Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Introduction To Organic Chemistry

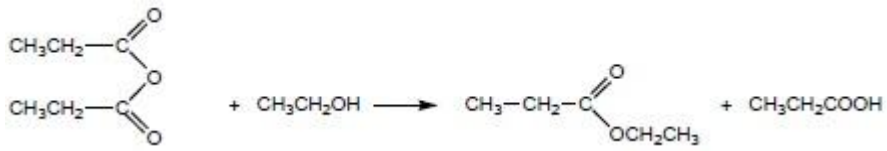
Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Mark Schemes

Q1.

(a)



Ethyl propanoate only

M1 *Structure of ester (allow $C_2H_5CO_2C_2H_5$)*

1

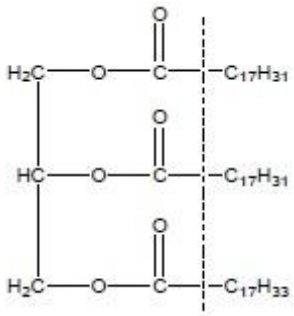
M2 *propanoic acid formula (allow $C_2H_5CO_2H$) and correctly balanced equation*

1

M3 *Ethyl propanoate only*

1

(b)



M1 for all except $C_{17}H_{3x}$ (i.e. all to the left of the dotted line)

Allow $–O_2C–$, –OOC–, –OCO–

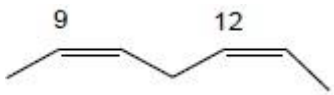
Not $–CO_2–$, –COO–

1

M2 for two $C_{17}H_{31}$ and one $C_{17}H_{33}$ in any order top to bottom

1

(c)



M1 for skeleton

1

M2 for both Z correct

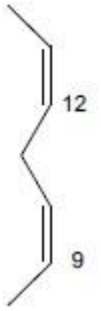
Downloaded from www.merit-minds.com

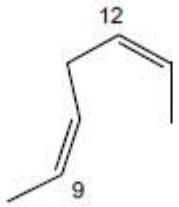
Independent marks

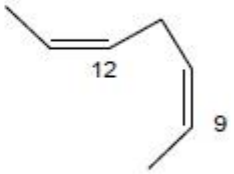
1

C9 – C14 shown with double bonds in the correct place
Ignore structure beyond carbon 14
*If hydrogens shown or not skeletal can only score **M2***

Other representations include







(d) $C_{19}H_{34}O_2 + 26½\ O_2 \longrightarrow 19\ CO_2 + 17\ H_2O$

Allow 53/2 or all doubled

1

(e) Absorption in spectrum at 2350 cm^{-1} does not correspond to data booklet value of 1680 – 1750 cm^{-1} or for C=O bonds in organic compounds)

Allow would expect a peak at 1680 – 1750 cm^{-1}

1

(f) C=O Bonds in CO_2 absorb infrared radiation (of 2350 cm^{-1})

1

IR radiation emitted by the earth does not escape (from the atmosphere)
OR
This energy is transferred to other molecules in the atmosphere by collisions (so all atmosphere is warmed)

Ignore IR reflected

1

[11]

Downloaded from www.merit-minds.com

Q2.

(a) Aldehyde/propanal has dipole-dipole forces (between molecules)

If any 'covalent bonds broken' CE=0 for clip.

Ignore Van der Waal forces

M1

Alcohol/propan-1-ol AND Carboxylic acid/ propanoic acid have hydrogen bonding (between molecules).

Ignore reference to energy

M2

The forces between the molecules in aldehyde are weaker (than those in alcohol and acid so it will evaporate first.)

M3 only awarded following correct M1 OR M2

Allow converse for M3

M3

(b) Keep the temperature of the reaction mixture below the boiling point of propan-1-ol/below 97 °C

Allow temperature in range 49-96 inclusive

Allow description of cooling the vessel

M1

Cool the distillate / collecting vessel

Ignore reference to oxidising agents

Penalise lid / sealed container

M2

(c) Add named carbonate/hydrogencarbonate OR magnesium to a sample of the distillate.

Incorrect chemical CE=0

Allow formula (mark on for incorrect formula)

Allow blue litmus or correct named indicator

M1

Effervescence/fizz/bubbles would confirm presence of acid or converse

Blue litmus turns red confirms acid present or converse

Allow gas/CO_2 produced which turns lime water cloudy OR gas/H_2 produced which burns with a squeaky pop

M2

(d) (Temperature difference = 15.1 °C)

If ΔT wrong – AE mark on otherwise can only award M2

If use 457 in M1, can only score M2

q = 150 × 4.18 × 15.1 or 9467.7 J or 9.4677kJ

M1

amount ethanol burned = 0.457/46.0 = 9.93×10^{-3} mol

If use 457 in M2 can score 2 for - 0.953 kJ mol-1

M2

Heat change per mole = (M1/1000)/M2 = 952.99 kJ mol-1

ΔH = – 953 kJ mol^{-1} must be 3sfs and must be negative

(allow range -953 to -954)

BEWARE if they miss conversion to kJ and also miss

Downloaded from www.merit-minds.com

conversion to g, they get answer = - 953 which scores 1
+953 can score M1 and M2
Allow -950 or -960 for rounding to 2sf

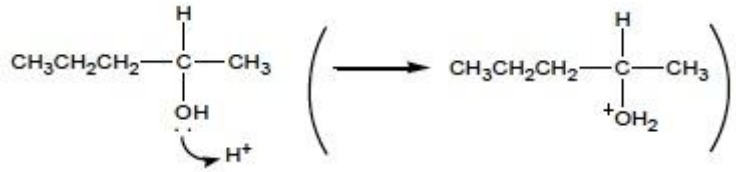
M3

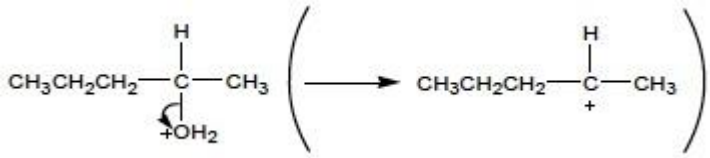
(e) Elimination

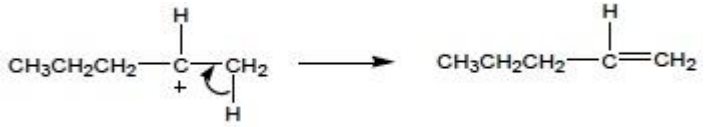
Penalise base elimination

M1

Mechanism : Either (E1)



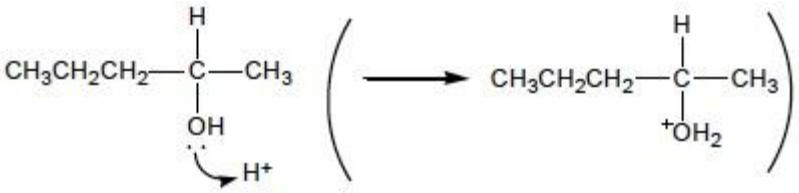




M2 for protonation of alcohol, i.e. lp plus arrow to H^+
or to H of H–O– in H_2SO_4 and from H-O bond to O
M3 for protonated alcohol plus arrow showing loss of water
M4 for arrow showing loss of H^+
From correct carbocation (E1)
wrong alcohol used / alkene formed loses M4

3

OR (E2)





M2 for protonation of alcohol, i.e. lp plus arrow to H^+
or to H of H–O– in H_2SO_4 and from H-O bond to O
M3 for protonated alcohol plus arrow showing loss of water
M4 for arrow showing simultaneous loss of H^+
wrong alcohol used / alkene formed loses M4

Downloaded from www.merit-minds.com

(f) *E*-pent-2-ene

Allow trans

M1

C=C bond cannot <u>rotate</u> **and**

Each carbon in the double bond has (2) different groups attached.

Allow (two) different groups on each/either side of the double bond.

M2

[16]

Downloaded from www.merit-minds.com