Jump to the page: 76

Understanding
1. Complete the following sentence:
   Fuels are substances that, when burned, turn chemical a. ___________ energy into useful
   b. ___________ and light.
2. What supplied most energy for early humans?
3. Which city was the first in New Zealand to ban open fires?

Thinking
1. How can wind power be used in irrigating land?

Contributing
Research whether wood is a non-renewable resource. Should wood be used as a fuel?

Answers (except for ‘Contributing’) are provided on page 302 of ESA Study Guide Year 10 Science
Chapter 5: Fuels
Fossil fuels

Questions from pages 79, 80 of *ESA Study Guide Year 10 Science*

**Understanding**

1. a. What are ‘fossil fuels’?

b. Give two examples of fossil fuels: _______ and _______

2. Put the following in the order in which they formed:
   - anthracite coal
   - bituminous coal
   - lignite
   - peat

3. In what parts of New Zealand are there operating coalmines?

4. How long does it take to form natural gas and oil?

5. What once-living organisms is most oil made from?

6. Explain the difference between permeable rock and impermeable rock.

**Thinking**

1. Draw a flow diagram to show how anthracite coal forms, starting with tree ferns.

2. Explain what happens to the plankton/sediment layer as new layers of sediment are deposited on top of it during the formation of oil and natural gas.

3. Explain the importance of the layer of impermeable rock, and of tectonic movements, in the formation of an oilfield.

Answers are provided on pages 302 and 303 of *ESA Study Guide Year 10 Science*
Questions from pages 82–84 of *ESA Study Guide Year 10 Science*

**Understanding**

1. What atoms are hydrocarbons made from? ____________ and ____________

2. Give another name for ‘crude oil’. ____________

3. Name the process by which hydrocarbons are extracted from petroleum.

4. Name and give formulae for the main hydrocarbon(s) in:
   a. natural gas ____________
   b. LPG ____________

5. Name and give the formula of the poisonous gas that forms during incomplete combustion.

6. Identify the products of combustion A, B and C, in the diagram.

   A: ____________
   B: ____________
   C: ____________

**Thinking**

1. a. What is the chemical formula for the hydrocarbon, octane? ____________
   b. In which vehicle fuel is octane found? ____________
   c. Suggest how octane got its name. ____________

2. a. Explain what happens to the spaces between particles when a substance is pressurised to form a liquid.
   
   b. What is the advantage of liquefying petroleum gas? ____________

   c. i. Describe the ways CNG and LPG are transported. ____________

   ii. Give a reason why LPG is available throughout New Zealand, while CNG is available only in the North Island. ____________
3. Describe one similarity and one difference between complete and incomplete combustion.

4. The complete combustion of methane can be represented with the equation:
   \[ \text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} \]
   a. Name each substance shown in the equation.

   b. Write the word equation that describes the complete combustion of methane gas.

   c. For the equation:
      i. Where did the atoms that formed the carbon dioxide come from?

      ii. Where did the atoms that formed the water come from?

5. Consider the following table:

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Amount of pollutant produced (grams per kilogram of exhaust fumes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unburned hydrocarbons</td>
</tr>
<tr>
<td>CNG</td>
<td>2</td>
</tr>
<tr>
<td>LPG</td>
<td>7</td>
</tr>
<tr>
<td>Petrol</td>
<td>12</td>
</tr>
</tbody>
</table>

   a. What are the advantages of converting cars to run on CNG?

   b. Give any disadvantages of converting cars to run on CNG.

   c. If a vehicle was to be converted to run on either CNG or LPG, which would be the best choice if the vehicle was to be driven frequently over the whole of New Zealand? Give a reason.

   d. Give a reason why using CNG as a vehicle fuel may be better for the environment than LPG.

Answers are provided on pages 303 and 304 of ESA Study Guide Year 10 Science
Chapter 5: Fuels
Alternative energy sources

Questions from page 86 of ESA Study Guide Year 10 Science

Understanding
1. Describe ‘biomass’.

2. What sort of fuels are made from biomass?

3. Name three types of biofuel.

4. When were the first electric vehicles made?

Thinking
1. Make two lists, one of the advantages and the other of the disadvantages of producing and using biofuels.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Explain the link between the Sun, photosynthesis and biofuels.

   ____________________________________________________________

3. Suggest a reason why the price of food could rise because of biofuel production.

   ____________________________________________________________

4. Explain why electric vehicles can contribute to air pollution despite the fact that they do not emit any pollutants.

   ____________________________________________________________

Contributing
Find out how hydrogen can be used to power vehicles. What advantages and disadvantages do hydrogen-powered cars offer?

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________

   ____________________________________________________________

Answers (except for ‘Contributing’) are provided on page 304 of ESA Study Guide Year 10 Science