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CHEMISTRY ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	ALCOHOLS
PAPER TYPE:	SOLUTION - 3
TOTAL QUESTIONS	10
TOTAL MARKS	26

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Alcohols - 3

I.

(a)

Carbon-neutral:

Carbon-neutral means that there is no change in the total amount of carbon dioxide, carbon, or greenhouse gas present in the atmosphere or air.

(1)

(b)

The main advantage of using glucose from crops as the raw material for the production of ethanol is that it is renewable or sustainable.

This is because the crops such as supercape or corn, can be grown and

This is because the crops, such as sugarcane or corn, can be grown and harvested repeatedly, providing a continuous and sustainable source of glucose for ethanol production.

(1)

(c)

One **disadvantage** of using crops for ethanol production is the slow process, which involves the time-consuming growth of crops before they can be harvested and processed.

(1)

2. B

(1)

3.

Percentage of oxygen by mass =
$$100 - 40.9 - 4.5$$

= 54.6

Determine the ratio of elements:

• Carbon:
$$\frac{40.9}{12.01}$$
 = 3.4

• Hydrogen:
$$\frac{4.5}{1.01}$$
 = 4.5

• Oxygen:
$$\frac{54.6}{16.0}$$
 = 3.41

Divide by the smallest ratio:

Carbon:Hydrogen:Oxygen=
$$\frac{3.41}{3.41}$$
; $\frac{4.5}{3.41}$; $\frac{3.41}{3.41}$

Round to the nearest whole number ratio:

Nearest whole number ratio

Empirical formula:

Empirical formula = $C_3H_4O_3$

Check if the empirical formula mass equals the given molecular formula mass (88.0):

· Empirical formula mass

Since the empirical formula mass is approximately equal to the given molecular formula mass, the molecular formula is the same as the empirical formula:

Molecular formula: C3H4O3

(4)

4. A

(1)

5.
Test with Bromine Water:

Reagent:

Bromine Water (Br_2)

Observation:

Decolourised / becomes colourless

Oleic acid, being an unsaturated compound, can react with bromine water. In the presence of unsaturation, bromine water decolorizes from its characteristic brown color to colorless or a much lighter color.

This change in color indicates the addition reaction between bromine and the double bond in oleic acid.

(5)

6. A

(1)

7.

(a)

Reagent: Hydrogen gas (H2) Conditions: Nickel (Ni) catalyst Temperature: 100–200 °C or heat

(2)

(b)

Difference in Structure:

Soft Margarine:

This margarine is less hydrogenated, meaning that not all of the double bonds (C=C bonds) in the unsaturated fatty acids of the vegetable oil have been saturated with hydrogen. As a result, the molecular structure of soft margarine contains more C=C bonds or unsaturated fatty acids, leading to a more open and flexible structure.

Hard Margarine:

In contrast, hard margarine undergoes further hydrogenation, where more of the C=C bonds are saturated with hydrogen. This process results in a more saturated molecular structure, with fewer C=C bonds and a tighter packing of fatty acid chains.

Difference in Melting Point:

Soft Margarine:

The higher proportion of unsaturated fats in soft margarine contributes to a lower melting point. The presence of C=C bonds introduces kinks and bends in the fatty acid chains, making it easier for the molecules to move and transition from a solid to a liquid state at a lower temperature.

Hard Margarine:

The increased saturation in hard margarine raises its melting point. The saturated fats have a more linear and tightly packed structure, requiring

higher temperatures for the margarine to transition from a solid to a liquid state

(5)

8. D

(1)

9.

An unsaturated compound contains at least one double bond between its carbon atoms.

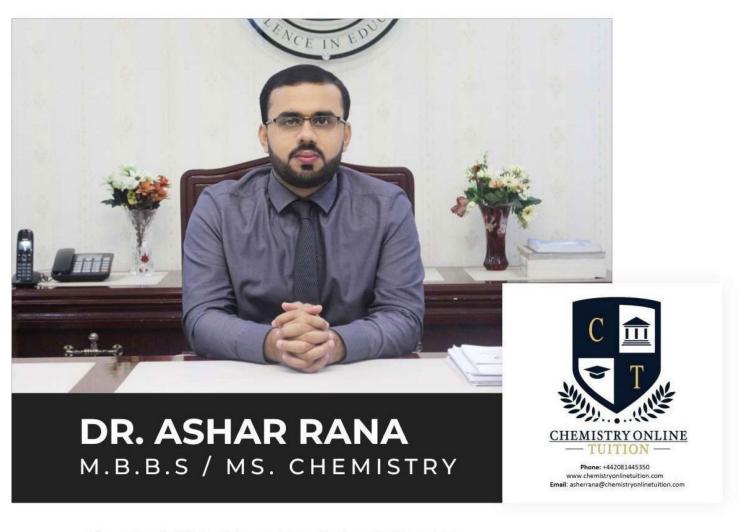
Example: H2C=CH2

Examples of unsaturated compounds include alkenes, where the presence of the double bond (C=C) influences the compound's properties and behavior in chemical reactions.

(2)

10. A

(1)



- · Founder & CEO of Chemistry Online Tuition Ltd.
- · Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
- · CIE & EDEXCEL Examiner since 2015
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