N5 Chemistry: Unit 2 – Nature's Chemistry REVISION

Lesson 16 – Combustion Reactions

Learning Outcomes

By the end of this lesson, you should have revised:

1. The terms exothermic and endothermic
2. How to identify and create combustion reactions
3. How to carry out calculations from equations.

Success Criteria

You will have been successful in this lesson if you:

1. Watch the links provided
2. Complete revision questions provided
3. Complete and submit homework assigned

There is also a further reading section to help you gain more depth of understanding for this section.

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. MS Teams will be monitored throughout the week by a chemistry teacher. If you need help or clarification with either the task or the content of the lesson, just ask.

Links to Prior Knowledge

You may wish to revise the following to help you understand this lesson:

- N5 Unit 2: Homologous Series

- N5 Unit 2: Energy from Fuels

You do not need to copy any notes as this is all revision, but you should complete all questions and tasks as outlined in this document.

Watch these videos first:

Lesson 16: Combustion Reactions - https://youtu.be/UN-OKlHzgxY

Endothermic and Exothermic Reactions:

https://www.youtube.com/watch?v=pYpZWodUTVk

You should also consult your Unit 2 Notes and printed notes to help further consolidate your knowledge. A digital copy of the printed notes can be found on the S4 Chemistry Team.

Further Reading

To learn more about chemical analysis, try the following online resources:

BBC Bitesize: https://www.bbc.co.uk/bitesize/guides/zx73tv4/revision/1

https://www.bbc.co.uk/bitesize/guides/zx73tv4/revision/2

https://www.bbc.co.uk/bitesize/guides/zx73tv4/revision/3

Scholar: Log in through GLOW

National 5 Chemistry
→ Nature's Chemistry → 7. Energy from Fuels → 7.3 Combustion
→ Chemical Changes and Structure → 6.2 Balanced equations

Evans2 chem web: https://www.evans2chemweb.co.uk/

Username: snhs password: giffnock

Select any teacher → revision → National 5 → Unit 2 → Energy from Fuels

Extension Questions:

Yellow/Purple book Calculations based on Equations page 99-100

Complete the following questions in your class work jotter. The answers will be posted on Teams on Wednesday for you to self-assess.

Practice Questions – Combustion Reactions

1. State what is meant by the terms:

   a. Exothermic reaction
   b. Endothermic reaction
   c. Combustion reaction (3)

2. Complete the following word equations:

   a. Methane + oxygen → _____ + _____
   b. Hex-1-ene + oxygen → _____ + _____
   c. Propan-1-ol + oxygen → _____ + _____ (3)

3. Complete and balance the following chemical equations:

   a. CH_4 + O_2 → _____ + _____ (2)

   b. C_3H_8 + O_2 → _____ + _____ (2)

   c. C_2H_5OH + O_2 → _____ + _____ (2)

4. Calculate the mass of water produced from burning 28.8 g of pentane in the reaction below.

$$C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$$

(3)

Total: 15 marks

Past-Paper Questions – Combustion Reactions

1. When methane burns in a plentiful supply of air, the products are

   A carbon and water

   B carbon dioxide and water

   C carbon monoxide and water

   D carbon dioxide and hydrogen (1)

2. A compound burns in air. The only products of the reaction are carbon dioxide, sulfur dioxide and water.
   The compound must contain

   A carbon and sulfur only

   B carbon and hydrogen only

   C carbon, hydrogen and sulfur

   D carbon, hydrogen and sulfur and oxygen (1)

3. Identify the gas that turns limewater cloudy.

   A oxygen

   B nitrogen

   C hydrogen

   D carbon dioxide (1)

4. In which of the following types of reaction is oxygen a reactant?

A Combustion

B Neutralisation

C Polymerisation

D Precipitation (1)

5. A reaction is endothermic if

A energy is required to start the reaction

B heat is released during the reaction

C the temperature drops during the reaction

D the temperature rises during the reaction (1)

6. A reaction is exothermic if

A energy is absorbed from the surroundings

B energy is released to the surroundings

C energy is required to start the reaction

D there is no energy change (1)

(questions continued on next page)

7. Alkanes burn, releasing heat energy.

   State the term used to describe all chemical reactions that release heat energy. (1)

8. Nonane burns to produce carbon dioxide and water.

   $$C_9H_{20} + 14O_2 \rightarrow 9CO_2 + H_2O$$

   Calculate the mass, in grams, of carbon dioxide produced when 12.8 g of nonane is burned. (3)

   Show your working clearly

Total: 10 marks

Now complete the Unit 2 Revision – Homework 1 on the next page and submit to your class teacher via Teams (or your usual channel).

*Photos of your work should be submitted by **1pm on Friday 26th February.***

Unit 2 Revision - Homework 1 (17 marks)

Section 1 – 6 marks

1.

The molecular formula for cyclohexane is

A C_6H_6

B C_6H_{10}

C C_6H_{12}

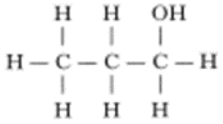
D C_6H_{14}.

2.

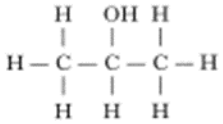
Which of the following alcohols has the highest boiling point?

(You may wish to use page 6 of the data booklet to help you.)

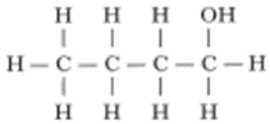
A



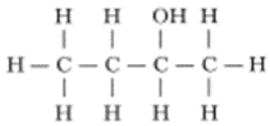
B



C

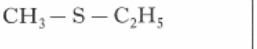
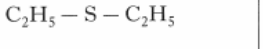
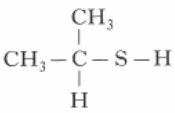
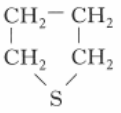


D



3.

The grid shows some sulphur compounds.

A 	B 
C 	D 

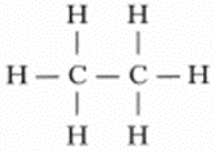
(*a*) Identify the **two** compounds which have the same molecular formula.

(*b*) Identify the compound which has the general formula $C_nH_{2n}S$.

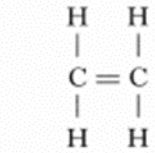
4.

Which of the following compounds has an isomer?

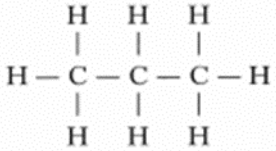
A



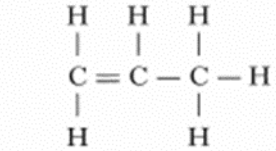
B



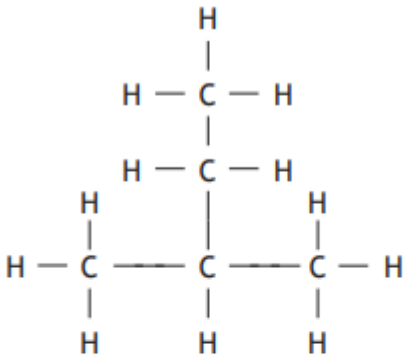
C



D



5.



The name of the above compound is

A 2-ethylpropane

B 1,1-dimethylpropane

C 2-methylbutane

D 3-methylbutane.

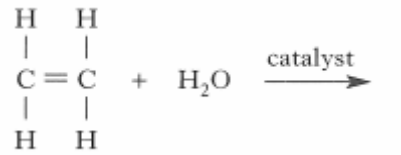
Section 2 – 11 marks

6. A very hot flame is produced when ethyne gas (C_2H_2) burns in a plentiful supply of oxygen.

a. Write an equation for the above reaction. (1)

b. What is the chemical name for the above reaction? (1)

7. One way in which ethanol is produced industrially is shown below.



a. What name is given to this type of reaction? (1)

b. Draw the structure of the product formed. (1)

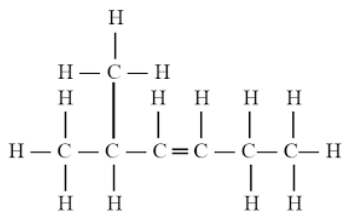
8. Propane and butane are members of the same homologous series.

What is meant by the term homologous series?

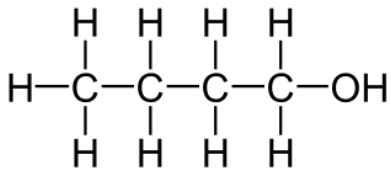
(1)

9. Give the full systematic name of the following molecules

a.



b.



(2)

10.

a. Use the databook to state the boiling point of

i. propane

ii. heptane (2)

b. Why does heptane have a higher boiling point than propane? (2)