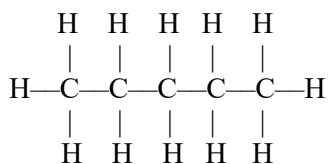
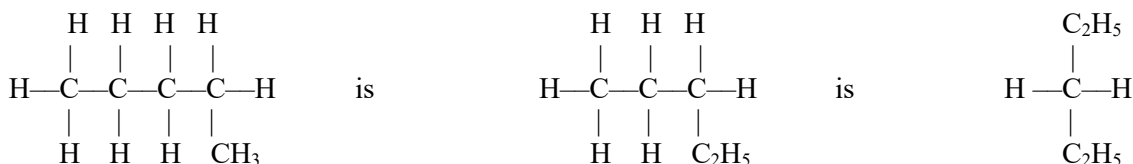


STRUCTURAL ISOMERISM : Saturday, 27th October 2018

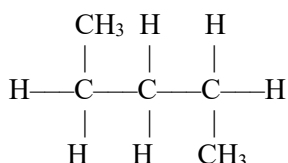
- Structural isomers *have the same molecular formula but have different structural formulae*.¹
- If we consider the entities that possess the Molecular Formula C_5H_{12} , we can see that although all the structures (on this page) *appear to be different from each other*, nevertheless they are NOT different. The rule is that if you imagine all the C atoms positioned on one long piece of wire (as in the first diagram below), and **if you can bend the wire into the required shape without cutting the wire and soldering the cut piece back on, then the resultant molecule is not an isomer. It is the SAME molecule** but if you have to cut and solder the wire back on, **then it is an isomer**.



- **The molecules below are NOT isomers of C_5H_{12} .** They ARE all Pentane molecules – and they look different merely because the C atoms have been rotated around single bonds. (Please name the molecule, and if the name is the same then it is *not* a different molecule.)



In order to name a molecule, remember to first look for the longest C chain that you can find.



These are **ALL PENTANE** molecules. Name the molecule, and if the name is the same then **IT IS STILL PENTANE!**

These four species are NOT isomers of each other.

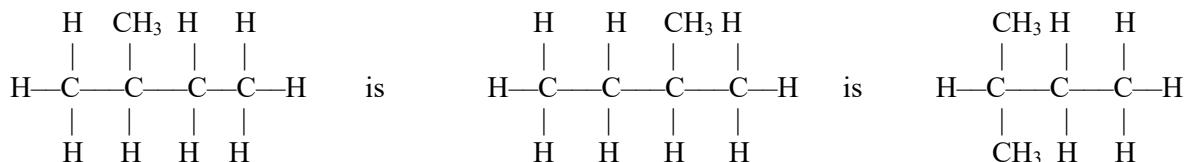
And now for the true isomers of Pentane viz. (a) 2-methyl butane, and (b) 2,2-dimethyl propane.

¹ It is possible to call all the isomers of pentane “chain isomers”, indicating that the differences occur merely in the structure of the chain.

a) 2-methyl BUTANE (these next three diagrams all represent EXACTLY the SAME molecule)

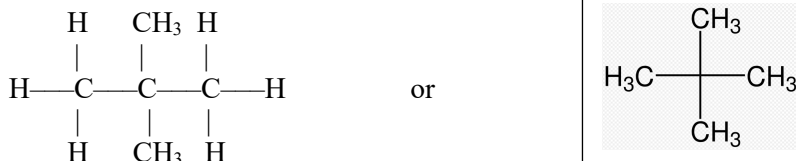
For the molecule in the middle, I have just gone round the back of the first molecule and I am now looking at it from the back of it.

This one is NOT a propane!
It is still a butane.



- You might at first sight think that the molecule on the right is different from the one in the middle and the one on the left – **but it is NOT different**. It is exactly the same molecule. Name it and you will see this. The molecule below IS different, but the one above is **2-methyl butane**.

b) 2,2-dimethyl PROPANE



- That's it. There are three isomers with the molecular formula C_5H_{12} . They are pentane, 2-methyl butane, and 2,2-dimethyl propane. There are NO OTHER ISOMERS OF C_5H_{12} ! Try drawing it for yourself and you will see that this is so! **Name the molecule that you draw, and if it has the same name as one of the three above, then IT WILL BE EXACTLY THE SAME MOLECULE.**
- Next week we will look at "Cis-trans isomerism". In Latin "cis" means "on the same side" and "trans" means "across" or "on the other side". You DO need to remember which word means which – and you can do so by remembering that if you "transport" someone across a river, then you are taking that person *to the other side*. (Similarly, 'transatlantic' means on the other side of the Atlantic.)