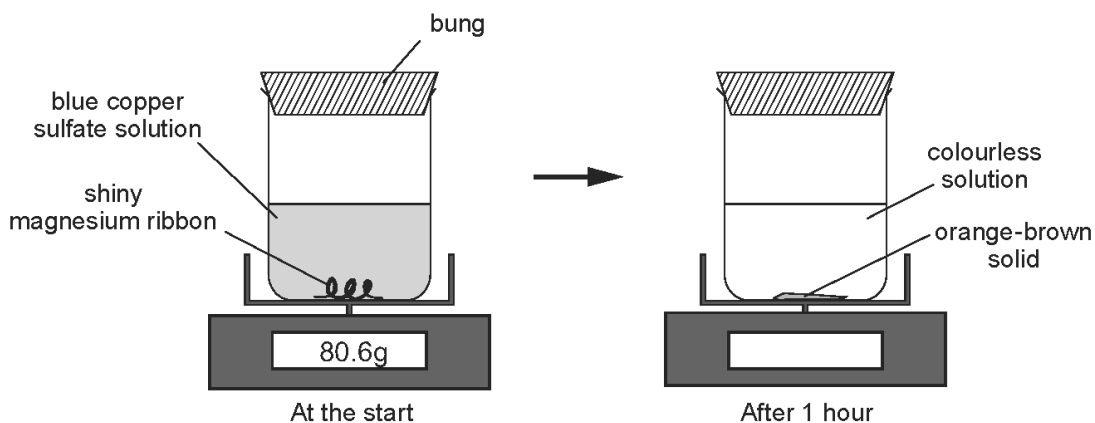


PAG C1 Exam Questions

Question	Maximum Mark	Mark Awarded
1	5	
2	6	
3	8	
4	8	
Total Mark		

1.

A pupil was asked to investigate what happens when a piece of shiny magnesium ribbon is added to copper sulfate solution. The apparatus was set up as shown below. The mass was recorded at the start and again after one hour.



(a) Complete the word equation:

magnesium + copper sulfate \longrightarrow + [1]

(b) Choose from the box below the name given to this type of reaction. [1]

combustion	corrosion	displacement	electrolysis
------------	-----------	--------------	--------------

(c) Put a tick (\checkmark) in the box next to the mass of the beaker and contents after 1 hour.

more than 80.6g equal to 80.6g less than 80.6g

Give the reason for your choice. [2]

(d) The experiment was repeated using sodium sulfate solution instead of copper sulfate solution. No reaction took place.

Put the metals copper, magnesium and sodium in order of reactivity. [1]

Most reactive

.....

Least reactive

5

2.

The order of reactivity of some elements is shown below.

<i>Most reactive</i>	sodium
	calcium
	magnesium
	aluminium
	carbon
	zinc
	iron
	hydrogen
	lead
	copper
	silver
<i>Least reactive</i>	gold

Predict, giving a reason for your answer, whether the following pairs of substances react and give any expected observation(s).

(a) Iron and copper sulfate solution [2]

.....

.....

.....

.....

(b) Magnesium and dilute hydrochloric acid [2]

.....

.....

.....

.....

(c) Aluminium oxide and carbon [2]

.....

.....

.....

.....

6

3.

A student was investigating the reactivity of copper, magnesium and zinc. He placed each metal into the solutions shown in the table and recorded his observations.

Metal	Solution	Observations
magnesium	copper sulfate	a brown solid forms and the solution turns from blue to colourless
zinc	copper sulfate	a brown solid forms and the solution turns from blue to colourless
magnesium	zinc sulfate	the magnesium ribbon turns dark grey
copper	zinc sulfate	no reaction

(a) Use the information in the table to place the metals in order of reactivity. [1]

Most reactive

.....

Least reactive

(b) Name the products formed in the reaction between magnesium and copper sulfate solution. [2]

..... and

(c) Give the chemical formula for zinc sulfate. [1]

(d) Lead can be extracted from its oxide using carbon in a furnace.

(i) Balance the following symbol equation for the reaction taking place. [1]



(ii) Oxidation and reduction both take place in the above reaction. Name the substance being oxidised and give a reason for your choice. [2]

Substance being oxidised

Reason

.....

(iii) State why heating with carbon cannot be used to extract aluminium from its ore. [1]

.....

.....

4. (a) Give the electronic structure of sodium, Na. [1]

.....

(b) Draw a diagram to show the metallic bonding in sodium. [2]

(c) (i) Sodium reacts vigorously with water.

Give two observations you would make when a small piece of sodium is added to a trough of water. [1]

.....

.....

(ii) Name the products of this reaction. [1]

..... and

(d) As you go down Group 1 of the Periodic Table the elements become more reactive.

State the main difference you would see if potassium instead of sodium was added to water. [1]

.....

(e) Explain why Group 1 metal reactivity increases down the group. [2]

.....

.....

.....

8

Marking Scheme

1.

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)		1	magnesium sulfate + copper	magnesium sulfate <i>solution</i> / copper <i>solid</i> / copper <i>metal</i>		
		(b)		1	displacement			
		(c)		2	equal to 80.6 (1) (in a chemical reaction) atoms are not created or destroyed / (in a chemical reaction) atoms are re-arranged / nothing has entered / left the beaker (1) [Marks linked (unless no box ticked) i.e. second mark cannot be awarded if first is not]		'it is a sealed container'	
		(d)		1	sodium magnesium copper	Na Mg Cu		

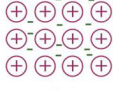
2.

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)		2	reaction takes place since iron is higher in the series / more reactive than copper (1) brown solid formed / solution becomes colourless / decolourises (1)			
		(b)		2	reaction takes place since magnesium is higher in the series than hydrogen (1) effervescence / bubbling / temperature rise / exothermic (1)	magnesium disappears		
		(c)		2	no reaction takes place (1) aluminium is higher in the series / more reactive than carbon (1)	no displacement		

3.

Question Number		Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)	1	magnesium zinc copper (must be correct order)	Mg Zn Cu		
		(b)	2	copper (metal) (1) magnesium sulfate (solution) (1)	Cu MgSO ₄		
		(c)	1	ZnSO ₄			
		(d) (i)	1	2 PbO 2 Pb both needed			
		(ii)	2	carbon (1) as it gains oxygen (1)	C loses electrons	reacts with oxygen	
		(iii)	1	any one from: aluminium is more reactive (than carbon) aluminium is too reactive carbon is less reactive (than aluminium) carbon is not reactive enough	Al is above C in reactivity series	Al is very reactive	

4.

Question Number		Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	5	(a)	1	2,8,1			
		(b)	2	 positive ions fixed positions electrons mobile / sea – all four points (2) – two/three points (1)			
		(c) (i)	1	floats moves fizzes / bubbles goes into a round shape / melts – any two		vigorous reaction dissolves	
		(ii)	1	sodium hydroxide and hydrogen – both needed	NaOH + H ₂	H	
		(d)	1	potassium burns / lilac flame		potassium moves faster	yellow / orange / red / green flame
		(e)	2	atoms get bigger / greater distance between the (positive) nucleus and the (outer) electron (1) outer electron more weakly held (1)			