



CHEMISTRY ONLINE
— **TUITION** —

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CHEMISTRY

ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	ALCOHOLS
PAPER TYPE:	SOLUTION - 2
TOTAL QUESTIONS	10
TOTAL MARKS	31

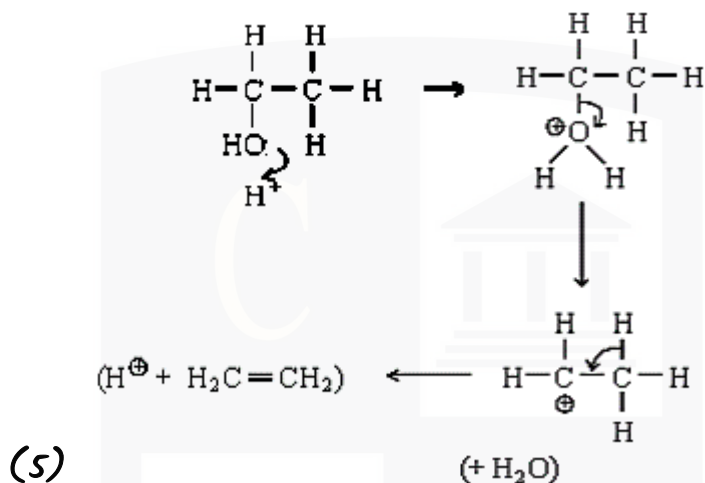
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Alcohols - 2

1.

Catalyst: Al_2O_3 or H_2SO_4

Mechanism for dehydration of ethanol:



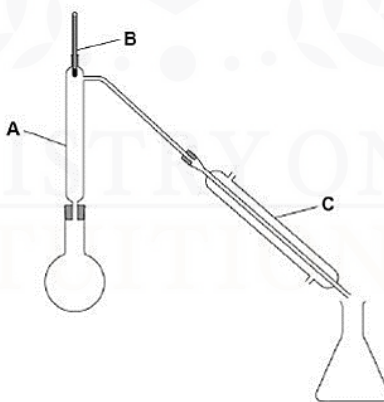
2. B

(1)

3.

(a)

The apparatus is simple distillation setup designed to collect a sample of ethanol.



Turn on the water: This step involves starting the flow of water through the condenser (part C) to ensure effective cooling during the distillation process.

Heat the flask with a Bunsen burner:

The flask is heated to produce a mixture of water and ethanol vapors. The heat causes the liquid to vaporize, creating a gaseous mixture in the flask. **Vapors pass up the fractionating column (A):**

The fractionating column A is designed to aid in the separation of the components of the vapor mixture based on their boiling points. It allows the rising vapors to cool and condense partially, with the heavier components (water) falling back into the flask, while the lighter components (ethanol) continue upward.

Observe the thermometer at B:

The thermometer at B is used to monitor and control the temperature inside the apparatus. It is crucial to keep the temperature at or below the boiling point of ethanol to ensure that only ethanol vapors (along with a small amount of water) pass into the condenser.

Use the condenser at part C: The condenser (part C) is employed to cool the vapors, causing them to condense back into a liquid state.

This process effectively separates ethanol from water, as ethanol has a lower boiling point.

Functions of Parts:

- **Flask:** Serves as the container for the liquid mixture (water and ethanol) to be distilled.
- **Bunsen burner:** Provides the heat necessary for vaporization of the liquid mixture in the flask.
- **Fractionating column A:** Facilitates the separation of the water and ethanol vapors by allowing condensation of heavier components and letting lighter components continue upwards.
- **Thermometer B:** Monitors and controls the temperature to ensure selective vaporization of ethanol.
- **Condenser C:** Cools the vapor mixture, causing ethanol to condense back into liquid form, ready for collection.

(6)

(b)

Assume that the volume of the sample is equal to the sum of the volumes of water and ethanol.

Volume of sample = volume of ethanol + volume of water

Let

m = mass of ethanol

$$20 = (m / 0.79) + (16-m) / 1.00$$

$$1.266m - m = 20 - 16$$

$$0.266m = 4$$

$$m = 4/0.266$$

$$m = 15g$$

(2)

4. B

(1)

5.

Percentage of oxygen = 100% - (Percentage of carbon + Percentage of hydrogen)

$$\text{Percentage of oxygen} = 100\% - (64.9\% + 13.5\%)$$

$$\text{Percentage of oxygen} = 100\% - 78.4\%$$

$$\text{Percentage of oxygen} = 21.6\% \#$$

$$C = \frac{64.9}{12} = 5.41$$

$$H = \frac{13.5}{1} = 13.5$$

$$O = \frac{21.6}{16} = 1.35$$

Find the simplest whole-number ratio:

- Divide each mole value by the smallest of the three (1.35):
 - $5.41/1.35=4$
 - $13.5/1.35=10$
 - $1.35/1.35=1$

Round to the nearest whole number:

- C: 4
- H: 10
- O: 1

Therefore, the empirical formula of the alcohol is $C_4H_{10}O$.

(3)

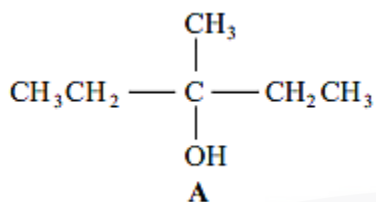
6. A

(1)

7.

(a)

Name alcohol A:



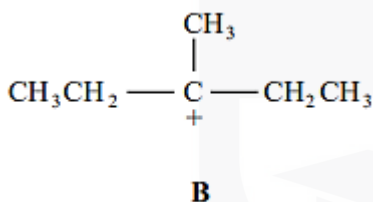
3-methylpentan-3-ol

(1)

(b)

Intermediate B:

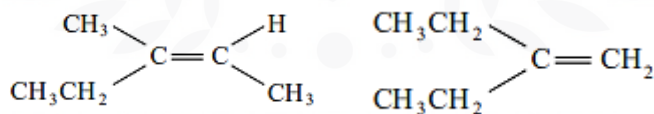
Carbonium ion/carbocation



(2)

(c)

Geometrical isomers C:



(2)

8. A

(1)

I am Sorry !!!!!

9.

(a)

Reagent:

Potassium (or sodium) dichromate (VI)

Conditions:

Acidified or H_2SO_4 / HCl

Type of reaction:

Oxidation / redox

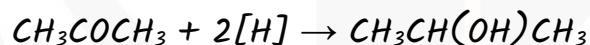
(2)

(b)

Suitable reagent:

$NaBH_4$ or H_2/Ni

Equation:



(3)

10. B

(1)

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- Founder & CEO of Chemistry Online Tuition Ltd.
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