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
65 Minutes

Score /54

Percentage %

CHEMISTRY

OCR AS & A LEVEL

Mark Scheme

Module 6: Organic chemistry and analysis

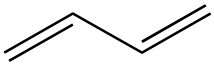
1. (i) Any two realistic fragments,
e.g. CH_3^+: 15; $C_2H_5^+$: 29; $C_3H_7^+$: 43; $C_4H_9^+$: 57; OH^+: 17, *etc*. **(1) (1)**
Do not penalise missing charge. 2

(ii) breathalysers/monitoring of air pollution, MOT emission testing, *etc*. **(1)** 1

[3]

2. mole ratio = 88.89/12 : 11.1/1 = 7.41 : 11.1 **(1)**
empirical formula = C_2H_3 **(1)**
relative mass of C_2H_3 = 27.
M_r = 2 × 29 so molecular formula = C4H6 **(1)**
X reacts with 2 mol H_2 so there are 2 double bonds **(1)**

Possible structure = 1,3-butadiene /



(1)

[5]

3. (a) (i) H^+ 1
$Cr_2O_7^{2-}$ 1

(ii) Orange to green/black/blue 1

(b) (i) contains a C=O/aldehyde, ketone, carboxylic acid and ester/
carbonyl/carbonyl in an aldehyde 1

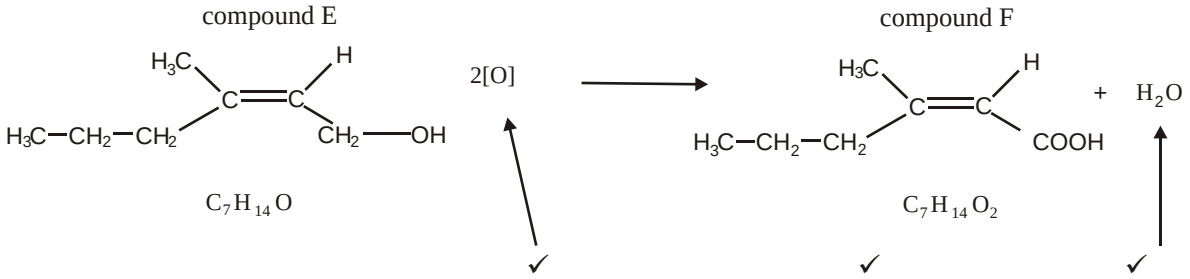
(ii) does **not** contain a O–H/ (hydrogen bonded in a) carboxylic acid 1

(iii) distillation (no mark) **because** distillation allows loss of volatile components /removes butanal from oxidising mixture 1
prevents formation of RCOOH/ partial oxidation would be achieved or reverse argument for reflux not being used
in that reflux prevents loss of volatile components
hence complete oxidation would be achieved/RCOOH would be formed 1
✓

[7]

4. (i) H^+ ✓ $Cr_2O_7^{2-}$ 2

(ii)



3

(iii) carboxylic acid would have an absorption between
1680 – 1750 cm^{-1} /1700 cm^{-1} or 2500 – 3300 cm^{-1}. 1

[6]

5. (a) (i) (volatile components) can escape/distil out 1

ethanal is most volatile/b pt less than 60°C/partial oxidation 1

(ii) (volatile components) cannot escape/ refluxed 1

complete oxidation will be achieved/oxidised to the acid 1

(b) $C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$
($CH_3COOH + H_2O$ ✓) 2

(c) spectrum C 1

spectrum C only shows absorption at 1700 cm^{-1} for the C=O 1

the other two spectra contain the OH group absorption at approx 3000 cm^{-1} 1

[9]

6. acrylic acid 1

approx 1700 cm^{-1} (range 1650 – 1750) indicates C=O 1

approx 3000 cm^{-1} (range 2500- 3300) indicates O-H 1

not 3230 – 3550 cm^{-1}

[3]

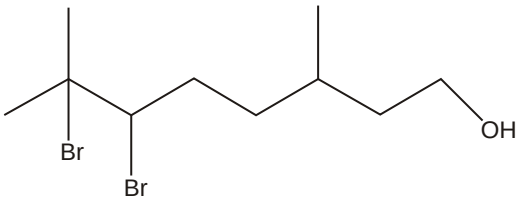
7. (a) (i) alkene ✓ 1

alcohol/hydroxy/hydroxyl ✓ 1

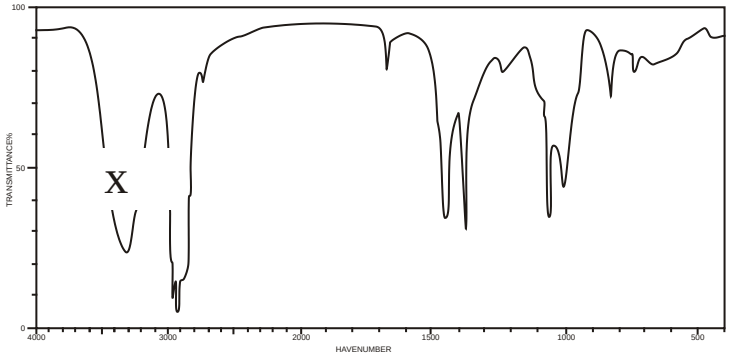
(b) (i) I = alkene & II = alcohol… both are needed ✓ 1

(ii) decolourised / colourless ✓ 1

(iii) ✓ 1



(iv) **X** as shown below ✓ 1



(c) (i) Ni/Pt/Rh/Pd ✓ 1

(ii) compound **B** is $C_{10}H_{22}O$ ✓ 1

(iii) $C_{10}H_{20}O + H_2 \rightarrow C_{10}H_{22}O$ ✓ 1

[9]

8. (a) (i) Alkene/C=C ✓ 1

Alcohol/ROH/hydroxy/hydroxyl/OH (not OH^- or hydroxide) ✓ 1

(ii) One of the C in both C=C is joined to two atoms or groups that are the same ✓ 1

(b) Observation decolourisation (of Br_2) ✓ 1

Molecular formula $C_{10}H_{18}OBr_4$ ✓✓ 2

$C_{10}H_{18}OBr_2$ gets 1 mark

(c) reagent CH_3COOH ✓ 1

catalyst $H_2SO_4/H^+/HCl$ (aq) *or dilute loses the mark* ✓ 1

(d) (i) $C_{10}H_{18}O + 2[O] \rightarrow C_{10}H_{16}O_2 + H_2O$ ✓✓ 2

1 mark for H_2O and 1 mark for 2[O]

(ii) The infra-red spectrum was of compound **Y**

because absorption between 1680 – 1750 cm^{-1} indicates a C=O ✓ 1

and the absence of a peak between 2500 – 3300 cm^{-1} shows the absence of the OH hydrogen bonded in a carboxylic acid ✓ 1

[12]

J ¤