1 This is part of the reactivity series of metals.

most reactive	magnesium
	aluminium
	zinc
	iron
	copper
	silver
least reactive	gold

(a) Iron is extracted by the reduction of iron oxide.

In the extraction process, iron oxide is reduced by heating it with carbon.

(i) The extraction process involves both reduction and oxidation reactions.

State what is oxidised in this process.

(1)

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(ii) Aluminium is extracted from its oxide by electrolysis.

Explain why iron can be extracted from iron oxide by heating it with carbon but electrolysis has to be used to extract aluminium from its oxide.

(2)

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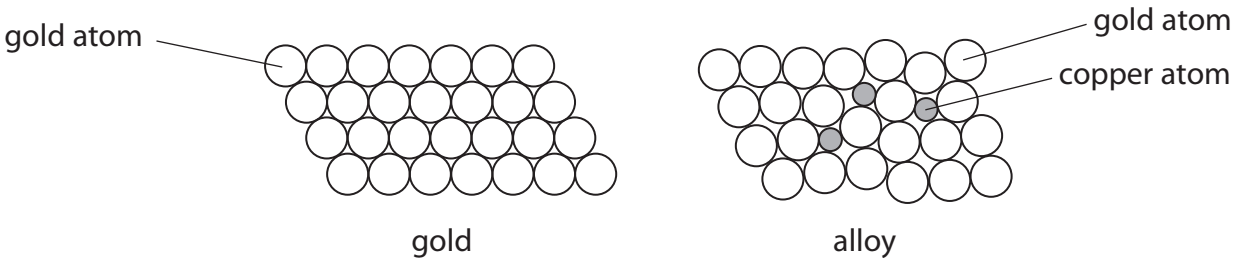
(b) The photograph shows a mask discovered in Colombia.

It is made from a gold and copper alloy.

The diagrams show the structure of pure gold and of the alloy containing a few atoms of copper.



Explain how the presence of copper atoms results in an alloy with a higher strength than pure gold.

(3)

*(c) Metals have specific uses based on their properties.

The table shows some properties of four metals.

metal	cost of 1 kg / £	density / g cm^{-3}	relative strength	resistance to corrosion	electrical conductivity
aluminium	1	2.70	high	good	good
copper	5	8.92	high	good	very good
gold	33000	19.3	low	excellent	excellent
silver	620	10.5	low	very good	excellent

Use the data in the table to explain some uses of each of these metals in relation to their individual properties.

(6)

(Total for Question 1 = 12 marks)

2 Some acids such as hydrochloric acid are described as strong acids.
Some acids such as ethanoic acid are described as weak acids.

(a) (i) Explain the difference between a strong acid and a weak acid.

(2)

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(ii) Give a reason why adding hydroxide ions to an acid solution leads to an increase in pH.

(1)

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(b) The salt zinc nitrate can be made by reacting zinc oxide, ZnO, with dilute nitric acid, HNO_3.

Write the balanced equation for this reaction.

(2)

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(c) 50 cm^3 of potassium hydroxide solution of concentration 40 g dm^{-3} is needed for an experiment.

Calculate the mass of potassium hydroxide that must be dissolved in water to make 50 cm^3 of solution of this concentration.

(2)

mass of potassium hydroxide = ... g

*(d) Salts of metals can be made by reacting one of the metal's compounds with the appropriate acid.

Plan an experiment to prepare pure, dry crystals of magnesium sulfate, $MgSO_4$, by reacting a suitable magnesium compound with a suitable acid.

You may use equations if you wish.

(6)

(Total for Question 2 = 13 marks)