

Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Q1.

Hexane (C_6H_{14}) is a member of the homologous series of alkanes.

- (a) (i) Name the raw material from which hexane is obtained.

(1)

- (ii) Name the process used to obtain hexane from this raw material.

(1)

- (b) C_6H_{14} has structural isomers.

- (i) Deduce the number of structural isomers with molecular formula C_6H_{14}

Write the number in this box.

(Space for working)

(1)

- (ii) State **one** type of structural isomerism shown by the isomers of C_6H_{14}

(1)

- (c) One molecule of an alkane **X** can be cracked to form one molecule of hexane and two molecules of propene.

- (i) Deduce the molecular formula of **X**.

(1)

- (ii) State the type of cracking that produces a high percentage of alkenes. State the

conditions needed for this type of cracking.

Type of cracking _____

Conditions _____

(2)

- (iii) Explain the main economic reason why alkanes are cracked.

(1)

- (d) Hexane can react with chlorine under certain conditions as shown in the following equation.



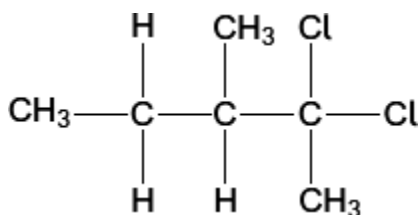
- (i) Both the products are hazardous. The organic product would be labelled 'flammable'. Suggest the most suitable hazard warning for the other product.

(1)

- (ii) Calculate the percentage atom economy for the formation of $\text{C}_6\text{H}_{13}\text{Cl}$ ($M_r = 120.5$) in this reaction.

(1)

- (e) A different chlorinated compound is shown below. Name this compound and state its empirical formula.



Name _____

Empirical formula _____

(2)

(Total 12 marks)

Q2.

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.

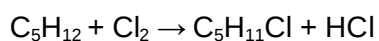
(3)

- (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.

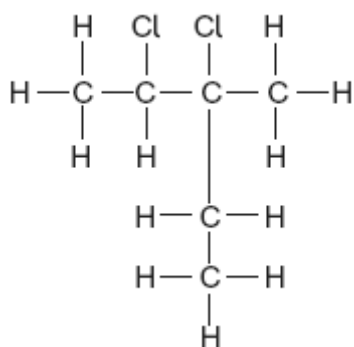


Calculate the percentage atom economy for the formation of $\text{C}_5\text{H}_{11}\text{Cl}$

Deduce how many straight-chain isomers of $\text{C}_5\text{H}_{11}\text{Cl}$ could be formed.

(3)

- (f) Consider the following compound.



Name this compound.

Deduce the empirical formula of this compound.

(2)

(Total 13 marks)