New Document 1

**Name:**

**Class:**

**Date:**

**Time:** 37 minutes

**Marks:** 35 marks

**Comments:**
Q1.
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

(ii) What is used to sterilise the water?

Tick (✓) one box.

- Carbon
- Chlorine
- Sodium chloride

(iii) Why is the water sterilised?

______________________________________________________________
______________________________________________________________

(1)
(b) Water can be purified by distillation.

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)

Q2.

Plastics are used to make many everyday items, such as the body of the kettle.

(a) Complete the sentences by drawing a ring around the correct words.

(i) The plastic is made from many small molecules called ____________
catalysts
monomers
polymers

(ii) Propene is produced by cracking some of the fractions that are

separated from

crude oil
limestone
metal ores

(b) After a few years the kettle no longer worked.
• Some parts of the kettle are made of plastic.
• Some parts of the kettle are made of stainless steel.
• The owner of the kettle disposed of it in a landfill site.

Consider these statements.

Suggest three reasons why the kettle should not be disposed of in a landfill site.

1. _______________________________________________________________
_________________________________________________________________
2. _______________________________________________________________
_________________________________________________________________
3. _______________________________________________________________
_________________________________________________________________

(Total 5 marks)

Q3.

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.

(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.
Q4.

This question is about drinking water.

(a) Name two methods of treating water from rivers, lakes or the sea to produce drinking water.

Tick two boxes.

- Anaerobic digestion
- Cracking
- Desalination
- Electrolysis
- Sterilising

(b) The table below shows the amounts of dissolved ions in a sample of drinking water.

<table>
<thead>
<tr>
<th>Dissolved ion</th>
<th>Mass in mg per dm$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl$^-$</td>
<td>250</td>
</tr>
<tr>
<td>Na$^+$</td>
<td>200</td>
</tr>
<tr>
<td>NO$_3^-$</td>
<td>40</td>
</tr>
</tbody>
</table>

What is the name of the ion with the symbol Cl$^-$?

Tick one box.

- Calcium ion
- Carbonate ion
Chloride ion

Chlorine ion

(c) Use the information in the table above to complete the bar chart in Figure 1.

Figure 1

(d) Look at the questions labelled A, B, C, D.

A  How many substances are there in drinking water?

B  How much fluoride is in drinking water?

C  Is fluoride soluble in drinking water?

D  Should fluoride be added to drinking water?

Which one of the questions cannot be answered by science alone?

Tick one box.

A  B  C  D

(e) Give two reasons why the answer you have chosen cannot be answered by science
A sample of drinking water contains 1.5 mg of fluoride per dm$^3$ of water. A person drinks 1 dm$^3$ of this water.

The recommended daily amount of fluoride is 4.0 mg.

Which calculation gives the percentage of the recommended daily amount of fluoride in 1 dm$^3$ of this water?

Tick one box.

\[
\frac{1.5 \times 100}{4.0} \quad \checkmark \\
\frac{1.5 \times 4.0}{100} \quad \checkmark \\
\frac{4.0 \times 100}{1.5} \quad \checkmark \\
\frac{100}{1.5} \times 4.0
\]

Figure 2 shows the effect of fluoride in drinking water on tooth decay in different age groups.

Describe the pattern of tooth decay in Figure 2 for water without fluoride.

Use data to justify your answer.
(h) Describe the effect of adding fluoride to drinking water for the age groups in Figure 2.

Q5.

The apparatus in the figure below is used to separate a mixture of liquids in a fuel.

(a) What is apparatus W on above the figure above?

Tick one box.

Beaker

Boiling Tube

Flask

Jug

(b) What is the name of this method of separation?

Tick one box.
(c) Name the changes of state taking place at A and B in the figure above.
Use words from the box.

<table>
<thead>
<tr>
<th>boiling</th>
<th>condensing</th>
<th>freezing</th>
<th>melting</th>
</tr>
</thead>
</table>

Change of state at A: _________________________________________________
Change of state at B: _________________________________________________

(2)

(d) Table 1 shows the boiling points of the hydrocarbons in the fuel.

<table>
<thead>
<tr>
<th>Hydrocarbon</th>
<th>Boiling point in °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentane</td>
<td>36</td>
</tr>
<tr>
<td>Hexane</td>
<td>69</td>
</tr>
<tr>
<td>Heptane</td>
<td>98</td>
</tr>
<tr>
<td>Octane</td>
<td>125</td>
</tr>
</tbody>
</table>

Which hydrocarbon will be the last to collect in the beaker?
Tick one box.

Pentane
Hexane
Heptane
Octane
(e) The fuel is a mixture of liquids that has been designed as a useful product. What name is given to this type of mixture?
Tick one box.
- Catalyst
- Formulation
- Polymer
- Solvent

(1)

(f) Describe how this fuel is different from crude oil.

___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

(2)

(g) A student measured the melting point of a solid hydrocarbon four times. The student's results are in Table 2.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Melting point in °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>4</td>
<td>37</td>
</tr>
</tbody>
</table>

Calculate the mean melting point of the hydrocarbon, leaving out any anomalous result.

Give your answer to two significant figures.

___________________________________________________________________
___________________________________________________________________

Mean melting point = __________________ °C

(2)
(Total 10 marks)
Mark schemes

Q1.
(a) (i) Solids
   1
(ii) Chlorine
   1
(iii) kill microbes / bacteria
      allow to make the water safe to drink
      ignore disinfect
      ignore remove / get rid of microbes
   1
(b) energy
   allow heat
   1
(c) improve dental health
   allow reduce tooth decay
   allow (local) government requirement
   allow help teeth
   1
   [5]

Q2.
(a) (i) monomers
   1
(ii) crude oil
   1
(b) any three from:
   • metal may not corrode away / remains
   • plastic remains / does not break down (decay) / not affected by microorganisms
      accept non-biodegradable
   • should recycle / conserve resources / mend the kettle / burn (plastic) as a fuel
      accept it is a waste of materials / resources
   • landfill sites are limited / filling up
   • water pollution
      ignore harms wildlife / habitats or problems caused by burning the kettle
   3
   [5]

Q3.
(a) contains (large amounts of) dissolved solids / difficult to remove dissolved solids
allow salty / too much salt
allow sea water makes you thirsty / vomit
allow polluted / untreated / contaminated

(b) filtered: removes solids / removes insoluble material / dirt
ignore large objects

chlorine: kills/destroy bacteria/microbes/ germs etc
allow disinfect / sterilise or gets rid of bacteria
ignore purify / clean

Q4.

(a) Desalination
Sterilising

(b) Chloride ion

(c) correct bar for \(\text{NO}_3^-\)

(d) \(D\)

(e) any two from:
- people have the right to choose (opinion)
- ethical / moral question
- cannot be tested by experiment

\[
\frac{1.5}{4.0} \times 100
\]

(g) the percentage tooth decay increases with age
by 4 % for each increasing age group

(h) reduces tooth decay (for all age groups)
greater reduction in older people

Q5.

(a) Flask

(b) Fractional distillation
(c) \( \textbf{A} \) – boiling

\textit{in this order}

\( \textbf{B} \) – condensing

(d) Pentane

(e) Formulation

(f) the fuel is a pure compound

and crude oil is a mixture

or

the fuel is made up of four hydrocarbons

\textit{allow crude oil contains a large number of compounds and the fuel contains four}

and crude oil could have many more

(g) \((35 + 37 + 37 / 3) = 36.33\)

36

\textit{allow (35 + 48 + 37 + 37 / 4 =) 39(.25) for 1 mark}