Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

(a) Thermometer and bung in flask with bulb level with side arm.
Must be cross section diagram with no gaps at joints
1

Condenser jacket with water in at bottom and out at top.
1

(b) Liquids are immiscible
Allow don't mix, forms two layers (stated or implied)
Allow it is insoluble
Ignore density or reference to solutions
1

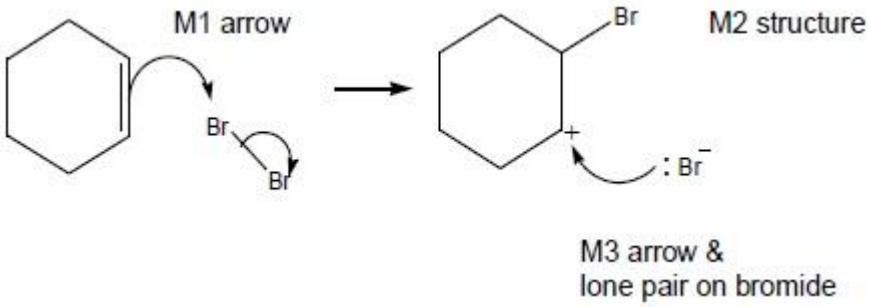
(c) Liquid goes clear / not cloudy
Ignore colourless
1

(d)

Via moles	*Via mass*	*Via volume*	
Amount cyclohexanol (= 14.4/100) = 0.144 mol	Amount cyclohexanol (= 14.4/100) = 0.144 mol	Amount cyclohexanol (= 14.4/100) = 0.144 mol	**M1**
Mass cyclohexene formed = 4.15 x 0.81 = 3.36 g	Mass cyclohexene formed = 4.15 x 0.81 = 3.36 g	Mass of cyclohexene expected (= 0.144 × 82.0 = 11.808 g) OR M1 × 82	**M2**
amount cyclohexene obtained (= 3.36/82.0 = 0.0410 mol) OR M2/82.0	mass of cyclohexene expected (= 0.144 × 82.0 = 11.808 g) OR = M1 × 82.0	volume of cyclohexene expected (= 11.808/0.810 = 14.577cm^3) OR M2/0.810	**M3**
$\%\text{Yield} = \frac{0.0410}{0.144} \times 100$ OR $\frac{M3}{M1} \times 100$	$\%\text{Yield} = \frac{3.36}{11.808} \times 100$ OR $\frac{M2}{M3} \times 100$	$\%\text{Yield} = \frac{4.15}{14.577} \times 100$ OR $\frac{4.15}{M3} \times 100$	**M4**
= 28.5% (must be 3 sf)	= 28.5% (must be 3 sf)	= 28.5% (must be 3 sf)	
Only award M5 if answer is to 3sf and follows some attempt at % yield calculation in M4			**M5**

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(e)



M3 arrow &
lone pair on bromide

*Lose **M1** if*

Full charges on Br−Br

OR

Wrong partial charges on Br−Br

OR

Arrow is to Br^+ ion (formed in a preliminary step)

*Any C shown in the ring must have the correct number of hydrogens attached to score **M2***

3

[12]

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Q2.

(a)

	C	H
%mass	88.2	11.8
mol	$\frac{88.2}{12}$	$\frac{11.8}{1}$
	= 7.35	= 11.8
÷ smaller	$\frac{7.35}{7.35}$	$\frac{11.8}{7.35}$
	= 1	= 1.61
x5	= 5	= 8

Empirical formula = molecular formula C_5H_8

M1 *for amounts 7.35 and 11.8*

1

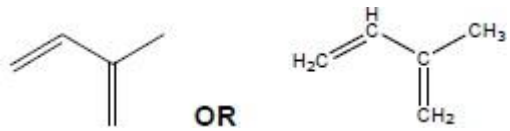
M2 *for process dividing* ***M1*** *by smaller*

1

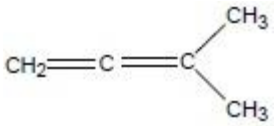
M3 *for answer* C_5H_8 *only*

1

M4 (must be branched)



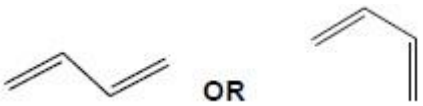
Allow alternatives



HC≡CCH(CH₃)₂

1

(b)



Must be skeletal

1

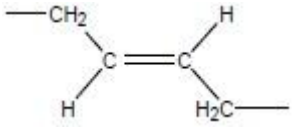
Buta-1,3-diene

M2 *can only be this and is independent of* ***M1***

1

(c)

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Must show trailing bonds

Ignore brackets and n

Allow skeletal – with brackets



Must be E 'trans'

1

Mark independently

Restricted rotation about the C=C or double bond

Allow lack of rotation/no rotation/limited rotation about the C=C or double bond

Ignore different groups on each carbon of the C=C double bond

1

(d) Carbon Carbon bonds are non polar or (too) strong or not attacked by nucleophiles
Or
Carbon Carbon bonds cannot be hydrolysed

Allow carbon chains.....
OR
Bonds between repeating units.....

Ignore C−H bonds

1

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