

IGCSE Chemistry

Complete Revision Summary

Rates and Equilibrium

Organic Chemistry

Chemical Analysis

Chemistry of the Atmosphere

Using Resources

CRUDE OIL

Hydrocarbons and Crude Oil

Alkanes

Fractional Distillation

Properties of Hydrocarbons

Cracking

Alkenes

Reaction of Alkenes

Alcohols

Carboxylic Acid

Addition Polymerization

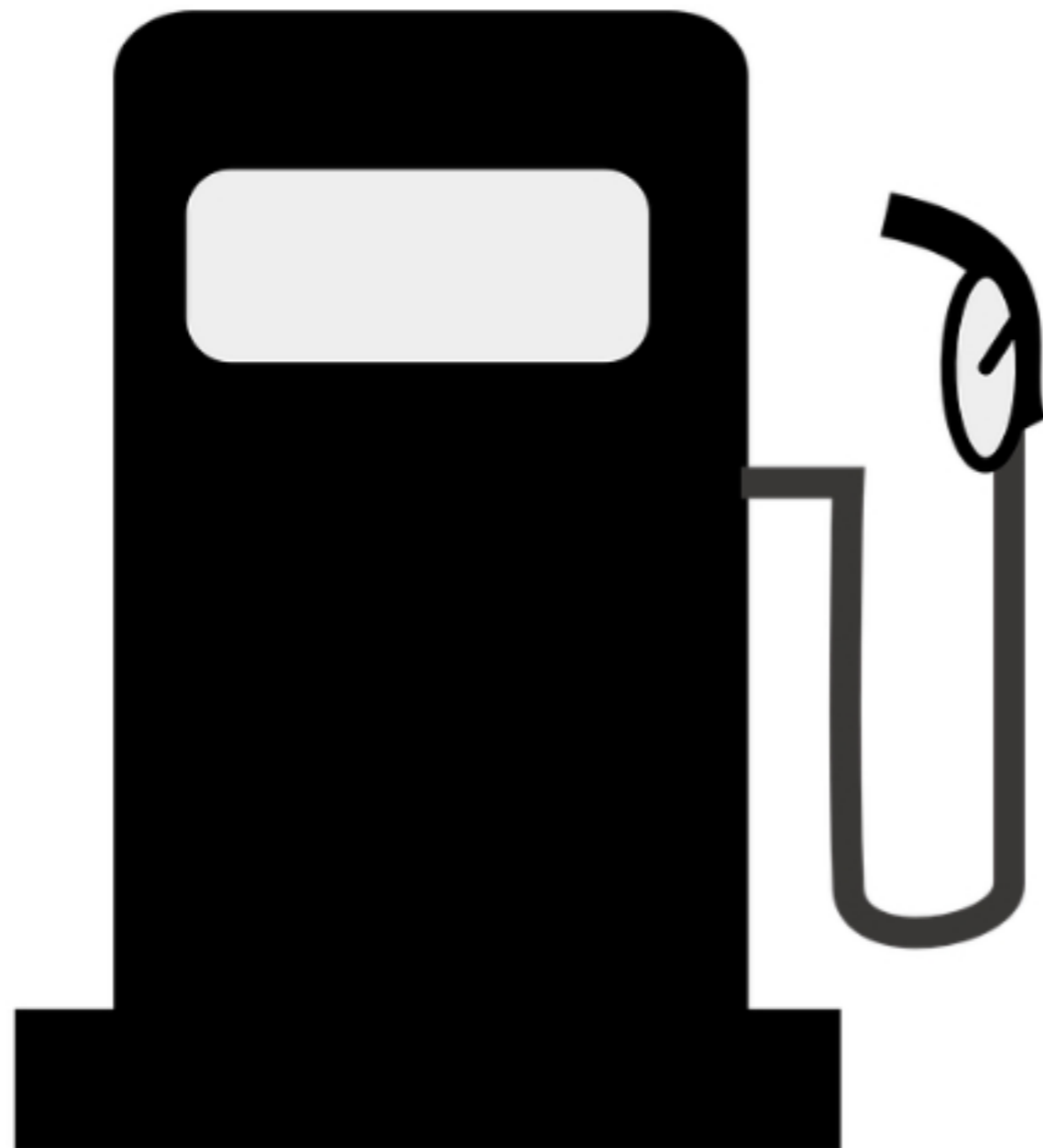
Condensation Polymerization

Amino Acids

DNA

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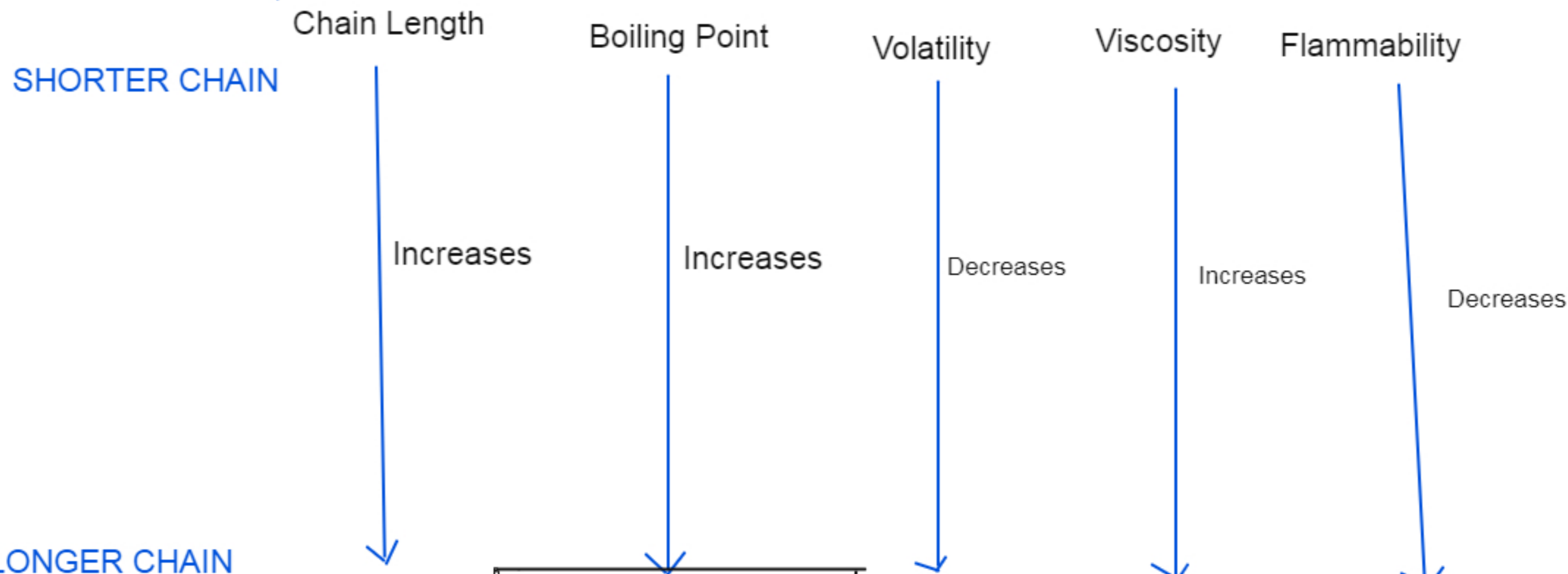
## CRUDE OIL



It is a black thick liquid which takes millions of years to form.

It is the mixture of hydrocarbon. Hydrocarbon are the compounds made up of carbon and hydrogen only.

The components of the crude oil are important and the crude oil is separated by the process of fractional distillation.



It is the temperature at which hydrocarbon boils. It increases with increase in chain length

property to convert into vapour. It decrease with chain length as boiling point increases

Thickness of the fraction which increases with chain length

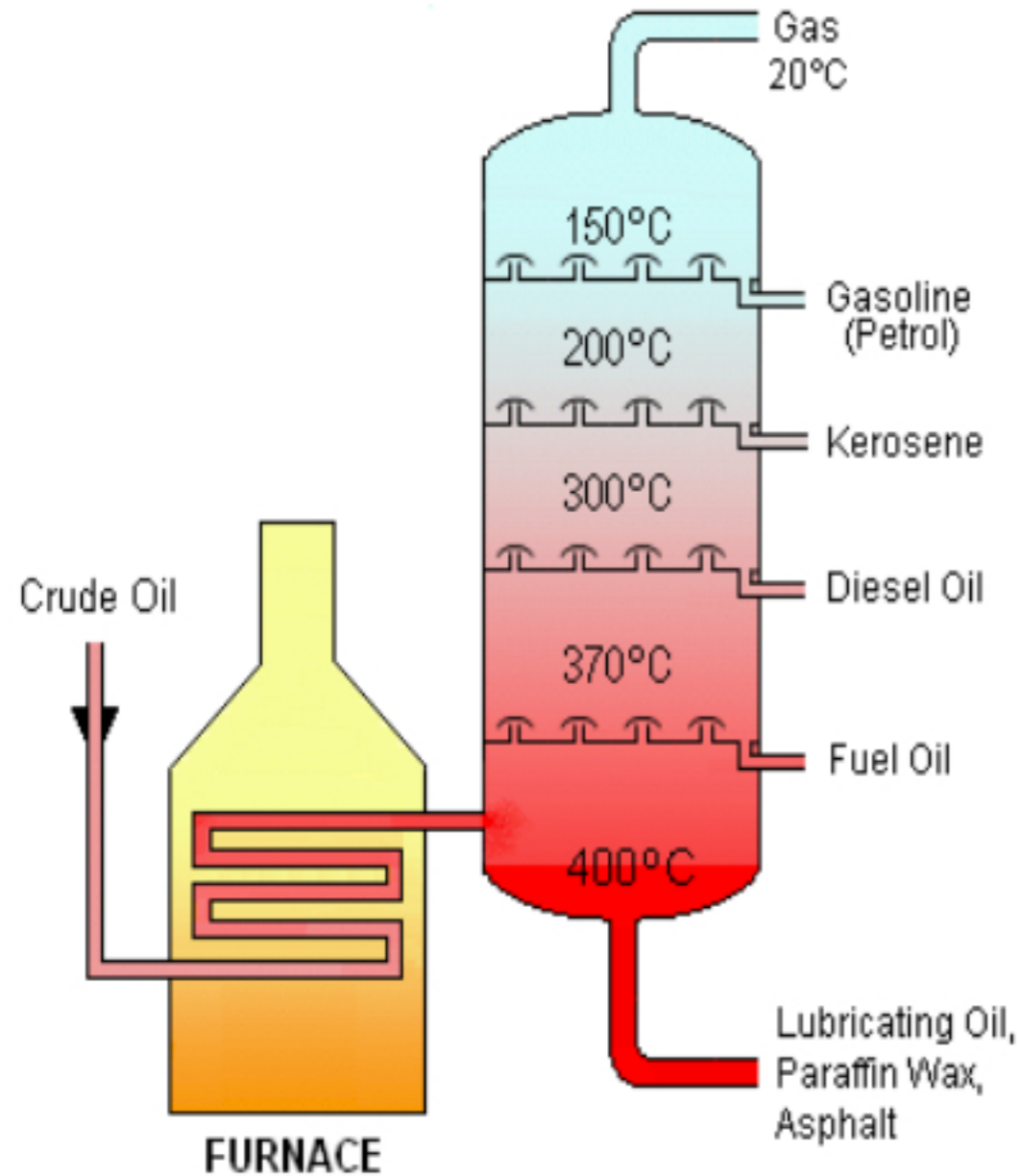
How quickly it can burn. it decreases with chain length due to increase in boiling point.

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## FRACTIONAL DISTILLATION OF CRUDE OIL

It is separated in fractionating column with different substances of similar boiling points

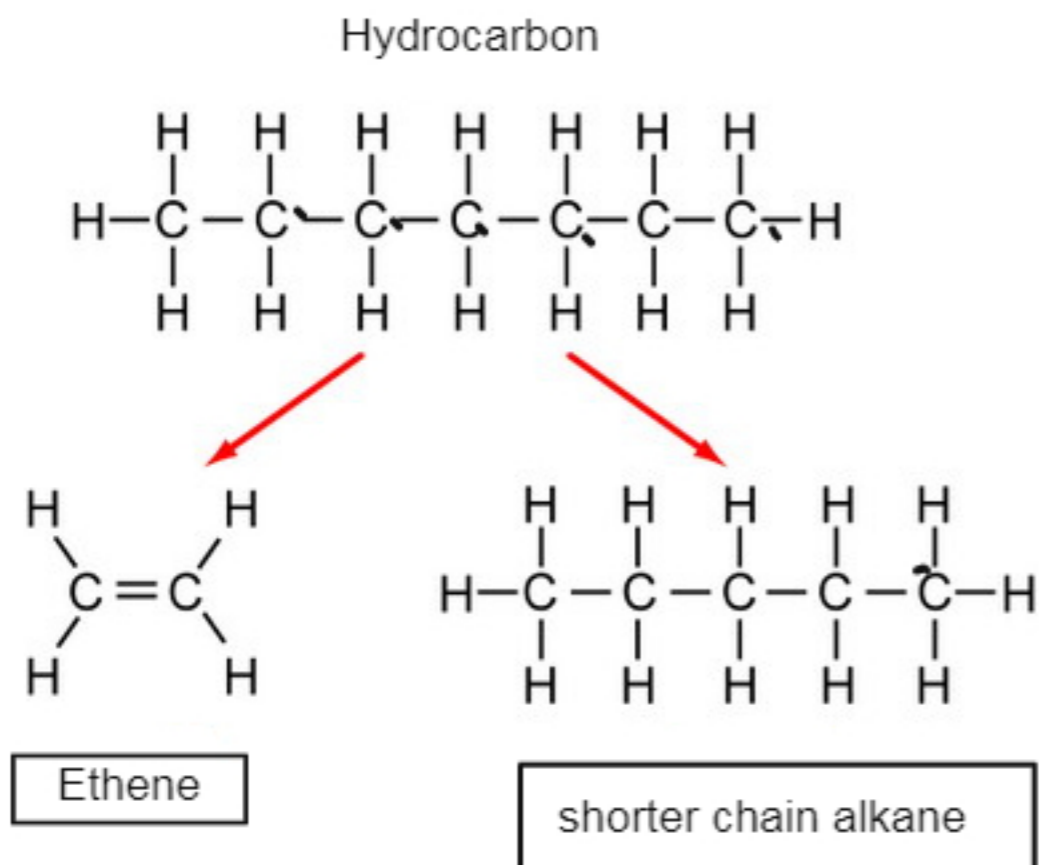
separating the mixtures on the basis of boiling points.



LIQUIFIED GAS	FUEL
GASOLINE/PETROL	CAR FUEL
KEROSENE	AIRCRAFT FUEL
DIESEL OIL	FUEL IN DIESEL ENGINES
RESIDUE	MAKING ROADS

L — Look  
G — Great  
K — Kid.  
D — doing.  
R — Roll!

## CRACKING



Thermal decomposition of longer chain hydrocarbon into a shorter chain alkane and alkenes

Thermal Cracking

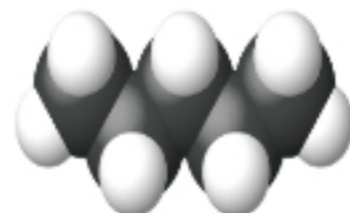
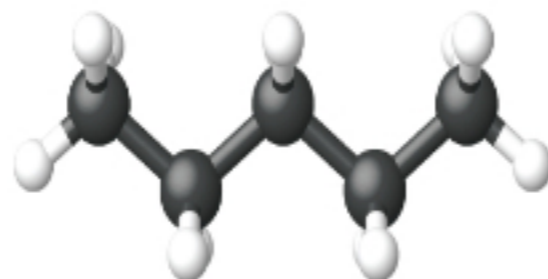
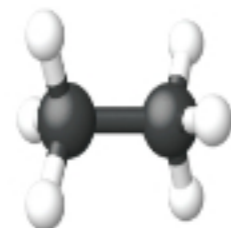
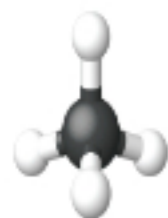
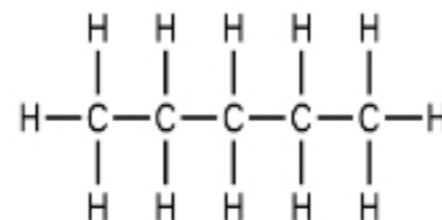
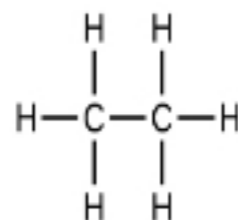
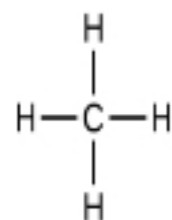
It is done at a very high temperature

Catalytic Cracking

It is done using a catalyst

### WHY CRACKING ?

- Shorter chain alkanes are more in demand as they are more efficient fuel which fractional distillation alone cannot meet .
- Alkenes are required for polymerization and synthesize other hydrocarbons which fractional distillation cannot meet.



methane  
 $\text{CH}_4$

ethane  
 $\text{CH}_3\text{CH}_3$  or  $\text{C}_2\text{H}_6$

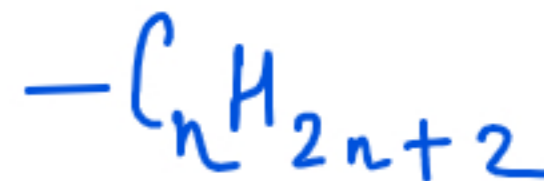
pentane  
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$  or  $\text{C}_5\text{H}_{12}$

Saturated Hydrocarbon

carbon carbon  
single bond

made up of  
carbon and  
hydrogen only

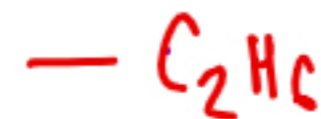
GENERAL FORMULAE



METHANE



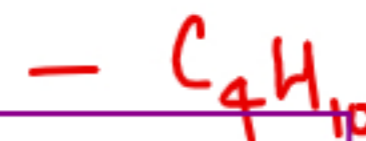
ETHANE



PROPANE



BUTANE



PENTANE



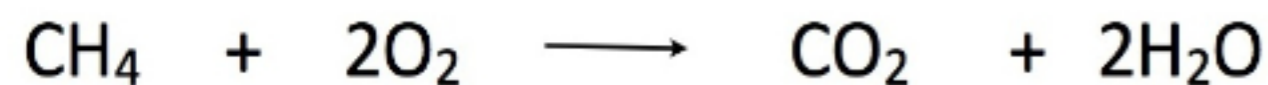
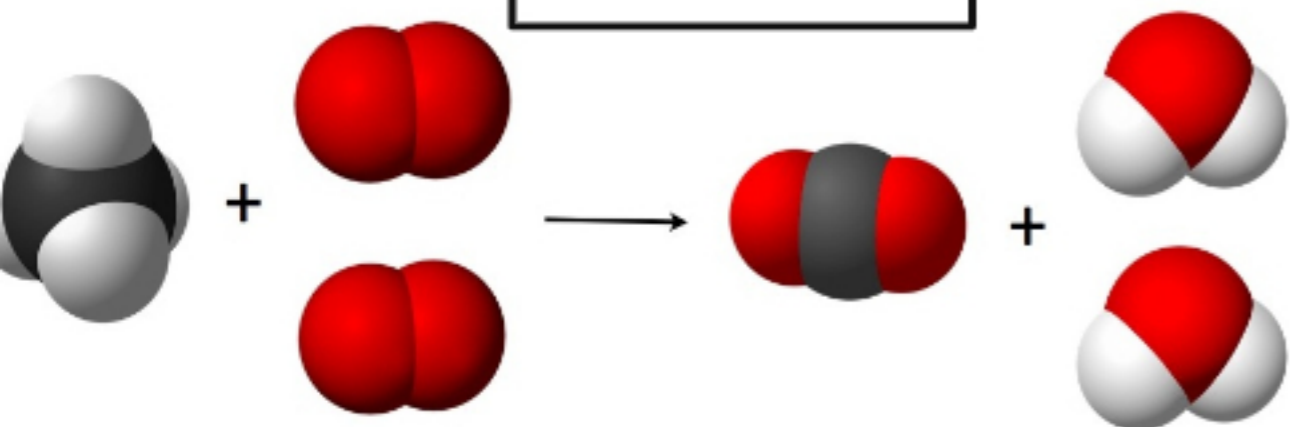
Members of the same family have similar functional group similar chemical properties and general formulae but different physical property and each members differs from successive by  $\text{CH}_2$

Homologous Series

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## COMBUSTION

### COMPLETE

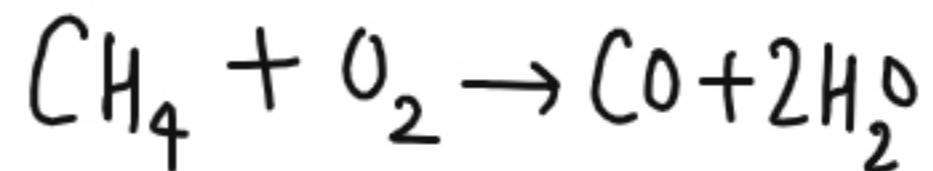


FUEL IS COMPLETELY BURNED

PRODUCES CARBON DIOXIDE  
AND WATER

IT IS NOT TOXIC

### INCOMPLETE

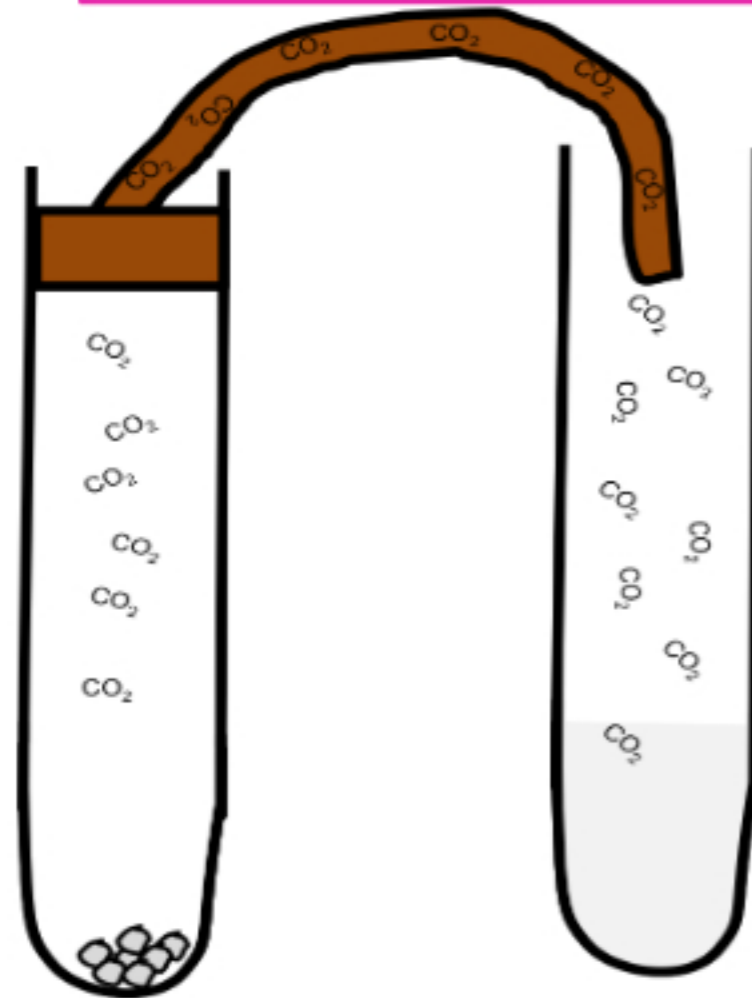


FUEL IS PARTIALLY BURNED DUE TO LIMITED  
SUPPLY OF OXYGEN

PRODUCES CARBON MONOXIDE AND WATER

CARBON MONOXIDE IS TOXIC AS IT DECREASES  
THE OXYGEN CARRYING CAPACITY OF RED BLOOD  
CELLS

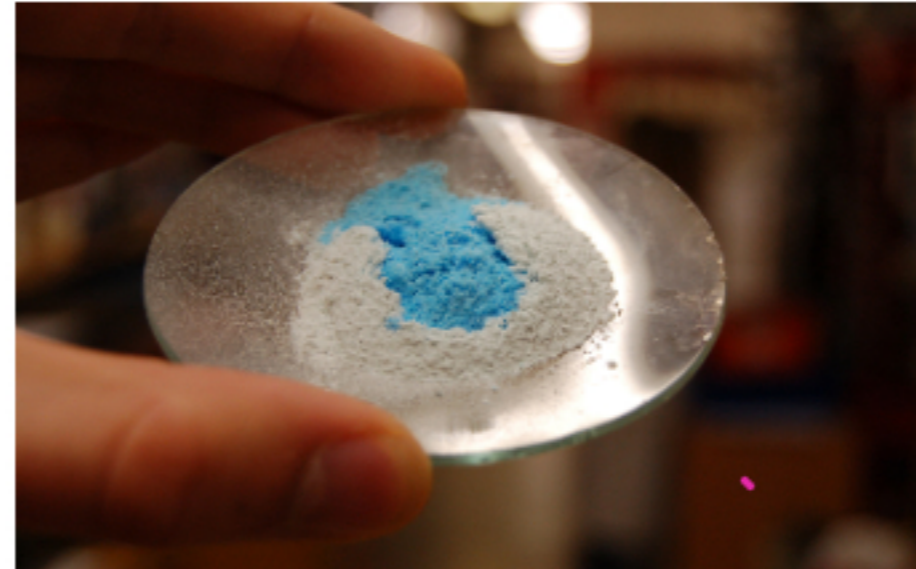
Carbon Dioxide Test



Limewater  
Test.

Carbon Dioxide will turn limewater milky

Water Test



Anhydrous copper  
sulphate test

Water will turn anhydrous  
white copper sulphate crystals  
to blue.



blue cobalt  
chloride  
paper test

Cobalt chloride blue  
paper will turn pink  
in the presence of  
water

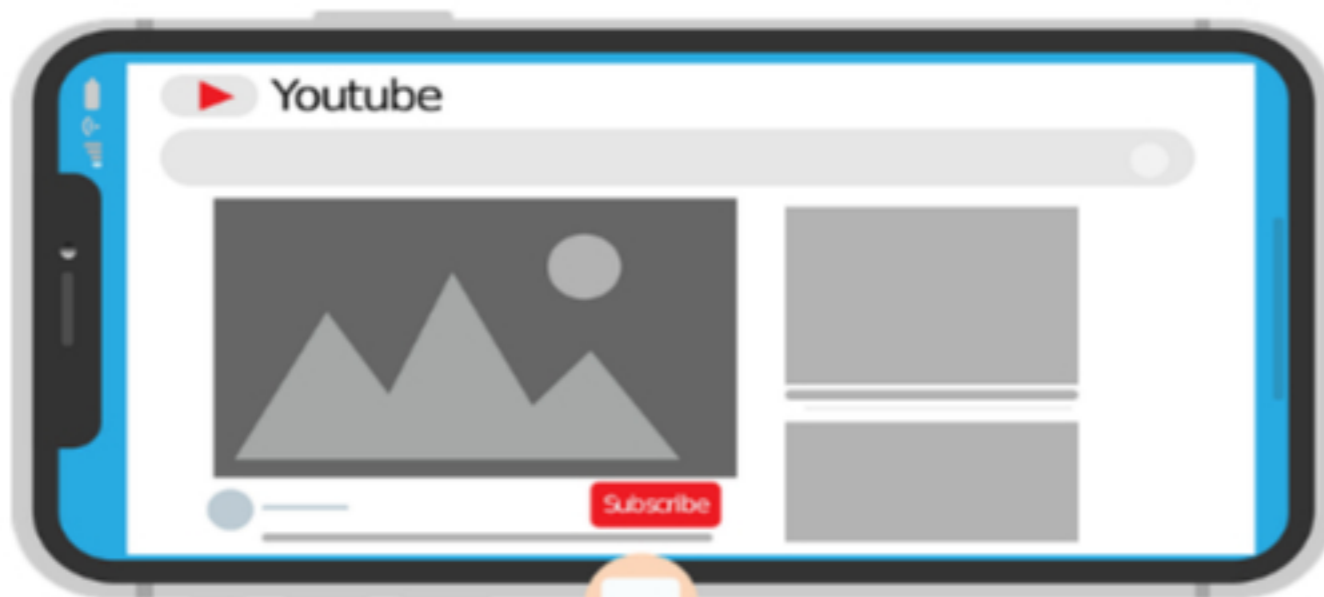


## FUNCTIONAL GROUPS

Groups of atoms that give special properties and reactions to the organic molecule

	Functional Group	Examples	Formation
ALKENES	$\text{=}$	Ethene, propene, butene, pentene	Cracking of crude oil
ALCOHOLS	$\text{-OH}$	methanol, ethanol, propanol, butanol, pentanol	Reaction of alkene with water
CARBOXYLIC ACID	$\begin{array}{c} \text{O} \\ \parallel \\ \text{-C-OH} \end{array}$	methanoic acid, ethanoic acid, propanoic acid, butanoic acid.	Oxidation of alcohols
ESTERS	$\begin{array}{c} \text{O} \\ \parallel \\ \text{-C-O} \end{array}$	methyl ethanoate, ethyl ethanoate	Reaction of alcohols and carboxylic acid

## NEXT STEP



CHECK SPECIFICATION



EXAM QUESTIONS ON THIS TOPIC

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