

%	I can ...	Prove it!																									
	<p>6.4. I can calculate masses from balanced symbol equations (triple only)</p> <p>7.8. I can write ionic half equations for displacement reactions (triple only)</p> <p>8.3. I can write half equations for the reaction occurring at each electrode (triple only)</p> <p>8.4. I can explain how electrolysis can be used to extract metals from their ores (triple only)</p> <p>8.5. I can explain whether hydrogen would be produced during electrolysis of a give aqueous solution. (triple only)</p>	<p>1) Write out balanced symbol equations for these reactions, then complete the calculation for each:</p> <p>(a) Work out how many grams of sodium chloride are produced when 5.3g of sodium carbonate reacts with dilute hydrochloric acid.</p> <p>(b) What mass of sulphuric acid reacts with sodium hydroxide to produce 10 g of sodium sulphate?</p> <p>(c) What mass of sodium sulphate is made when 5.0kg of sodium hydroxide is reacted with sulphuric acid?</p> <p>2)</p> <p>(a) Zinc metal can displace copper ions from a solution of copper (II) sulphate. Copper metal and a solution of zinc (II) sulphate are produced. Write out ionic half equations for the zinc and for the copper. Label which of these half equations shows reduction and which shows oxidation.</p> <p>(b) When chlorine reacts with iron (II) ions in solution, chloride ions and iron (III) ions are produced. Write out the ionic half equations for chlorine and iron. Label which of these half equations shows reduction and which shows oxidation.</p> <p>3) Write balanced half equations for each electrode during the electrolysis of:</p> <p>(a) Molten Aluminium Oxide (b) Aqueous Copper Bromide</p> <p>4) Can you explain how electrolysis would be used to remove aluminium from its ore?</p> <p>5) Explain if hydrogen, or the metal would be produced during the electrolysis of these aqueous solutions. (a) $\text{NaCl}_{(aq)}$ (b) $\text{CuCl}_{2(aq)}$ (c) $\text{AgNO}_{3(aq)}$</p>																									
	<p>4.3. I can link melting and boiling points to the type of bonding in this substance</p> <p>5.3. I can balance a given symbol equation</p> <p>5.4. I can include appropriate state symbols in an equation</p> <p>6.1. I can calculate the relative formula mass of a substance (triple only)</p> <p>6.2. I can calculate the atom economy of a reaction (triple only)</p> <p>6.3. I can calculate the percentage yield for a reaction (triple only)</p> <p>6.5 I can calculate the percentage by mass of an element in a compound (triple only)</p> <p>7.9. I can link reactivity to how metals are extract from their ore</p> <p>8.2. I can explain what is produced at each electrode during electrolysis (triple only)</p>	<table border="1" data-bbox="693 875 1381 1041"> <thead> <tr> <th>Substance</th> <th>Melting Point ($^{\circ}\text{C}$)</th> <th>Boiling Point ($^{\circ}\text{C}$)</th> </tr> </thead> <tbody> <tr> <td>Aluminium</td> <td>660</td> <td>2450</td> </tr> <tr> <td>Nitrogen</td> <td>-210</td> <td>-195</td> </tr> <tr> <td>Sodium Chloride</td> <td>801</td> <td>1413</td> </tr> <tr> <td>Diamond</td> <td>3550</td> <td>4827</td> </tr> </tbody> </table> <p>1) (a) Which type of bonding would you find in each substance? (b) Explain in terms of bonding why each substance has high or low melting and boiling points.</p> <p>2) Balance the symbol equations from 60% Q5c).</p> <p>3) Add the state symbols into the symbol equations from 60% Q5.</p> <p>4) Can you calculate the relative formula mass for the following compounds: (a) CO_2 (b) HCl (c) MgO (d) CH_4 (e) CuSO_4 (f) NaCl (g) PbCO_3</p> <p>5) What is the atom economy of this process to make ethanol? $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_5\text{OH}$</p> <p>6) Calculate the percentage yield for the following scenarios: (a) The theoretical yield of reaction 1 was 20g of Sodium Chloride. The actual yield produced was 18g. (b) The theoretical yield of reaction 2 was 55g of Copper Oxide. The actual yield produced was 21g. (c) The theoretical yield of reaction 3 was 100g of Lithium Hydroxide. The actual yield produced was 9g.</p> <p>7) Thinking about the reactivity of gold, iron and magnesium, how would you extract them from their ore? Explain your answer for each one!</p> <p>8) Electrolysis is going to be used to separate molten lead bromide. (a) Draw and label the equipment that you would need (b) What would form at the cathode? What would form at the anode? Explain your answer.</p> <p>9) Calculate the percentage by mass of (a) carbon in carbon dioxide. (b) oxygen in copper oxide. (c) chlorine in sodium chloride.</p>	Substance	Melting Point ($^{\circ}\text{C}$)	Boiling Point ($^{\circ}\text{C}$)	Aluminium	660	2450	Nitrogen	-210	-195	Sodium Chloride	801	1413	Diamond	3550	4827										
Substance	Melting Point ($^{\circ}\text{C}$)	Boiling Point ($^{\circ}\text{C}$)																									
Aluminium	660	2450																									
Nitrogen	-210	-195																									
Sodium Chloride	801	1413																									
Diamond	3550	4827																									
	<p>I can explain what an alloy is and how it's properties differ from a pure metal</p> <p>I can describe corrosion as a reaction and explain how to prevent it (triple only)</p> <p>2.1. I can describe the structure and properties of simple covalent structures</p> <p>2.2. I can describe the structure and properties of giant covalent structures (including diamond, graphite and silica)</p> <p>3.1. I can describe the structure and properties of giant ionic structures</p> <p>5.2. I can write a symbol equation for a given reaction</p> <p>5.4. I can link changes in mass to the word equation for a reaction</p> <p>7.6. I can predict what would happen in a displacement reaction between two substance</p> <p>8.1. I can describe how electrolysis is carried out (triple only)</p>	<p>1) Look at the two structures below. Which is an alloy? Which is a pure metal? Explain your answer.</p>  <p>2) Mr Gray is really worried about corrosion on his boat.</p> <ul style="list-style-type: none"> - Define corrosion - Explain why this may be such a big problem for Mr Gray's boat - Give two ways that Mr Gray could prevent his boat from corroding <p>3) For each type of structure, identify the correct properties:</p> <table border="1" data-bbox="693 2077 1955 2249"> <thead> <tr> <th></th> <th>Metals/Non-metals</th> <th>Melting and Boiling point (low/high)</th> <th>Does it conduct electricity?</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>Giant Ionic Compound</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Giant Metallic Structure</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Simple Covalent Molecule</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Giant Covalent Structure</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>4) Describe the structure and bonding within diamond. You should include: The element it is made from. How many atoms are bonded to each other? Whether it has ionic, metallic or covalent bonds? Whether it is a giant structure or simple molecule?</p> <p>5) Can you write a symbol equation for all of the reactions in 50% Q4</p> <p>6) Explain why sodium will gain mass when it is left in the air.</p> <p>7) Explain if these chemicals would react. If they would, complete the word equation. (a) Copper Chloride + Magnesium \rightarrow (b) Iron sulphide + Copper \rightarrow (c) Sodium Bromide + Copper \rightarrow</p>		Metals/Non-metals	Melting and Boiling point (low/high)	Does it conduct electricity?	Example	Giant Ionic Compound					Giant Metallic Structure					Simple Covalent Molecule					Giant Covalent Structure				
	Metals/Non-metals	Melting and Boiling point (low/high)	Does it conduct electricity?	Example																							
Giant Ionic Compound																											
Giant Metallic Structure																											
Simple Covalent Molecule																											
Giant Covalent Structure																											



%	I can ...	Prove it!																																			
 50%	<p>1.1 I can describe the uses of metals</p> <p>I can identify the type of bonding in a substance</p> <p>4.2. I can identify a substances state using it's melting and boiling point</p> <p>5.1. I can write a word equation for a given reaction</p> <p>7.1. I can describe the reaction of given metals with oxygen</p> <p>7.2 I can describe the reaction of given metals with water</p> <p>7.4. I can describe the reactions of given metals with acids</p> <p>7.5. I can use evidence to rank metals in order of reactivity</p> <p>7.7. I can describe the tests for carbon dioxide, hydrogen and oxygen</p>	<p>1) Which metal would you use for the following (choose from the box below)? Explain your answer using the key terms at the bottom of the learning ladder.</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-around; margin: 10px 0;"> Sodium Copper Aluminium </div> <p>(a) Making an electrical wire (b) Making an aeroplane (c) Making a saucepan</p> <p>2) Which type of bonding would there be in each of the following substances? (REMEMBER: Metal + Non-Metal = Ionic bonding, Metals only = Metallic bonding, Non-metals only = Covalent bonding).</p> <p>(a) Sodium Chloride (b) Calcium Chloride (c) Oxygen (d) Methane (CH₄) (e) Magnesium (f) Magnesium Oxide (g) Calcium (h) Carbon Dioxide (i) Copper</p> <p>3) Look at the table of melting and boiling points.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Element</th> <th>Melting Point (°C)</th> <th>Boiling Point (°C)</th> </tr> </thead> <tbody> <tr> <td>Aluminium</td> <td>660</td> <td>2450</td> </tr> <tr> <td>Argon</td> <td>-189</td> <td>-186</td> </tr> <tr> <td>Francium</td> <td>30</td> <td>700</td> </tr> <tr> <td>Mercury</td> <td>-39</td> <td>357</td> </tr> </tbody> </table> <p>(a) Which has the highest melting point? (b) Which has the lowest boiling point? (c) What state would Aluminium be at room temperature (20°C)? (d) What state would Francium be at 50°C? (e) What temperature would I have to heat Mercury to for it to turn into a gas?</p> <p>4) Can you write a word equation for the following reactions? (a) Sodium reacts with chlorine to form sodium chloride (b) Copper reacts with oxygen to form copper oxide (c) Lithium reacts with water to form lithium hydroxide and hydrogen</p> <p>5) Complete the general equations for the following reactions:</p> <p>(a) Metal + Oxygen → _____ (b) Metal + Water → _____ + _____ (c) Metal + Acid → _____ + _____ (d) Turn each of the reactions above into full sentences.</p> <p>6)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Metal</th> <th>Description of metal's reaction with oxygen</th> <th>Description of metal's reaction with water</th> <th>Description of metal's reaction with acid</th> </tr> </thead> <tbody> <tr> <td>Magnesium</td> <td>Burns with a bright white flame</td> <td>Very slow reaction with cold water but vigorous with steam</td> <td>Vigorously bubbles producing large amounts of hydrogen</td> </tr> <tr> <td>Iron</td> <td>Does not burn, glows in oxygen when heated</td> <td>Slow reaction with steam</td> <td>Slowly reacts with a small amount of gas produced</td> </tr> <tr> <td>Sodium</td> <td>Burns quickly with a bright yellow flame</td> <td>Violent reaction with cold water. Catches fire</td> <td>Not safe to complete</td> </tr> <tr> <td>Copper</td> <td>Does not burn</td> <td>No reaction with steam</td> <td>No reaction at all</td> </tr> </tbody> </table> <p>Look at the table above. Use it to help you to put the 4 metals into the order of their reactivity from the least reactive to the most reactive. Give a reason for your decisions.</p> <p>7) I have a mystery gas. When I add a lit splint, it makes a squeaky pop. When it is bubbled through limewater, the limewater stays colourless. When a glowing splint is added, nothing happens. Which gas do you think it is?</p>	Element	Melting Point (°C)	Boiling Point (°C)	Aluminium	660	2450	Argon	-189	-186	Francium	30	700	Mercury	-39	357	Metal	Description of metal's reaction with oxygen	Description of metal's reaction with water	Description of metal's reaction with acid	Magnesium	Burns with a bright white flame	Very slow reaction with cold water but vigorous with steam	Vigorously bubbles producing large amounts of hydrogen	Iron	Does not burn, glows in oxygen when heated	Slow reaction with steam	Slowly reacts with a small amount of gas produced	Sodium	Burns quickly with a bright yellow flame	Violent reaction with cold water. Catches fire	Not safe to complete	Copper	Does not burn	No reaction with steam	No reaction at all
Element	Melting Point (°C)	Boiling Point (°C)																																			
Aluminium	660	2450																																			
Argon	-189	-186																																			
Francium	30	700																																			
Mercury	-39	357																																			
Metal	Description of metal's reaction with oxygen	Description of metal's reaction with water	Description of metal's reaction with acid																																		
Magnesium	Burns with a bright white flame	Very slow reaction with cold water but vigorous with steam	Vigorously bubbles producing large amounts of hydrogen																																		
Iron	Does not burn, glows in oxygen when heated	Slow reaction with steam	Slowly reacts with a small amount of gas produced																																		
Sodium	Burns quickly with a bright yellow flame	Violent reaction with cold water. Catches fire	Not safe to complete																																		
Copper	Does not burn	No reaction with steam	No reaction at all																																		

Key Terms

Solid Liquid Gas Atom Period Group Metal Non-Metal Element
 Compound Mixture Symbol Formula Property Nucleus Shell
 Energy Level Proton Neutron Electron Positive Negative Delocalised
 Density Isotope Ion Ionic Bonding Metallic Bonding Covalent Bonding



%	I can ...	Prove it!																																																																																																																							
	<p>4.1. I can describe and draw a model of the three states of matter</p> <p>7.3 I can describe the test for acids and bases</p> <p>(Autumn 1) 1.1. I can classify a substance as an element or compound</p> <p>(Autumn 1) 1.2. I can give the symbol for the first 20 elements</p> <p>(Autumn 1) 1.3. I can name common compounds from their formula</p> <p>(Autumn 1) 3.2. I can describe the current (nuclear) model of the atom</p> <p>(Autumn 1) 3.3. I can calculate protons, neutrons and electrons for an atom</p> <p>(Autumn 1) 3.4. I can draw the electronic structure and work out the electronic configuration for a given atom</p> <p>(Autumn 1) 4.2. I can explain why something is classified as a metal or non-metal</p>	<p>1) (a) Label each of the following: Solid, Liquid or Gas. (a) Can you complete the final diagram?</p> <div style="text-align: center;"> <p>_____</p> </div> <p>2) (a) Sarah wants to test if a substance is an acid or an alkali. Two indicators that can be used by Sarah to decide whether a substance is an acid or alkali are _____ and _____.</p> <p>(b) Complete the pH scale below:</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Description</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Neutral</td> <td></td> <td></td> <td></td> <td>Weak Alkali</td> <td></td> <td></td> </tr> <tr> <td>pH</td> <td>1</td> <td></td> <td>3</td> <td></td> <td></td> <td>6</td> <td></td> <td>8</td> <td>9</td> <td></td> <td></td> <td>13</td> </tr> <tr> <td>Colour</td> <td></td> <td></td> <td>Orange</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Purple</td> </tr> </table> <p>3) Put each substance into the correct column below. Copper, Methane, Gold, Aluminium, H₂, H₂O, CO₂, N₂</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;">Elements</td> <td style="width: 50%;">Compounds</td> </tr> <tr> <td style="height: 40px;"></td> <td style="height: 40px;"></td> </tr> </table> <p>4) Fill in the missing symbols/names.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 16.6%;">Name</td> <td style="width: 16.6%;">Lead</td> <td style="width: 16.6%;"></td> <td style="width: 16.6%;">Calcium</td> <td style="width: 16.6%;"></td> <td style="width: 16.6%;">Silver</td> <td style="width: 16.6%;"></td> </tr> <tr> <td>Symbol</td> <td></td> <td>N</td> <td></td> <td>Mg</td> <td></td> <td>Fe</td> </tr> </table> <p>5) Label each part of the atom. Complete the table.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;"> <p>Key Terms:</p> <p>Electron Proton Neutron Nucleus Shell</p> </div> <div style="text-align: center; margin-right: 20px;"> </div> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Sub atomic particle</th> <th>Relative size</th> <th>Relative charge</th> <th>Location</th> </tr> </thead> <tbody> <tr> <td>Electron</td> <td>1/2000</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>0</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>In the nucleus</td> </tr> </tbody> </table> </div> <p>6) For each element, calculate the number of protons, neutrons and electrons.</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Element</th> <th>e.g. Lithium</th> <th>Sodium</th> <th>Hydrogen</th> <th>Argon</th> <th>Calcium</th> <th>Boron</th> </tr> </thead> <tbody> <tr> <td>Atomic No.</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mass No.</td> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Protons</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Neutrons</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Electrons</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>7) Draw an atom of each of the elements in the table above. Then write the electronic configuration beneath. The first one has been done for you.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Lithium 2.1</p> </div> <div style="text-align: center;"> <p>Sodium</p> </div> <div style="text-align: center;"> <p>Hydrogen</p> </div> <div style="text-align: center;"> <p>Argon</p> </div> <div style="text-align: center;"> <p>Calcium</p> </div> <div style="text-align: center;"> <p>Boron</p> </div> </div> <p>8) Classify the following things as metals/non-metals: Iron, Lead, Calcium, Oxygen, Beryllium, Chlorine, Neon, Lithium, Nitrogen, Hydrogen.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 50%;">Metals</td> <td style="width: 50%;">Non-Metals</td> </tr> <tr> <td style="height: 40px;"></td> <td style="height: 40px;"></td> </tr> </table>	Description						Neutral				Weak Alkali			pH	1		3			6		8	9			13	Colour			Orange									Purple	Elements	Compounds			Name	Lead		Calcium		Silver		Symbol		N		Mg		Fe	Sub atomic particle	Relative size	Relative charge	Location	Electron	1/2000					0					In the nucleus	Element	e.g. Lithium	Sodium	Hydrogen	Argon	Calcium	Boron	Atomic No.	3						Mass No.	7						Protons	3						Neutrons	4						Electrons	3						Metals	Non-Metals		
Description						Neutral				Weak Alkali																																																																																																															
pH	1		3			6		8	9			13																																																																																																													
Colour			Orange									Purple																																																																																																													
Elements	Compounds																																																																																																																								
Name	Lead		Calcium		Silver																																																																																																																				
Symbol		N		Mg		Fe																																																																																																																			
Sub atomic particle	Relative size	Relative charge	Location																																																																																																																						
Electron	1/2000																																																																																																																								
		0																																																																																																																							
			In the nucleus																																																																																																																						
Element	e.g. Lithium	Sodium	Hydrogen	Argon	Calcium	Boron																																																																																																																			
Atomic No.	3																																																																																																																								
Mass No.	7																																																																																																																								
Protons	3																																																																																																																								
Neutrons	4																																																																																																																								
Electrons	3																																																																																																																								
Metals	Non-Metals																																																																																																																								

