

## Sidechains (also called alkyl groups)

Sometimes organic molecules have chains of carbons going out of the side of the molecule, instead of just a hydrogen atom attached to a carbon on the main chain. We name these side chains alkyl groups, and specifically, if there is only one carbon in the side chain it is a methyl side chain; 2 carbons, ethyl etc as shown in the table below:

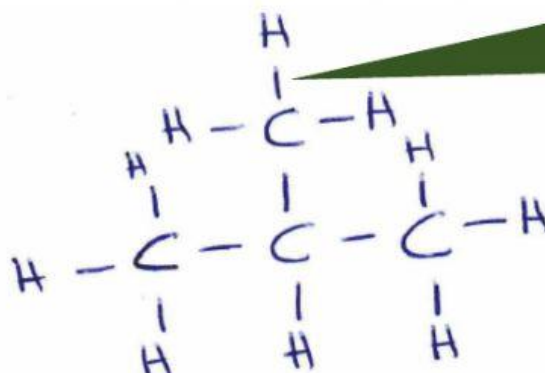
Alkyl group (side chain)	Name
-CH <sub>3</sub> (1 carbon)	methyl
-CH <sub>2</sub> -CH <sub>3</sub> (2 carbons)	ethyl
-CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub> (3 carbons)	propyl
-CH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub> (4 carbons)	butyl

- In order to indicate the positions of the alkyl groups, you need to number the carbon atoms in the main chain. Start with the end closest to the side chain.
- Start by writing down the position and name of all the attached groups, in alphabetical order.
- If there is more than one of a specific alkyl group then we use the following prefix (but the prefix is not counted when you determine alphabetical order of side chains!).

No of the same side chain (alkyl group)	prefix
1	mono
2	di
3	tri
4	tetra

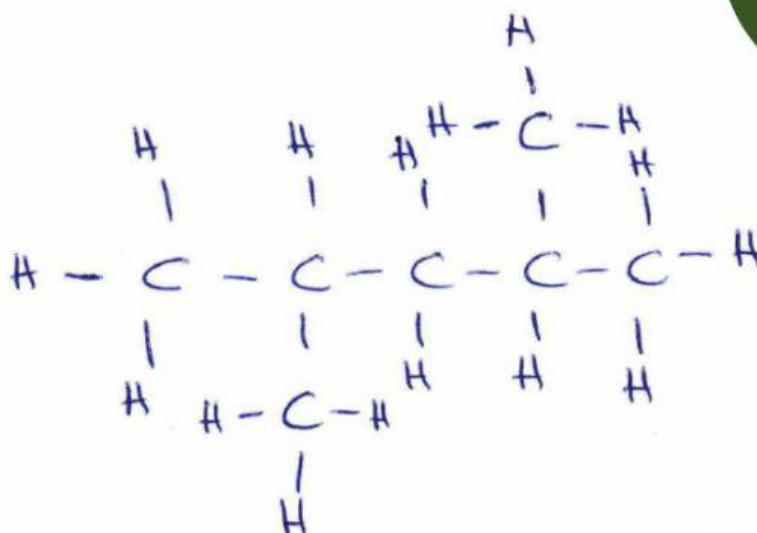
Examples:

2-methylpropane



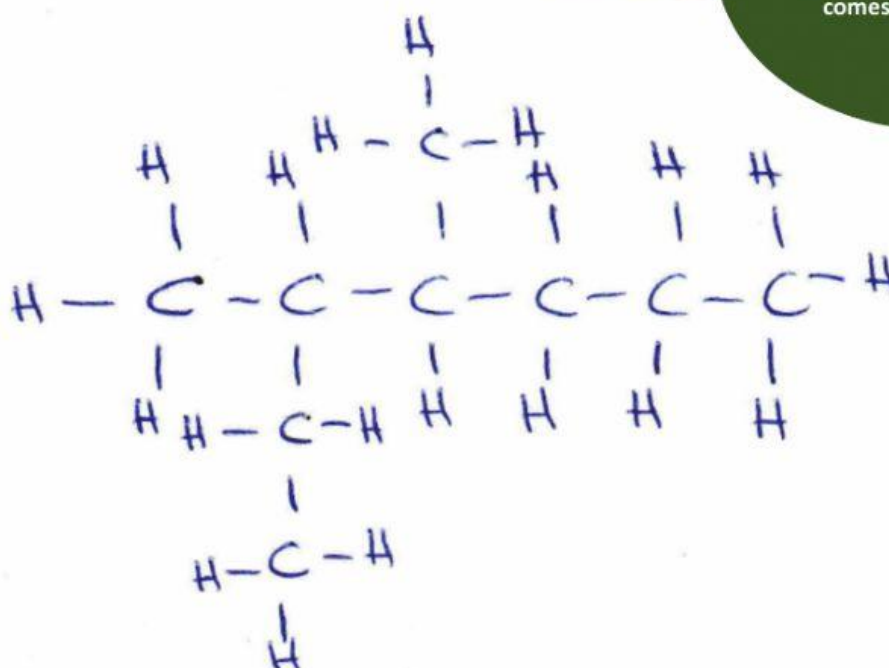
Note that every carbon still has four bonds. Where it is not bonded to another carbon, it will be bonded to an H.

2,4-dimethylpentane



Note that 2 methyl side chains means the name is dimethyl with numbers of the carbons on the main chain where the

2-ethyl-3-methylhexane



Note that the ethyl group is listed first in the name NOT because the number comes first but because e comes before m in the alphabet

**Exercise:**

Draw structural formulae for the following in the back of your Chemistry books:

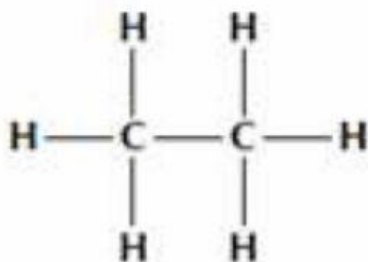
- |                        |                                  |
|------------------------|----------------------------------|
| 1) 3-ethylpentane      | 2) 3-methylheptane               |
| 3) 2-methylbutane      | 4) 3-ethyl-2,4-dimethylpentane   |
| 5) 2,2-dimethylbutane* | 6) 3-ethyl-2,4,5-trimethyloctane |

(\*Hint: if the same number is repeated, the 2 alkyl groups come off the same C)

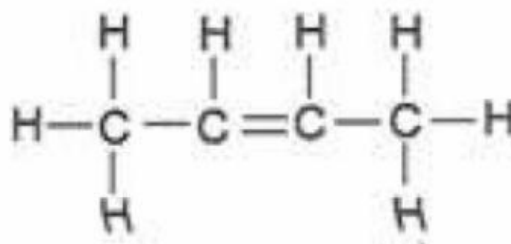
## Exercises – Alkanes, Alkenes, Alkynes:

Question 1: Name the following structures:

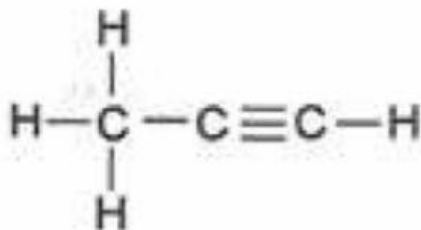
1.1



1.2



1.3



**Question 2: Draw the structural formulae for the following ALKANES in your books:**

- |     |                                |      |                             |
|-----|--------------------------------|------|-----------------------------|
| 2.1 | 2,3-dimethylheptane            | 2.2  | 3-ethyl-2,4-dimethylpentane |
| 2.3 | 4-ethyl-3,4-dimethylheptane    | 2.4  | 2,2,4-trimethylhexane       |
| 2.5 | 2,2-dimethylhexane             | 2.6  | 4-ethyloctane               |
| 2.7 | 3,4,4,5-tetramethylheptane     | 2.8  | 3-ethyl-2-methylpentane     |
| 2.9 | 3,3-diethyl-2,2-dimethylhexane | 2.10 | 4-ethyl-2,3-dimethyloctane  |

**Question 3: Draw structural formulae for the following ALKENES in your books:**

- |      |  |      |                            |
|------|--|------|----------------------------|
| 3.1  | hex-2-ene                                  | 3.2  | propene                    |
| 3.3  | buta-1,3-diene (*2 double bonds on butene) |      |                            |
| 3.4  | 2-ethyl-3-methylbut-1-ene                  | 3.5  | penta-1,2-diene            |
| 3.6  | 2-methylbuta-1,3-diene                     | 3.7  | 2-methylpenta-2,3-diene    |
| 3.8  | but-2-ene                                  | 3.9  | 3-ethyl-3-methylpent-1-ene |
| 3.10 | Hex-1-ene                                  | 3.11 | 2-ethyl-3-methylpent-1-ene |

**Question 4: Draw structural formulae for the following ALKYNES in your books:**

- |     |           |     |            |
|-----|-----------|-----|------------|
| 4.1 | hex-1-yne | 4.2 | propyne    |
| 4.3 | but-2-yne | 4.4 | pent-3-yne |