



New Document 1

Name: _____

Class: _____

Date: _____

Time: **31 minutes**

Marks: **30 marks**

Comments:

Q1.

- (a) The hydrocarbon $C_{16}H_{34}$ can be cracked.

Balance the equation for cracking $C_{16}H_{34}$



(1)

- (b) Describe the differences between cracking and distillation.

(2)

- (c) What type of reaction is cracking?

Tick **one** box.

Combustion

Decomposition

Neutralisation

Precipitation

(1)

- (d) Ethene is used to make poly(ethene).

Poly(ethene) is used to make plastic bags.

the table below shows data from a Life Cycle Assessment (LCA) for a plastic bag and a paper bag.

	Plastic bag	Paper bag
Raw materials	Crude oil or natural gas	Wood
Energy used in MJ	1.5	1.7
Mass of solid waste in g	14	50
Mass of CO ₂ produced in kg	0.23	0.53
Volume of fresh water used in dm ³	255	4 520

A company stated: 'A Life Cycle Assessment shows that using plastic bags has less environmental impact than using paper bags'.

Evaluate this statement. Use your knowledge and the information from above the table above.

(6)
(Total 10 marks)

Q2.

All life on Earth depends on water.

The figure below shows an iceberg floating on the sea.



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(a) Explain how the water molecules in the iceberg could end up as water in a lake.

(4)

(b) Rainwater collects in rivers and lakes.

Water in rivers and lakes contains materials that make the water unsafe to drink.

Describe how the water from rivers and lakes is treated to make it safe to drink.

(4)

(Total 8 marks)

Q3.

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

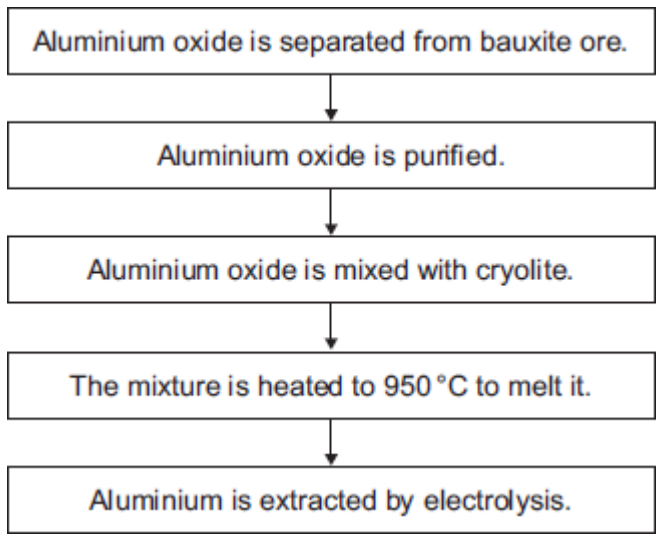
Aluminium is used to make many items.



Window © Sergei Popov/iStock Airplane © Luminis/iStock
Pylon © afj1977/iStock Can © fotofermer/iStock
Car © tridland/iStock

Aluminium is extracted from aluminium ore. Aluminium ore is called bauxite, which is impure aluminium oxide.

The flow chart shows the main steps in the extraction of aluminium from aluminium ore.



Most aluminium is recycled.

Aluminium is recycled by melting scrap aluminium at 700 °C.

Use your own knowledge and the information given to answer the question.

Suggest why most aluminium is recycled.

(Total 6 marks)

Q4.

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

There are millions of plastic bags in use. After use most of these plastic bags are buried in landfill sites. The amount sent to landfill could be reduced if the plastic bags:

- could be reused
- could be recycled by melting and making them into new plastic products
- could be burned to release energy.

Use the information above and your knowledge and understanding to give the positive and negative environmental impacts of using these methods to reduce the amount of plastic bags sent to landfill.

(Total 6 marks)

Mark schemes

Q1.

(a) 4 (C₂H₄) 1

(b) cracking involves a catalyst 1

distillation does not

or

distillation does not involve a chemical change

but cracking does 1

(c) Decomposition 1

(d) **Level 3 (5–6 marks):**
A logically structured evaluation with links involving several comparisons. Nearly all points made are relevant and correct.

Level 2 (3–4 marks):
Some valid comparisons made between the two types of bag. There may be some incorrect or irrelevant points.

Level 1 (1–2 marks):
A vague response with few correct and relevant points and with no direct comparisons.

0 marks:
No relevant content

Indicative content

Accept converse in terms of plastic bags for all statements

- Paper bags are made from a renewable resource
- Plastic bags are made from a finite resource
- Paper bags require more energy to manufacture
- Paper bags produce more waste
- Paper bags are biodegradable
- Paper bags create more CO₂
- CO₂ created by paper bags offset by photosynthesis in growing wood
- Paper bag requires much more fresh water
- Paper bags cannot be recycled
- Agree because non-renewability less important than other factors **or** disagree because of converse **or** can't say because data inconclusive / incomplete

6

[10]

Q2.

(a) **Level 2 (3–4 marks):**
A detailed and coherent explanation of how the water molecules transfer through the

water cycle from one form / area to another. Logical links are made between the general details of the water cycle to the context of the iceberg.

Level 1 (1–2 marks):

Simple relevant facts stated about the water cycle. Details may be missing and any links made with the context of the iceberg may be inconsistent or vague.

0 marks:

No relevant content.

Indicative content

- water in the iceberg is in its solid state
- when the iceberg melts water is in its liquid form
- and the water molecules go into the sea
- water evaporates from the surface of the sea
- so the water molecules go into the air as vapour
- as the air rises it cools
- so water vapour condenses into droplets in clouds
- clouds can be moved around the world by winds
- droplets then fall as rain / snow / hail / precipitation into a lake

4

(b) solid materials

1

removed by filtration **or** by passing through filter beds

1

microbes

1

are killed by sterilisation

1

allow killed by chlorine / ozone / ultraviolet light

[8]

Q3.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1–2 marks)

A brief reason is given against extraction or for recycling. There is little scientific terminology used.

Level 2 (3–4 marks)

Some reasons are given with clear statements against extraction and or for recycling. Some scientific terminology is used

Level 3 (5–6 marks)

Several reasons are given with a detailed explanation against extraction and for recycling. Scientific terminology is used accurately

examples of chemistry points made in the response

ignore uses and properties of aluminium. Comparative

statements count for both methods

extraction:

- limited resources of aluminium oxide
- higher temperatures required
allow quoted temperatures eg extracted at 950°C
- large amount of energy required
- expensive
- requires mining / quarrying
- process takes longer / has more stages
- produces more carbon dioxide / greenhouse gases

recycling:

- saves resources
- cheaper to recycle
- uses less energy
- only needs to be melted
allow quoted temperatures eg melted / recycled at 700°C
- less electricity needs to be *used*
- less effect on environment
- example of *effect on environment*
eg less destruction of habitats
- avoids need for disposal / use of landfill
- no need for quarrying
- sustainable

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[6]

Q4.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

No relevant content.

0 marks

There is a brief description of a positive and a negative environmental impact involved with one or more methods used to reduce the amount of plastic bags sent to landfill.

Level 1 (1–2 marks)

There is some description of both positive and negative

environmental impacts involved with at least 2 methods used to reduce the amount of plastic bags sent to landfill.

Level 2 (3–4 marks)

There is a clear, balanced and detailed description of both a positive and a negative environmental impact of using each of the 3 methods used to reduce the amount of plastic bags sent to landfill.

Level 3 (5–6 marks)

examples of the points made in the response

Reuse:

Reuse means less bags used so:

Positive environmental impact

- Saves raw materials/crude oil
- Saves energy
- Cuts down on CO₂ emissions
- Less global warming

Negative environmental impact

- Could cause litter
- Could still be sent to landfill

Recycle:

Bags can be recycled so:

Positive environmental impact

- Used to make new plastic bags / objects
- Saves raw materials / crude oil
- Saves energy compared to producing plastic bags from crude oil
- Cuts down on CO₂ emissions
- Less global warming

Negative environmental impact

- Collection point sites cause an eyesore / litter problem
- Transportation to recycling plant releases carbon dioxide / causes global warming

Burn:

Bags can be burned so:

Positive environmental impact

- Could provide energy for heating buildings
- Could provide energy for generating electricity

Negative environmental impact

- Increases CO₂ emissions
- Increases global warming
- Could release toxic gases
- Does not conserve raw materials / crude oil