

OCR (A) Chemistry A-level

Topic 4.1.2 - Alkanes

Flashcards

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What is an alkane?



What is an alkane?

A saturated hydrocarbons containing
C-H bonds only



What is the general formula of an alkane?



What is the general formula of an alkane?



Are alkane bonds polar?
Why/why not?



Are alkane bonds polar? Why/why not?

Nonpolar because carbon and hydrogen have similar electronegativities



What is the shape and angle
of an alkane?



What is the shape and angle of an alkane?

Tetrahedral

109.5°



Describe the σ (sigma) bond in
alkane



Describe the σ bond in alkane

The sigma bond is a covalent bond which has a direct overlap of the electron clouds of the bonding atoms.



What type of intermolecular forces do alkanes have? Why?



What type of intermolecular forces do alkanes have? Why?

London force → induced dipole-dipole interaction, because the bonds are nonpolar



What happens to the boiling point as alkane chain length increases? Why?



What happens to the boiling point as alkane chain length increases? Why?

The boiling point increases because there is more surface area and so more number of induced dipole- dipole interaction. Therefore more energy required to overcome the attraction



Does a branched molecule have lower or higher boiling point compared to equivalent straight chain? Why?



Does a branched molecule have lower or higher boiling point compared to equivalent straight chain? Why?

The branched molecule has a lower boiling point because they have fewer surface area and hence less induced dipole -dipole interactions.



Are alkanes soluble in water?
why?



Are alkanes soluble in water? Explain your answer.

Insoluble because hydrogen bonds in water are stronger than alkanes' London forces of attraction



How reactive are alkanes?



How reactive are alkanes?

Very unreactive



What reactions will alkanes undergo?



What reactions will alkanes undergo?

Combustion and reaction with halogens



What type of reaction is combustion?



What type of reaction is combustion?

Oxidation reaction



What is complete combustion?



What is complete combustion?

Combustion that occurs with plentiful supply of air



What are the products of complete combustion when alkanes are used?



What are the products of complete combustion when alkanes are used?

Carbon dioxide and water



What is the colour of the bunsen burner flame during complete combustion?



What is the colour of the bunsen burner flame during complete combustion?

Blue flame



What is incomplete combustion and what products are formed in the case of alkanes?



What is incomplete combustion and what products are formed in the case of alkanes?

Combustion in a limited supply of oxygen

Products : water, carbon dioxide and carbon monoxide



Write an equation for the
complete combustion of
propane



Write an equation for the combustion of propane



What type of hydrocarbon are most likely to undergo incomplete combustion?



Which type of hydrocarbon are most likely to undergo incomplete combustion?

Longer chains



What is the environmental impact of carbon monoxide?



What is the environmental impact of carbon monoxide?

It is toxic/poisonous



What is the environmental impact of soot (carbon)?



What is the environmental impact of soot (carbon)?

Asthma, cancer, global dimming



How are halogenoalkanes formed from alkanes?



How are halogenoalkanes formed from alkanes?

Radical substitution



In the presence of what does
alkane react with halogens?



In the presence of what does alkane react with halogens?

UV light



What are the three stages of free radical substitution?



What are the three stages of free radical substitution?

Initiation - breaking halogen bond to form free radicals

Propagation - chain part of the reaction where products are formed but free radical remains

Termination - free radicals removed, stable products formed



Write equations for the
reaction of CH_4 with Cl_2 to
form CH_3Cl



Write equations for the reaction of CH_4 with Cl_2 to form CH_3Cl

Initiation: $\text{Cl}_2 \rightarrow 2\text{Cl}\cdot$ (in presence of UV light)

Propagation: $\text{Cl}\cdot + \text{CH}_4 \rightarrow \text{HCl} + \cdot\text{CH}_3$

$\cdot\text{CH}_3 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{Cl}\cdot$

Termination:

$\cdot\text{CH}_3 + \text{Cl}\cdot \rightarrow \text{CH}_3\text{Cl}$

$2\text{Cl}\cdot \rightarrow \text{Cl}_2$

$\cdot\text{CH}_3 + \cdot\text{CH}_3 \rightarrow \text{CH}_3\text{CH}_3$

