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

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Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) <u>average/mean mass of 1 atom (of an element)</u>
1/12 mass of one atom of ^{12}C
or
<u>average/mean mass of atoms of an element</u>
1/12 mass of one atom of ^{12}C
or
<u>average/mean mass of atoms of an element × 12</u>
mass of one atom of ^{12}C
or
<u>(average) mass of one mole of atoms</u>
1/12 mass of one mole of ^{12}C
or
<u>(weighted) average mass of all the isotopes</u>
1/12 mass of one atom of ^{12}C
or
average mass of an atom/isotope (compared to C−12) on a scale in which an atom of C−12 has a mass of 12

M1 = top line

1

M2 = bottom line

1

if moles and atoms/isotopes mixed max = 1

(b) **M1** $186.3 = \frac{(185 \times 10) + (X \times 17)}{27}$
correct expression

1

M2 (relative isotopic mass) = <u>187</u>(.1)

1

(c) same electron configuration

allow same number of electrons
allow same electron structure
ignore same number of protons
ignore different number of neutrons
*do **not** accept same number of neutrons*

1

(d) **M1** mass $^{185}Re \left(= \frac{185}{6.02 \times 10^{23} \times 1000} \right) = 3.072 \times 10^{-25}$
calculate mass in kg

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1

M2 $v = \frac{d}{t}$

recall of v = d/t

1

M3 $v^2 = \frac{2KE}{m}$ **or** $7.5(0) \times 10^{11}$

rearrangement to get v^2

1

M4 $v = \sqrt{\frac{2KE}{m}}$ **or** 8.66×10^5

allow $\sqrt{\frac{2 \times 1.153 \times 10^{-13}}{M1}}$

1

M5 $t \left(= \frac{1.45}{8.66 \times 10^5} \right) = 1.67 \times 10^{-6}$ (s)

M5 $t = \frac{1.45}{M4}$

allow 1.67×10^{-6} to 1.68×10^{-6} (s)

1

alternative method:

M1 mass ^{185}Re $\left(= \frac{185}{6.02 \times 10^{23} \times 1000} \right) = 3.072 \times 10^{-25}$

calculate mass in kg

1

M2 $v = \frac{d}{t}$ **or** $KE = \frac{md^2}{2t^2}$

recall of v = d/t

1

M3 $t^2 = \frac{md^2}{2KE}$

rearrangement to get t^2

1

M4 $t = d\sqrt{\frac{m}{2KE}}$ **or** $\sqrt{\frac{md^2}{2KE}}$ **or** $\sqrt{\frac{3.072 \times 10^{-25}}{2 \times 1.153 \times 10^{-13}}}$

allow $\sqrt{\frac{M1}{2 \times 1.153 \times 10^{-13}}}$

1

M5 $t = 1.67 \times 10^{-6}$ (s)

allow 1.67×10^{-6} to 1.68×10^{-6} (s)

1

(e) at the detector/(negative) plate the ions/Re^+ gain an electron

1

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(relative) abundance depends on the size of the current

1

alternative answer

M1 ion knocks out an electron into electron multiplier

M2 signal from electron multiplier proportional to number of ions

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Q2.

(a) Smaller titre will increase (%) uncertainty / error

1

amount $Br_2 = 0.025 \times \frac{30}{1000} = 7.5 \times 10^{-4}$ mol

Or 0.00075

1

(b) Ratio Y :bromine

M1 1 : 5

Alternative calc using supplied answer

M1

M2 n Y in 25 cm^3 oil = $\frac{7.5 \times 10^{-4}}{5} = 1.5 \times 10^{-4}$

n Y in 25 cm^3 oil = $\frac{6.25 \times 10^{-4}}{5} = 1.25 \times 10^{-4}$

If no ratio must state n Y for M2

M2

M3 n Y in 250 cm^3 = M2 × 10 = (1.5×10^{-3})

n Y in 250 $cm^3 = 1.25 \times 10^{-4} \times 10 = (1.25 \times 10^{-3})$

M3

M4 Mass = M3 × 880 = (1.32 g)

Mass = $1.25 \times 10^{-3} \times 880 = (1.1\ g)$

M4

M5 Total mass oil needed = M4 × $\frac{100}{85}$ = 1.55 g

Total mass oil needed = 1.1 × $\frac{100}{85}$ = 1.29g

M5

If wrong ratio used treat as AE and mark ECF

(c) Extra step: Weigh the bottle after oil transfer (and record the mass)

OR Rinse the bottle with solvent after transfer and add the washings (to the volumetric flask)

M1

Justification: Not all of the oil is transferred
Or so that the mass of oil left in the bottle is accounted for Or find the exact mass of oil used

To ensure all the oil is transferred

M2 is dependent on M1

M2

(d) To ensure the solution is homogeneous

Allow evenly mixed/ distributed OWTTE

Uniform solution

1

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(e) $M_r = 345 - 1$

Must show workings in both M1 and M2

M1

M_r ($C_5H_{10}O$) = 86

$\frac{M1}{86}$ = 4 Hence $C_{20}H_{40}O_4$

M2

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