



CHEMISTRY ONLINE
— **TUITION** —

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CHEMISTRY

ORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	CARBOXYLIC ACIDS
PAPER TYPE:	SOLUTION - 3
TOTAL QUESTIONS	10
TOTAL MARKS	33

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Carboxylic Acids and Derivatives - 3

1.

(a)

Following are the two important precautions when heating the mixture of ethanol and crude aspirin.

Precaution 1:

Use a water bath to heat the mixture instead of a Bunsen burner, as ethanol is flammable.

Precaution 2:

Heat the mixture to a temperature below 78°C to prevent the ethanol from boiling away.

(2)

(b)

The purpose of adding a small amount of cold ethanol during filtration under reduced pressure is:

- To remove any soluble impurities.
- To avoid aspirin dissolving by using a small amount of cold solvent.
- To remove or wash away any ethanolic solution on the product.

(1)

(c)

One difference in appearance you would expect to see between the crude aspirin and the purified aspirin is that the purified aspirin will have larger crystals or needle-like crystals and will be lighter in color.

(1)

(d)

$$\text{Amount of salicylic acid} = 6.01/138 = 4.36 \times 10^{-2} \text{ mol}$$

$$\text{Mass of } (\text{CH}_3\text{CO})_2\text{O} = 10.5 \times 1.08 = 11.34 \text{ g}$$

$$\text{Amount of } (\text{CH}_3\text{CO})_2\text{O} = 11.34 / 102 = 1.11 \times 10^{-1} \text{ mol}$$

As the amount of aspirin produced from salicylic acid ($4.36 \times 10^{-2} \text{ mol}$) is less than that from ethanoic anhydride ($1.11 \times 10^{-1} \text{ mol}$), ethanoic anhydride is in excess.

$(\text{CH}_3\text{CO})_2\text{O}$ is in excess.

Mass of aspirin =

$$= 4.36 \times 10^{-2} \times 0.841 \times 180$$

$$= 6.59 \text{ g}$$

2. B

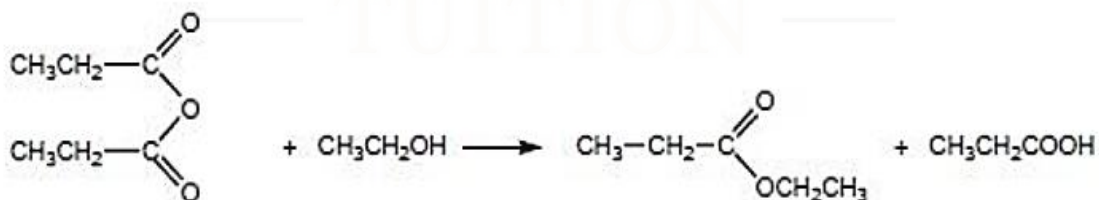
(5)

3.

(1)

(a)

Structure of the ester:



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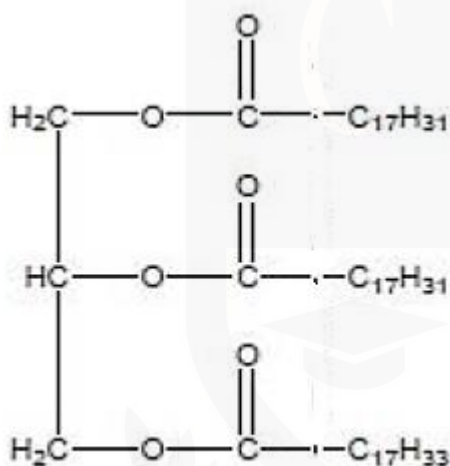
IUPAC name of the ester:

Ethyl propanoate

(3)

(b)

Following is the structure of the vegetable oil showing the ester links:



(2)

4. D

(1)

5.

(a)

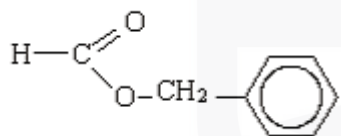
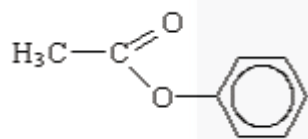
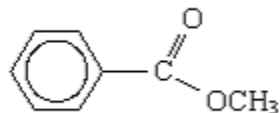
Molecular formula of ester: C₈H₈O₂

(1)

I am Sorry !!!!!

(b)

Following could be possible structures for ester:



(3)

6. D

(1)

7.

Equation for the Preparation of Ethyl Butanoate:

Reactants:

- Butanoic acid ($\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$)
- Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)

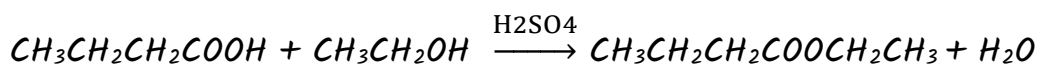
Product:

- Ethyl butanoate ($\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_3$) and water (H_2O)

Catalyst:

- Concentrated sulfuric acid (H_2SO_4)

Balanced Equation:



(4)

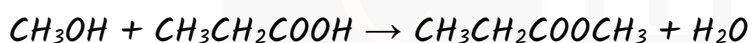
8. B

(1)

9.

(a)

Following is an equation for the formation of methyl propanoate, $\text{CH}_3\text{CH}_2\text{COOCH}_3$, from methanol and propanoic acid:



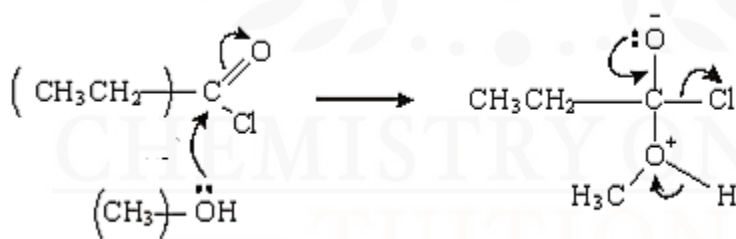
(1)

(b)

Name of the mechanism:

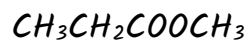
(nucleophilic) addition-elimination

Mechanism:



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Product:



(5)

10. D

(1)



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