Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Alkanes

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Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

Pentane is a member of the alkane homologous series.

(a) Give the general formula for the homologous series of alkanes.

_____

(1)

(b) One of the structural isomers of pentane is 2,2-dimethylpropane.

Draw the displayed formula of 2,2-dimethylpropane.

State the type of structural isomerism shown.

_____

(2)

(c) A molecule of hydrocarbon **Y** can be thermally cracked to form one molecule of pentane and two molecules of ethene only.

Deduce the molecular formula of **Y**.

State why high temperatures are necessary for cracking reactions to occur.

Give **one** reason why thermal cracking reactions are carried out in industry.

_____

_____

_____

_____

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(3)

(d) Write an equation for the incomplete combustion of pentane to form a solid pollutant.

Suggest why this solid pollutant is an environmental problem.

(2)

(e) Pentane can react with chlorine as shown in the following equation.

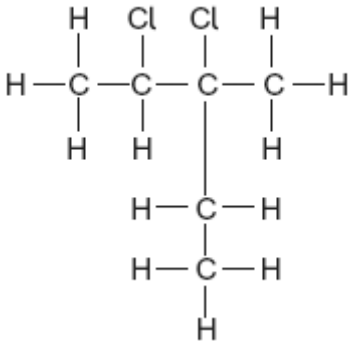
$$C_5H_{12} + Cl_2 \rightarrow C_5H_{11}Cl + HCl$$

Calculate the percentage atom economy for the formation of $C_5H_{11}Cl$

Deduce how many straight-chain isomers of $C_5H_{11}Cl$ could be formed.

(3)

(f) Consider the following compound.



Name this compound.

Deduce the empirical formula of this compound.

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(2)
(Total 13 marks)

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Q2.

Cetane ($C_{16}H_{34}$) is a major component of diesel fuel.

(a) Write an equation to show the complete combustion of cetane.

_____

(1)

(b) Cetane has a melting point of 18 °C and a boiling point of 287 °C.
In polar regions vehicles that use diesel fuel may have ignition problems.
Suggest **one** possible cause of this problem with the diesel fuel.

_____

_____

(1)

(c) The pollutant gases NO and NO_2 are sometimes present in the exhaust gases of vehicles that use petrol fuel.

(i) Write an equation to show how NO is formed and give a condition needed for its formation.

Equation _____

Condition _____

(2)

(ii) Write an equation to show how NO is removed from the exhaust gases in a catalytic converter. Identify a catalyst used in the converter.

Equation _____

Catalyst _____

(2)

(iii) Deduce an equation to show how NO_2 reacts with water and oxygen to form nitric acid (HNO_3).

_____

(1)

(d) Cetane ($C_{16}H_{34}$) can be cracked to produce hexane, butene and ethene.

(i) State **one** condition that is used in this cracking reaction.

_____

(1)

(ii) Write an equation to show how one molecule of cetane can be cracked to form hexane, butene and ethene.

_____

(1)

(iii) State **one** type of useful solid material that could be formed from alkenes.

_____

(1)

(Total 10 marks)

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