OCR (A) Chemistry GCSE

Topic 6 - Global challenges

Flashcards

Most ores contain metals chemically combined with oxygen. What process must be carried out to extract the metal from its ore?

Most ores contain metals chemically combined with oxygen. What process must be carried out to extract the metal from its ore?

Reduction

Which two methods could be used to extract metals from their ores?

How can metals be extracted from their ores?

Reduction with carbon: Can only be done if the metal is less reactive than carbon (links to reactivity series).

Electrolysis: Can be done with all metals, but requires a large amount of energy (high cost).

How would you extract iron from its ore?

How would you extract iron from its ore?

Iron is less reactive than carbon so can be extracted from iron oxide by reduction with carbon.

Electrolysis could also be used, but this would use a lot of unnecessary energy (high cost).

What is the chemical equation for the reduction of iron(III) oxide with carbon?

What is the chemical equation for the reduction of iron(III) oxide with carbon?

$$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$$

How can aluminium be extracted from its ore?

How can aluminium be extracted from its ore?

Aluminium is more reactive than carbon so electrolysis must be used.

When the molten ore undergoes electrolysis, the metal forms at the cathode.

When aluminium is extracted from aluminium oxide, why is it first dissolved in molten cryolite?

When aluminium is extracted from aluminium oxide, why is it first dissolved in molten cryolite?

Aluminium oxide has a very high melting point. Dissolving it in molten cryolite reduces the melting point so less energy and money is required to form the electrolyte.

How is electrolysis used to extract metals from their ores?

How is electrolysis used to extract metals from their ores?

The anode (positive) is made out of the impure ore.
The cathode (negative) is made of the pure metal.

The positive metal cations move through the electrolyte to the cathode where they gain electrons and form the pure metal.

How can plants be used as an alternative metal extraction method? How does it work?

(Higher only)

How can plants be used as an alternative metal extraction method? How does it work? (Higher only)

Phytoextraction:

Plants are grown in areas with metals in the soil. The plants take up metals through their roots and concentrate them in their shoots and leaves. These plants are burned and the metals are removed from the ash.

How can bacteria be used as an alternative metal extraction method? How does it work?

(Higher only)

How can bacteria be used as an alternative metal extraction method? How does it work? (Higher only)

Bacterial extraction:

Some bacteria absorb metal compounds. These bacteria produce solutions called leachates containing the metals. Scrap iron can be used to remove the metal from the leachate.

What are the limitations of biological methods of extraction?

(Higher only)

What are the limitations of biological methods of extraction? (Higher only)

- Produces smaller quantities of metals.
- Slow processes.
- Require displacement or electrolysis for the final step.
- Bacteria require acidic conditions and may introduce toxic substances to the environment.

What is the Haber process?

(Chemistry only) (Higher only)

What is the Haber process?

(Chemistry only) (Higher only)

An industrial process used to produce ammonia (for synthetic fertilisers).

What are the ideal conditions for the Haber process?

(Chemistry only) (Higher only)

What are the ideal conditions for the haber process? (Chemistry only) (Higher only)

- 450°C temperature
- 200 atm pressure
- Iron catalyst

Why are the conditions of the Haber process considered to be a compromise?

(Chemistry only) (Higher only)

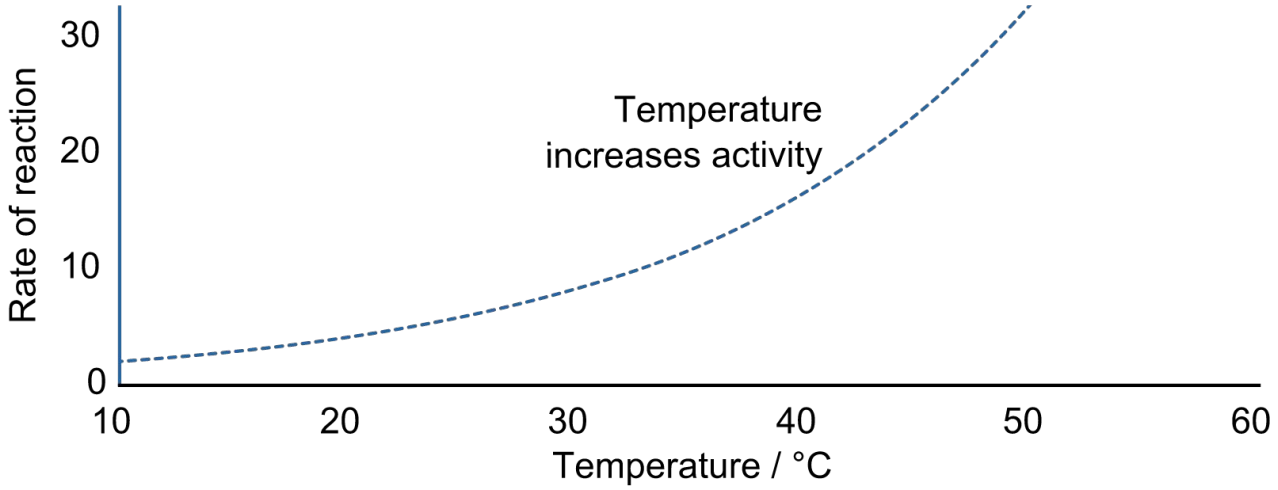
Why are the conditions of the Haber process considered to be a compromise? (Chemistry only) (Higher only)

Both temperature and pressure are a compromise:

- The forward reaction is exothermic so favours a low temperature however this can't be too low as it would lead to a slow rate of reaction.
- The forward reaction favours a high pressure which would increase the yield, however high pressures are very expensive to maintain and can be dangerous.

Describe the shape of a graph showing temperature and rate of reaction (Chemistry only) (Higher only)

Describe the shape of a graph showing temperature and rate of reaction (Chemistry only) (Higher only)



What factors are commercially used conditions in industrial processes dependent on?

(Chemistry only) (Higher only)

What factors are commercially used conditions in industrial processes dependent on?
(Chemistry only) (Higher only)

- Availability and cost of raw materials.
- Control of the position of equilibrium.
- Rate of reaction.
- Energy requirements and expenses.

Why is the Haber process important for agricultural production?

(Chemistry only)

Why is the Haber process important for agricultural production? (Chemistry only)

It produces ammonia which is used in synthetic nitrogen-based fertilisers.

What are the steps in the Haber process? (Chemistry only)

What are the steps in the Haber process?

(Chemistry only)

1. Obtain hydrogen and nitrogen from natural gas and air.
2. Compress the gases to 200 atm and heat them to 450°C.
3. Pump the gases are pumped into a tank containing layers of catalytic iron beads. Nitrogen and hydrogen react to form ammonia.
4. Ammonia and any unreacted hydrogen and nitrogen pass into a cooling tank. Ammonia is collected as a liquid.
5. The unreacted hydrogen and nitrogen are recycled back into the tank.

How can ammonium fertilisers be developed in a laboratory? (Chemistry only)

How can ammonium fertilisers be developed in a laboratory? (Chemistry only)

Using a titration. Ammonium sulfate can be produced by titrating ammonia with sulfuric acid.

What are the differences between the laboratory and industrial methods of producing ammonium sulfate?
(Chemistry only)

What are the differences between the laboratory and industrial methods of producing ammonium sulfate? (Chemistry only)

Laboratory	Industrial
• Small scale so only small volumes produced. • Reactants easily ordered from a supplier. • Only involves a few stags so relatively fast.	• Large scale so large volumes can be produced continuously. • Prior processes are needed to make the reactants sulfuric acid and ammonia. • Longer process so slower. • Can be automated to increase accuracy and precision.

Which compounds are important in agricultural production?

(Chemistry only)

Which compounds are important in agricultural production? (Chemistry only)

Compounds containing nitrogen, phosphorus or potassium.

Why must nitrogen, phosphorus and potassium be supplied to plants in soluble compounds?

(Chemistry only)

Why must nitrogen, phosphorus and potassium be supplied to plants in soluble compounds? (Chemistry only)

So they can be easily absorbed by the roots of the plants to help plant production.

What are NPK fertilisers?
(Chemistry only)

What are NPK fertilisers? (Chemistry only)

Fertilisers that contain nitrogen, phosphorus and potassium salts.

Which ammonium salts can be used for fertilisers?

(Chemistry only)

Which ammonium salts can be used for fertilisers? (Chemistry only)

Ammonium nitrate (ammonia + nitric acid)

Ammonium sulfate (ammonia + sulfuric acid)

Fill in the blanks: ‘The industrial production of fertilisers involves _____ integrated processes, using a ____ of raw materials’

(Chemistry only)

Fill in the blanks: ‘The industrial production of fertilisers involves _____ integrated processes, using a ____ of raw materials’ (Chemistry only)

Several

Variety

What is a life cycle assessment?

What is a life cycle assessment?

Analysis of the overall environmental impact that a product may have throughout its lifetime.

What different factors are considered in a life cycle assessment?

What different factors are considered in a life cycle assessment?

- Extraction and processing of raw materials.
- Manufacturing.
- Packaging and transportation.
- Use of the product.
- Disposal.

Why is recycling important?

Why is recycling important?

Materials such as metals, glass, ceramics and certain plastics can be recycled. A lot of energy is required to extract materials and obtaining these materials cause environmental impacts. Recycling limits these impacts and helps to preserve the finite resources used to make the materials.

What are the advantages associated with recycling materials?

What are the advantages associated with recycling materials?

- Provides employment.
- Saves finite resources.
- Less energy used in recycling than processing new materials.
- Reduces the amount of landfill required.

What are the disadvantages associated with recycling materials?

What are the disadvantages associated with recycling materials?

- Labour intensive and expensive to separate materials.
- Still has environmental impacts (e.g. melting polymers produces toxic gases which are harmful for animals and plants).
- Materials can often only be recycled a certain number of times as they lose their properties and become unusable.

What is an alloy?
(Chemistry only)

What is an alloy? (Chemistry only)

A mixture of two or more metals. The combination of metals gives an alloy its unique properties.

Why are alloys usually harder than pure metals?

(Chemistry only)

Why are alloys usually harder than pure metals? (Chemistry only)

Pure metals have atoms in uniform rows. The layers are able to slide over one another, making them soft and malleable. Alloys contain different sized atoms which distort the rows. This means the layers are unable to slide over one another, making the material harder.

What is the common name for the alloy of copper and zinc? What are its properties and uses?

(Chemistry only)

What is the common name for the alloy of copper and zinc? What are its properties and uses? (Chemistry only)

- Brass.
- Properties: malleable, ductile, low melting point, high tensile strength, good electrical conductor.
- Uses: hinges, electrical plugs, instruments.

What metals make up the alloy solder?
What are its properties and uses?
(Chemistry only)

What metals make up the alloy solder? What are its properties and uses? (Chemistry only)

- Tin and lead.
- Properties: strong, electrical conductor, variable melting points.
- Uses: joining metals together (pipes and electrical components).

What metals make up the alloy bronze? What are its properties and uses? (Chemistry only)

What metals make up the alloy bronze? What are its properties and uses? (Chemistry only)

- Copper and tin.
- Properties: copper coloured, high melting point, ductile, brittle, expands upon solidifying.
- Uses: castings, bearings, decoration.

Duralumin is an alloy of aluminium, copper and other metals. What are its properties and uses?

(Chemistry only)

Duralumin is an alloy of aluminium, copper and other metals. What are its properties and uses?
(Chemistry only)

Properties: strong, lightweight, hard, malleable, good thermal and electrical conductor, corrosion resistant

Uses: manufacture of aircrafts

What are steels? (Chemistry only)

What are steels? (Chemistry only)

Alloys of iron and carbon (may contain other elements).

What are the properties and uses of low carbon steel, high carbon steel and stainless steel?

(Chemistry only)

What are the properties and uses of low carbon steel, high carbon steel and stainless steel? (Chemistry only)

- Low carbon steel: Easily shaped and light so used for car body panels.
- High carbon steel: Hard so used for construction.
- Stainless steel: Corrosion resistant so suitable for cutlery.

What causes metals to corrode?
(Chemistry only)

What causes metals to corrode? (Chemistry only)

Reacting with oxygen (forms metal oxide)

What is rusting?
(Chemistry only)

What is rusting? (Chemistry only)

Corrosion of iron (reacts with oxygen and water in the air).

What 2 substances need to be excluded to prevent rusting? (Chemistry only)

What 2 substances need to be excluded to prevent rusting? (Chemistry only)

Oxygen (O_2)

Water (H_2O)

How can oxygen and water be excluded to prevent iron rusting?

(Chemistry only)

How can oxygen and water be excluded to prevent iron rusting?

- Paint the metal
- Coat the metal in oil/grease
- Cover the metal in plastic
- Keep the metal in a vacuum container

What is sacrificial protection? How does it prevent corrosion?

(Chemistry only)

What is sacrificial protection? How does it prevent corrosion? (Chemistry only)

Sacrificial protection is protecting a metal from corrosion by coating it with a more reactive metal.

The more reactive metal will corrode first, preventing corrosion of the inner metal.

Which metal is used in the sacrificial protection of iron?

(Chemistry only)

Which metal is used in the sacrificial protection of iron? (Chemistry only)

Zinc

What are the general properties of glass ceramics?

What are the general properties of glass ceramics?

- Transparent.
- Strong but brittle.
- Easily moulded into shapes.
- Poor conductors.

What are the general properties of clay ceramics?

What are the general properties of clay ceramics?

- Opaque.
- Soft and malleable.
- Hardened with heat.
- Brittle once hardened.
- Poor conductors.

What are the general properties of polymers?

What are the general properties of polymers?

- Properties can be adapted to suit the purpose.
- Usually tough and flexible.
- Can be transparent or opaque.
- Poor conductors.

What is a composite material?

What is a composite material?

Contains two or more materials with different properties.

Typically, there are two components: the reinforcement (makes up the bulk of the material) and the matrix (binds the reinforcement together).

Why do composites have a wide range of different properties?

Why do composite materials have a wide range of different properties?

As composite materials are made of several materials, the properties can be tailored to suit the need of the composite. Different composite materials contain different reinforcements and matrixes so the properties vary.

What are the general properties of metals?

What are the general properties of metals?

- Shiny
- Malleable
- Ductile
- Good conductors
- Can form alloys to produce more desirable properties

What is a functional group?
(Chemistry only)

What is a functional group? (Chemistry only)

A group of atoms that determine the characteristic characteristic chemical properties of an organic compound.

What is a homologous series?

(Chemistry only)

What is a homologous series? (Chemistry only)

A series of organic compounds with the same functional group and successive members differing by $-CH_2$.

Why do members of the same homologous series undergo similar reactions?

(Chemistry only)

Why do members of the same homologous series undergo similar reactions? (Chemistry only)

The molecules have the same functional group so have similar chemical properties.

Alkanes are saturated hydrocarbons.
Explain what this means
(Chemistry only)

Alkanes are saturated hydrocarbons. Explain what this means (Chemistry only)

Hydrocarbon - contains only hydrogen and carbon.

Saturated - carbon atoms are all joined by single bonds.

Name the first four alkanes and the first three alkenes

(Chemistry only)

Name the first four alkanes and the first three alkenes (Chemistry only)

Alkanes:

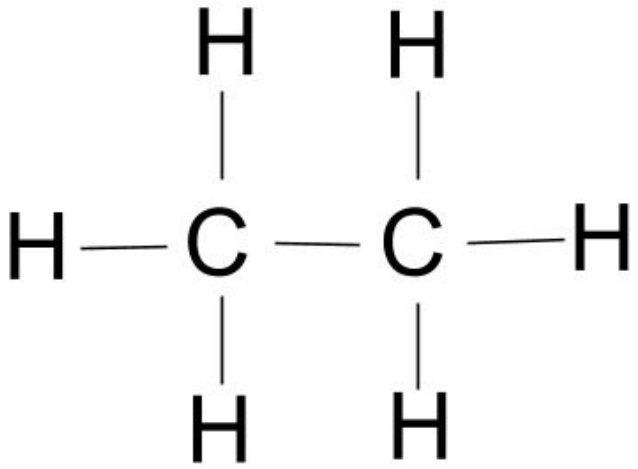
- Methane
- Ethane
- Propane
- Butane

Alkenes:

- Ethene
- Propene
- Butene

Draw the displayed formula of ethane (Chemistry only)

Draw the displayed formula of ethane (Chemistry only)

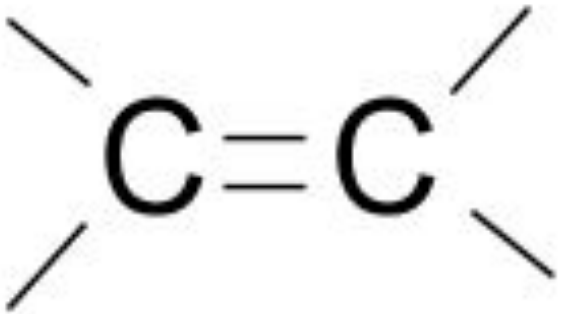


What is the functional group of an alkene?

(Chemistry only)

What is the functional group of an alkene? (Chemistry only)

C=C double bond

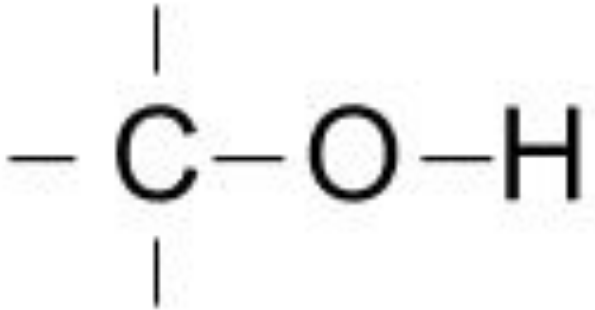


What is the functional group of an alcohol?

(Chemistry only)

What is the functional group of an alcohol?
(Chemistry only)

OH

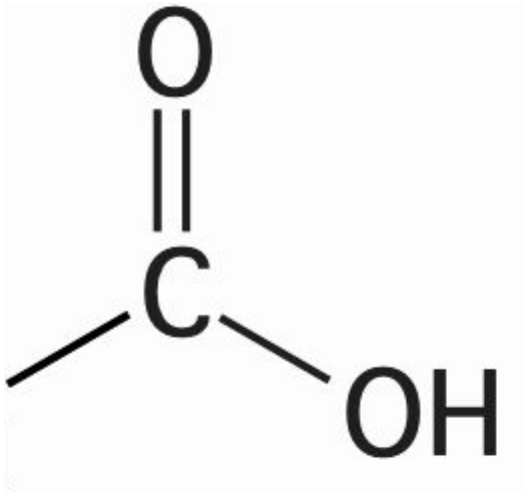


What is the functional group of a carboxylic acid?

(Chemistry only)

What is the functional group of a carboxylic acid? (Chemistry only)

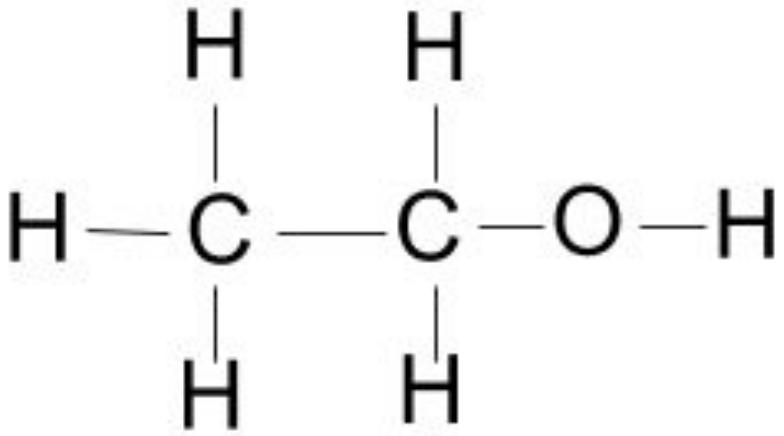
COOH



Draw the displayed formula of ethanol

(Chemistry only)

Draw the displayed formula of ethanol (Chemistry only)



A straight chain alcohol contains 3 carbons. Name this alcohol

(Chemistry only)

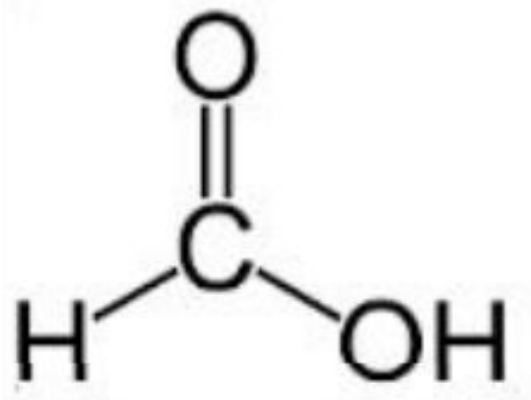
A straight chain alcohol contains 3 carbons. Name this alcohol (Chemistry only)

Propanol

Draw the displayed formula of methanoic acid

(Chemistry only)

Draw the displayed formula of methanoic acid (Chemistry only)



Name the carboxylic acid that contains 4 carbons

(Chemistry only)

Name the carboxylic acid that contains 4 carbons (Chemistry only)

Butanoic acid

What is formed when an alkane or alkene undergoes complete combustion?

(Chemistry only)

What is formed when an alkane or alkene undergoes complete combustion? (Chemistry only)

Carbon dioxide and water

What is the chemical formula for the complete combustion of propane?

(Chemistry only)

What is the chemical formula for the complete combustion of propane? (Chemistry only)

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

Why can alkenes undergo addition reactions?

(Chemistry only)

Why can alkenes undergo addition reactions? (Chemistry only)

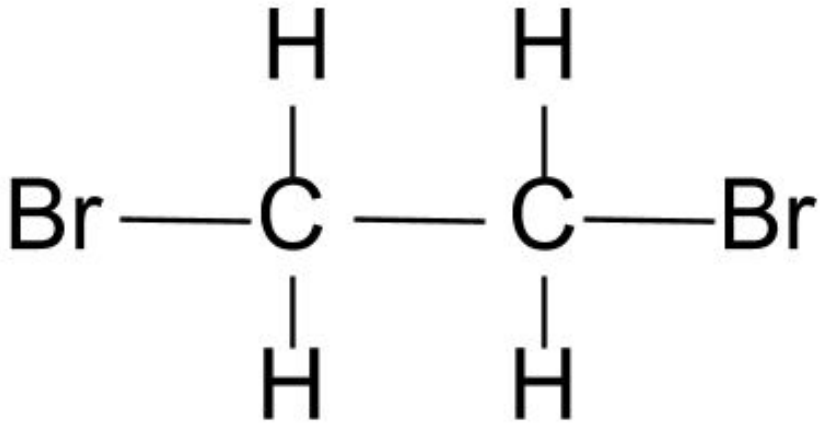
Because they contain a C=C double bond which can break during a reaction to become a C-C single bond.

What is formed when ethene undergoes an addition reaction with bromine?

(Chemistry only)

What is formed when ethene undergoes an addition reaction with bromine? (Chemistry only)

Dibromoethane:

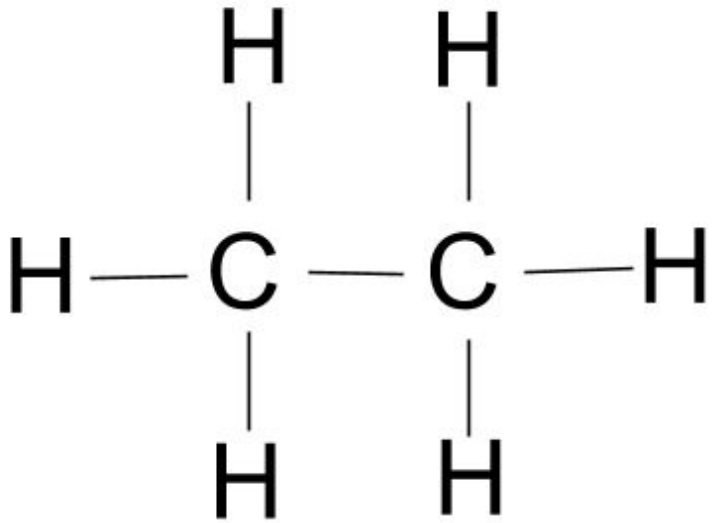


What is formed when ethene undergoes an addition reaction with hydrogen?

(Chemistry only)

What is formed when ethene undergoes an addition reaction with hydrogen? (Chemistry only)

Ethane:



How can bromine water be used to test for alkenes? (Chemistry only)

How can bromine water be used to test for alkenes? (Chemistry only)

Bromine water can reacts with alkenes due to the double bond.

An alkene will discolour bromine water, (orange to colourless).

What type of reaction can convert an alcohol into a carboxylic acid?
(Chemistry only)

What type of reaction can convert an alcohol into a carboxylic acid? (Chemistry only)

Oxidation

What is used to oxidise an alcohol to form a carboxylic acid?

(Chemistry only)

What is used to oxidise an alcohol to form a carboxylic acid? (Chemistry only)

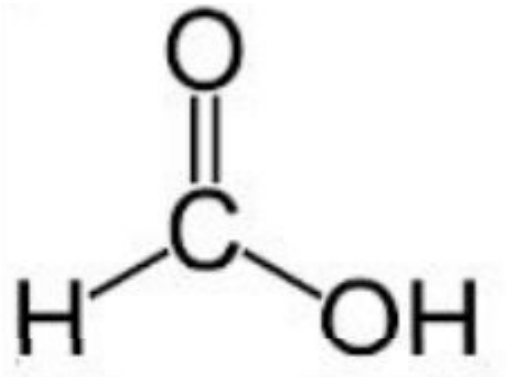
Potassium manganate (VII)

Methanol is oxidised using potassium manganate (VII). Draw the displayed formula of the product.

(Chemistry only)

Methanol is oxidised using potassium manganate (VII). Draw the displayed formula of the product. (Chemistry only)

Methanoic acid:



Name the process in which ethene molecules join together to form a poly(ethene) (Chemistry only)

Name the process in which ethene molecules join together to form a poly(ethene) (Chemistry only)

Addition polymerisation

How can ethene molecules undergo polymerisation to form poly(ethene)? (Chemistry only)

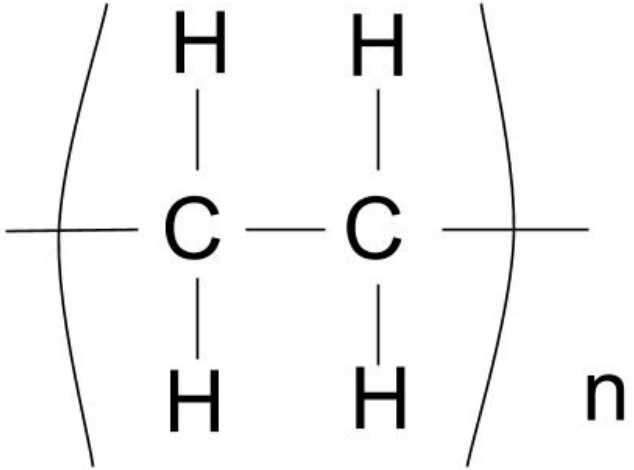
How can ethene molecules undergo polymerisation to form poly(ethene)? (Chemistry only)

Ethene is an alkene containing a C=C double bond. The C=C bond in each ethene monomer breaks then a bond forms between adjacent monomers. Many monomers join to form the polymer.

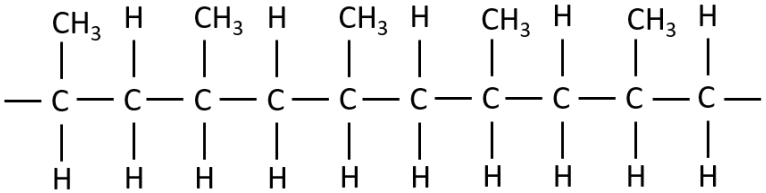
Draw the displayed formula of the product formed from the addition polymerisation of ethene

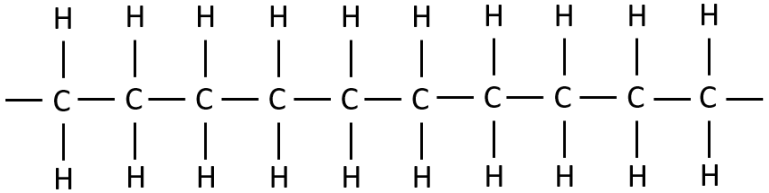
(Chemistry only)

Draw the displayed formula of the product formed from the addition polymerisation of ethene (Chemistry only)



What monomers formed the addition polymers below? (Chemistry only)





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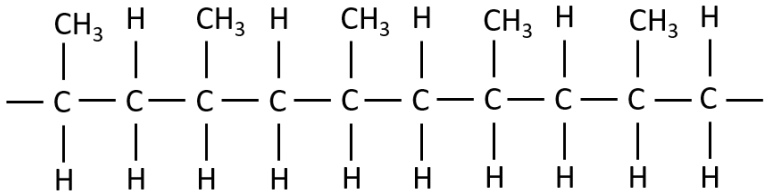
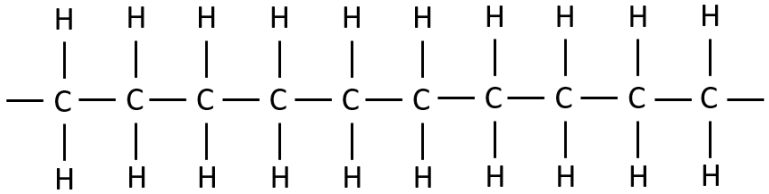
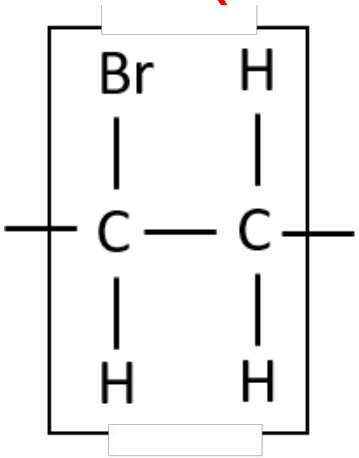


Poly(propene) formed from propene.



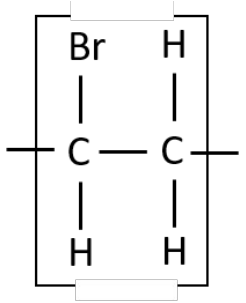
Poly(ethene) formed from ethene.

What monomer formed the addition polymer below? (Chemistry only)

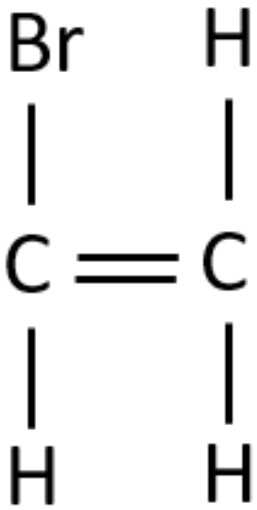


What monomer formed the addition polymer below?

(Chemistry only)



Bromoethene

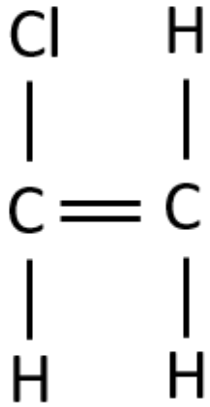


Draw the repeat unit of the polymer formed from chloroethene

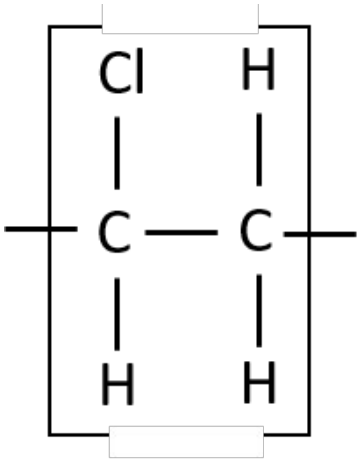
(Chemistry only)

Draw the repeat unit of the polymer formed from chloroethene (Chemistry only)

Monomer:



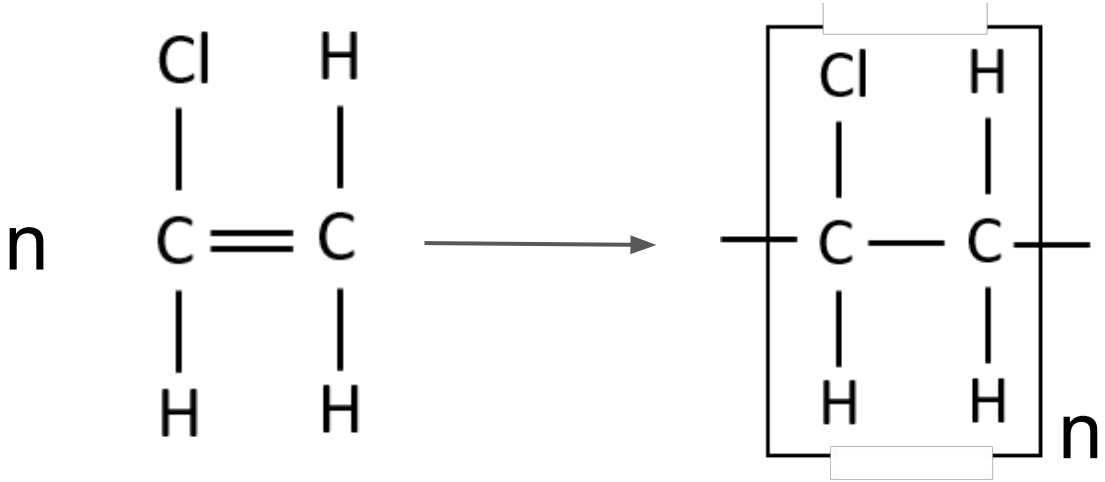
Repeat unit:



Write an equation for the formation of the addition polymer poly(chloroethene)

(Chemistry only)

Write an equation for the formation of the addition polymer poly(chloroethene) (Chemistry only)



What is condensation polymerisation?

(Chemistry only) (Higher only)

What is condensation polymerisation?

(Chemistry only) (Higher only)

The formation of a polymer during which monomers are joined together with the release a small molecule like water.

How is a polyester formed?
(Chemistry only) (Higher only)

How is a polyester formed? (Chemistry only) (Higher only)

Formed from a condensation reaction between a dicarboxylic acid (contains 2 COOH groups) and a diol (contains 2 OH groups).

How many monomers are in one repeat unit of a polyester? (Chemistry only) (Higher only)

How many monomers are in one repeat unit of a polyester? (Chemistry only) (Higher only)

Two

How is water formed when an ester bond is made?

(Chemistry only) (Higher only)

How is water formed when an ester bond is made? (Chemistry only) (Higher only)

OH^- is lost from a carboxylic acid group. H^+ is lost from the OH of an alcohol group. A bond forms between these two organic molecules.

The OH^- and H^+ combine to form a water molecule.

How can a polyester be formed in the laboratory?

(Chemistry only) (Higher only)

How can a polyester be formed in the laboratory? (Chemistry only) (Higher only)

Molecules containing 2 carboxylic acid groups are heated with molecules containing 2 alcohol groups in the presence of an acid catalyst.

What is DNA?
(Chemistry only)

What is DNA? (Chemistry only)

A polymer made from four different monomers called nucleotides.

What are the names of the nucleotides that make up DNA?

(Chemistry only)

What are the names of the nucleotides that make up DNA? (Chemistry only)

- Adenine (A)
- Cytosine (C)
- Guanine (G)
- Thymine (T)

What are other important natural polymers based on?

(Chemistry only)

What are other important natural polymers based on? (Chemistry only)

Sugars and amino acids

What is it that determines how an organic compound reacts?

(Chemistry only)

What is it that determines how an organic compound reacts? (Chemistry only)

The functional groups in the compound.

Where can crude oil be found?

Where can crude oil be found?

Under the sea and ground.

What does it mean when crude oil is described as ‘finite’?

What does it mean when crude oil is described as ‘finite’?

It will run out.

How can crude oil be separated?

How can crude oil be separated?

Fractional distillation

How does the process of fractional distillation work to separate crude oil?

How does the process of fractional distillation work to separate crude oil?

- Crude oil is vaporised before it enters a fractionating column.
- The fractionating column is hotter at the bottom than at the top. Vapours rise up and condense at different fractions depending on the boiling points on the substances.
- Hydrocarbons with low boiling points will be tapped off the top of the column and those with high boiling points will be tapped off the bottom.

Why can crude oil be separated?

Why can crude oil be separated?

The different hydrocarbons in crude oil have different boiling points because they have different chain lengths. Longer hydrocarbons have stronger intermolecular forces between molecules so more energy is required to turn them into a gas, hence a higher boiling point.

In what ways do the hydrocarbons at the different factions differ?

In what ways do the hydrocarbons at the different factions differ?

- Different boiling points.
- Ease of ignition.
- Viscosity.
- The number of hydrogen and carbon atoms their molecules have.

Name the fractions of crude oil

Name the fractions of crude oil

- Refinery gas
- Petrol
- Kerosene
- Diesel oil
- Fuel oil
- Bitumen

Where in the fractionating column do the hydrocarbons with the highest viscosity condense?

Where in the fractionating column do the hydrocarbons with the highest viscosity condense?

Viscosity relates to how thick and sticky a substance is.

The hydrocarbons with the highest viscosity, like bitumen, are collected at the bottom of the fractionating column.

What are the properties of the hydrocarbons tapped from the top of the fractionating column, like petrol and refinery gas?

What are the properties of the hydrocarbons tapped from the top of the fractionating column, like petrol and refinery gas?

- Low boiling point.
- Highly volatile.
- Easily ignited.
- Shorter carbon chains (small molecules).

Fractions of crude oil are mostly a mixture of compounds from which homologous series? What is the general formula of this homologous series?

Fractions of crude oil are mostly a mixture of compounds from which homologous series? What is the general formula of this homologous series?

Alkane

General formula: C_nH_{2n+2}

Crude oil is the ‘feedstock’ of what industry?

Crude oil is the ‘feedstock’ of what industry?

Petrochemical industry.

List some uses of the different fractions of crude oil

List some uses of the different fractions of crude oil

Bitumen used to make roads.

Petrol and diesel used for cars.

Refinery gas for heating and cooking.

Kerosene used for jet fuel.

Naphtha for making chemicals.

What is cracking?

What is cracking?

Breaking down large hydrocarbons into smaller more useful ones.

What is formed when an alkane is cracked?

What is formed when an alkane is cracked?

A short chain alkane (saturated) and a short chain alkenes (unsaturated).

What type of reaction is cracking?

What type of reaction is cracking?

Thermal decomposition.

Why is cracking necessary?

Why is cracking necessary?

The demand for short chain alkenes and alkanes is much greater than the demand for longer chain alkanes.

Describe how cracking is carried out

Describe how cracking is carried out

Vapourised hydrocarbons are either passed over a hot catalyst (like alumina or silica) or mixed with steam at 600-700ºC to allow thermal decomposition to occur.

When will a chemical cell stop producing a potential difference?

(Chemistry only)

When will a chemical cell stop producing a potential difference? (Chemistry only)

When the reactants are used up.

What is a fuel cell?
(Chemistry only)

What is a fuel cell? (Chemistry only)

A cell that continually produces a voltage as long as oxygen and fuel are supplied.

What is the only product of a hydrogen-oxygen fuel cell?
(Chemistry only)

What is the only product of a hydrogen-oxygen fuel cell? (Chemistry only)

Water

Write the two half equations for the reactions that take place in a hydrogen-oxygen fuel cell (Chemistry only)

Write the two half equations for the reactions that take place in a hydrogen-oxygen fuel cell (Chemistry only)

$$2H_2 \rightarrow 4H^+ + 4e^-$$

$$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$$

Write an equation for the overall reaction that takes place in a hydrogen-oxygen fuel cell

(Chemistry only)

Write an equation for the overall reaction that takes place in a hydrogen-oxygen fuel cell

(Chemistry only)

$$2H_2 + O_2 \rightarrow 2H_2O$$

What are the advantages of using fuel cells?

(Chemistry only)

What are the advantages of using fuel cells?
(Chemistry only)

- No pollution.
- Produce more energy than other fuel like petrol.
- Continuous process as long as fuel is supplied.

What are the disadvantages of using fuel cells?

(Chemistry only)

What are the disadvantages of using fuel cells? (Chemistry only)

- The materials used to make them are expensive.
- High pressure tanks required to store oxygen and fuel (e.g. hydrogen).
- Hydrogen is expensive and hard to store.
- Efficiency is affected by temperature.

Where did the gases that formed Earth's early atmosphere come from?

Where did the gases that formed Earth's early atmosphere come from?

Volcanic activity

Describe how Earth's early atmosphere formed

Describe how Earth's early atmosphere formed

- Initially, the surface of the earth was molten and there was no atmosphere.
- Cooling causing land masses to solidify.
- Volcanoes formed on the land masses and released gases which formed the early atmosphere.

What was the Earth's early atmosphere thought to contain?

What was the Earth's early atmosphere thought to contain?

- Little or no oxygen.
- Large amount of carbon dioxide
- Water vapour.
- Small amounts of other gases.

How did oceans form?

How did oceans form?

Water vapour condensed when the Earth cooled.

Why did the amount of carbon dioxide in the atmosphere decrease when the oceans formed?

Why did the amount of carbon dioxide in the atmosphere decrease when the oceans formed?

Some carbon dioxide dissolved into the oceans.

How did the amount of oxygen in the early Earth's atmosphere increase?

How did the amount of oxygen in the early Earth's atmosphere increase?

The growth of early plants used carbon dioxide for photosynthesis and released oxygen. The amount of oxygen gradually increased while the amount of carbon dioxide decreased.

What are greenhouse gases?

What are greenhouse gases?

Gases in the atmosphere that cause the greenhouse effect such as carbon dioxide, methane and water vapour.

What is the greenhouse effect?

Describe the greenhouse effect

- Electromagnetic radiation passes through the atmosphere and is absorbed by the Earth, causing the Earth to warm up.
- The Earth releases energy as infrared radiation (IR).
- Some IR goes into space but some is absorbed by greenhouse gases in the atmosphere. This warms the lower atmosphere.

How has human activity increased atmospheric carbon dioxide concentration?

How has human activity increased atmospheric carbon dioxide concentration?

- Burning of fossil fuels for energy releases carbon dioxide.
- Deforestation reduces the amount of photosynthesis occurring so less carbon dioxide being converted into oxygen.

What are the percentages of gases that make up atmosphere today?

What are the percentages of gases that make up atmosphere today?

Nitrogen - 78%

Oxygen - 21%

Argon - 0.93%

Carbon - 0.04%

What are the effects of global warming?

What are the effects of global warming?

- Melting of polar ice caps.
- Difficulties acquiring drinking water.
- Flooding.
- Flash fires.
- Destruction of ecosystems.

How has human activity increased the amount of methane in the atmosphere?

How has human activity increased the amount of methane in the atmosphere?

- Raising livestock such as cows.
- Decay of organic waste in landfill sites.

What is the trend between fossil fuel consumption and carbon dioxide concentration?

What is the trend between fossil fuel consumption and carbon dioxide concentration?

The carbon dioxide concentration in the atmosphere has increased as fossil fuel consumption has increased.

What are the major sources of carbon monoxide, sulfur dioxide, nitrogen oxides and soot particulates?

What are the major sources of carbon monoxide, sulfur dioxide, nitrogen oxides and soot particulates?

- Carbon monoxide and soot: incomplete combustion.
- Sulfur dioxide: Combustion of sulfur impurities in fuel.
- Oxides of nitrogen: oxidation of nitrogen at high temperatures (e.g. vehicle engines).

What are the dangers associated with carbon monoxide, sulfur dioxide, nitrogen oxides and soot particulates?

What are the dangers associated with carbon monoxide, sulfur dioxide, nitrogen oxides and soot particulates?

- Carbon monoxide: Toxic gas, binds to haemoglobin reducing the amount of oxygen that can be carried by the blood leading to death.
- Sulfur dioxide: Acid rain.
- Oxides of nitrogen: Acid rain.
- Soot particulate: Respiratory problems and global dimming.

What is the problem with acid rain?

What is the problem with acid rain?

- Corrosion metal structures.
- Damage to stone buildings and statues.
- Damage to the waxy layer on leaves.
- Increases the acidity of aquatic environments such as lakes.

List three ways the emission of atmospheric pollutants can be reduced

List three ways the emission of atmospheric pollutants can be reduced

- Use catalytic converters.
- Use lower sulfur fuel.
- Use gas scrubbers.

What does potable mean?

What does potable mean?

Safe to drink.

Describe the main steps involved in treating groundwater

Describe the main steps involved in treating groundwater

Groundwater has passed through layers of rock and sand so has already been filtered. The water must be chlorinated to kill microorganisms and make it potable.

Describe the main steps involved in treating wastewater

Describe the main steps involved in treating wastewater

1. Sedimentation: Where large insoluble particles sink to the bottom after the water is left still for a while.
2. Filtration: Removes small insoluble particles by passing the water through layers of sand and filters.
3. Chlorination: Kills bacteria and microorganisms which are too small to be removed by filtration.

How can seawater be made potable?

How can seawater be made potable?

Distillation:

1. Filter to remove insoluble particles.
2. Boil.
3. Cool and condense the water vapour.

What issues surround the process of making seawater potable?

What issues surround the process of making seawater potable?

- Extremely expensive as it requires a lot of energy to boil large volumes of water.
- Wastewater is toxic due to the high concentration of salt so must be disposed of carefully.

Why is chlorine added to water? What is the problem with chlorine?

Why is chlorine added to water? What is the problem with chlorine?

Adding chlorine to water to kill microorganisms.

Chlorine is toxic but reduces the risk of waterborne diseases. Only a small amount is added to water so most countries believe the benefits outweigh the risks.