

## Mark Scheme - 4

1.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept				
(a)	2	atomic masses (1) reactions / properties of elements (1)		'relative' mass number					
(b)	2	similarity – groups / periods (1) difference – gaps / two elements in some blocks / some elements in different groups / no noble gases or transition elements in early table (1)	no atomic number in early table / named examples of elements that have changed position	properties columns / rows					
(c)	2	He <table style="margin-left: 40px; border: none;"> <tr> <td></td> <td>3</td> </tr> <tr> <td>2</td> <td>4</td> </tr> </table> all four correct for (2) any 2 for (1)		3	2	4			
	3								
2	4								

2.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		1	<b>B and F</b> (both needed)			
(b)		1	<b>D</b>			
(c)	(i)	2	it is a semi metal / metalloid / shows properties of both metal and non-metal (1)  must give example of one property of a metal and one of non-metal e.g. conducts electricity but low density etc. (1)	idea of conflicting properties	<b>A</b>	
	(ii)	1	<b>D and E</b> (both needed)			
(d)	(i)	2	310 – 250 (1) 540 / 60 = 9 g/cm <sup>3</sup> (1)  cao (2)			
	(ii)	2	measurements are inaccurate / not precise / incorrect  credit (1) for basic idea and additional (1) for sensible reason e.g. measuring cylinder not precise enough, only measures to nearest 10cm <sup>3</sup> (2)  accept any other sensible answers e.g. sample is impure / oxidised or volume (liquid or solid) changes with temperature		human error	





3.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)	1	sodium, magnesium and aluminium (ignore 'silicon')	Na, Mg and Al		
	(ii)	1	silicon	Si		
	(iii)	1	both gases (at room temperature)		very low density	
	(iv)	1	density of the metals increases across the period			
(b)		2	the evidence supports the statement for P, Cl, Ar and/or S, Cl, Ar (1)  P is lower than S/P or S does not follow the trend (1)  need to look at data for other periods (1)  any two for (1) each	if Si is included in their list		

4.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	1	<b>B</b>	Ne / neon		
(b)	2	<b>D and F</b> (1) <b>both needed</b> <i>either order</i>  (D and F) are in the same group / (D and F) are both in Group 6 (D and F) both have 6 electrons in their outer shell (1)  [Marks linked (unless no letters given)]			
(c)	2	Set of properties: <b>2</b> (1)  <b>both metallic and non-metallic properties / metalloid / semi-metal</b> [If referring to specific properties from table it must clearly convey the idea that one (or more) is a metallic property and another is a non-metallic property, e.g. high m.p. and b.p. (like a metal) and brittle (like a non-metal); no credit for a simple list of all properties] (1)  [Marks linked (unless no number is given) i.e. second mark cannot be awarded if first is not]	'high m.p., b.p. and shiny <b>BUT</b> brittle'	Reference to Group 4	

5.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept	
(a)	1	calcium and chlorine - both needed		Ca and Cl	chloride	
(b)	1	sodium/magnesium/aluminium	Na/Mg/Al			
(c)	(i)	1	nitrogen	N		
	(ii)	2	eg hydrogen  carbon  (1)  (1) {atoms need to touch}			
(d)	1	H <sub>2</sub> CO <sub>3</sub>	CO <sub>3</sub> H <sub>2</sub>			

6.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	3	<i>mass number</i> 7 (1) <i>atomic number</i> 6 (1) <i>number of neutrons</i> 12 (1)			
(b)	(i)	1	2,8		
	(ii)	2	two shells (containing electrons)  outer shell is full / can't accept any more electrons		8 in outer shell
(c)	2	<b>B and C</b> (1)  same number of protons but different numbers of neutrons / same atomic number but different mass number (1)  [marks linked i.e. second mark cannot be awarded if first is not given]		reference to electrons	

7.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		1	Br <sub>2</sub>			
(b)		2	gas at room temperature therefore bp < 20 °C (1) above the mp / -101 °C (1)			
(c)		1	treatment of water supply or swimming pool / sterilise water / toilet cleaners / bleach / disinfectant		clean water / water supply – needs to be qualified	poison gas
(d)		2	gas (at room temperature)  pale (yellow) colour / coloured  acceptable predicted value for the melting point i.e. < -101 °C  any two for (1) each	any colour          'diatomic'	F <sub>2</sub>          low melting point	colourless

8.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		2	liquid (1) must be correct to award second mark  melting point below <b>and</b> boiling point above room temperature / 20°C (1)			
(b)		2	less reactive down the group (1)  no / very slow reaction (1)	converse		
(c)		1	$2\text{Fe} + 3\text{F}_2 \rightarrow 2\text{FeF}_3$			
(d)	(i)	1	$2\text{Cl}^- - 2\text{e}^- \rightarrow \text{Cl}_2$			
	(ii)	1	concentration of iodide in seawater is too low / very low	electricity too expensive		
	(iii)	1	toxic / kills bacteria		gets rid of bacteria	

9.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept	
(a)	1	potassium	K			
(b)	1	potassium + oxygen → potassium oxide  follow through (ft) error from (a) only if Group 1 metal given	$K + O_2 \rightarrow K_2O$ (ignore balancing) consequential possible	gas		
(c)	1	lithium / sodium  ft only if Group 1 metal given is less reactive than that named in (a)	Li / Na			
(d)	(i)	1	silver nitrate	$AgNO_3$		
	(ii)	1	dissolved (in water)	diluted / solution	liquid / molten	
	(iii)	1	white independent of (i)		milky	creamy

10.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept	
(a)	1	C	98 and 890			
(b)	1	to prevent sodium reacting with air/oxygen/water (vapour)	prevent from oxidising / corroding	because it reacts with air/oxygen/water (vapour)		
(c)	(i)	1	yellow yellow/orange	orange		
	(ii)	2	sodium + oxygen (1) sodium oxide (1)	$Na + O_2$ (1) $Na_2O$ (1) – ignore balancing		
	(iii)	1	$2Na + Cl_2 \rightarrow 2NaCl$			





12.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)	1	sodium chloride / sodium carbonate			
	(ii)	1	sodium carbonate / lithium carbonate			
(b)		3	add silver nitrate solution (1) white <b>precipitate</b> with potassium chloride (1) yellow <b>precipitate</b> with potassium iodide (1)  allow (1) for <b>both</b> colours correct if precipitate not used in either case	answer based on displacement reaction – bromine water; description of colour changes	add HNO <sub>3</sub> flame test	
(c)		2	ammonia (1)  turns (damp) red litmus blue (1)			
(d)		3	Fe <sup>3+</sup> + 3OH <sup>-</sup> (1) Fe(OH) <sub>3</sub> (1) correct state symbols (1)			

13.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		3	carbon dioxide → turns limewater milky (1)  ammonia → turns damp red litmus blue (1)  oxygen → relights a glowing splint (1)			
(b)		3	yellow flame (1)  green flame (1)  brown precipitate (1)			

14.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	3	$\text{Fe} + \text{Br}_2$ (1) $\text{FeBr}_3$ (1) $2 \ 3 \ 2$ (1) balancing mark only awarded if all formulae are correct			
(b)	2	silver nitrate (solution) (1) cream / off-white precipitate (1)			

15.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	3	brick-red (for $\text{Cu}^{2+}$ flame test) (1) yellow precipitate (for $\text{Cl}^-$ ion test) (1) white (precipitate for $\text{Fe}^{3+}$ test) (1)			
(b)	1	sodium chloride, water and ammonia – all needed			

16.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		2	pH6 – should be pH 11-12 (or alkaline) (1)  burns with an orange flame – should be lilac flame (1)	8-14 / above 7  lithium with implication that reaction should be more rapid (but less rapid than reaction of sodium)		7 or above
(b)		4	flame test (1) yellow flame (1)  (add) silver nitrate (solution) (1) white precipitate (1)  must have correct test for observation mark to be awarded	orange flame		