CAIE Chemistry IGCSE

11.5 Alkenes

Flashcards

What does it mean when alkenes are described as ‘unsaturated hydrocarbons’?

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Hydrocarbons - Alkenes only contain hydrogen and carbon.

Unsaturated - Alkenes have at least one carbon-carbon double bond

Describe how alkenes can be manufactured

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By cracking long chain alkanes using a high temperature and catalyst

Long chain hydrocarbons are heated until vaporised. The vapours are passed over a hot catalyst to break the long chains. Alternatively, the vapours are mixed with steam at very high temperatures so that thermal decomposition occurs.

What are the products of cracking?

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- Shorter chain alkanes
- Alkenes
- Hydrogen

Give reasons why cracking of long chain alkanes is done

Give reasons why cracking of long chain alkanes is done

1. Produces alkenes which can be used as chemical feedstock
2. Helps to meet supply and demand of fractions
   - Fractional distillation of crude oil usually produces more long chain alkanes and less short chain alkanes, the latter has higher demand
   - Cracking produces shorter chain alkanes which are more useful as fuels than long chain hydrocarbons

What's the difference between saturated and unsaturated compounds?

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Saturated - only contain single covalent bonds.

Unsaturated - contain at least one double bond.

How can you distinguish between saturated and unsaturated compounds?

How can saturated and unsaturated compounds be distinguished between?

Add aqueous bromine.

Bromine water is decolourised in unsaturated compounds (alkenes) whereas it remains orange in saturated compounds (alkanes).

Why do alkenes decolourise bromine water?

Why do alkenes decolourise bromine water?

Alkenes are unsaturated. The double bond allows alkenes to react with bromine to form a bromoalkane.

What is an addition reaction?
(extended only)

What is an addition reaction? (extended only)

A reaction in which at least two molecules combine together to form a larger molecule, with only 1 product formed.

In terms of alkenes, what is an addition reaction?

(extended only)

In terms of alkenes, what is an addition reaction? (extended only)

The addition of hydrogen, a halogen or steam across the C=C double bond. The product doesn't contain a C=C double bond.

What are the different products formed when an alkene undergoes addition reactions with bromine, hydrogen and steam?

(extended only)

What are the different products formed when an alkene undergoes addition reactions with bromine, hydrogen and steam? (extended only)

Addition with bromine: Dibromoalkane.

Addition with hydrogen: Alkane.

Addition with steam: Alcohol.

Write the word and balanced symbol equations for the reaction between ethene and bromine

(extended only)

Write the word and balanced symbol equations for the reaction between ethene and bromine (extended only)

Ethene + Bromine → 1,2-dibromoethane

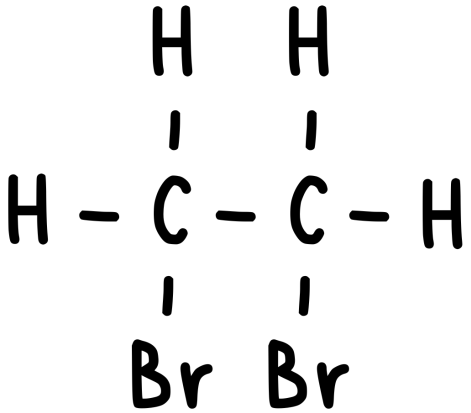
$C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$

Draw the structural and displayed formulae of the product for the reaction between ethene and bromine

(extended only)

Draw the structural and displayed formulae of the product for the reaction between ethene and bromine (extended only)

$C_2H_4Br_2$ or $CH_2(Br)CH_2(Br)$



Write a balanced word and symbol equations for the reaction between propene and hydrogen

(extended only)

Write a balanced word and symbol equations for the reaction between propene and hydrogen (extended only)

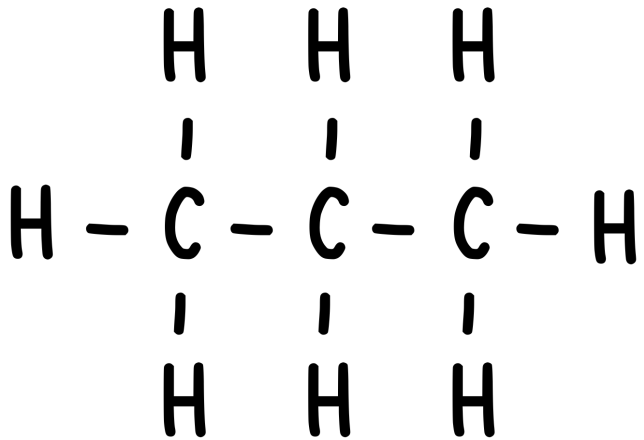
Propene + hydrogen → Propane

$C_3H_6 + H_2 \rightarrow C_3H_8$

Draw the structural and displayed formulae of the product for the reaction between propene and hydrogen (extended only)

Draw the structural and displayed formulae of the product for the reaction between propene and hydrogen (extended only)

C_3H_8 or $CH_3CH_2CH_3$



Write a balanced word and symbol equations for the reaction between ethene and steam

(extended only)

Write the word and balanced symbol equations for the reaction between ethene and steam (extended only)

Ethene + steam → ethanol

$C_2H_4 + H_2O\ (g) \rightarrow C_2H_5OH$

Draw the structural and displayed formulae of the product for the reaction between ethene and steam

(extended only)

Draw the structural and displayed formulae of the product for the reaction between ethene and steam (extended only)

C_2H_5OH or CH_3CH_2OH