EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

Time allowed
55 Minutes

Score /46

Percentage %

CHEMISTRY

OCR AS & A LEVEL

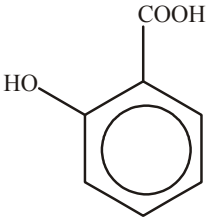
Mark Scheme

Module 6: Organic chemistry and analysis

F324: Rings, Polymers and Analysis

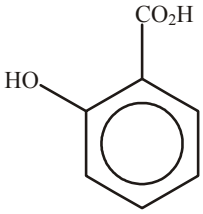
4.1.3 Carboxylic Acids and Esters /46

1.

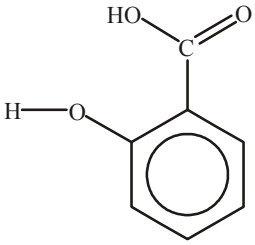


✓

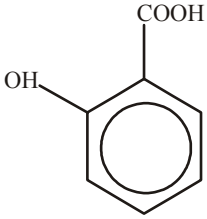
ALLOW



or



DO NOT ALLOW *incorrect bond linkage*



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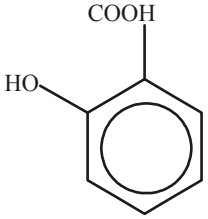

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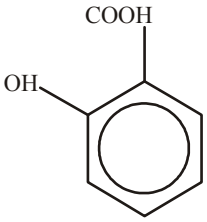


[1]

2. (i) hydrolysis **(1)**

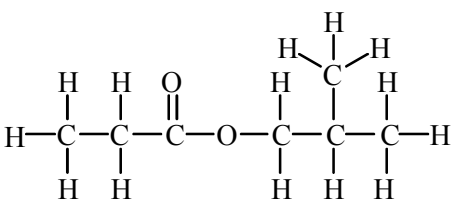
(sorbitan monolaurate is an) ester **(1)**

broken down to form an alcohol and carboxylic acid/salt **(1) AW** / equation to show the reaction 3

(ii) sorbitan monolaurate is made from a renewable resource / not based on crude oil **(1) AW** 1

[4]

3. (a)



propanoate and ester group **(1)** 2-methyl propyl **(1)** 2

(b) propanoic acid **(1)**
(2-)methylpropan-1-ol **(1)**

heat **(1)**
conc. H_2SO_4 **(1)**
(allow ecf from part (a) for the equation)

$CH_3CH_2COOH + CH_3)_2CHCH_2OH \rightarrow CH_3CH_2COOCH_2CH(CH_3)_2 + H_2O$
reactants **(1)** products **(1)** 6

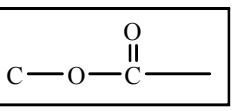
(c) mass spectrum / spectrometry **(1)**

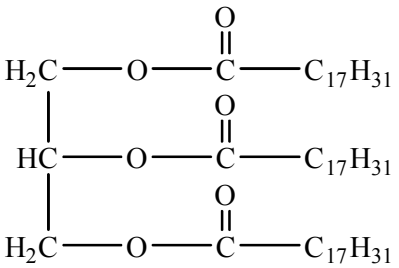
molecular ion peak /
m/e or mass of the peak furthest right **(1)** **AW** 2

[10]

4. (i)

(1) for a correct ester
(1) for rest





Accept correct skeletal form (even if only for acyl groups)
but must have 17C and two double bonds/one triple bond 2

(ii) 6. Ecf from (i). **(1)** 1

[3]

5. Three of following points: **(1)(1)(1)**

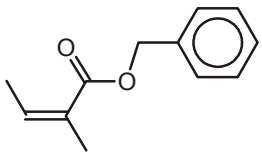
- 1. There is van der Waals (IDID) between triglycerides.
- 2. There is van der Waals between triglycerides and (non-polar) solvent.
- 3.Triglycerides cannot hydrogen bond (to water)(enough).
- Because there are not enough suitable sites/oxygen atoms
  Or long hydrocarbon chains do not hydrogen
  bond/would interfere with hydrogen bonding in water
  AW 3

[3]

6. (a) (i) alkene **(1)**
ester **(1)** 2

allow "C=C double bond"

i.



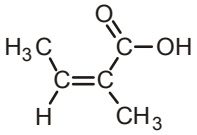
(1) 1

ii. $C_{12}H_{14}O_2$ **(1)** 1

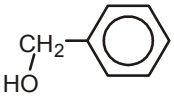
(b) same structural formula/order of bonds,
different spacial arrangement **AW (1)**

description or diagram showing **B** and how it is different from **A (1)** 2

(c)



(1)



(1) 2

(d) (i) peak at 1680-1750 (cm^{-1}) due to C=O **(1)**

peak at 1000-1300 (cm^{-1}) due to C-O / **(1)** 2

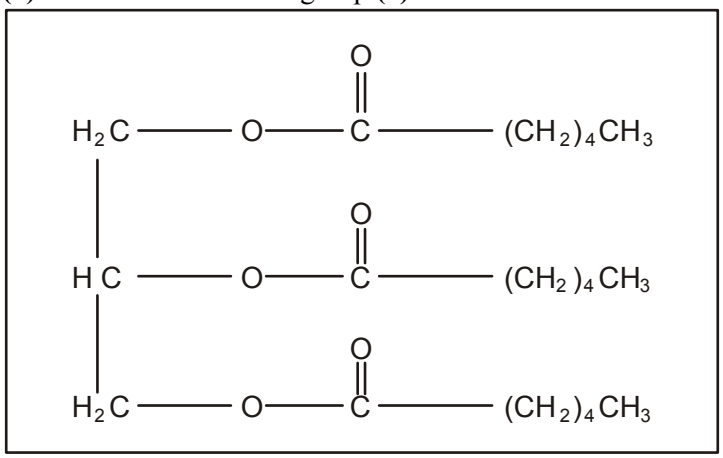
(ii) 2500-3300 / 3230-3550 (cm^{-1}) **(1)**

O-H /carboxylic acid/alcohol is **not** present in **A (1)**

allow 1 mark for ~500-1500 (cm^{-1}) which is a unique fingerprint region etc 2

[12]

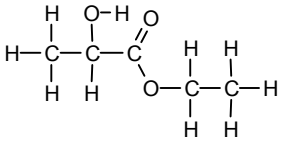
7. **(1)** for correct functional group **(1)** for the rest



C_5H_{11} acceptable 2

[2]

8. (i)



(1) 1

(ii) any sensible change in flavour linked to the presence of the ester or loss of the acid **(1)** – e.g.
'more fruity due to the ester'
'less sour as acids get used up' 1

[2]

9. (i) flavouring / fruity smell etc 1
NOT *perfume or sweetener*

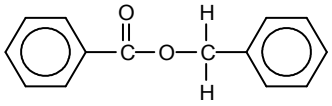
(ii) conc H_2SO_4 **(1)**
reflux/ distil **(1)** 2

(iii) $CH_3COOH + C_9H_{15}CH_2OH \rightarrow CH_3COOCH_2C_9H_{15} + H_2O$ 3
(1) **(1)** **(1)**
allow $C_2H_4O_2$ *and* $C_{12}H_{20}O_2$
but ***NOT*** *wrong structures*
allow ecf on the wrong acid

[6]

10. (i) H^+ /acid / named strong acid eg H_2SO_4 / HC*l* 1

(ii)



displayed ester group **(1)**
rest of the ester **(1)** 2

[3]