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

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

Mark Schemes

Q1.

(a) $Cl\bullet + O_3 \longrightarrow ClO\bullet + O_2$

Allow dot in free-radical on either O or Cl.

1

$ClO\bullet + O_3 \longrightarrow 2O_2 + Cl\bullet$

1

(b) (KOH acts as a) base

1

(propan-1-ol acts as a) solvent.

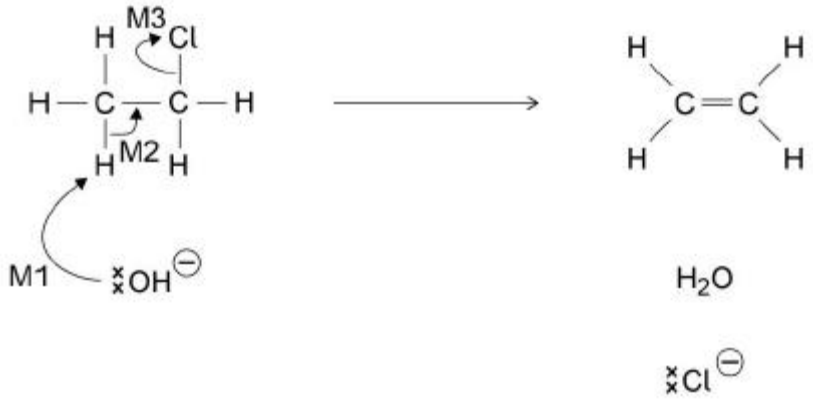
Allow product of reaction between KOH and propan-1-ol / $CH_3CH_2CH_2O^-$ acts as base.

1

(c) (Name of mechanism) Elimination

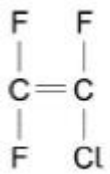
1

mechanism: 3 arrows (1 mark each).



3

(d)



1

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(e) 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 & the explanation of each stage is generally correct and virtually complete. Stages 1 and 2 are supported by correct data. Answer communicates the whole process coherently and shows a logical progression from stage 1 to stage 2 and then stage 3.

Steps in stage 3 are in logical order and working is shown. If there is no working for ratio or statement of ratio then full marks cannot be awarded.

If the formulae of the three molecular ions are not correct (2d) then the student can't access Level 3 (any incorrect chemistry drops the student to the bottom mark within the level they have achieved).

5-6 marks

Level 2

Stage 2 is attempted (**2a-2c** do not need to be explicitly stated) but the calculation may contain inaccuracies **OR** the explanation may be incomplete **OR** first two stages are covered and the explanations are generally correct and virtually complete. Answer is mainly coherent and shows a progression through the first two stages. Some steps in each stage may be incomplete.

If percentage of carbon is missing or incorrect (1a) then student can't access Level 2.

3-4 marks

Level 1

Stage 1 needs to be attempted but may contain inaccuracies.

OR

Stage 3 attempted but may contain inaccuracies / molecular formula not determined.

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 (determines empirical formula)

1a *16.3% carbon*

1b *Divide by* A_r

1c *Divide by smallest (0.904)*

1d *Convert ratio in simplest integer (x 2)*

C	Cl	F
$\frac{16.3}{12.0} = 1.358$	$\frac{32.1}{35.5} = 0.904$	$\frac{51.6}{19.0} = 2.716$
$\frac{1.358}{0.904}$	$\frac{0.904}{0.904}$	$\frac{2.716}{0.904}$

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3	2	6

Stage 2 (determines formulae of three molecular ions)

2a *For E.F.* M_r *(corresponds to the molecule) = 221*

2b *since* M_r *= 221 lies within molecular ion range 220–224*

2c *Thus empirical formula = molecular formula*

2d *Three correct formulae*

2e *Correct* M_r *for each of three molecules*

$C_3{}^{35}Cl_2F_6{}^+$	$C_3{}^{35}Cl^{37}ClF_6{}^+$	$C_3{}^{37}Cl_2F_6{}^+$
220	222	224

Stage 3 (explains the ratio of 3 molecular ion peaks)

3a *Working*

2b *Correct (simplified) ratio* ***9:6:1***

Note: 9:3:1 will be a common incorrect answer (max 5).

Working:

$C_3{}^{35}Cl_2F_6{}^+$	$C_3{}^{35}Cl^{37}ClF_6{}^+$	$C_3{}^{37}Cl_2F_6{}^+$
220	222	224
$^{35}Cl_2 = \left(\frac{3}{4}\right)^2 = \frac{9}{16}$	$^{35}Cl^{37}Cl$ and $^{37}Cl^{35} = 2 \times \frac{1}{4} \times \frac{3}{4} = \frac{6}{16}$	$^{37}Cl_2 = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$

[15]

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Q2.

(a) $\frac{(82 \times 5) + (83 \times 3) + (84 \times 26) \times (86 \times 7)}{41} = \frac{3445}{41}$

1

84.0

1

Kr

1

(b) $82/(1.243 \times 10^{-5})^2 = 86 / t^2$

So $t^2 = 86 / 82 \times (1.243 \times 10^{-5})^2$

1

$t^2 = 1.6204 \times 10^{-10}$

1

$t = 1.273 \times 10^{-5}$ (s)

1

[6]

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