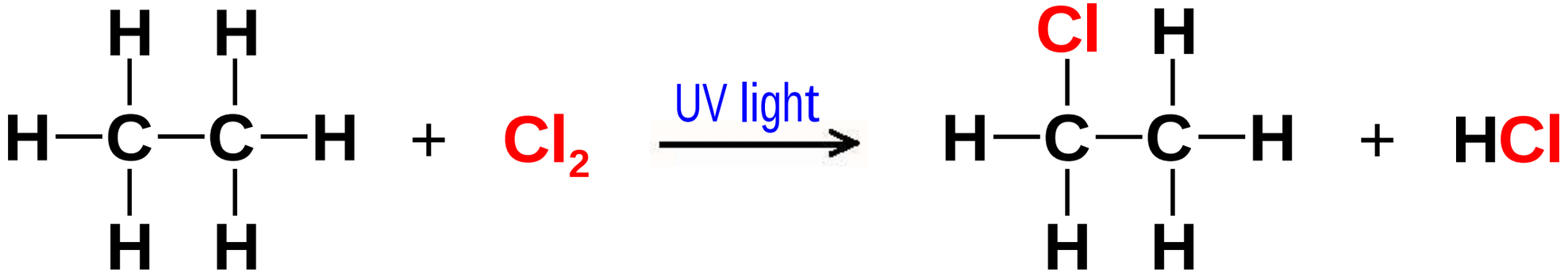
example: combustion of propane

$$C_3H_8 + 5\,O_2 \longrightarrow 3\,CO_2 + 4\,H_2O$$

2. Substitution Reactions

A group on a molecule is replaced by another group.
For alkanes the group that is replaced is a hydrogen.

Halogenation



ethane
(an alkane)

chloroethane
(an alkyl halide)