Name of the Student:_____
Max. Marks : 23Marks **Time : 23 Minutes**

Mark Schemes

Q1.

(a) Number of protons + neutrons (in the nucleus of the atom)

Do not allow reference to mass or average

Ignore references to C-12 being 12

1

(b)

	Number of protons	**Number of neutrons**	**Number of electrons**
^{46}Ti	22	**24**	**22**
$^{49}Ti^{2+}$	22	**27**	**20**

Mark as rows

1
1

(c) Let ^{49}Ti be y

M1 $47.8 = \frac{(46 \times 2y) + (47 \times 2y) + (48 \times (100 - 5y)) + (49 \times y)}{100}$

$47.8 = \frac{235y + 4800 - 240y}{100}$

Allow

M1 $47.8 = \frac{(46 \times 2) + (47 \times 2) + (48 \times n) + 49}{(5 + n)}$

1

M2 5y = 20 OR y = 4

M2 0.2n =4 or n=20

1

M3 abundance of ^{46}Ti = 8%

M3 % $^{46}Ti = \frac{2}{25} \times 100 = 8\%$

1

[6]

Downloaded from www.merit-minds.com

Q2.

(a) Cross at 1580

Allow a cross drawn for Si that is between the values for Mg and Al

1

(b) **M1** Na

1

M2 $Na^{+}(g) \rightarrow Na^{2+}(g) + e^{-}$

***M2** Allow $Q^{+}(g) \rightarrow Q^{2+}(g) + e^{-}$*

State symbols essential

Allow correct equation consequential on their element

1

(c) The number of protons increases OR nuclear charge increases

1

Shielding is similar/same OR electrons are added to the same shell

Allow same number of shells

1

(d) Chlorine/Cl

1

(e) $4P + 5O_2 \rightarrow P_4O_{10}$ OR $P_4 + 5O_2 \rightarrow P_4O_{10}$

Allow multiples

Ignore state symbols

Do not allow equations with P_2O_5

1

[7]

Downloaded from www.merit-minds.com

Q3.

(a) **M1**: P dissolved or put in/added to a solvent

***M1**: Allow named solvent eg water or methanol*

1

M2: (injected through) a needle or nozzle or capillary and at high voltage/4000 volts or high potential

***M2**: Allow needle is positively charged*

1

M3: Gains a proton / H^+

***M3**: Not atoms gain a proton*

***M3**: Could be scored from equation*

1

M4: $P + H^+ \rightarrow PH^+$

*Correct equation gains **M3** and **M4***

Ignore state symbols

1

(b) 555

1

(c) **M1** $V = d/t$ or $= 1.22 \times 10^5\ ms^{-1}$

Recall this equation

1

M2 $m = \frac{2KE}{v^2}$ or $\frac{2 \times 2.09 \times 10^{-15}}{(1.22 \times 10^5)^2}$

or

M2 $m = \frac{2KE \times t^2}{d^2}$ or $\frac{2 \times 2.09 \times 10^{-15} \times (1.23 \times 10^{-5})^2}{1.50^2}$

Rearrangement to give m

1

M3 $m = \underline{2.8(1) \times 10^{-25}}$ (kg)

***M3**: Calculation of m.*

1

M4 $= 2.81 \times 10^{-25} \underline{\times L} = 0.169$

***M4**: Allow **M3** × L*

1

M5 $0.169 \underline{\times 1000} = 169.(2)$

***M5**: Allow **M4** × 1000*

169 only scores 5 marks

Allow answers to 2 significant figures or more ignore units

1

[10]

Downloaded from www.merit-minds.com