Year 10

Chemistry booklet

Topic 2 – Organic Chemistry

Name: _____

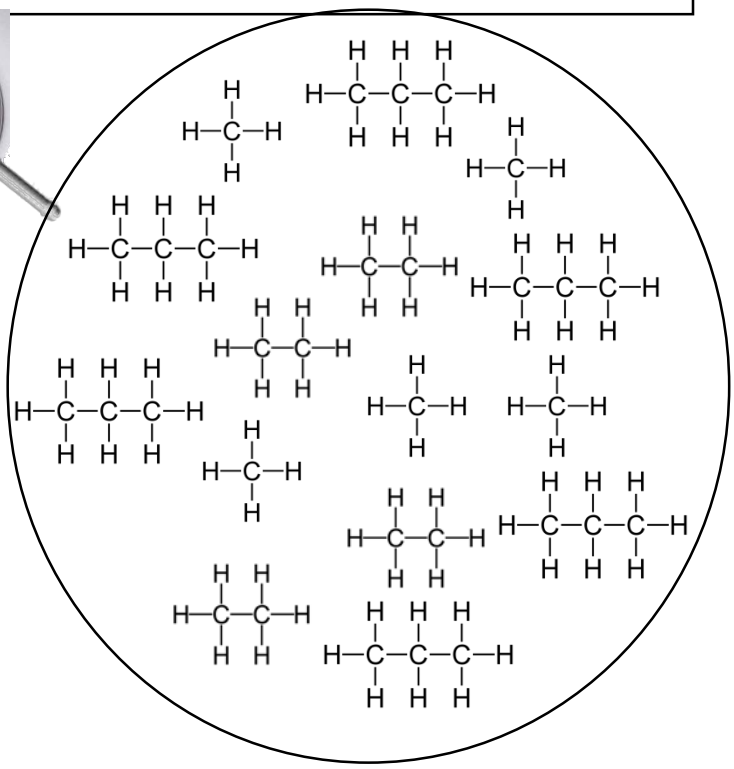
Organic Chemistry

Give a definition for each of these key words:

Organic chemical	
Molecular formula	
Structural formula	
Crude oil	
Fractional distillation	
Hydrocarbon	
Alkane	
Alkene	
Alcohol	
Carboxylic acid	
Ester	
Functional group	
Fermentation	

Crude oil in close-up

Below is a picture of crude oil after it has been looked at under a microscope. Answer the questions to do with this picture. Use the information sheet and info box to help you.



Crude oil contains many different compounds which are not chemically joined together. The many different compounds are called hydrocarbons, because they are made from the elements H and C. Most of these hydrocarbons are special ones called alkanes. They only have single bonds and are useful for many different things. For example, methane (which contains one C and four H's) is used as fuel. Ethane (which contains two C's and six H's) is used to make ethanol. Propane (contains three C's and eight H's) also used as a fuel. Because these compounds are found as a mixture in crude oil, and so aren't chemically joined together, it is possible to separate them in a process called fractional distillation.

1) What is the same about all the compounds in the crude oil?

_____**(2 marks)**

2) What is different about all the compounds in crude oil?

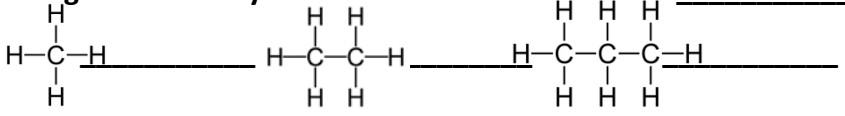
_____ **(2 marks)**

3) What name can be given to all the compounds found in crude oil? _____ **(1 mark)**

3) Is crude oil a mixture?_____ **(1 mark) Why?** _____

_____ **(2 marks)**

4) What is the special name given to the hydrocarbons found in crude oil? _____ **(1 mark)**

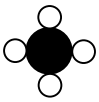
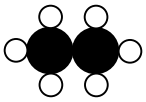
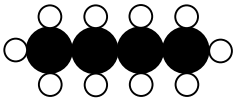
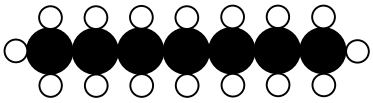
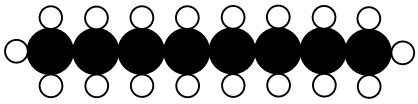
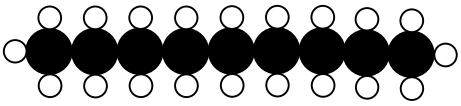
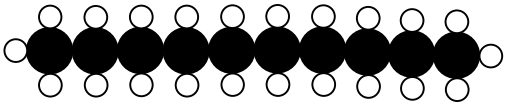
5) Name these alkanes:  **(3 marks)**

6) By what process can these alkanes be separated? _____ **(1 mark)**

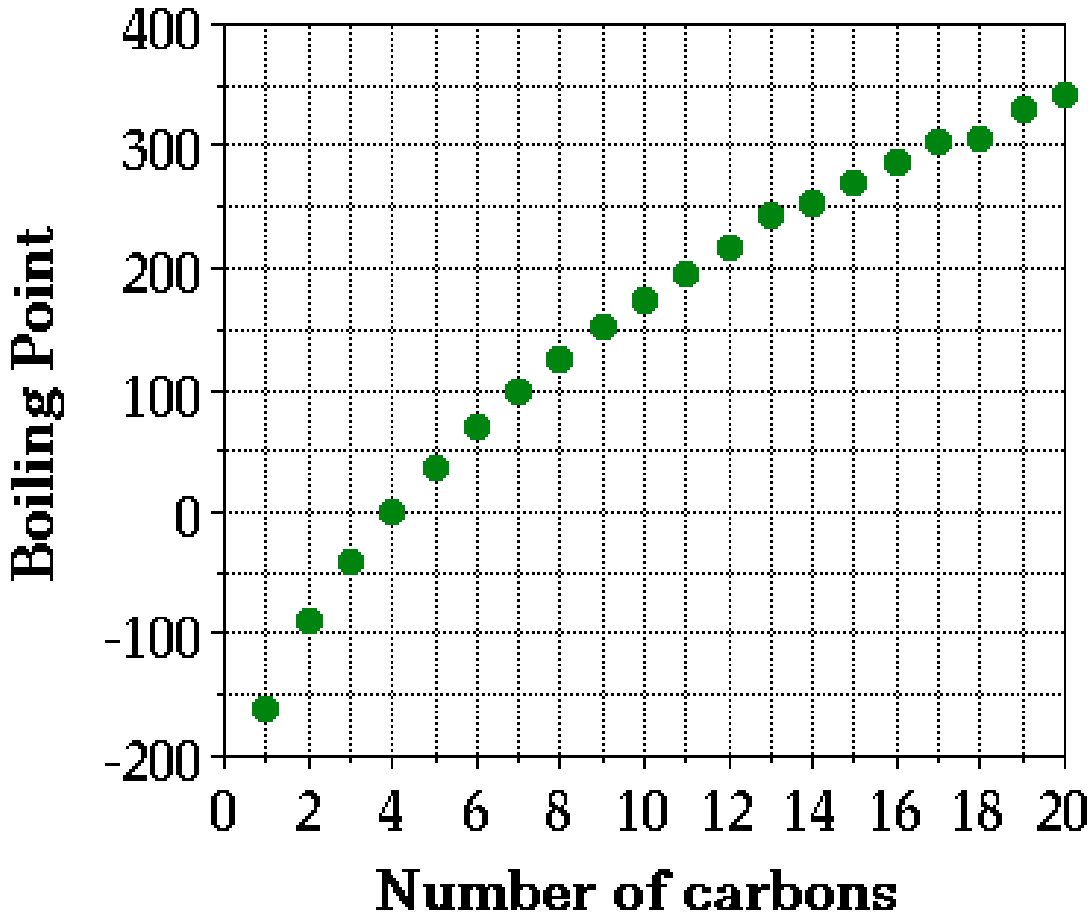
Hydrocarbons and crude oil

Crude oil is a mixture of hydrocarbons, from simple methane to chains with 70 or more carbon atoms. Before it can be used the mixture must be separated

Complete the table by filling in the formulae or structures

name	formula	structure	Boiling point C
	CH_4		-161
ethane			-89
propane	C_3H_8		-42
butane			-1
pentane	C_5H_{12}		+36
hexane	C_6H_{14}		+69
heptane			+98
			+126
nonane			+151
decane			+174

Hydrocarbons: Boiling Point and Chain Length

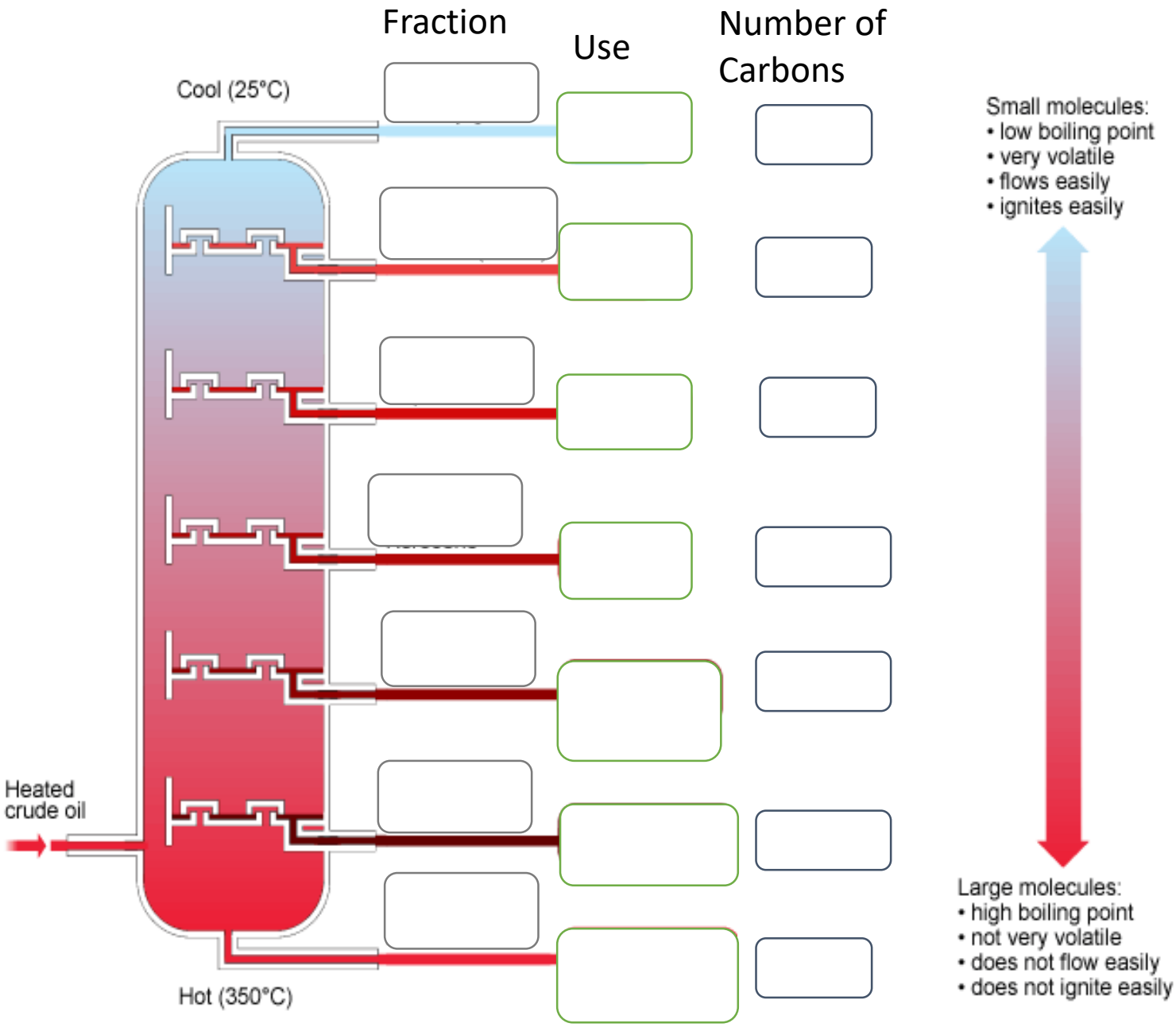


1. Summarise the trend shown in the graph above

2. **Explain** the trend shown by the graph (hint: think forces between molecules)

Fractional distillation

Complete the diagram of the fractional distillation column below:



When a _____ turns to a gas it is called _____, the _____where all of a liquid will turn to gas is called the boiling point. Different liquids have different_____. _____ a mixture of liquids by their boiling point is called_____.

temperature liquid evaporation boiling points Separating fractional distillation

Your 3 step Guide to Drawing Alkanes

1	2	3
Work out the number of carbons needed. Propane has ___ carbon atom(s) Draw them in the box.	Make sure each carbon has 4 bonds coming from it. The carbon atoms should all join together in a chain.	Add hydrogen atoms to any empty bond. You have drawn propane. What is its chemical formula? _____

1	2	3
Work out the number of carbons needed. Butane has ___ carbon atom(s) Draw them in the box.	Make sure each carbon has 4 bonds coming from it. The carbon atoms should all join together in a chain.	Add hydrogen atoms to any empty bond. You have drawn butane. What is its chemical formula? _____

What is the difference between an alkane and an alkene?

_____
_____
_____
_____
_____
_____
_____

Draw a diagram of ethane and a diagram of ethene in the space below:

Alcohols $C_nH_{2n+1}OH$

Write down the molecular formula for the following alcohols:

- Methanol
- Ethanol
- Propanol
- Butanol

Uses for alcohols:

Two methods to make Ethanol:

Combustion Equations

Complete the following equations

1. Petrol + oxygen → Carbon dioxide + _____

2. Methane + oxygen → _____ _____ + _____

3. Pentane + _____ → Carbon dioxide + _____

4. CH_4 + __O_2 → CO_2 + __H_2O

5. C_2H_6 + __O_2 → ___CO_2 + __H_2O

6. C_8H_{18} + __O_2 → ___CO_2 + __H_2O

7. Write a balanced symbol equation for the complete combustion of pentane (C_5H_{12})

_____

8. What is the difference between complete combustion and incomplete combustion?

_____
_____
_____
_____

9. Explain what happens when alcohol burns

_____
_____
_____
_____
_____
_____