

1	2	Key										3	4	5	6	7	0
		relative atomic mass atomic symbol name atomic (proton) number															
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

*The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

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1. Tammy was given a substance to analyse.
She was told that it contained two metal ions and two non-metal ions.

(a) Tammy carried out a flame test on the substance and found that it produced a yellow flame.

(i) Describe how Tammy could carry out the flame test.

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.....

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(2)

(ii) Which ion caused the yellow flame?

Put a cross (X) in the correct box.

calcium ions	<input type="checkbox"/>
iron(III) ions	<input type="checkbox"/>
potassium ions	<input type="checkbox"/>
sodium ions	<input type="checkbox"/>

(1)

(b) Tammy dissolved some of the substance in distilled water to form a solution.

(i) To one portion of the solution, she added drops of sodium hydroxide solution.
A red-brown precipitate formed.

Which ion did this test show to be present?

Put a cross (X) in the correct box.

calcium ions	<input type="checkbox"/>
iron(III) ions	<input type="checkbox"/>
potassium ions	<input type="checkbox"/>
sodium ions	<input type="checkbox"/>

(1)



- _____

(1)

- _____

(1)

Q1

1



<p>2. Clothes can be washed using soaps or detergents. In hard water areas, washing soda crystals are sometimes added before soap is used.</p> <p>(a) Apart from washing, suggest another use of water in everyday life.</p> <p>.....</p> <p>.....</p> <p>(1)</p> <p>(b) Which sodium compound is contained in washing soda crystals?</p> <p>.....</p> <p>.....</p> <p>(1)</p> <p>(c) Name the two types of substances needed to make soap.</p> <p>1</p> <p>2</p> <p>(2)</p> <p>(d) Modern washing powders contain detergents. They can be 'biological' or 'non-biological'.</p> <p>(i) Describe differences between using detergents and using soaps in hard water areas.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>(2)</p> <p>(ii) Give one difference between 'biological' and 'non-biological' washing powders.</p> <p>.....</p> <p>.....</p> <p>(1)</p> <p>(Total 7 marks)</p>	<p>Leave blank</p> <p>Q2</p> <div></div>
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<p>3. Sulphuric acid is an important substance. It is used to make many other substances.</p> <p>(a) Name two substances that are produced from sulphuric acid.</p> <p>1</p> <p>2 (2)</p> <p>(b) The first step in the manufacture of sulphuric acid is the burning of sulphur in air to form sulphur dioxide.</p> <p style="text-align: center;">$S + O_2 \rightarrow SO_2$</p> <p>Suggest why air rather than pure oxygen is used.</p> <p>.....</p> <p>..... (1)</p> <p>(c) The sulphur dioxide is then reacted with more oxygen from air in the presence of a hot catalyst. The reaction is reversible.</p> <p>(i) Name the catalyst used.</p> <p>..... (1)</p> <p>(ii) Write the balanced equation for the reversible reaction.</p> <p>..... (3)</p> <p>(d) Describe how the gas from (c) is made into sulphuric acid.</p> <p>.....</p> <p>..... (1)</p> <p style="text-align: right;">(Total 8 marks)</p>	<p>Leave blank</p> <p>Q3</p> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div>



4. Copper is used to make water pipes and in the electronics industry.

(a) Describe **two** properties of copper or its compounds that are typical of transition metals and their compounds.

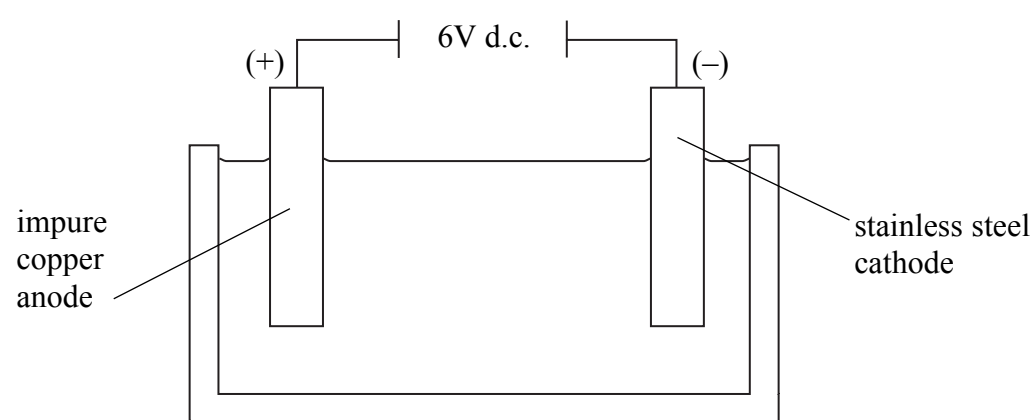
1

2

(2)

(b) Very pure copper is produced from impure copper by electrolysis.

The diagram shows a cell in which impure copper is the anode and the cathode is stainless steel.



(i) Identify the electrolyte used in the cell.

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(1)

(ii) Describe what happens to the impure copper electrode during electrolysis.

.....

.....

(1)

(iii) Describe what happens at the negative electrode.

.....

.....

(2)



<p>(iv) During the electrolysis, impurities collect below the positive electrode. Explain the importance of these impurities.</p> <p>.....</p> <p>.....</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(Total 8 marks)</p>	<p>Leave blank</p> <p>Q4</p> <div></div>



5. Drinking water in the United Kingdom is high quality and contains a very low concentration of lead ions.

In some parts of the United States drinking water contains a higher concentration of lead ions.

A group is campaigning for lead-free water.



Lead ions are toxic and it is important to know the concentration of these ions in the water.

(a) Arnie suggests

- take 1000 cm^3 of tap water
- heat to evaporate the tap water to dryness
- find the mass of the residue
- the mass of residue = the mass of lead

Suggest **two** reasons why this method would **not** give an accurate figure for the mass of lead ions in the water.

1

.....

2

.....

(2)



- (b) David is trying to find the concentration of lead ions (Pb^{2+}) in a solution. He adds a few drops of potassium iodide solution to the solution containing lead ions. A yellow precipitate forms. Lead iodide is an insoluble compound with a distinctive yellow colour.

- (i) Write the ionic equation for the reaction.

.....
(3)

- (ii) This is a reliable test for lead ions. Why is it important that only lead ions give this distinctive yellow precipitate?

.....
.....
(1)

- (iii) Faiza tells David that the test described above does not determine the **concentration** of lead ions in the solution but that this could be done by titration. Explain why Faiza is correct.

.....
.....
.....
.....
(2)



<p>(c) Titration can be used to find the concentration of a sodium hydroxide solution. In an experiment sodium hydroxide solution is titrated with dilute hydrochloric acid of known concentration. Describe how you would carry out this titration. Include the names of the pieces of apparatus you would use.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>(4)</p> <p>(Total 12 marks)</p>	<p>Leave blank</p> <p>Q5</p>



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6. Alcohols and esters are some of the substances used to make cosmetics.



(a) Suggest a reason why

(i) alcohols are used in cosmetics.

..... (1)

(ii) esters are used in cosmetics.

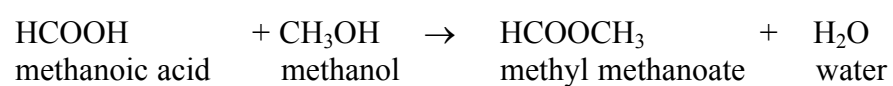
..... (1)

(b) A molecule of ethanol reacts with a molecule of ethanoic acid to make one molecule of the ester ethyl ethanoate and one molecule of water.

Write the equation for this reaction.

..... (2)

(c) Another ester, methyl methanoate, can be made as follows



(i) Calculate the mass of methyl methanoate, HCOOCH_3 , that can be made from 320 kg methanol, CH_3OH .
(Relative atomic masses: C = 12, H = 1.0, O = 16)

Answer..... kg
(3)



<p>(ii) Suggest why a manufacturer would need to carry out this sort of calculation.</p> <p>.....</p> <p>.....</p> <p style="text-align: right;">(1)</p> <p>(iii) Describe another reaction of methanoic acid.</p> <p>.....</p> <p>.....</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(Total 10 marks)</p>	<p>Leave blank</p> <p>Q6</p> <table border="1"><tr><td></td><td></td></tr></table>		



7. The alkali metals react vigorously with water.

The following is a description of the reaction of potassium with water.

A small piece of potassium was dropped onto a large volume of water. The potassium melted to form a ball. The ball whizzed across the surface of the water and a lilac flame was seen around it.

(a) Suggest why the potassium melts.

.....
(1)

(b) What burns to produce the flame?

.....
(1)

(c) What causes the flame to be lilac coloured?

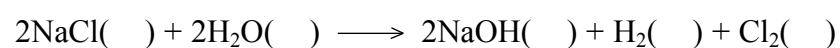
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(1)

(d) What would you **see** if litmus solution is added to the liquid?

.....
.....
(1)

(e) Sodium hydroxide is made by the electrolysis of brine.
This process produces sodium hydroxide, chlorine and hydrogen.

The overall equation for the electrolysis is



(i) Add all the state symbols to the equation.

(1)

(ii) Suggest why this is an important industrial process.

.....
.....
(1)



<p>(iii) In the electrolysis of brine, chloride ions are converted to chlorine. Explain why this reaction is an oxidation reaction.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>(1)</p> <p>(iv) Write the balanced half equation for the conversion of chloride ions, Cl^-, into chlorine.</p> <p>.....</p> <p>(2)</p> <p>(Total 9 marks)</p>	<p>Leave blank</p> <p>Q7</p>
<p>TOTAL FOR PAPER: 60 MARKS</p> <p>END</p>	



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