Question

How can hydrocarbons be broken down into smaller molecules?

Question

What is an alkane?

Give an example and draw it

Question

What kind of reaction happens when large hydrocarbons are broken down?

Question

What is the general formula for an alkane?

Question

What is the general formula for an alkene?

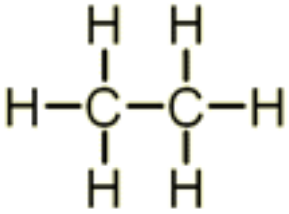
Give an example and draw it

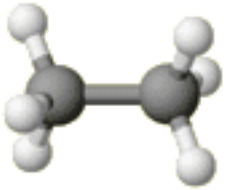
Question

How can you test for an alkene?

Answer

An alkane is a hydrocarbon, e.g. ethane





Answer

Cracking

Answer

C_nH_{2n+2}

Answer

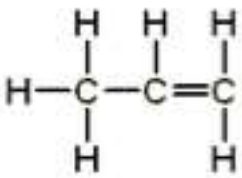
Thermal decomposition

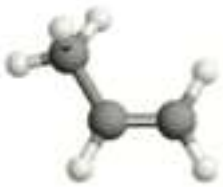
Answer

Bromine water – goes clear

Answer

C_nH_{2n} – e.g. propene





Question

What conditions are needed for cracking of large hydrocarbons?

Question

What are the products of cracking useful for?

Question

How can ethanol be made from ethene?

Question

What is polymerisation?

Question

Give 2 examples of polymers

Question

What determines the properties of polymers?

Answer

Useful as fuels

Answer

Cracking – heat hydrocarbons and vapourise them, then pass these vapours over a catalyst

Answer

Polymerisation is when small molecules are joined to make longer, more useful molecules (e.g. ethane makes poly(ethane))

Answer

Ethene reacted with steam and in the presence of a catalyst = ethanol

Answer

What they are made from and the conditions under which they are made

Answer

Poly(ethane) and poly(propene)

Question

Give 6 uses of polymers

Question

What are the problems with polymers?

Question

How can vegetable oil be extracted from fruit and seeds?

Question

Why are vegetable oils an important part of our diet?

Question

Why are emulsions useful?

Question

What uses do emulsions have?

Answer

Often polymers are not biodegradable causing issues with disposal

Answer

New packaging, waterproof coatings, dental-polymers, hydrogels, smart materials (shape memory polymers)

Answer

They provide us with nutrient and energy

Answer

Crushing, pressing and distilling

Answer

Better texture, coating ability and appearance used in salad dressings and ice cream

Answer

They are thicker than oil or water and have uses dependent on their special properties – an emulsion is a suspension of fat droplets in water (or some other liquid)

Question

Vegetable oils that contain double bonds can be detected by what?

Question

How can vegetable oils that are unsaturated be hardened?

Question

What are hydrogenated oils?

Question

Why are hydrogenated oils useful?

Question

What is thermal decomposition?

Question

What is a monomer?

What is a polymer?

Answer

React them with hydrogen, pass over a nickel catalyst and heat at 60°C

Answer

Reacting with bromine water which changes from orange to colourless

Answer

They have a higher melting point and so are solid at room temperature, making them useful as spreads (cakes and pastries)

Answer

Hydrogenated oils are vegetable oils that have extra hydrogen in them, making them harder

Answer

Monomer – single molecule of a chemical such as ethane

Polymer – more than one monomer joined together such as poly(ethane)

Answer

The breaking up of a molecule using heat

Question

What conditions are needed to make ethanol?

Ethanol can also be made by fermenting yeast – what is the equation for this?

Question

What conditions are needed for hydrogenation?

Question

Give some examples of emulsions

Question

What are the benefits, drawbacks and risks of using vegetable oil to make fuel?

Question

What are the issues associated with disposing of polymers?

Question

What raw material is used to make plastics?

Answer

React them with hydrogen, pass over a nickel catalyst and heat at 60°C

Answer

Steam and a catalyst

Glucose ⇨ Carbon dioxide + Ethanol

Answer

Advantages: carbon emissions reduced; better for the car; readily available

Disadvantages: specialist equipment needed; unknown risks

Answer

Mayonnaise, milk, ice cream, salad dressing etc…

Answer

Crude oil

Answer

Polymers are not biodegradable and so are difficult to dispose of

Question

What is fractional distillation?

Question

Where is a fractional distillation column the coolest?

Question

Why is cornstarch used as a replacement for some previous polymers?

Question

Why can combustion be termed as an oxidation reaction?

Question

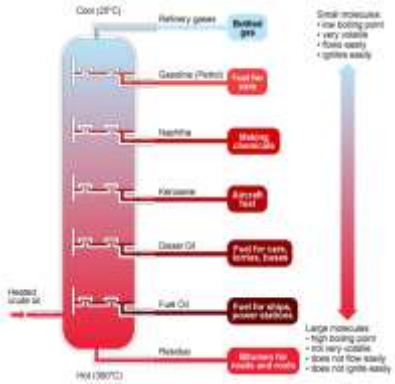
What causes incomplete combustion

Question

What potentially dangerous gases are released in the combustion of fossil fuels?

Answer

It is coolest at the top



Answer

A way to separate a mixture into different fractions, based on boiling point

Different hydrocarbons evaporate at different temperatures, after which they are condensed

Answer

Combustion involves oxygen being added to the fuel (the carbon and hydrogen are oxidised)

Answer

It is a biodegradable polymer which breaks down more easily

Answer

Carbon dioxide / monoxide / sulfur dioxides / nitrogen oxides / un-burnt hydrocarbons / particulates

Answer

A lack of oxygen

Question

Why was Wegener's continental drift theory not accepted for some time?

Question

What does the Earth consist of?

Question

How did scientists originally think mountains were formed?

Question

What are tectonic plates?

Question

What causes the tectonic plates to move?

Question

What causes the convection currents?

Answer

Crust, mantle, outer core, and inner core

Answer

Continental drift was not accepted for a long time as it was thought the world was shrinking

Answer

The Earth's crust and upper part of the mantle is cracked into a number of large pieces, known as tectonic plates

Answer

Scientists believed that the shrinking of the Earth as it cooled caused the mountains

Answer

Natural radioactive processes release heat

Answer

Convection currents cause the movements of the tectonic plates

Question

What can happen if the tectonic plates move?

Question

How do earthquakes occur?

Question

How long have the proportions of gases in the atmosphere been as they are?

Question

What gases are in the atmosphere?

Question

What are the proportions of the gases in the atmosphere?

Question

What is distillation?

Answer

Earthquakes are causes by tectonic plates rubbing against one another

Answer

Earthquakes and volcanoes

Answer

Nitrogen, oxygen, carbon dioxide, noble gases, and water vapour

Answer

200 million years

Answer

Distillation is when the solution is boiled and the vapour is cooled and collected

Answer

78% nitrogen
21% oxygen
0.04% carbon dioxide
0.9% argon
+ small amounts water vapour + noble gases

Question

What chemicals can be used to identify double carbon bonds?

Question

How do materials biodegrade?

Question

What happened on Earth in the first one billion years?

Question

How did the oceans form?

Question

What was the Earth's early atmosphere mainly made of?

Question

Which planets are similar to Earth's early atmosphere?

Answer

If materials biodegrade they are broken down by microorganisms

Answer

Bromine and iodine

Answer

The water vapour from the volcanic activity condensed and formed the oceans

Answer

Violent volcanic activity

Answer

Mars and Venus

Answer

Mainly carbon dioxide with little or no oxygen

Question

What was there very little of in the early atmosphere?

Question

What were there small amounts of in the early atmosphere?

Question

What produces oxygen?

Question

How has the carbon from carbon dioxide been 'locked up'?

Question

How do levels of carbon dioxide rise today?

Question

Why is the burning of fossil fuels bad environmentally?

Answer

Methane and water vapour

Answer

Oxygen

Answer

Most of the carbon dioxide is locked up in sedimentary rocks as carbonates and fossil fuels

Answer

Plants

Answer

Carbon dioxide is thought to be responsible for climate change

Sulfur dioxide and oxides of nitrogen cause acid rain

Solid particles cause global dimming

Answer

Burning fossil fuels

Question

What impact do humans have on the Earth?

Question

What foods contain hydrogenated oils and why?

Question

Why are long hydrocarbon chains 'cracked'?

Question

What do cars have to reduce carbon monoxide, nitrogen oxides and un-burnt hydrocarbons?

Question

What alternatives are there to fossil fuels?

Question

What is the Miler and Urey experiment of 1952?

Answer

Margarine – this hardens the vegetable oil, turning it more solid so it can be spread

Answer

Humans burn fossil fuels making carbon dioxide

Plastics are difficult to dispose of properly

Answer

Catalytic converters

Carbon Monoxide + Nitrogen Oxide → Nitrogen + Carbon Dioxide

Nitrogen Oxides → Nitrogen + Oxygen

Hydrocarbon + Oxygen → Carbon Dioxide + Water

Answer

Long hydrocarbon chains are not as useful as short hydrocarbon chains so they are 'cracked' into smaller chains

Answer

An experiment to recreate life replicating the early conditions on Earth (ammonia, methane, hydrogen, water and electrical sparks simulating lightning)

Carbon compounds had formed (amino acids) which make proteins suggesting this is how life began (bacteria)

Answer

Hydrogen (although requires energy to split in the first place) and bio-fuels (controversy growing plants for fuel when land could be used for food)

Question

Crude oil is a mixture – what is a mixture

Question

What is the formula for methane, ethane, propane and butane?

Question

How do the properties of long and short chain hydrocarbons differ in terms of boiling point, viscosity and flammability?

Question

What is the formula for ethene and how would polyethene be represented?

Question

What are the advantages and disadvantages of cooking in oil rather than in water?

Question

How can sulfur dioxide gas released during the burning of fossil fuels be prevented?

Answer

Methane – CH_4

Ethane – C_2H_6

Propane – C_3H_8

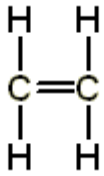
Butane – C_4H_{10}

Answer

2 or more elements or compounds which are not chemically joined

Answer

Ethene – C_2H_4



Answer

As hydrocarbon length increases the boiling point increases, the hydrocarbon becomes more viscous and less flammable

Answer

Sulfur can be removed before burning as well as sulfur dioxide being removed after combustion

Answer

Advantages: vegetable oils have higher boiling points than water so can be used to cook foods at higher temperatures producing quicker cooking

Disadvantages: cooking in oil increases the energy the food releases when eaten