Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1

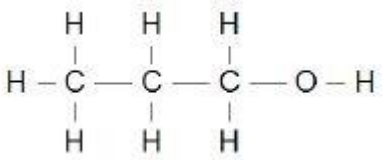
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Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Mark Schemes

Q1.

(a)



Must be displayed **1**

(b) Nucleophilic substitution **1**

Excess NH_3

Ignore aqueous, alcoholic, conc, dil, temp, heat, pressure **1**

(c) Amount of $CH_3CH_2CH_2Br$ 25.2/122.9 (=0.205) (mol) **M1**

Amount of $CH_3CH_2CH_2NH_2$ M1 × 0.75 (= 0.154) (mol) **M2**

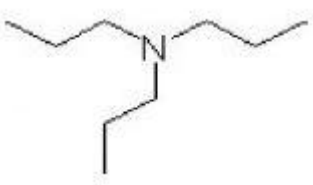
Mass $CH_3CH_2CH_2NH_2$ M2 × 59.0 = 9.07g Must be 3sf **M3**

If either Mr incorrect or used incorrectly then only award 1 mark for 75% yield calculation
(ignore rounding to 123 for $CH_3CH_2CH_2Br$)

OR
Max mass amine = M1 × 59.0 (= 12.1) (g)
Actual mass = M2 × 0.75 = 9.07g Must be 3sf

Allow 9.09 but if 9.08 check for AE
18.9 scores 1 for 75%

(d)



Must be skeletal

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Ignore lone pair

1

<u>tertiary amine or 3° amine (only award if a tertiary amine shown)</u>

1

(e) NaOH/ ethanol or KOH / ethanol (both required)

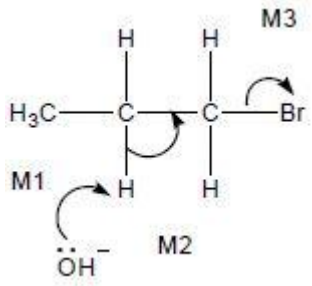
***NOT** aqueous*

Ignore heat, temp, conc., dil,

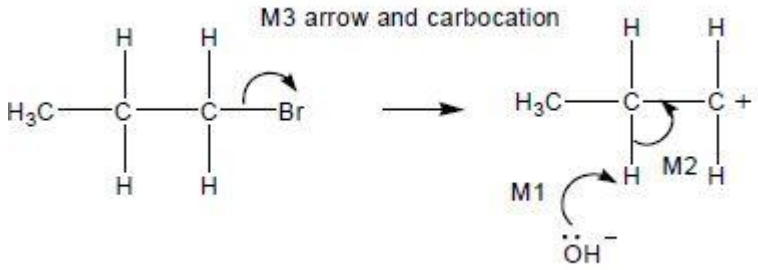
Accept alcoholic for ethanol

1

(f) (Basic) Elimination



Also credit E1 mechanism



1

M1 arrow from <u>lone pair on O</u> of hydroxide to correct H (or to space mid way between hydroxide O and H)

M2 arrow from C-H bond to C-C bond following attack by OH^- on the correct H

M3 arrow from C-Br bond to Br

If nucleophilic substitution shown then allow M3 only in mechanism

If wrong haloalkane used then Max 2 for mechanism

M3 curly arrow for loss of Br^- & structure of carbocation

M1 arrow from <u>lone pair on O</u> of hydroxide to H (or to space mid way between hydroxide O and H) (same as E2)

M2 arrow from C-H bond to C-C bond (same as E2)

3

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Q2.

(a) [Kr] $5s^2$ $4d^{10}5p^5$

1

(b) This question is marked using levels of response. Refer to the Mark Scheme Instructions for Examiners for guidance on how to mark this question.

Level 3
All stages are covered and the explanation of each stage is correct and complete.

Answer communicates the whole explanation coherently and shows a logical progression from stage 1 to stage 2 and then stage 3.

5-6 marks

Level 2
All stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies **OR** two stages are covered and the explanations are generally correct and virtually complete.

Answer is mainly coherent and shows a progression through the stages. Some steps in each stage may be out of order and incomplete.

3-4 marks

Level 1
Two stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies, **OR** only one stage is covered but the explanation is generally correct and virtually complete.

Answer includes some isolated statements, but these are not presented in a logical order or show confused reasoning.

1-2 marks

Level 0
Insufficient correct chemistry to warrant a mark.

0 marks

Indicative Chemistry content

Stage 1

I_2 is molecular.

HI is molecular.

Stage 2

IMF hold the molecules together.

There are weak IMF forces hence the melting point is low in both substances.

I_2 bigger molecule than HI so I_2 has more electrons.

Stage 3

Therefore stronger van der Waals between molecules in I_2 that need more energy to break causing the melting point to be higher.

HI also shows permanent dipole-dipole attraction between molecules but these forces are less than the vdW forces in iodine.

6

(c) No delocalised electrons or ions

1

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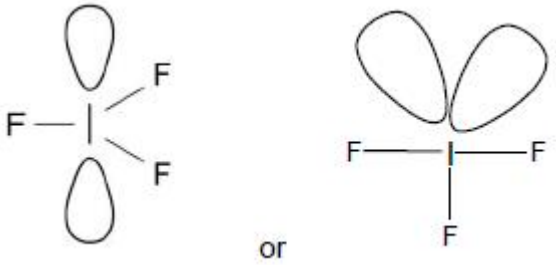
(d) $\frac{1}{2}H_2 + \frac{1}{2}I_2 \rightarrow HI$

Allow multiples

1

(e) NH_4I_3

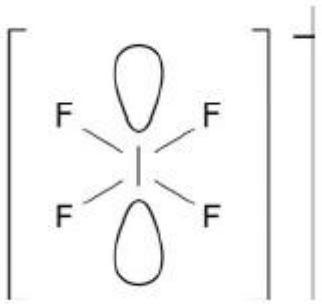
1



(f)

Allow any shape with 3 bond pairs and 2 lone pairs

1



Allow any shape with 4 bond pairs and 2 lone pairs (e.g. lone pairs in equatorial positions)

1

(g) +5

1

+7

1

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