N5 Chemistry: Unit 2 – Nature's Chemistry REVISION

Lesson 14 – Carboxylic Acids

Learning Outcomes

By the end of this lesson you should have revised:

1. How to draw, name and identify carboxylic acids with no more than 8 carbons in the longest chain, indicating the position of the hydroxyl group.
2. State and use general formulae.
3. State uses and describe properties of carboxylic acids.

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 1: Acids and Bases: Neutralisation

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 this video first:

Lesson 14: Carboxylic Acids - https://youtu.be/Tp_JX-WdAZE

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/zt2bh39/revision/2

Scholar: Log in through GLOW

National 5 Chemistry → Nature's Chemistry → 6. Carboxylic Acids

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

Username: snhs password: giffnock

Select any teacher → revision → National 5 → Unit 2 → Carboxylic Acids

Extension Questions:

Yellow/Purple book Carboxylic Acids page 94

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

Practice Questions – Carboxylic Acids

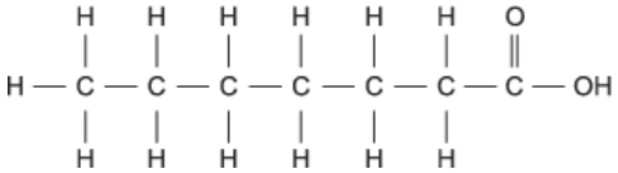
1. Draw the full structural formula for the following compounds:
   a. methanoic acid
   b. propanoic acid (2)

2. State the molecular formula for:
   a. Butanoic acid
   b. Hexanoic acid (2)

3. Carboxylic acids have several uses.
   a. State three uses of carboxylic acids. (1)
   b. Sate the chemical name and the molecular formula of vinegar. (2)

4. Give the name of the following compounds:

   a. C_2H_5COOH
   b.



   c. C_4H_9COOH (3)

5. Draw the functional group present in all carboxylic acids. (1)

6. State the four carboxylic acids that dissolve in water. (1)

7. What will be the pH value for a carboxylic acid solution? (1)

8. Carboxylic acids can be used like other laboratory acids to produce salts. Complete the word equations below:

   a. magnesium + ethanoic acid →
   b. lithium hydroxide + methanoic acid → (2)

Total: 15 marks

Past-Paper Questions – Carboxylic Acids

1. Which line in the table correctly describes the trends going from hexanoic acid to butanoic acid?

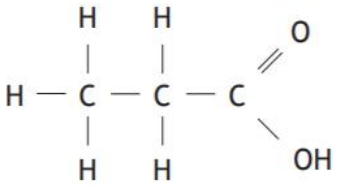
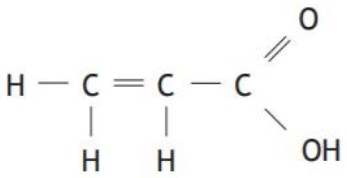
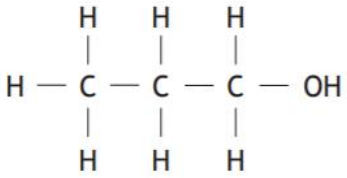
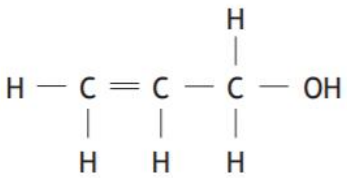
	Formula mass	Solubility in water
A	increasing	decreasing
B	decreasing	increasing
C	decreasing	decreasing
D	increasing	increasing

(1)

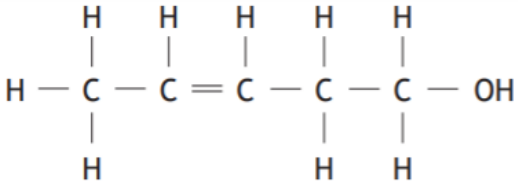
2. Vinegar is a solution of

   A ethanol
   B methanol
   C ethanoic acid
   D methanoic acid (1)

3. A student tested some compounds. The results are given in the table.

Compound	*pH of aqueous solution*	*Effect on bromine solution*
	4	no effect
	4	decolourised
	7	no effect
	7	decolourised

Which line in the table shows the correct results for the following compound?

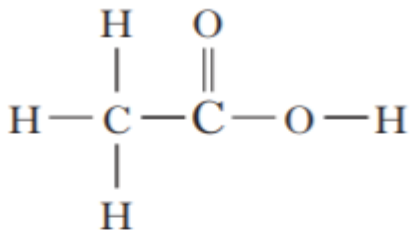


	pH of aqueous solution	*Effect on bromine solution*
A	4	decolourised
B	7	decolourised
C	4	no effect
D	7	no effect

(1)

4. Which structural formula represents an alkanoic acid (carboxylic acid)?

A



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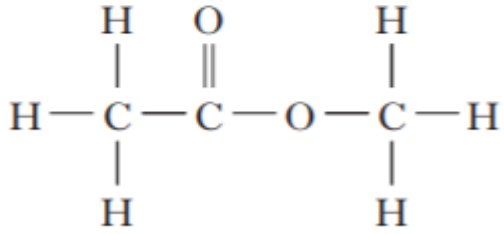

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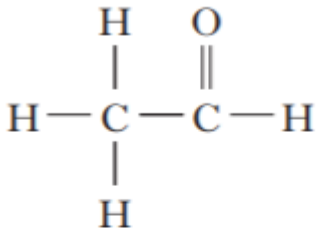
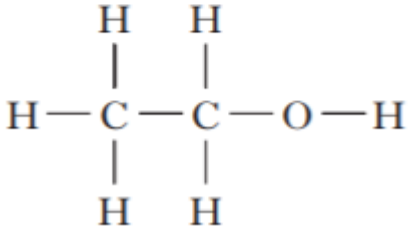
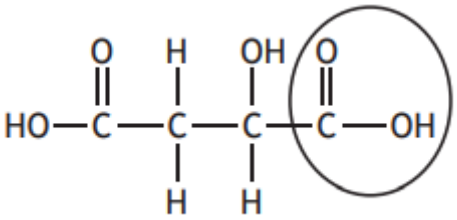


D



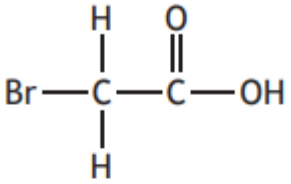
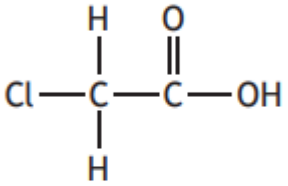
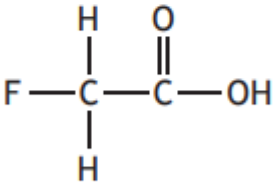
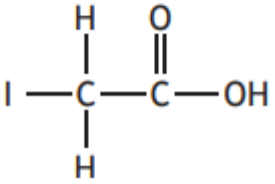
(1)

5. Malic acid is a carboxylic acid found in some fruits.



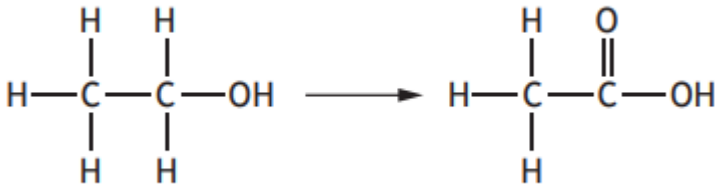
a. Name the functional group circled in the diagram above. (1)

b. Carboxylic acids can contain a halogen atom. The pH of 1 mol l^{-1} solutions of some of these acids are given in the table.

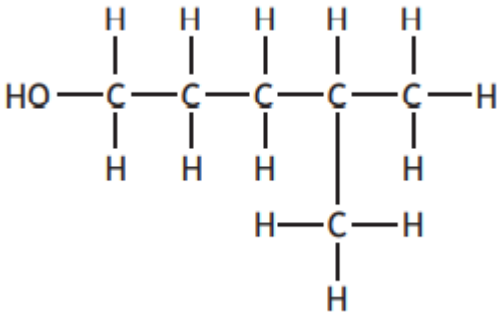
Carboxylic acid	*pH*
	1·45
	1·42
	1·33
	1·55

Describe how the acidity of the carboxylic acid is related to the position of the halogen in group 7 of the periodic table. (1)

c. The Jones oxidation reaction can be used to convert alcohols to carboxylic acids.



The following alcohol can also be converted to a carboxylic acid by the Jones oxidation reaction.



Draw a structural formula for the carboxylic acid produced in this reaction. (1)

6. Carboxylic acids have a range of physical and chemical properties. Melting point is an example of a physical property.

   The table gives information about propanoic acid and butanoic acid.

Carboxylic acid	*Melting point* (°C)
propanoic acid	–21
butanoic acid	–5

   a. Draw a structural formula for butanoic acid. (1)

   b. Explain why butanoic acid has a higher melting point than propanoic acid. (2)

Total: 10 marks