Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

(a) allows smaller bubbles to form / prevents the formation of (very) large bubbles

ALLOW provides large surface area for bubbles to form on
IGNORE 'air'
NOT no bubbles form / prevents bubbles forming

1

(b) (Mass of ester = 1.05 × 5.0 = 5.25g)
amount of ester = 5.25 / 150.0 = 0.0350 mol

1

amount of NaOH = 30 × 2 / 1000 = 0.06 mol

1

OR

(Mass of ester = 1.05 × 5.0 = 5.25g)
amount of ester = 5.25 / 150.0 = 0.0350 mol

1

Vol of 0.035 mol of NaOH = (0.035/2) × 1000 = 17.5 cm^3
(so 30 cm^3 used is an excess)

1

OR

amount of NaOH = 30 × 2 / 1000 = 0.06 mol

1

0.06 mol of ester = 9 g = 8.57 cm^3
(only 5 cm^3 used so NaOH in excess)

1

Mark independently

Max 2

(c) To ensure that the ester is completely hydrolysed / to ensure all the ester reacts

ALLOW to ensure the other reagent has completely reacted

1

(d) Many organic compounds / the ester / ethanol are flammable

ALLOW prevent ignition of any flammable vapours formed

1

(e) Reflux allows reactant vapours (of volatile organic compounds) to be returned to the reaction mixture / does not allow any reactant vapour to escape

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IGNORE reference to products

1

(f) $C_6H_5COONa + HCl \longrightarrow C_6H_5COOH + NaCl$

Allow ionic equation.

ALLOW molecular formulae ($C_7H_5O_2Na$ and $C_7H_6O_2$)

ALLOW skeletal benzene ring

1

(g) Sodium benzoate soluble because it is ionic

IGNORE polar

1

Benzoic acid insoluble because: despite the polarity of the COOH group / ability of COOH to form H-bonds, the benzene ring is non-polar.

ALLOW 'part of molecule' or 'one end' for COOH

1

(h) Dissolve crude product in <u>hot</u> solvent/water

ALLOW ethanol

If no M1 max = 4

1

of minimum volume

ALLOW reference to saturated soln as alternative to 'min vol'

1

Filter (hot to remove insoluble impurities)

IGNORE use of Buchner funnel here

1

Cool to recrystallise

apply list principle for each additional process in an incorrect method but IGNORE additional m.pt determination

1

Filter under reduced pressure / with Buchner/Hirsch apparatus

1

wash (with cold solvent) **and** dry

1

(i) 5.12 / 122 (= 0.042 mol)

method mark

1

(0.042/0.04) × 100 = 105 %

ecf for M1/0.04

or calculation that 0.04 mol of benzoic = 4.88 g (M1) so

% yield = (5.12/4.88) × 100 = 105%

1

Product not dried / impurities present in product

Only allow M3 if M2>100%

1

[18]

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