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

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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

Trichlorofluoromethane (CCl_3F) was developed as a refrigerant. The production and use of CCl_3F is now restricted.

(a) The equation for a process used to manufacture CCl3F is

$$SbF_3Br_2 + CCl_4 \rightarrow CCl_3F + SbF_2Br_2Cl$$

Calculate the percentage atom economy for the production of CCl_3F in this reaction. Give your answer to 3 significant figures.

Percentage atom economy _____

(2)

An alternative synthesis of CCl_3F is the free-radical substitution reaction between fluoromethane (CH_3F) and chlorine.

(b) An intermediate in this alternative synthesis is dichlorofluoromethane ($CHCl_2F$)

Give equations to represent the two propagation steps in the conversion of $CHCl_2F$ into CCl_3F

Propagation step 1

_____

Propagation step 2

_____

(2)

(c) Analysis of the products of this reaction shows the formation of a compound with the empirical formula CCl_2F

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Give an equation to represent a termination step forming this compound. Show the structural formula of the product in the equation.

_____

(1)

(Total 5 marks)

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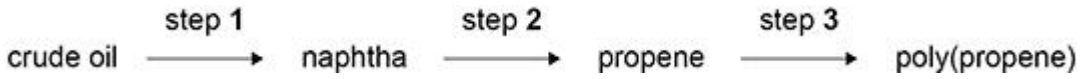
Q2.

This question is about poly(propene).

(a) The three key steps in the manufacture of poly(propene) from crude oil are shown.



Naphtha is a mixture of alkanes with 6 to 12 carbon atoms per molecule.

For each step, name the process and state briefly the purpose of the process that leads to the formation of poly(propene).

Step **1**

Name _____

Purpose _____

_____

_____

Step **2**

Name _____

Purpose _____

_____

_____

Step **3**

Name _____

Purpose _____

_____

_____

(6)

(b) Poly(propene) is not biodegradable because it is unreactive.

Explain why poly(propene) is unreactive.

_____

_____

_____

(1)

(c) Scientists are developing new polymers, including some that are biodegradable.

Suggest why it is beneficial for some polymers to be biodegradable.

_____

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_____

_____

(1)

(Total 8 marks)

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Q3.

This question is about the ozone layer in the upper atmosphere.

(a) State why the ozone layer is beneficial for living organisms.

_____

_____

_____

(1)

(b) State how chlorofluorocarbons (CFCs) form chlorine atoms in the upper atmosphere.

_____

_____

_____

(1)

(c) Give equations to show how chlorine atoms catalyse the decomposition of ozone.

_____

_____

(2)

(d) Hydrochlorofluorocarbons (HCFCs) have been used in place of CFCs.
In the mechanism to make an HCFC from a fluoroalkane, two incomplete steps are shown.

Complete each step in the mechanism.

Give the name of the type of step shown by both these equations.

_____ → ● CHF_2 + HCl

● CHF_2 + Cl_2 → _____

Type of step _____

(3)

(Total 7 marks)

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