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

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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

This question is about $CFCl_3$

$CFCl_3$ used to be the propellant in most aerosol cans.

(a) Use IUPAC rules to name $CFCl_3$

_____

(1)

(b) Give an equation for each of the **two** propagation steps in the conversion of $CHFCl_2$ into $CFCl_3$

Equation 1

_____

Equation 2

_____

(2)

(c) In the presence of ultraviolet radiation, $CFCl_3$ breaks down in the upper atmosphere to form chlorine free radicals.

Give an equation for this reaction.

_____

(1)

(d) Chlorine free radicals catalyse the decomposition of ozone.

Give **two** equations to show how chlorine free radicals decompose ozone.

Equation 1

_____

Equation 2

_____

(2)

(e) The production and use of CFCs have been banned in many countries because they decrease the amount of ozone in the upper atmosphere.

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State why ozone in the upper atmosphere is important for life on Earth.

_____

_____

(1)

(Total 7 marks)

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Q2.

This question is about hydrocarbons.

(a) Eicosane ($C_{20}H_{42}$) can be cracked by heating to 700 K in the presence of a catalyst.

The products are

- an aromatic hydrocarbon C_8H_{10}
- an alkane C_6H_{14}
- another alkane.

$$C_{20}H_{42} \longrightarrow C_8H_{10} + C_6H_{14} + _____$$

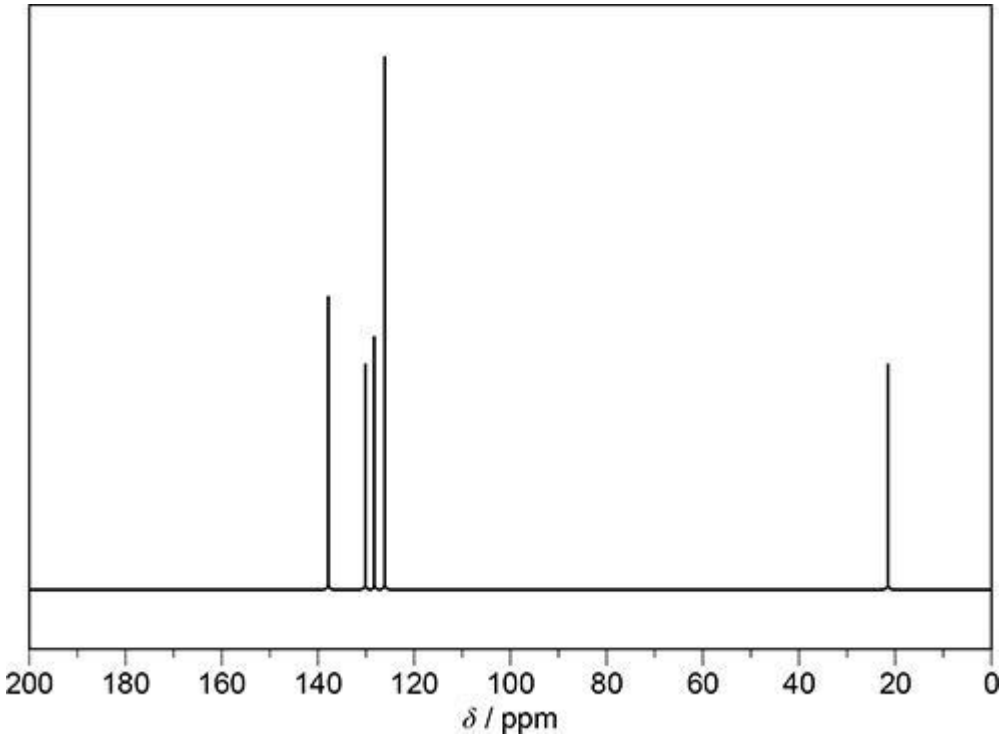
Complete the equation for this reaction.

Give a suitable catalyst for this reaction.

Catalyst _____

(2)

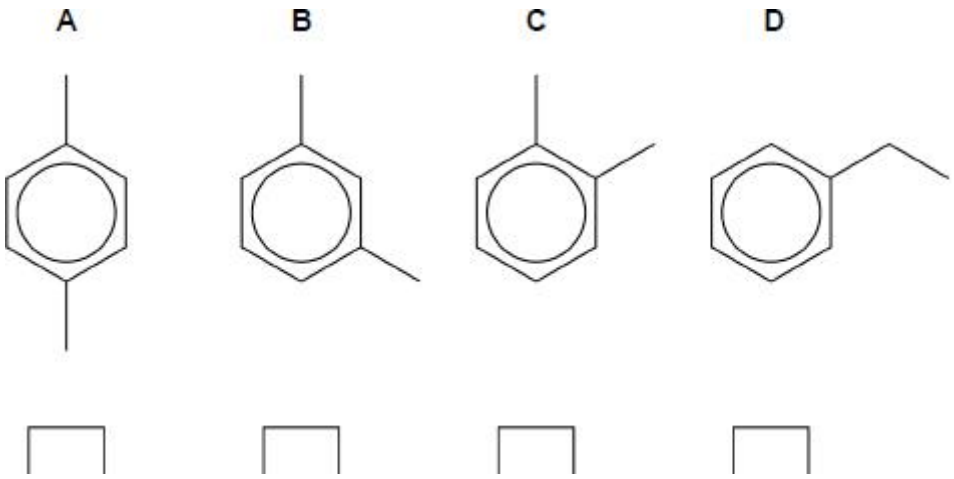
(b) The figure below shows the ^{13}C NMR spectrum for the aromatic hydrocarbon C_8H_{10}



Which of these is the structure of C_8H_{10}?

Tick (✓) **one** box.

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(1)

(c) Cracking can also be done without a catalyst, using a temperature of 1200 K and a pressure of 7000 kPa

State the type of product that is formed in high percentage in this type of cracking.

_____

(1)

(d) A sample of butane has a volume of 20 cm^3 at room temperature and pressure.

The sample is burned completely in 1350 cm^3 of air.

The final mixture is cooled to room temperature and pressure.

$$C_4H_{10} + 6\tfrac{1}{2}\ O_2 \longrightarrow 4\ CO_2 + 5\ H_2O$$

Calculate the total volume of gas in the final mixture.
Assume that air contains 21% by volume of oxygen.

Total volume of gas remaining _____ cm^3

(4)

(e) Natural gas is used in power stations to produce electricity.

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Natural gas contains sulfur impurities. Sulfur dioxide forms when these impurities are burned.

State an environmental problem caused by sulfur dioxide.

Give the formula of a compound that is used to help remove sulfur dioxide from the combustion products.

Environmental problem _____

Formula of compound _____

_____

(2)

(Total 10 marks)

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