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

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

Mark Schemes

Q1.

(a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ (4s^0)$

1

(b) **M1** In $Ca^{(+)}$ (outer) electron(s) is further from nucleus

Or $Ca^{(+)}$ loses electron from a higher (energy) orbital

Or $Ca^{(+)}$ loses electron from a 4(s) orbital or 4th energy level or 4th energy shell and $K^{(+)}$ loses electron from a 3(p) orbital or 3rd energy level or 3rd energy shell

Must be comparative

Allow converse arguments

1

M2 More shielding (in Ca^{+})

1

(c) Be /Beryllium

1

(d) $Mg(OH)_2$

1

(e) $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$

Ignore state symbols

1

n $BaCl_2$ $(6/1000 \times 0.25) = 1.5 \times 10^{-3}$ and n $Na_2SO_4 = (8/1000 \times 0.15) = 1.2 \times 10^{-3}$
and $BaCl_2$ /barium chloride in excess

Working required or 3×10^{-4} of $BaCl_2$

1

$10\ cm^3$ (of 0.15 mol dm^{-3} sodium sulfate)

or $0.01dm^3$

1

(f) **M1** Same electronic configuration / same number of electrons (in outer shell) / all have 37 electrons (1)

Ignore protons and neutrons unless incorrect numbers

Not just electrons determine chemical properties

1

M2 $\frac{86x + 87x + 88(100-2x)}{100} = 87.7$

Alternative M2:

$$\frac{86 + 87 + 88y}{1 + 1 + y} = 87.7$$

1

M3 x = 10% (or × = 0.1)

M3 y = 8

1

M4 (% abundance of 88 isotope is 100 – 2x10) = <u>80(.0)%</u>

M4 % of 88 isotope is 100 – 10y = 80(.0) %

Allow other alternative methods

1

(g) $^{138}Ba^{+}$

1

(h) **M1** $\text{mass} = \frac{137 \times 10^{-3}}{6.022 \times 10^{23}} = 2.275 \times 10^{-25}$ (kg)

Calculation of m in kg

If not converted to kg, max 4

If not divided by L lose M1 and M5, max 3

1

M2 $v^2 = \frac{2KE}{m} = \frac{2 \times 3.65 \times 10^{-16}}{2.275 \times 10^{-25}} = 3.2088 \times 10^{9}$

For re-arrangement

1

M3 $v = \sqrt{2KE/m}$ ($v = 5.6646 \times 10^{4}$)

For expression with square root

1

M4 v = d/t or d = vt or with numbers

1

M5 d = ($5.6646 \times 10^{4} \times 2.71 \times 10^{-5}$) = 1.53 - 1.54 (m)

M5 must be to 3sf

If not converted to kg, answer = 0.0485-0.0486 (3sf). This scores 4 marks

1

Alternative method

M1 $m = \frac{137 \times 10^{-3}}{6.022 \times 10^{23}} = 2.275 \times 10^{-25}$

M1 Calculation of m in kg

1

M2 v = d/t

M2, M3 and M4 are for algebraic expressions or correct expressions with numbers

1

M3 $d^2 = \frac{KE \times 2t^2}{m}$

1

M4 d = $\sqrt{KE \times 2t^2}$ (= √ (3.65 × 10^{-16} × 2 × (2.71 × 10^{-5})^2 / 2.275 × 10^{-25}))

1

M5 d = 1.53 – 1.54 (m)

M5 must be to 3sf

1

[18]