



Week 8: Fuels and Hydrocarbons

Lesson 1: Combustion Reactions

Complete Starter (in back of class jotter)

Starter

- 1) What are three fossil fuels?
- 2) Are fossil fuels considered finite or infinite resources? Explain your answer
- 3) What is the name for the reaction where a fuel reacts with oxygen?



Learning Outcomes

By the end of this lesson you should know:

- A fuel is a substance that stores energy
- When a substance burns it reacts with oxygen in a combustion reaction
- The reactants and products of the combustion of carbon and hydrogen

Success Criteria

You will have been successful in this lesson if you:

1. Watch the video lesson
2. Complete questions provided
3. Self-assessed your work with the solutions (posted on Wednesdays on the S2 Team)

If you have any questions about the content of this lesson, you should ask your **class teacher either through your class MS team or via email**. You will be receiving printed notes booklets in the coming months so there **is no need to copy down notes**.



What to do

Complete tasks 1 - 5 - This involves watching the video lesson, answering questions in your class jotter on Fuels and Combustion and correcting today's starter. Once completed, your Extension activity can be found at the end of the document.

Task 1: Watch the video lesson below and follow the instructions

Follow this link and watch the recorded lesson on Combustion of Hydrogen and Carbon:

<https://youtu.be/sYPrCJowrHU>

Copy down the questions on the final slide, pause the video and attempt to answer these questions.

Resume the video and then self-assess your answers.

If you had different answers, write down the correct answers shown in the video.



Task 2: Take the heading Self Check 1 in your class jotter

Answer the following questions:

- 1) The combustion of carbon is exothermic.
 - a) Explain the meaning of the underlined words.
 - b) Write an equation, using symbols and formulae, for the combustion of carbon.
 - c) Will carbon burn better in air or oxygen? Explain your answer.
 - d) What is the test for oxygen?
 - e) What will happen when a burning splint is put into a jar of pure oxygen?
 - f) What is the test for carbon dioxide?
- 2) Coal is a solid fuel used for heating in houses.
 - a) What is meant by the word fuel?
 - b) What gas is used up when coal burns?



Task 3: Take the heading Self Check 2 in your class jotter

Answer the following questions:

- 1) Carbon has two main oxides, carbon monoxide and carbon dioxide.
 - a) Which of the oxides is poisonous?
 - b) Which oxide is produced when carbon burns in excess oxygen?
- 2) Carbon is an important fuel. Normally when carbon burns it produces carbon dioxide, although under certain conditions it will burn to produce carbon monoxide.
 - a) What are the formulae of carbon monoxide and carbon dioxide respectively?
 - b) Under what conditions will carbon burn to make carbon monoxide?
 - c) Write an equation for the reaction in which carbon burns to form carbon monoxide.
- 3) Hydrogen is a useful fuel. It is often used to power rockets.
 - a) What is formed when hydrogen burns?
 - b) Write a chemical equation for hydrogen burning.



Task 4: Take the heading Combustion of Carbon in your class jotter

What are the missing words in the following passage? Write out the paragraph in your jotter and underline or highlight the missing words that you have filled in.

Carbon burns easily in 1 gas in an 2 reaction, i.e. a reaction which changes chemical energy into 3 energy. When there is 4 (plenty of) oxygen then 5 6 is formed, but if there is 7 (not enough) oxygen then 8 9 is formed.

Carbon monoxide and carbon dioxide have different properties, e.g. 10 11, which is poisonous will burn in excess oxygen to form 12 13. On the other hand carbon dioxide will not react with oxygen and so is often used in fire extinguishers. To test for carbon dioxide we use 14 15, when carbon dioxide is bubbled through the liquid becomes 16.

Tasks 2-4 will have solutions posted on Wednesday to the Year group Microsoft Team.

Task 5: Correct today's starter

Starter answers

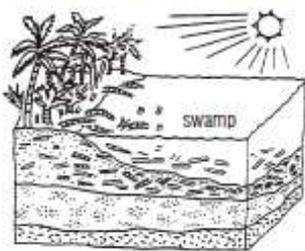
- 1) The three fossil fuels are coal, oil and gas.
- 2) Fossil fuels are considered finite resources because they take millions of years to form and will run out.
- 3) When a fuel reacts with oxygen, this is a combustion reaction.

Extension activity

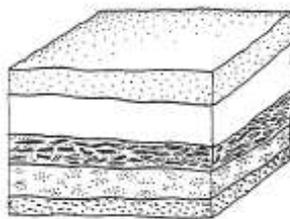
Once completed all your Chemistry work, here is a task on Fossil Fuels:

Take the heading **Fossils to Fuels** in your class jotter. These diagrams explain how coal and oil were formed. Read through them answer the questions that follow.

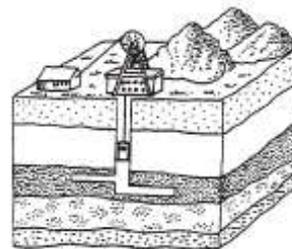
How was coal formed?



300 million years ago, plants store the Sun's energy. Dead plants fall into swampy water. The mud stops them from rotting away.

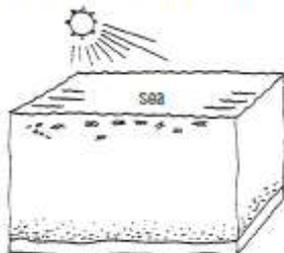


As the mud piles up, it squashes the plants. After millions of years under pressure, the mud becomes rock and the plants become **coal**.

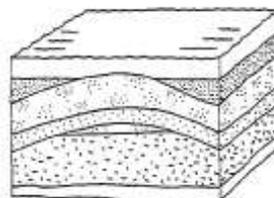


To reach the coal, miners dig shafts and tunnels. There is probably enough coal to last 300 years. Fossils of plants are sometimes found in lumps of coal.

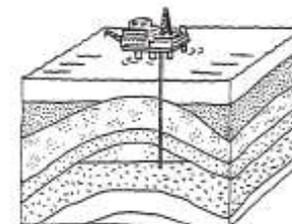
How was oil formed?



Tiny animals and plants live in the sea. When they die, they fall into the mud and sand at the bottom, and don't rot away.



Over millions of years they get buried deeper by the mud and sand. The pressure changes the mud and sand into rock, and the dead animals become **crude oil** and **natural gas**.



The oil can move upwards through some rocks, but if it meets a layer of hard rock it is trapped (with the gas). An oil rig can drill down to release it. There is enough oil to last about 40 years.

- 1) What is a fossil?
- 2) Why are coal, oil and gas called fossil fuels?
- 3) Give two similarities and two differences between the way coal and oil were formed.
- 4) Coal, oil and gas are called non-renewable resources. What do you think this means?