

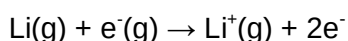
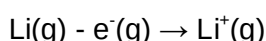
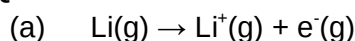
Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Mark Schemes

Q1.



One mark for balanced equation with state symbols

Charge and state on electron need not be shown

1

(b) Increases

If trend wrong then CE = 0/3 for (b). If blank mark on.

1

Increasing nuclear charge / increasing no of protons

Ignore effective with regard to nuclear charge

1

Same or similar shielding / same no of shells / electron
(taken) from same (sub)shell / electron closer to the
nucleus / smaller atomic radius

1

(c) Lower

If not lower then CE = 0/3

1

Paired electrons in a (4) p orbital

If incorrect p orbital then M2 = 0

1

(Paired electrons) repel

If shared pair of electrons M2 + M3 = 0

1

(d) Kr is a bigger atom / has more shells / more shielding
in Kr / electron removed further from nucleus/ electron
removed from a higher (principal or main) energy level

CE if molecule mentioned

Must be comparative answer

QWC

1

(e) 2 / two / II

(f) Arsenic / As

Q2.

- (a) 4d¹⁰ 5s² 5p¹ in any order

Allow subscripts for numbers

Allow capitals

1

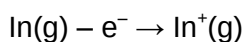
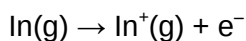
- (b) (i) Using an electron gun/(beam of) high energy/fast moving electrons

Ignore 'knocks out an electron'

1

- (ii) $\text{In(g)} + \text{e}^- \rightarrow \text{In}^+(\text{g}) + 2\text{e}^-$

OR



The state symbols need not be present for the electron - but if they are they must be (g)

No need to show charge on electron

If I CE = 0

Ignore any equations using M

1

- (iii) So no more than 1 electron is knocked out/so only one electron is knocked out/prevent further ionisation

Allow stop 2+ and 3+/other ions being formed

Not to get wrong m/z

1

- (iv) Any two processes from

- Accelerate (owtte)

- Deflect (owtte)

- Detect (owtte)

Ignore wrong causes of process

2 max

- (c) (i) Average/mean mass of (1) atom(s) (of an element)

1

1/12 mass of one atom of ¹²C

1

OR

(Average) mass of one mole of atoms

1/12 mass of one mole of ¹²C

OR

(Weighted) average mass of all the isotopes

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

Not average mass of 1 molecule

Allow the wording Average mass of 1 atom of an element compared to 1/12 mass atom of ^{12}C (or mass 1/12 atom of ^{12}C)

Allow if moles of atoms on both lines

Accept answer in words

Can have top line $\times 12$ instead of bottom line $\div 12$

If atoms/moles mixed, max = 1

(ii)
$$\frac{113x + 115y}{x + y} = 114.5$$

Allow idea that there are 4×0.5 divisions between 113 and 115

1

ratio (113:115) = 1:3 **OR** 25:75 **OR** 0.5:1.5 etc

Correct answer scores M1 and M2

If 1:3 for $\ln(115):\ln(113)$, max = 1

1

(d) None

1

Same no of electrons (in the outer shell)/same electron configuration)

Ignore electrons determine chemical properties/ignore protons

M2 dependent on M1 being correct

1

(e) 29.0%/29% O

If no O calculated, allow M2 if $\ln$ and H divided by the correct A_r

1

$$\frac{69.2}{114.8/114.5} \quad \frac{1.8}{1} \quad \frac{29.0}{16}$$

1

or

0.603 1.8 1.81

1 3 3

EF = $\ln \text{H}_3\text{O}_3$

Allow $\ln(\text{OH})_3$

Do not allow last mark just for ratio 1:3:3

If $\ln\text{O}_3\text{H}_3$ given with no working then allow 3 marks

If I not $\ln$, lose M3

1

[15]