N5 Chemistry: Unit 2 – Nature's Chemistry REVISION

Lesson 10 – Homologous Series

Learning Outcomes

By the end of this lesson you should have revised:

1. How to draw, name and identify alkanes, branched alkanes and cycloalkanes with no more than 8 carbons in the longest chain.
2. State and use general formulae

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

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 10a: Alkanes and Cycloalkanes

https://youtu.be/UqtcUQBB5eQ

Lesson 10b: Branched Alkanes

https://youtu.be/URHliX6_no0

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/zw4tw6f/revision/1

https://www.bbc.co.uk/bitesize/guides/zw4tw6f/revision/2

https://www.bbc.co.uk/bitesize/guides/zw4tw6f/revision/4

Scholar: Log in through GLOW

National 5 Chemistry → Nature's Chemistry →

2. Alkanes

3. Cycloalkanes

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

Username: snhs password: giffnock

Select any teacher → revision → National 5 → Unit 2 → Homologous Series

Extension Questions:

Yellow/Purple book	*Structure of Hydrocarbons*	*page 67-70 questions: 1-13*
	Reactions of Hydrocarbons	*page 71*

Complete the following questions in your class work jotter.
The answers will be posted on Teams on Wednesday.

Practice Questions – Homologous Series

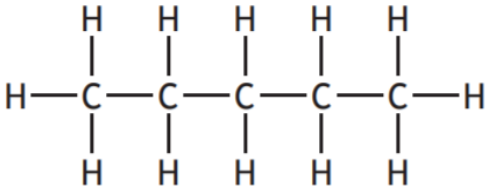
1. State what is meant by the term 'homologous series'. (1)

2. Using the general formulas, find the molecular formula for:
   a. The alkane with 25 carbons
   b. The cycloalkane with 12 carbons
   c. The alkane with 18 hydrogens (3)

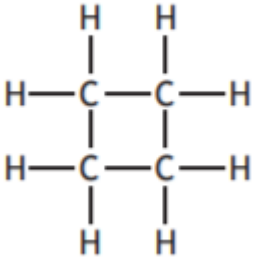
3. Draw the full structural formula for the following molecules:
   a. Butane
   b. Cyclopentane
   c. 2-methylheptane (3)

4. Name and write the shortened structural formula for the following structures: (6)

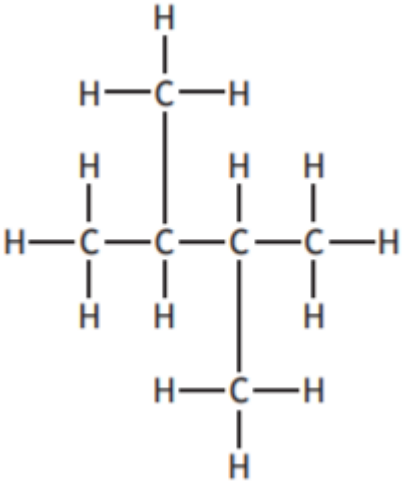
a)



b)



c)



5. Complete the following table: (2)

Homologous Series	General Formula	Use(s)	Solubility in Water
Alkanes			
Cycloalkanes			

Total: 15 marks

Past-Paper Questions – Homologous Series

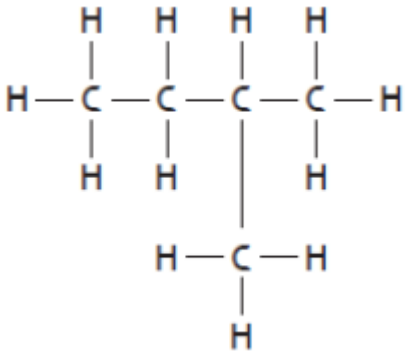
1. The molecular formula for cyclohexane is

   A C_6H_6

   B C_6H_{10}

   C C_6H_{12}

   D C_6H_{14} (1)

2. 

   The systematic name for the structure shown is:

   A 1,1-dimethylpropane

   B 2-methylbutane

   C 3-methylbutane

   D 2-methylpentane (1)

3. Which of the following could be the molecular formula for an alkane?

   A C_7H_{16}

   B C_7H_{14}

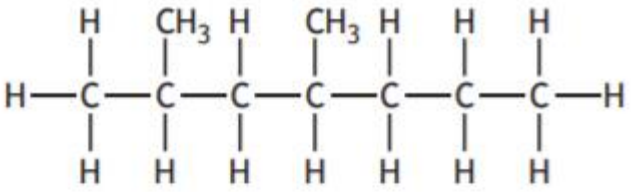
   C C_7H_{12}

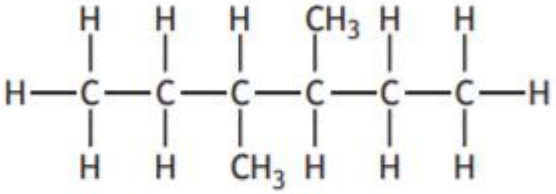
   D C_7H_{10} (1)

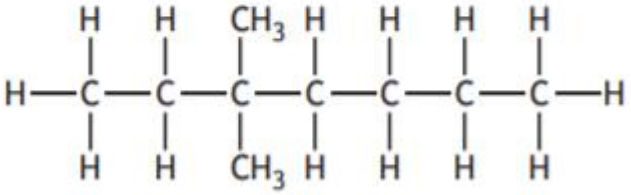
4. The shortened structural formula for a compound is

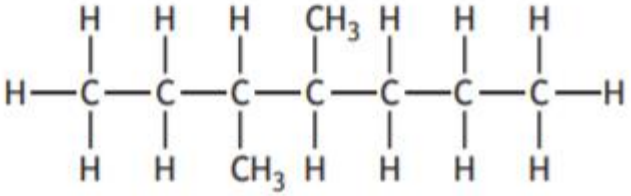
$$CH_3CH_2CH(CH_3)CH(CH_3)CH_2CH_2CH_3$$

Which of the following is another way of representing this structure?

A 

B 

C 

D 

(1)

5. The systematic name for $CH_3CH_2C(CH_3)CHCH_3$ is

A 3-methylpentane

B 2-methylpentane

C 3-methylpent-2-ene

D 2-methylpent-3-ene. (1)

6. The lowest temperature at which a hydrocarbon ignites is called its flash point.

Hydrocarbon	*Flash point (°C)*
Hexane	-23
Heptane	-4
Octane	13
Nonane	31

a) i) Using the information in the table, make a general statement linking the flash point to the number of carbon atoms. (1)

ii) Predict the flash point, in °C, of decane, $C_{10}H_{22}$ (1)

7. The table gives some information about propane and butane.

Alkane	*Boiling Point(°C)*
Propane	-42
Butane	-1

Explain why butane has a higher boiling point than propane. (2)

8. Liquefied petroleum gas (LPG), which can be used as a fuel for heating, is a mixture of propane and butane.

Propane and butane are members of the homologous series of alkanes.
Tick (✓) the two boxes that correctly describe members of the same homologous series. (1)

	Tick (✓)
They have similar chemical properties.	
They have the same molecular formula.	
They have the same general formula.	
They have the same physical properties.	
They have the same formula mass.	

Total: 10 marks

Now complete Homework 17: Chemical Analysis and submit to your class teacher via Teams (or your usual channel). A photo of your work should be submitted by 1pm on Friday 12th February.

Chemical Analysis 17

1. (a) Which of the following salts can be prepared by a precipitation reaction? You may wish to use the data booklet to help you.

   A Barium sulphate
   B Lithium nitrate
   C Calcium chloride
   D Ammonium phosphate

   (b) What method could be used to separate a precipitate from a solution?

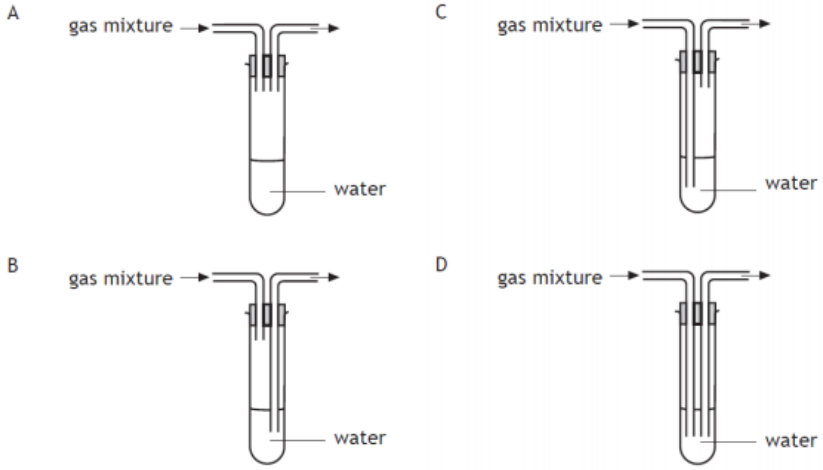
2. A solution of accurately known concentration is more commonly known as a

   A correct solution
   B precise solution
   C standard solution
   D prepared solution.

3. A solution of potassium carbonate, made up using tap water, was found to be cloudy. This could result from the tap water containing

   A lithium ions
   B calcium ions
   C sodium ions
   D ammonium ions.

4. Which of the following diagrams shows the apparatus which would allow a soluble gas to be removed from a mixture of gases?



5. The results of a titration experiment are given in the table below.

	Initial burette reading (cm^3)	Final burette reading (cm^3)	Volume used (cm^3)
1st titre	0.0	15.6	15.6
2nd titre	15.6	30.5	14.9
3rd titre	30.5	45.6	15.1

   (a) Calculate the average volume, in cm^3, of oxalic acid required to neutralise the sodium hydroxide solution.
   (b) Which titre values are used to calculate this average volume? Explain your answer.