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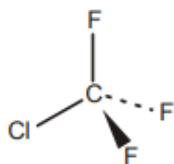
Level & Board	AQA (A-LEVEL)
TOPIC:	HALOGENOALKANES
PAPER TYPE:	SOLUTION - 1
TOTAL QUESTIONS	10
TOTAL MARKS	27

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Halogenoalkanes - 1

1.

(a) Shape of a molecule of CF_3Cl



(1)

(b) Bond angles in a molecule of CF_3Cl : $108 - 111^\circ$

(1)

(c) CF_3Cl is suitable as an aerosol propellant due to its volatile, non-toxic, non-flammable, unreactive, and inert nature. It easily liquefies under pressure, facilitating its use in aerosol containers for propelling products effectively and safely.

(1)

(d) Homolytic fission refers to the bond-breaking process in which a covalent bond is cleaved, and the shared electrons are divided equally between the two atoms.



(1)

(e) C-Cl bond is most likely to be broken when CF_3Cl is exposed to ultraviolet radiation because it is the weaker bond.

(1)

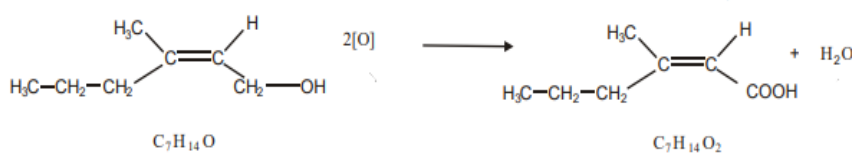
(f) $\text{Cl}\cdot$ and $\cdot\text{CF}_3$ are two free radicals most likely to be formed when CF_3Cl is exposed to ultraviolet radiation.

(2)

2. B (1)

3. (a) Suitable oxidising mixture: $H^+ Cr_2O_7^{2-}$ (2)

(b) Oxidation of compound E:



(3)

(c) Carboxylic acid could be distinguished by infra-red spectroscopy. Carboxylic acid would have an absorption between $1680 - 1750 \text{ cm}^{-1}$. The O-H bond of the carboxyl group gives rise to a very broad absorption over the range 2500 to 3300 cm^{-1} .

(1)

4. C (1)

5. A (1)

6. Balanced equation for the fermentation of glucose.
 $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

(2)

7. B

(1)

8.

Properties of CCl_2F_2 :

Non-toxic/Harmless: Midgley's demonstration, as he inhaled dichlorodifluoromethane without apparent harm, indicates that the compound is non-toxic for inhalation.

Non-flammable: Midgley's use of dichlorodifluoromethane to blow out a candle suggests that the compound is non-flammable.

Two other uses of chemicals like CCl_2F_2 :

Propellant in Aerosols: CCl_2F_2 is utilized as a propellant in aerosol products. Its volatility, lack of reactivity, non-toxicity, and ease of compression make it suitable for propelling contents like deodorants, hairsprays, and cleaning agents.

Blowing Agent in Foam Production (e.g., for Polystyrene): CCl_2F_2 has been employed as a blowing agent in the production of foam materials, such as polystyrene foam. Its unreactive nature allows it to expand the foam, creating a lightweight and insulating material.

Other applications:

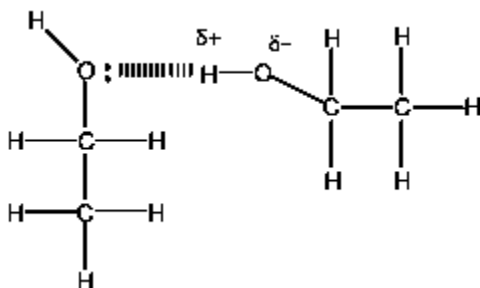
- **Dry Cleaning:** It serves as a solvent for organic materials, making it effective in dry cleaning processes.
- **Degreasing Agent:** Due to its good solvent properties for organic materials, CCl_2F_2 has been used as a degreasing agent.
- **Fire Extinguishers:** The non-flammable nature of CCl_2F_2 makes it suitable for use in fire extinguishers.

(4)

9.

Hydrogen bonding between two molecules of ethanol.

- *Dipoles between H-O*
- *Hydrogen bond between O in one O-H and H in the other O-H*
- *lone pair from O involved in the H-bond*



(3)

10. D

(1)



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- Founder & CEO of Chemistry Online Tuition Ltd.
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