AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.10.1 USING THE EARTH'S RESOURCES AND OBTAINING POTABLE WATER (PACK 2)

SCORE	PERCENTAGE
/214	%

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Q1.

Polymers are used to make fabrics.

Table 1 shows some properties of two polymers.

Table 1

Property	Polymer J	Polymer K
Density in g/cm^3	0.9	1.4
Melting point in °C	165	260
Flame resistance	Poor	Good
Water absorption	Low	High

(a) Polymer fabrics are used to make firefighter uniforms.

Complete **Table 2** by deciding for each property whether polymer J or polymer K is best for firefighter uniforms.

Use **Table 1**.

Density has been completed for you.

Tick **three** boxes.

Table 2

Property	Polymer J	Polymer K
Density in g/cm^3	✓	
Melting point in °C		
Flame resistance		
Water absorption		

(2)

(b) A firefighter uniform made from polymer **J** has a mass of 6.0 kg

Calculate the mass of a uniform of the same size made from polymer **K**.

Use **Table 1** and the equation:

$$\text{mass of uniform made from polymer } \mathbf{K} = \frac{\text{density of polymer } \mathbf{K}}{\text{density of polymer } \mathbf{J}} \times 6.0$$

_____

_____

_____

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Mass of uniform made from polymer **K** = _____ kg

(2)

(c) Polymers **J** and **K** are both thermosoftening polymers.

Polymer **L** is a thermosetting polymer.

Why would polymer **L** be better than polymers **J** and **K** for firefighter uniforms?

Tick **one** box.

Polymer **L** burns easily ☐

Polymer **L** does not biodegrade ☐

Polymer **L** will not melt ☐

(1)

Polymers **J** and **K** are made from crude oil.

In the past, firefighter uniforms were made from wool.

Wool is obtained from sheep.

(d) Why are many fabrics made from polymers instead of wool?

Tick **one** box.

Polymers are man-made ☐

Polymers are more hard-wearing ☐

Wool is more easily available ☐

Wool is more flame resistant ☐

(1)

(e) Why is wool more sustainable than polymers **J** and **K** for making firefighter uniforms?

_____

_____

_____

_____

(2)

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(Total 8 marks)

Q2.

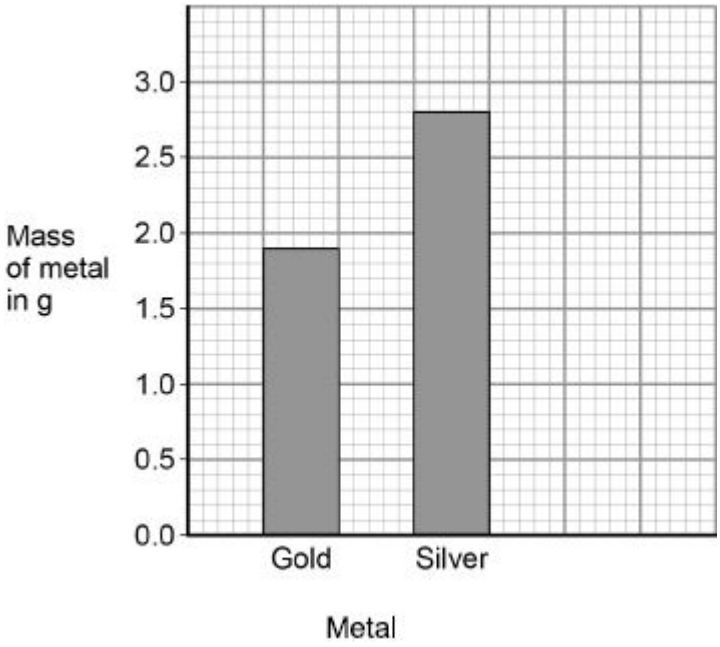
A 9 carat gold ring is made from a mixture of metals.

The table below shows the mass of different metals in the ring.

The mass of the ring is 5.0 g

Metal	Mass of metal in g
Gold	1.9
Silver	2.8
Copper	0.3

(a) Plot the data for copper from the table above on the graph below.



(2)

(b) The cost of gold is £30 per gram.

Calculate the cost of the gold used in the 9 carat gold ring.

Use the table above.

_____

_____

Cost of gold = £_____

(1)

(c) Rings can be made from 22 carat gold.

The ratio of the mass of gold in 22 carat gold compared to 9 carat gold is 22 :9

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Calculate the mass of gold in a 22 carat gold ring of mass 5.0 g

Use the table above.

_____

_____

_____

Mass of gold = _____ g

(2)

(d) Pure gold is 24 carats.

Suggest **two** reasons why silver and copper are mixed with gold to make 9 carat gold rings.

1. _____

_____

2. _____

_____

(2)

(e) Copper is obtained from copper ores or by recycling copper.

- Copper ores are non-renewable.
- Copper ores can be obtained by mining.
- Some scrap copper goes to landfill sites.

Give **three** reasons why we should use recycled copper instead of copper from copper ores.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

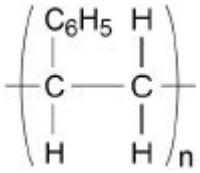
(Total 10 marks)

Q3.

Disposable cups are made from coated paper or poly(styrene).

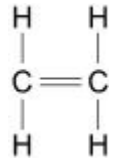
The diagram below represents the structure of poly(styrene).

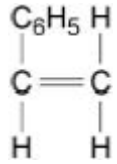
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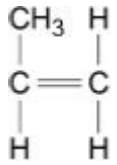


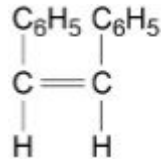
(a) Which small molecule is used to produce poly(styrene)?

Tick **one** box.

 ☐

 ☐

 ☐

 ☐

(1)

(b) Which process is used to make poly(styrene) from small molecules?

Tick **one** box.

Cracking ☐

Distillation ☐

Fermentation ☐

Polymerisation ☐

(1)

(c) Complete the sentences.

Choose answers from the box.

ceramics	**composites**	**four**	**many**

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monomers	polymers	two

Poly(styrene) is produced from small molecules called _____

When poly(styrene) is made, _____styrene molecules join to form large molecules.

These large molecules are called _____ .

(3)

(d) The table below gives some information about disposable cups.

	Coated paper cups	**Polystyrene cups**
Source of raw materials	Wood	Crude oil
Energy to make 1 cup in arbitrary units	550	200
Biodegradable	Yes	No
Recyclable	No	Yes

Compare the advantages and disadvantages of using coated paper and poly(styrene) to make disposable cups.

Use the table above and your knowledge and understanding of life cycle assessments (LCAs).

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 9 marks)

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Q4.

This question is about polymers.

(a) Polyesters are produced when monomers join together and lose a small molecule.

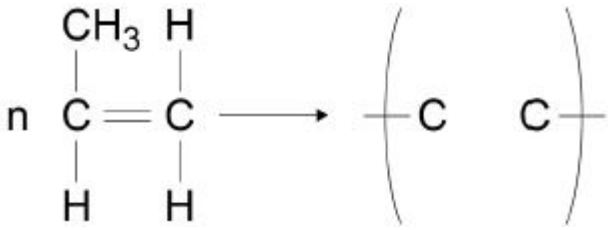
Name the small molecule lost.

_____

(1)

(b) Poly(propene) is produced from propene.

Complete the structure of poly(propene) in the equation.



(3)

(c) Carpets are made from:

- poly(propene)
- wool
- a mixture of poly(propene) and wool.

Poly(propene) wears out more slowly than wool.

A mixture of poly(propene) and wool to make carpets is more sustainable than using just poly(propene) or just wool.

Suggest why.

_____

_____

_____

_____

(2)

Polymer fibres are used to make firefighter uniforms.

The table below shows some properties of two polymer fibres.

	Polymer fibres	
Property	**Poly(propene)**	**Polyester**
Density in g/cm^3	0.90	1.38

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Melting point in °C	165	260
Flame resistance	Poor	Good
Water absorption	Low	High

(d) Evaluate the suitability of poly(propene) and polyester for firefighter uniforms.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 10 marks)

Q5.

Disposable cups are made from coated paper or poly(styrene).

The table below shows information on the life cycle assessments (LCAs) of disposable cups.

	Coated paper cups	**Poly(styrene) cups**
Raw materials	Wood	Crude oil
Mass of 1 cup in g	8.3	1.9
Energy to produce 1 cup in kJ	550	200
Energy released when 1 cup is burned in kJ	166	76
Biodegradable	Yes	No
Recyclable	No	Yes

(a) Evaluate the use of coated paper compared with poly(styrene) to make disposable cups.

Use the table above and your knowledge and understanding of LCAs.

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(6)

(b) Calculate the energy needed to produce 1.00 kg of coated paper cups.

Use the table above.

Give your answer in standard form.

Energy = _____ kJ

(2)

(c) Melamine is a polymer used to make non-disposable cups.

Melamine does **not** melt when it is heated.

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Explain why.

_____

_____

_____

_____

(2)

(Total 10 marks)

Q6.

Potable water is water that is safe to drink.

Seawater can be changed into potable water by desalination.

(a) Name the substance removed from seawater by desalination.

_____

(1)

(b) Desalination requires large amounts of energy.

Desalination is only used when there is no other source of potable water.

Give **one** reason why.

_____

_____

(1)

Water from lakes and rivers can be treated to make it potable.

(c) The first stage is to filter the water from lakes and rivers.

Why is the water filtered?

_____

_____

(1)

(d) Chlorine gas is then added to the filtered water.

Why is chlorine gas used to treat water?

_____

_____

(1)

(e) Describe a test for chlorine gas.

Give the result of the test if chlorine is present.

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Test _____

Result _____

(2)

Some students investigated different water samples.

The table shows some of their results.

Water	**pH**	**Mass of dissolved solid in g / dm^3**
Tap water	6.5	0.5
Seawater	8.1	35.0
Pure water		

(f) Complete the table above to show the expected results for pure water.

(2)

(g) What mass of dissolved solid is present in 100 cm^3 of the sample of tap water?

Tick (✔) **one** box.

0.05 g ☐

0.5 g ☐

5 g ☐

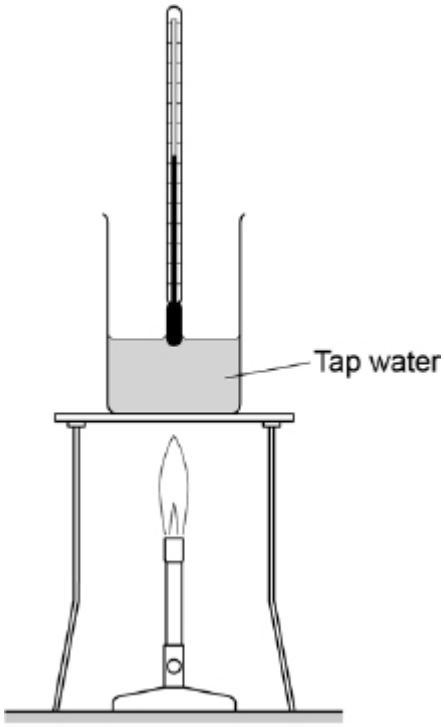
50 g ☐

(1)

(h) Boiling points can be used to show whether substances are pure.

The diagram shows the apparatus the students used to find the boiling point of tap water.

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The students made a mistake setting up the apparatus.

What mistake did the students make?

_____

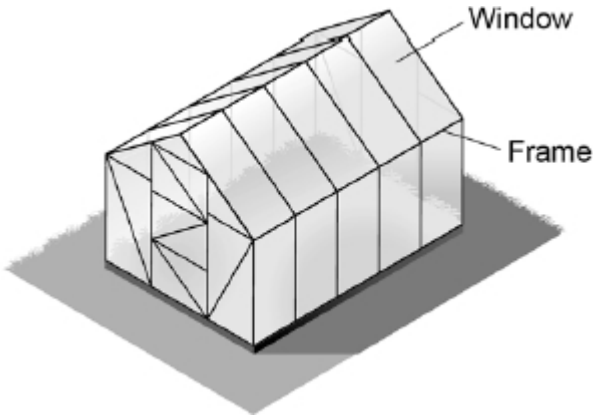
_____

(1)

(Total 10 marks)

Q7.

The diagram shows a greenhouse.



A greenhouse frame can be made from wood or aluminium.

Table 1 gives some information about wood and aluminium.

Table 1

Wood	Aluminium

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Raw material	Renewable	Non-renewable
Mass of greenhouse frame in kg	80	20
Useful lifetime in years	20	50
End of useful life	Can be chopped up and used as fuel	Can be recycled into new aluminium products

(a) Evaluate the use of each material for making greenhouse frames.

Use **Table 1**.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(b) Greenhouse frames are transported by lorry.

The lorry used can carry a maximum load of 12 tonnes.

Calculate the largest number of wooden greenhouse frames which could be transported by the lorry.

Use **Table 1**.

100 kg = 1 tonne

_____

_____

_____

Number of wooden greenhouse frames = _____

(2)

(c) It is more sustainable to make greenhouse frames from recycled aluminium than from aluminium from aluminium ore.

Give **two** reasons why.

1. _____

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_____

2. _____

_____

(2)

(d) Greenhouse windows can be made from glass or from polymers.

Table 2 gives information about glass and a polymer.

Table 2

	Glass	**Polymer**
Density in g / cm^3	2.8	1.2
Cost in £ per m^2	20	28
Effect of sunlight	No effect	Discolours over time

Suggest **one** advantage of making greenhouse windows from the polymer rather than from glass.

Use **Table 2**.

_____

_____

(1)

(Total 9 marks)

Q8.

Water from a lake in the UK is used to produce drinking water.

(a) What are the two main steps used to treat water from lakes?

Give a reason for each step.

Step 1 _____

Reason _____

Step 2 _____

Reason _____

(2)

(b) Explain why it is more difficult to produce drinking water from waste water than from water in lakes.

_____

_____

_____

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_____

_____

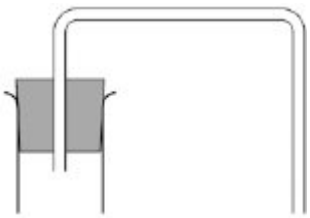
_____

(3)

(c) Some countries make drinking water from sea water.

Complete the figure below to show how you can distil salt solution to produce and collect pure water.

Label the following:
- pure water
- salt solution



(3)

(d) How could the water be tested to show it is pure?

Give the expected result of the test for pure water.

_____

_____

_____

_____

_____

(2)

(e) Why is producing drinking water from sea water expensive?

_____

_____

(1)

(Total 11 marks)

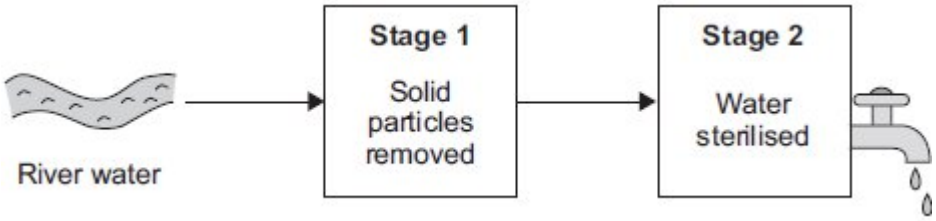
Q9.

This question is about water.

River water needs to be treated before it is safe to drink.

(a) The diagram shows two stages of the treatment of river water.

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(i) What is the name of the process used to remove solid particles in **Stage 1**?

Tick (✓) **one** box.

Crystallisation ☐

Fermentation ☐

Filtration ☐

(1)

(ii) What is added in **Stage 2** to sterilise the water?

Tick (✓) **one** box.

Chlorine ☐

Fluoride ☐

Potassium ☐

(1)

(b) Toxic substances in river water are removed by adding very small amounts of iron oxide nanoparticles.

(i) How is the size of nanoparticles different from normal-sized particles?

_____

_____

(1)

(ii) Nanoparticles are needed in only very small amounts.

Suggest why.

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_____

_____

(1)

(c) In certain areas of the UK, tap water contains aluminium ions.

What would you **see** when sodium hydroxide solution is added drop by drop to tap water containing aluminium ions?

_____

_____

_____

_____

(2)

(Total 6 marks)

Q10.

This question is about copper.

(a) Copper can be extracted by smelting copper-rich ores in a furnace.

The equation for one of the reactions in the smelting process is:

$$Cu_2S(s) + O_2(g) \longrightarrow 2\ Cu(s) + SO_2(g)$$

Explain why there would be an environmental problem if sulfur dioxide gas escaped into the atmosphere.

_____

_____

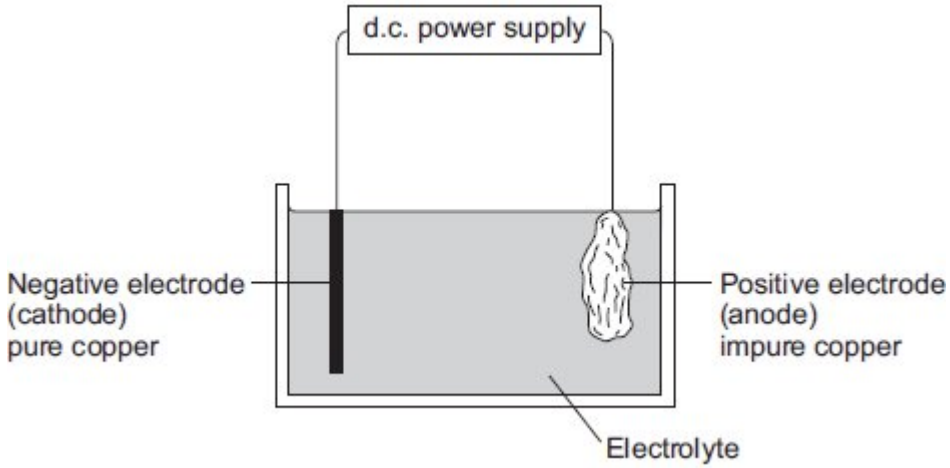
_____

_____

(2)

(b) The impure copper produced by smelting is purified by electrolysis, as shown below.

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Copper atoms are oxidised at the positive electrode to Cu^{2+} ions, as shown in the half equation.

$$Cu(s) \longrightarrow Cu^{2+}(aq) + 2e^-$$

(i) How does the half equation show that copper atoms are oxidised?

_____

_____

(1)

(ii) The Cu^{2+} ions are attracted to the negative electrode, where they are reduced to produce copper atoms.

Write a balanced half equation for the reaction at the negative electrode.

_____

(1)

(iii) Suggest a suitable electrolyte for the electrolysis.

_____

(1)

(c) Copper metal is used in electrical appliances.

Describe the bonding in a metal, and explain why metals conduct electricity.

_____

_____

_____

_____

_____

_____

_____

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_____

_____

(4)

(d) Soil near copper mines is often contaminated with low percentages of copper compounds.

Phytomining is a new way to extract copper compounds from soil.

Describe how copper compounds are extracted by phytomining.

_____

_____

_____

_____

_____

_____

(3)

(e) A compound in a copper ore has the following percentage composition by mass:

55.6% copper, 16.4% iron, 28.0% sulfur.

Calculate the empirical formula of the compound.

Relative atomic masses (A_r): S = 32; Fe = 56; Cu = 63.5

You must show all of your working.

_____

_____

_____

_____

_____

_____

_____

_____

Empirical formula = _____

(4)

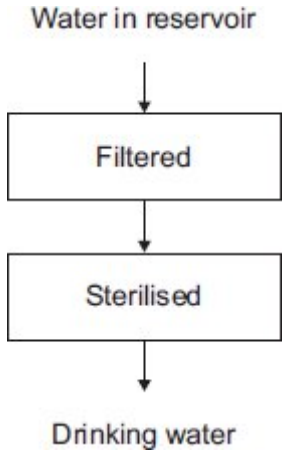
(Total 16 marks)

Q11.

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This question is about drinking water.

(a) The flow diagram below shows how water is made suitable for drinking.



(i) What is removed when the water is filtered?

Tick (✓) **one** box.

Gases ☐

Liquids ☐

Solids ☐

(1)

(ii) What is used to sterilise the water?

Tick (✓) **one** box.

Carbon ☐

Chlorine ☐

Sodium chloride ☐

(1)

(iii) Why is the water sterilised?

_____

_____

(1)

(b) Water can be purified by distillation.

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Drinking water is **not** usually purified by distillation because distillation is expensive.

Complete the sentence.

Distillation is expensive because it requires a lot of

_____

(1)

(c) Why do some water companies add fluoride to drinking water?

_____

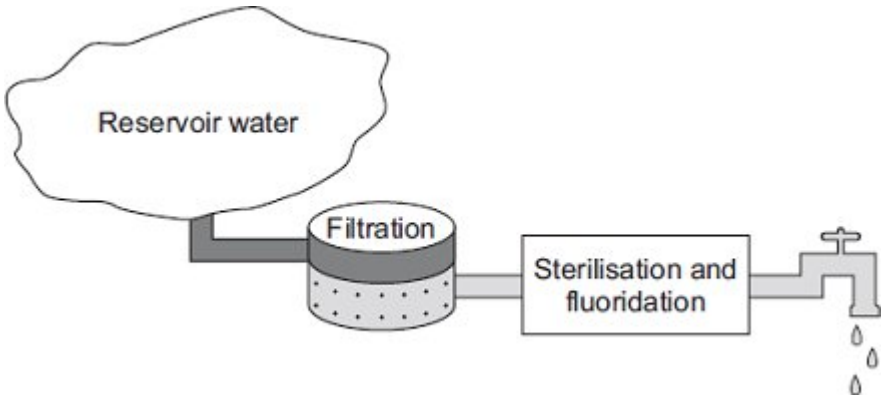
_____

(1)

(Total 5 marks)

Q12.

The diagram shows three stages in the treatment of reservoir water.



(a) (i) What is separated from the reservoir water during filtration?

Tick (✔) **one** box.

Bacteria ☐

Dissolved nitrates ☐

Solids ☐

(1)

(ii) What is added to sterilise the water?

Tick (✔) **one** box.

Calcium ☐

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Chlorine ☐

Magnesium ☐

(1)

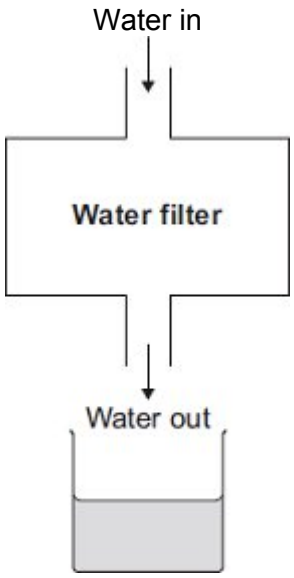
(iii) State **one** advantage of adding fluoride to drinking water.

_____

_____

(1)

(b) The diagram shows a water filter used in the home.



A student collected a sample of water from the filter.

The student could show that the filtered water contains dissolved salts without using a chemical test.

Describe how.

_____

_____

_____

_____

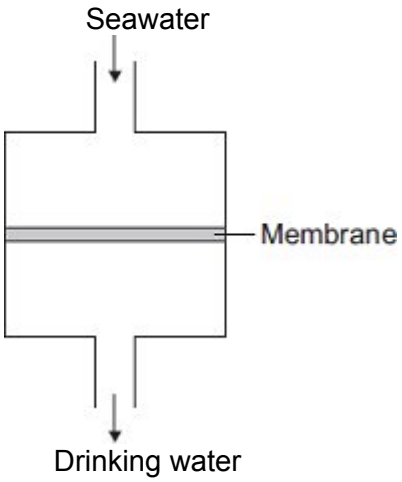
_____

_____

(2)

(c) Seawater is forced through a membrane to make drinking water.

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Suggest why water molecules can pass through the membrane, but sodium ions and chloride ions cannot.

_____

_____

(1)

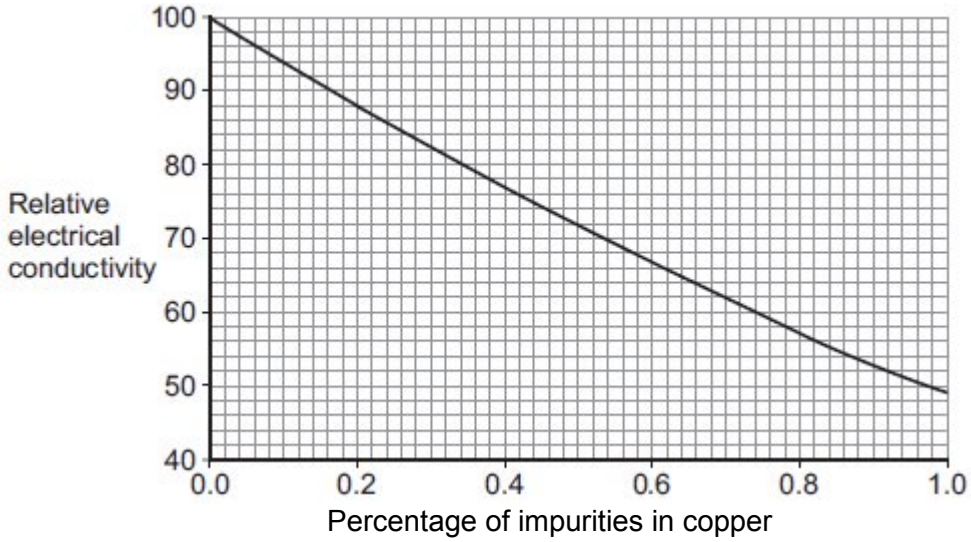
(Total 6 marks)

Q13.

This question is about copper.

(a) Most of the copper extracted is used in electric circuits.

The figure below shows how impurities change the electrical conductivity of copper.



Copper extracted by smelting is about 99% pure.

The 99% pure copper produced by smelting is purified to 99.9999% pure copper by electrolysis.

Use values from the graph to explain why copper is purified to 99.9999%.

_____

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_____

_____

_____

(2)

(b) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Read the information in the box.

Copper extraction

World demand for copper for the year 2011 was about 20 million tonnes.

World reserves of copper are estimated to be 700 million tonnes.

Most of the copper used is obtained from copper ores, which are mined.

The copper ore chalcopyrite is heated in a furnace to produce copper sulfide, CuS

The furnace is heated by burning fossil fuels.

Air is then blown through the hot copper sulfide, to produce copper and sulfur dioxide.

$$CuS + O_2 \rightarrow Cu + SO_2$$

A scientist made the statement: 'Copper should be recycled'.

Use the information in the box and your own knowledge and understanding to justify the scientist's statement.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

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Extra space

(6)

(c) Phytomining is used to obtain copper from land that contains very low percentages of copper compounds.

Describe how copper compounds are obtained by phytomining.

(3)

(Total 11 marks)

Q14.

Where copper ore has been mined there are areas of land that contain very low percentages of copper compounds.

One way to extract the copper is to grow plants on the land.

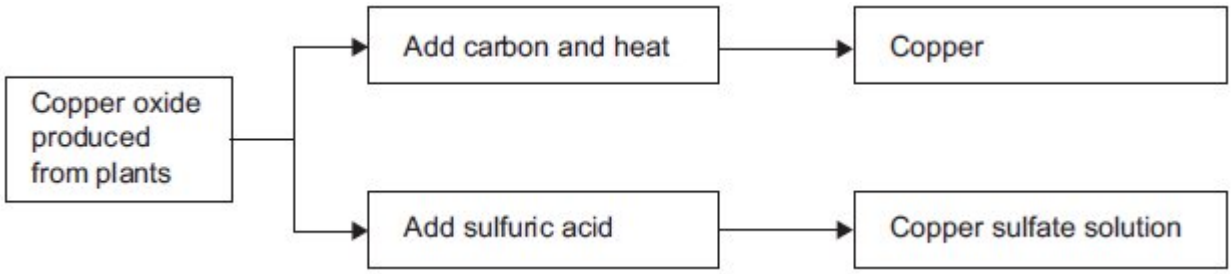
The plants absorb copper compounds through their roots.

The plants are burned to produce copper oxide.

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The copper oxide produced from plants can be reacted to produce copper or copper sulfate solution, as shown in **Figure 1**.

Figure 1



(a) Draw a ring around the correct answer to complete each sentence.

(i) Copper ores contain enough copper to make extraction of the metal

carbon neutral.
economical.
reversible.

(1)

(ii) Using plants to extract metals is called

photosynthesis.
phytomining.
polymerisation.

(1)

(iii) Copper oxide reacts with carbon to produce copper and

carbon dioxide.
oxygen.
sulfur dioxide.

(1)

(b) Copper is produced from copper sulfate solution by displacement using iron or by electrolysis.

(i) Complete the word equation.

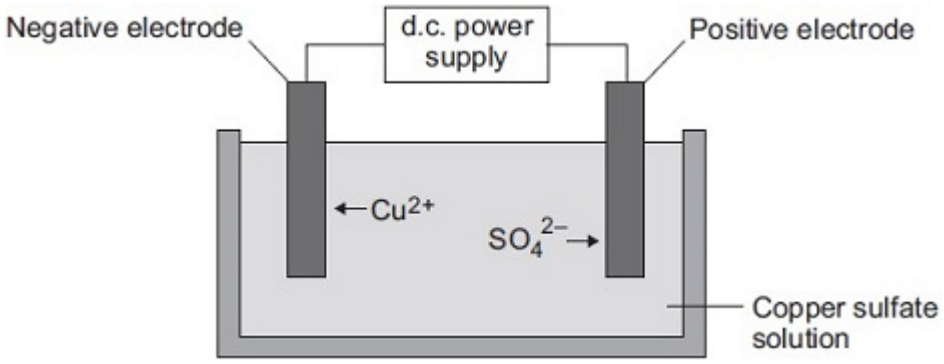
copper sulfate + iron ⟶ _____ + _____

(2)

(ii) **Figure 2** shows the electrolysis of copper sulfate solution.

Figure 2

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Why do copper ions go to the negative electrode?

_____

_____

(1)

(c) Suggest **two** reasons why copper should **not** be disposed of in landfill sites.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q15.

Where copper ore has been mined there are areas of land that contain very low percentages of copper compounds.

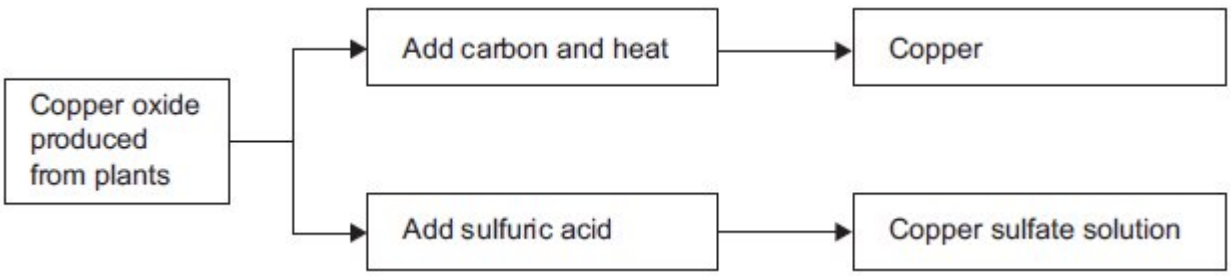
One way to extract the copper is to grow plants on the land.

The plants absorb copper compounds through their roots.

The plants are burned to produce copper oxide.

The copper oxide produced from plants can be reacted to produce copper or copper sulfate solution, as shown in **Figure 1**.

Figure 1



(a) (i) Complete the sentence.

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Using plants to extract metals is called _____ .

(1)

(ii) Suggest **two** reasons why copper from these areas of land is **not** extracted by smelting.

_____

_____

_____

_____

_____

(2)

(iii) Complete and balance the chemical equation for the reaction of copper oxide with carbon.

____CuO + C ⟶ _____ + CO_2

(2)

(b) Copper is produced from copper sulfate solution by displacement using scrap iron or by electrolysis.

(i) Use the Chemistry Data Sheet to help you to answer this question.

Give **two** reasons why scrap iron is used to displace copper.

_____

_____

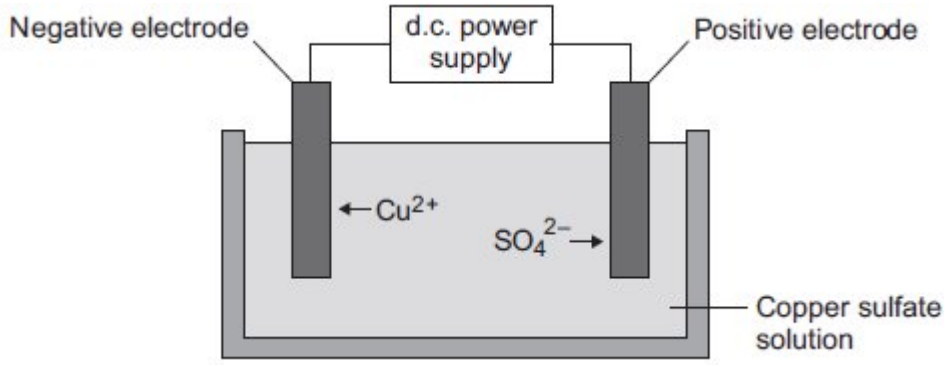
_____

_____

(2)

(ii) **Figure 2** shows the electrolysis of copper sulfate solution.

Figure 2



Describe what happens to the copper ions during electrolysis.

_____

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_____

_____

_____

(2)

(Total 9 marks)

Q16.

Water in Britain is taken from reservoirs to use as drinking water.



© KatieJonesPhotography/iStock/Thinkstock

(a) What are the **two** main steps used to treat water from reservoirs?

Give **one** reason for each step.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(b) Some people use water filters to treat water before drinking it.

(i) Water filters remove hardness from hard water.

What is in water filters that removes hardness from water?

_____

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_____

(1)

(ii) Suggest why water filters used in the home contain particles of silver.

_____

_____

(1)

(c) Pure water can be produced by distillation.

Why is distillation **not** usually an economic method of treating water for drinking?

_____

_____

(1)

(d) Drinking hard water has health benefits.

State **one** health benefit of drinking hard water.

_____

_____

(1)

(Total 8 marks)

Q17.

Most water contains dissolved compounds.

The concentrations of these dissolved compounds are higher in sea water than in drinking water.

(a) (i) Draw a ring around the correct answer to complete the sentence.

Pure water can be obtained from sea water by

distillation.
filtration.
neutralisation.

(1)

(ii) What is the boiling point of pure water? _____ °C

(1)

(b) A student wanted to find out how much solid was dissolved in sea water.

This is the method the student used:

- measure the mass of an empty evaporating basin
- measure 25 cm^3 of sea water and pour it into the evaporating basin
- heat the evaporating basin gently until all of the water has evaporated
- measure the mass of the evaporating basin containing the solid residue.

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(i) What piece of apparatus would be suitable for measuring 25 cm^3 of sea water?

_____

(1)

(ii) How could the student check that all of the water had evaporated?

_____

_____

_____

_____

(2)

(iii) The results the student obtained using 25 cm^3 of sea water are:

mass of empty evaporating basin = 23.21 g
mass of evaporating basin and dry solid residue = 24.04 g

Calculate the mass of solid dissolved in 1000 cm^3 of the sea water.

_____

_____

_____

Mass dissolved in 1000 cm^3 = _____ g

(2)

(c) In many countries chlorine is added to drinking water supplies.

Why is chlorine added to drinking water?

_____

_____

(1)

(d) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

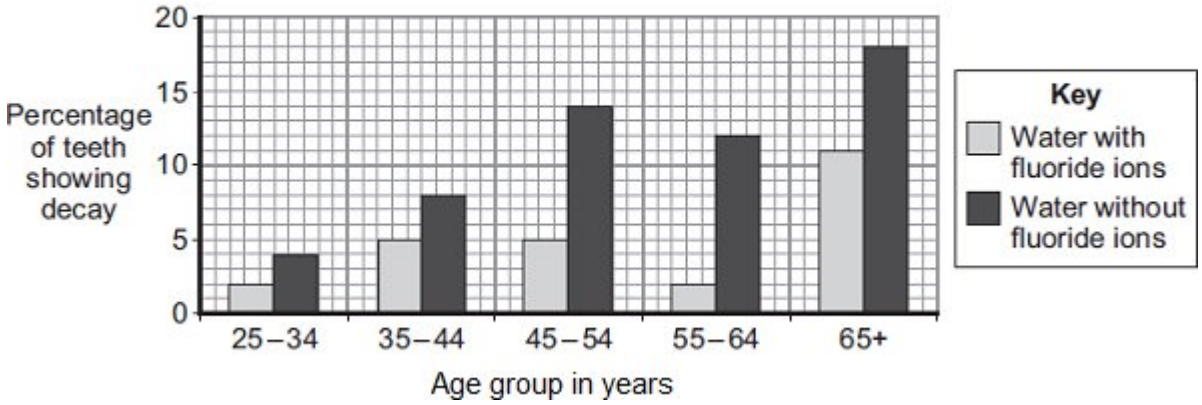
Compounds containing fluoride ions are added to some drinking water supplies.

Many scientists have done research into the effects of fluoride ions in drinking water.

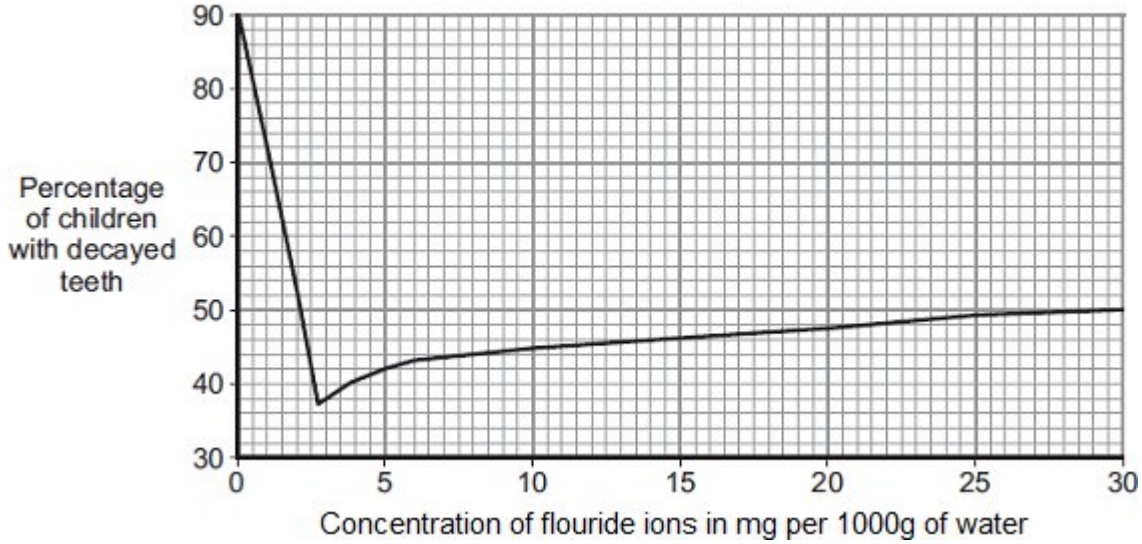
Graphs 1, **2** and **3** show some of the results obtained.

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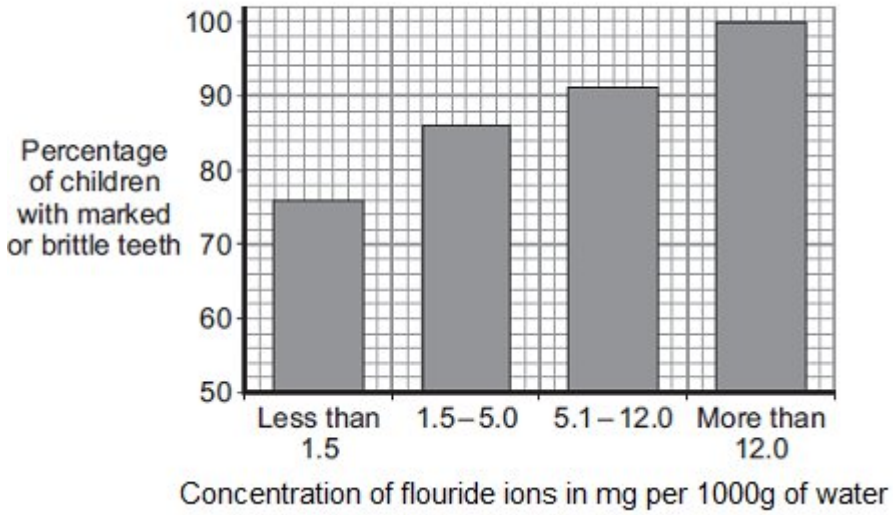
Graph 1



Graph 2



Graph 3



Evaluate the advantages and disadvantages of adding fluoride ions to drinking water.

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You should support your answer with evidence from **all three** graphs.

(6)
(Total 14 marks)

Q18.

Metals are extracted from their ores.

Many copper ores contain only 2% of copper compounds.

(a) Copper is now extracted from ores containing a low percentage of copper compounds.

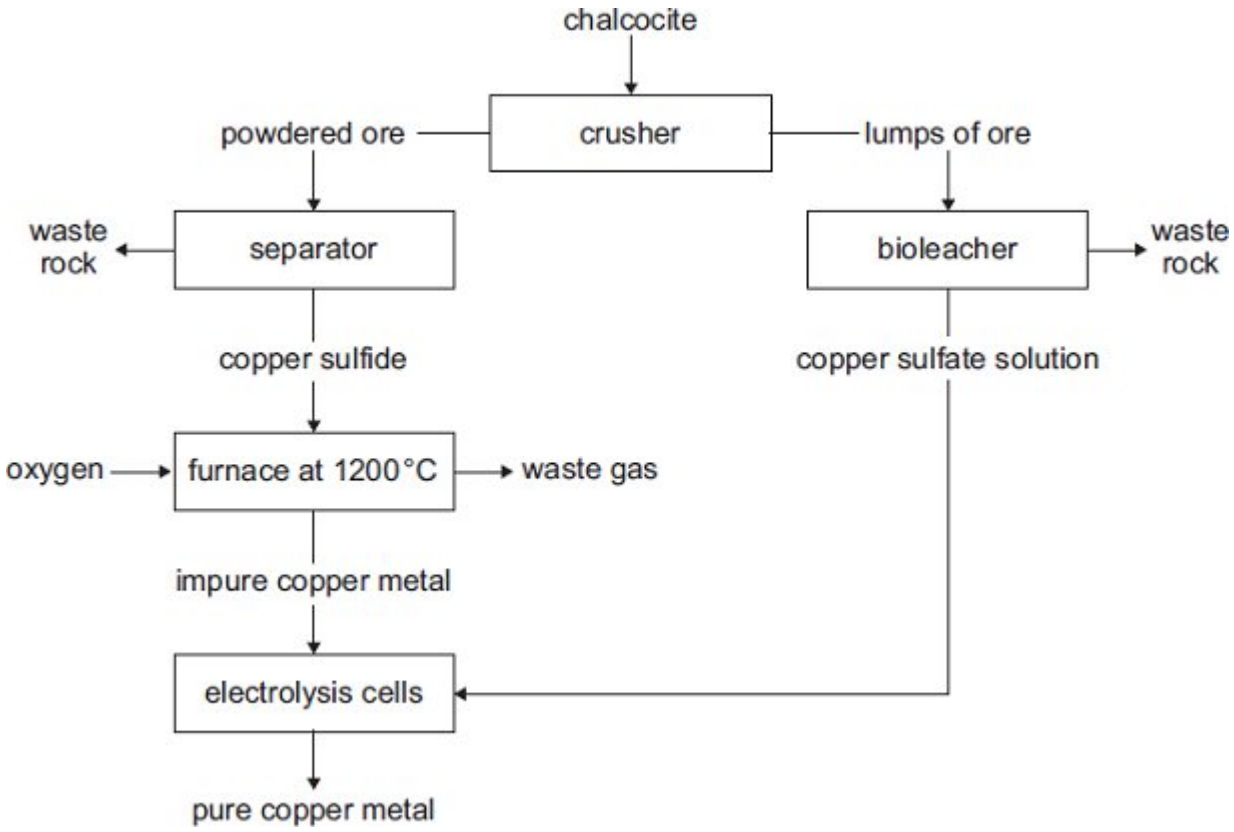
Suggest **two** reasons why.

(2)

(b) Chalcocite, an ore of copper, contains copper sulfide.

The flow diagram shows how copper metal is extracted from chalcocite.

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(i) Suggest **one** reason why it is difficult to dispose of the waste rock.

_____

_____

(1)

(ii) The reaction in the furnace could cause environmental pollution.
Explain how.

_____

_____

_____

_____

(2)

(iii) The extraction of pure copper is expensive.
Give **one** reason why.

_____

_____

(1)

(iv) Pure copper is produced by electrolysis of copper sulfate solution.

Which electrode do the copper ions move towards?
Give a reason for your answer.

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_____

_____

_____

_____

(2)

(v) Large areas of land are contaminated with copper compounds.
Phytomining can be used to remove these copper compounds from the land.

What is used in phytomining to remove copper compounds from the land?

_____

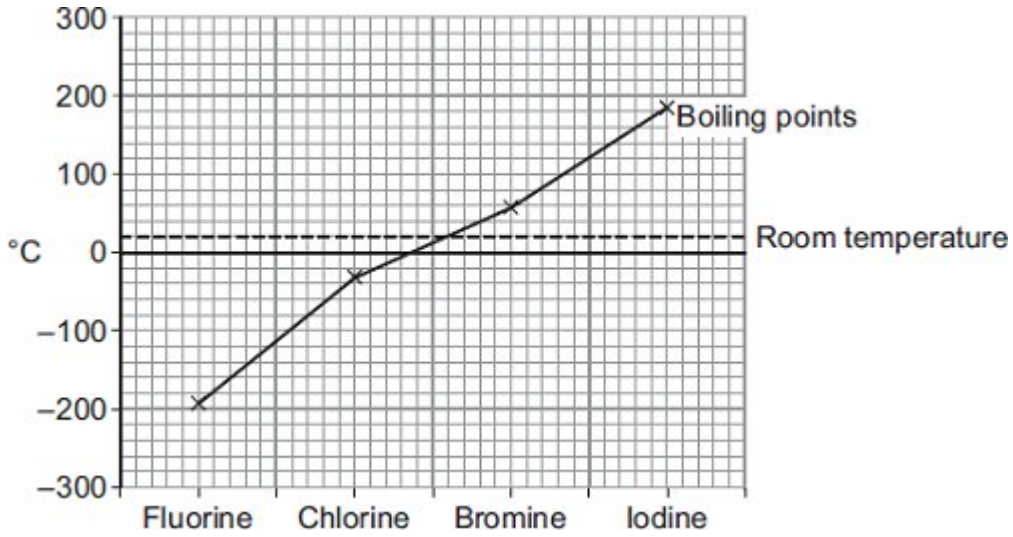
_____

(1)

(Total 9 marks)

Q19.

The graph shows the boiling points of the halogens.



(a) Use the graph to help you answer these questions.

(i) Use the correct answer from the box to complete the sentence.

gas	liquid	solid

At room temperature chlorine is a _____ .

(1)

(ii) Describe the trend in boiling point from fluorine to iodine.

_____

_____

(1)

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(b) Chlorine reacts with metals to produce metal chlorides.

(i) When a chlorine atom forms a chloride ion it gains one electron.

What is the charge on a chloride ion?

_____

(1)

(ii) Write a word equation for the reaction between sodium and chlorine.

_____

(1)

(c) In the UK water companies add chlorine to tap water.

Why is chlorine added to tap water?

_____

(1)

(d) Water companies add fluoride to tap water in some parts of the UK.

Fluoride is added to improve dental health.

Suggest **one** reason why some people are against adding fluoride to tap water.

_____

_____

_____

(1)

(Total 6 marks)

Q20.

Good quality water is essential for life.

(a) In the United Kingdom, water is filtered and treated with chlorine to make it safe to drink.



Explain why the water is:

filtered _____

_____

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treated with chlorine. _____

_____

(2)

(b) Millions of people in Bangladesh drink water from wells that contain high levels of arsenic. Arsenic is poisonous.

The World Health Organisation recommends that there should be no more than 0.01 mg of arsenic per litre in drinking water.

The table gives some information about two instrumental methods of testing for arsenic.

Factor to consider	**Laboratory Instrumental Method**	**Portable Instrumental Method**
Cost of equipment	£10 000	£50
Skill level of technician	Highly skilled	where test is done
Little training needed	Laboratory only	Anywhere
Time to prepare the instrument for the test	5 minutes	10 seconds
Sensitivity of the instrument	0.000001 mg of arsenic per litre of water	0.1 mg of arsenic per litre of water

(i) Use the information in the table to give **two** advantages and **one** disadvantage of using the Portable Instrumental Method compared with the Laboratory Instrumental Method.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

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(ii) The information about these two instrumental methods was provided by the Professional Institute of Water Engineers (PIWE). The Institute has no connection with the companies that make these instruments.

Suggest why many people would accept the views of PIWE rather than the views of the companies that make the instruments.

_____

_____

(1)

(Total 6 marks)

Q21.

Read the following information and then answer the questions.

Chlorine – for better, for worse?



Chlorine is used to make bleaches, plastics and medicines. Swimming pool water is often treated with chlorine.

Chlorine is used to make water safe to drink. It is relatively cheap and easy to use. People who drink untreated water risk dying from typhoid and cholera.

However, chlorine is a poisonous chemical. It causes breathing difficulties and can kill people. Some people are also allergic to chlorine.

(a) How does chlorine make water safe to drink?

_____

_____

(1)

(b) The amount of chlorine in swimming pool water should be carefully monitored and controlled.

Explain why.

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_____

_____

_____

_____

(2)

(c) Developing countries are likely to choose chlorination as their method of making water safe to drink.

Suggest why.

_____

_____

_____

(1)

(d) A government is setting up an enquiry into the safety of using chlorine.

(i) Suggest why people from all political parties should be represented.

_____

_____

_____

(1)

(ii) Suggest why the opinion of a well-respected scientist might change the outcome of any discussion.

_____

_____

_____

(1)

(iii) The decision taken about the safety of using chlorine should be based on evidence and data rather than on hearsay and opinion.

Suggest why.

_____

_____

_____

(1)

(Total 7 marks)

Q22.

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Chlorine and bromine are important Group 7 elements.

(a) Explain why chlorine is added to drinking water.

_____

_____

(1)

(b) Describe what you would **see** when bromine water is added to an unsaturated organic compound.

_____

_____

(1)

(c) Bromine can be extracted from seawater. The dissolved bromide ions are reacted with chlorine. Bromine and chloride ions are formed.

(i) Complete and balance the equation below, which represents the reaction between chlorine and bromide ions.

$$Cl_2 + 2Br^- \rightarrow _____ + _____$$

(1)

(ii) Describe what you **see** when chlorine is added to a solution containing bromide ions.

_____

_____

(1)

(d) In terms of electronic structure:

(i) state why bromine and chlorine are both in Group 7

_____

_____

(1)

(ii) explain why bromine is less reactive than chlorine.

_____

_____

_____

_____

_____

_____

_____

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(3)

(e) What is the result of adding acidified silver nitrate solution to a solution containing:

(i) chloride ions

_____

(1)

(ii) bromide ions?

_____

(1)

(Total 10 marks)

Q23.

Good quality water is needed for a healthy life.

In the United Kingdom, obtaining safe water for drinking is as simple as turning on a tap. The water is made safe to drink by water companies.

However, in many parts of Africa and Asia, water used for drinking is contaminated and untreated. It is estimated that 2.2 million people die each year as a result of drinking contaminated water.



DADA DANESHANANDA, Man with filtered water from the Mafi-Zongo water project. www.amurt.net/africa/ghana/2005

(a) Sea water is **not** used as drinking water.

Suggest why.

_____

_____

(1)

(b) Explain why water for drinking is filtered and then treated with chlorine.

_____

_____

_____

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_____

(2)

(Total 3 marks)

Q24.

Good quality water is needed for a healthy life.

In the United Kingdom, obtaining safe water for drinking is as simple as turning on a tap. The water is made safe to drink by water companies.

However, in many parts of Africa and Asia, water used for drinking is contaminated and untreated. It is estimated that 2.2 million people die each year as a result of drinking contaminated water.



DADA DANESHANANDA, Man with filtered water from the Mafi-Zongo water project. www.amurt.net/africa/ghana/2005

Efforts are being made to solve this problem and more water is being treated.

Describe how water in the United Kingdom is treated.

Explain how this makes it safe to drink.

_____

_____

_____

_____

_____

_____

_____

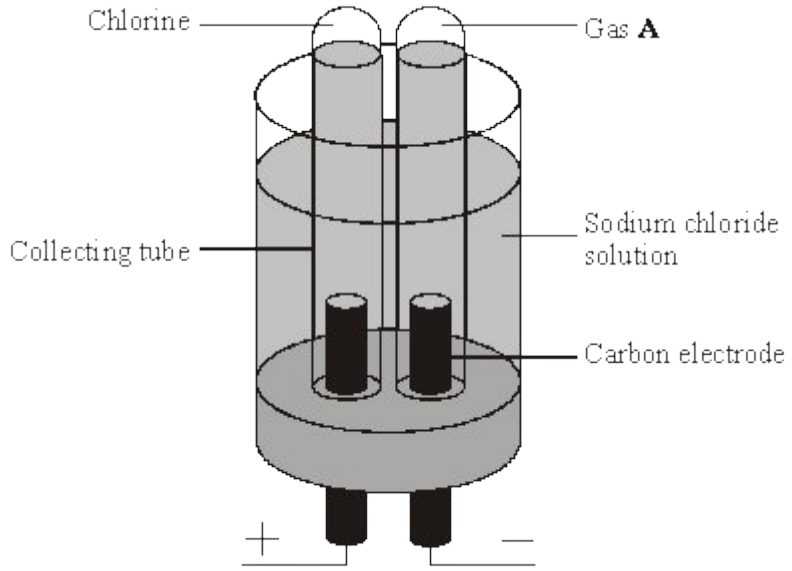
_____

(Total 3 marks)

Q25.

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The electrolysis of sodium chloride solution is an important industrial process. The apparatus shown below can be used to show this electrolysis in the laboratory.



(a) Name gas **A**. _____

(1)

(b) Chlorine is produced at the positive electrode. Describe and give the result of a chemical test to prove that the gas is chlorine.

_____

_____

_____

_____

(2)

(c) Chloride ions move to the positive electrode. Explain why.

_____

_____

(1)

(d) A small quantity of chlorine is added to drinking water. Explain why.

_____

_____

(1)

(e) The solution around the negative electrode becomes alkaline. Name the ion which makes the solution alkaline.

_____

_____

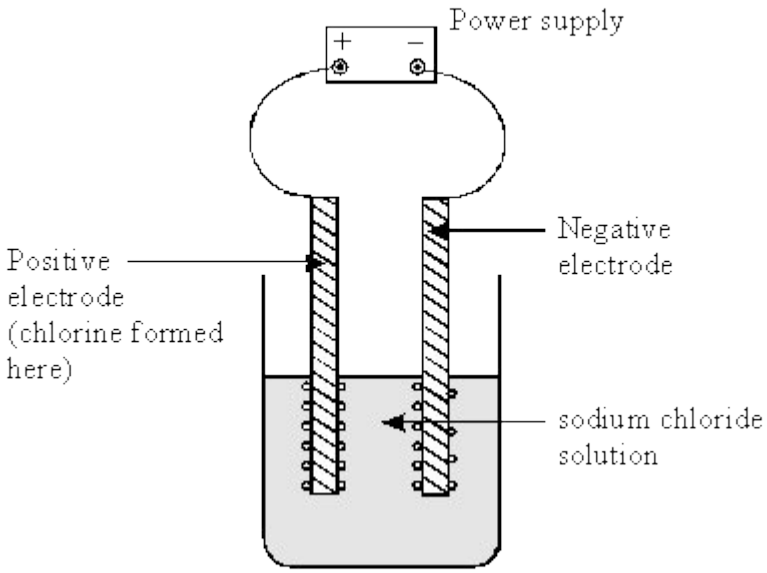
(1)

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(Total 6 marks)

Q26.

The diagram below shows the electrolysis of sodium chloride solution, in the laboratory.



(a) Which gas forms at the negative electrode? _____

(1)

(b) Explain why chlorine gas forms at the positive electrode.

_____

_____

_____

(2)

(c) State **one** use of chlorine gas.

_____

(1)

(Total 4 marks)

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