

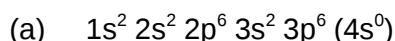
Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.



1

(b) **M1** In $\text{Ca}^{(+)}$ (outer) electron(s) is further from nucleusOr $\text{Ca}^{(+)}$ loses electron from a higher (energy) orbitalOr $\text{Ca}^{(+)}$ loses electron from a 4(s) orbital or 4th energy level or 4th energy shell and $\text{K}^{(+)}$ 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) $\text{Mg}(\text{OH})_2$

1

*Ignore state symbols*

1

 $n \text{BaCl}_2 (6/1000 \times 0.25) = 1.5 \times 10^{-3}$ and $n \text{Na}_2\text{SO}_4 = (8/1000 \times 0.15) = 1.2 \times 10^{-3}$
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 0.01 dm^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

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

Alternative M2:

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

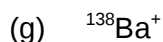
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M3 $x = 10\%$ (or $x = 0.1$)
 $M3 y = 8$

1

M4 (% abundance of 88 isotope is $100 - 2x10 = 80(.0)\%$
 $M4$ % of 88 isotope is $100 - 10y = 80(.0) \%$
 Allow other alternative methods

1



1

(h) **M1** $\text{mass} = \frac{137 \times 10^{-3}}{6.022 \times 10^{23}} = 2.275 \times 10^{-25} \text{ (kg)}$
 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 $d = (5.6646 \times 10^4 \times 2.71 \times 10^{-5}) = 1.53 - 1.54 \text{ (m)}$
 $M5$ 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 $d = \sqrt{\frac{KE \times 2t^2}{m}} (= \sqrt{(3.65 \times 10^{-16} \times 2 \times (2.71 \times 10^{-5})^2 / 2.275 \times 10^{-25}))$

1

M5 $d = 1.53 - 1.54 \text{ (m)}$
M5 must be to 3sf

1

[18]