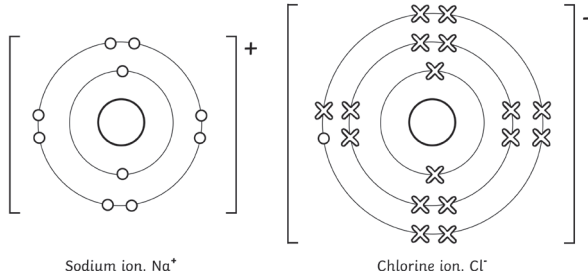


Mark Scheme

Combined Science GCSE

Key Concepts Test

(Levels 4-9)

	Answer	Marks
1. (a)	Answer must have a justification for one mark and a judgement for one mark so: negative ions have more electrons than protons therefore D will have a -2 charge.	(1) (1)
1. (b)	$40 + 2 \times (14 + 16 \times 3)$ $= 164$	(1) (1)
1. (c)	The sodium ions with an empty outer shell with a +1 charge. The chloride ion with a full outer shell (one from the Na) and a -1 charge.  Sodium ion, Na^+ Chlorine ion, Cl^-	(1) (1) (1) (1)

(Total for Question 1 = 8 marks)

	Answer	Marks
2. (a) (i)	B,E,I or A,D,H (all three for 1 mark)	(1)
2. (a) (ii)	J allow identification of Xenon or Xe	(1)
2. (a) (iii)	A,B,C or H,I,J (all three for 1 mark)	(1)
2. (b)	A and G	(1)
2. (c)	G	(1)
2. (d)	Two points from the following: - Outer shell is closer to the nucleus - Electron less easily lost - More attraction between electron and nucleus Accept converse argument for H	(2)

2. (e) (i)	Left-hand side of the periodic table (accept correctly drawn stepped line)	(1)
2. (e) (ii)	They have a sea of delocalised electrons which carry the current/are free to move.	(1) (1)

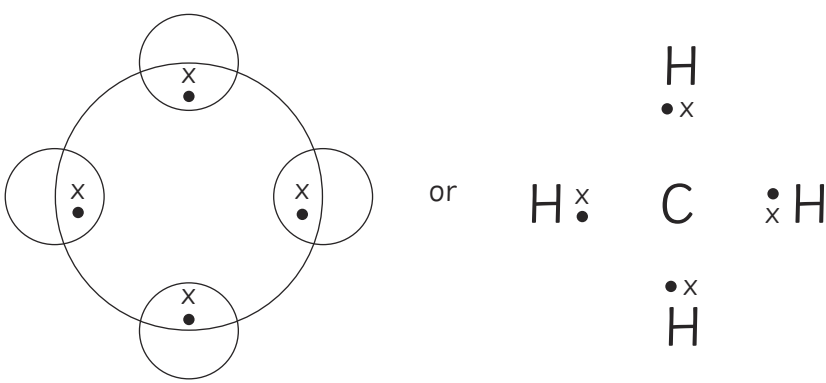
(Total for Question 2 = 10 marks)

	Answer	Marks						
3. (a)	2 marks for all three correct; 1 mark for 2 correct <table border="1"> <tr> <td>Electrons</td><td>Protons</td><td>Neutrons</td></tr> <tr> <td>11</td><td>11</td><td>12</td></tr> </table>	Electrons	Protons	Neutrons	11	11	12	(2)
Electrons	Protons	Neutrons						
11	11	12						
3. (b)	Nucleus contains protons and neutrons Shells/energy levels/orbitals have electrons	(1) (1)						
3. (c)	Negligible, or 1/1837	(1)						
3. (d)	In the nucleus	(1)						
3. (e)	2,8,1	(1)						
3. (f)	Proton number is the same but neutron number is different	(1)						
3. (g)	$57.3 \times 11 = 630.3$ $42.7 \times 13 = 555.1$ $\frac{630.3 + 555.1}{100} = 11.9$	(1) (1) (1)						

(Total for Question 3 = 11 marks)

	Answer	Marks
4.	Some of the following points could be made: Zinc: • sea of delocalised electrons with electrostatic forces of attraction between metal ions that are oppositely charged • lots of energy to separate metal ions • giant metallic lattice sodium chloride: • electrostatic forces of attraction between metal ions that are oppositely charged • lots of energy to separate ions • giant ionic lattice • dissolves in water/water separates ions diamond: • all atoms have strong covalent bonds/bonded to four carbon atoms • lots of energy to separate atoms/break bonds • does not dissolve/water does not separate atoms chlorine: • weak intermolecular forces • not much energy needed to separate molecules Level 3: 5-6: full, detailed explanation, linking structure and bonds as well as solubility in each substance; answer is clearly communicated with good use of spelling and grammar. Level 2: 3-4: simple explanations between bonding or structure or solubility for more than one substance. Spelling and grammar are used with some accuracy. Level 1: 1-2: limited explanation, explaining bonds or structure or solubility of one substance. Limited use of spelling and grammar.	(6)

(Total for Question 4 = 6 marks)

5. (a)	4	(1)
5. (b)	Giant covalent	(1)
5. (c)	Diamond has strong forces between atoms	(1)
	and is hard.	(1)
	Graphite has weak forces between layers of atoms	(1)
	and the layers can slide over each other.	(1)
5. (d)	One pair of electrons shared between C and H with one C and 4 H bonding. 	(2)

(Total for Question 5 = 8 marks)

6. (a)	$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$	(1)
6. (b)	Use ecf if part (a) is wrong	(1)
	$2 \times 23\text{g Na}$	(1)
	makes $2 \times 58.5\text{g NaCl}$	
	$9\text{g Na makes } \frac{(2 \times 58.5) \times 9\text{g NaCl}}{46} = 22.89\text{g (2dp)}$	
6. (b)	or	
	$23\text{g Na makes } 58.5\text{g NaCl}$	(1)
	$9\text{g Na makes } \frac{58.5 \times 9}{23} = 22.89\text{g (2dp)}$	
6. (c)	Iron: $5.6 \div 56 = 0.1$	(1)
	Chlorine: $7.1 \div 35.5 = 0.2$	(1)
	Ratio of 1:2 iron:chlorine = FeCl_2	(1)

(Total for Question 6 = 7 marks)