



WORKSHEET 18

School: Ba Sangam College

Year: 11

Subject: Chemistry

Name: _____

Strand	4 - Materials
Sub strand	4.3 Organic Substance
Content Learning Outcome	-Examine and outline the sources and formation of oil, natural gas and biogas. -Investigate the impact of using fossil fuels on the environment and present measures of reducing these impacts. -List and describe the different classes of hydrocarbons.

Organic Substances

All living things, plants and animals alike, contain carbon compounds which are vital to their life. In addition, natural fuels such as coal and petroleum which are known is enormous and they are called *organic compounds*.

Oil – Source and Formation

The most important liquid fuels are gasoline (petrol), kerosene (paraffin), diesel oil and fuel oil. All of these are mixtures of hydrocarbons obtained from crude oil.

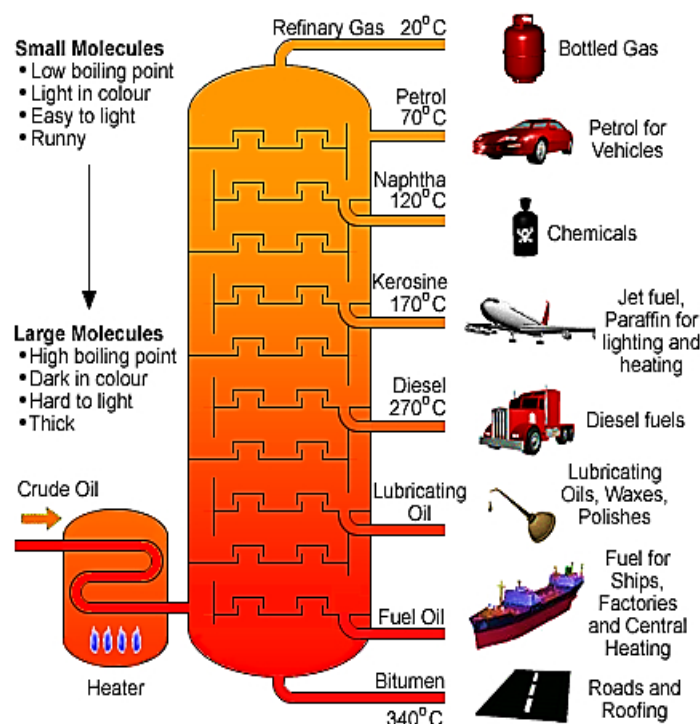
Crude oil

Crude oil is a fossil fuel found in rocks. It has been formed at the bottom of oceans over millions of years. Scientists believe that the remains of sea plants and animals become trapped in the sediment on the sea bed where they decomposed without air to form oil.

Refining crude oil

The fractional distillation of alkanes is performed in a refinery. Fuel and many other equally important products are obtained from the crude oil. Alkanes can be separated because large alkanes have high boiling points and small alkanes have low boiling points. The apparatus that is used to separate alkanes is called a *fractionating column*.

The figure below shows a fractionating column.



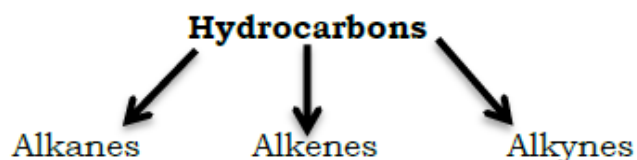
Natural gas and Biogas

The most important gaseous fuel is natural gas. It is formed when plants decay in the absence of air. Natural gas is an inexpensive fuel because it requires very little treatment before use. Biogas is made by bacteria from plant and animal waste. It is used for cooking or for powering automobiles.

Advantages of fossil fuels	Disadvantages of fossil fuels
Fossil fuel is less expensive. Alternative energy sources such as solar, wind and water are more expensive but cleaner and replaceable.	Fossil fuels are non-renewable and burning those causes air pollution.

Hydrocarbons

Organic chemicals that contain only carbon and hydrogen are called hydrocarbons. There are three classes of hydrocarbons: alkanes, alkenes and alkynes.



Comparison amongst the three hydrocarbons

	Alkanes	Alkenes	Alkynes
Description	Alkanes are hydrocarbons that contain only single bonds between the carbon atoms.	Alkenes are hydrocarbons that have at least one double bond between two carbon atoms.	Alkynes are hydrocarbons that have at least one triple bond between two carbon atoms.
General Formula	C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n-2}
Naming (follows a system)	Starts with the number of carbon atom and finishes with -ane. Example C ₁ -methane, C ₂ -ethane, C ₃ -propane, C ₄ -butane, C ₅ -pentane, C ₆ -hexane	Starts with the number of carbon atom and finishes with -ene. Example C ₂ -ethene, C ₃ -propene, C ₄ -butene, C ₅ -pentene, C ₆ -hexene	Starts with the number of carbon atom and finishes with -yne. Example C ₂ -ethyne, C ₃ -propyne, C ₄ -butyne, C ₅ -pentyne, C ₆ -hexyne
Properties	1. Colourless, insoluble in water and neutral. They will dissolve in oils and waxes. 2. Undergo combustion reactions producing carbon dioxide, water and heat. 3. Boiling and melting points increase as the number of carbon atom increases.	Similar to those of alkanes but are more reactive.	Similar to those of alkanes but are more reactive
Uses	1. Fuels e.g. methane, ethane 2. Starting materials for making other chemicals, including alcohols, plastics and fibres.	Manufacture of plastics, alcohols, artificial ripening of fruits, polymers for PVC and Teflon.	Used in welding gas, rocket fuel and medicine.

Name and formula of Alkanes

Name	No. of carbon atoms	Molecular Formula	Structural Formula
Methane	1	CH ₄	
Ethane	2	C ₂ H ₆	
Propane	3	C ₃ H ₈	

Exercise: Complete the table below.

Name	No. of carbon atoms	Molecular formula	Structural formula
Butane			

		C₅H₁₂	

Names and Formula of Alkenes

Name	No. of carbon atoms	Molecular Formula	Structural Formula
Ethene	2	C ₂ H ₄	
Propene	3	C ₃ H ₆	

Exercise: Complete the table below.

Name	No. of carbon atoms	Molecular formula	Structural formula
Butene	<u>4</u>	C₄H₈	
	<u>5</u>		
Hexene			

Name and Formula of Alkynes

Name	No. of carbon atoms	Molecular Formula	Structural Formula
Ethyne	2	C ₂ H ₂	
Propyne	3	C ₃ H ₄	

Exercise: Complete the table below.

Name	No. of carbon atoms	Molecular formula	Structural formula
	<u>4</u>	C₄H₆	
	<u>5</u>		