



Exampro GCSE Chemistry

C3 Chapter 5 Higher

Name:

Class:

Author:

Date:

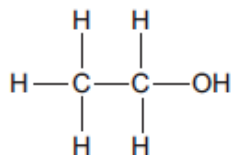
Time: 40

Marks: 40

Comments:

Q1. (a) The structure of an alcohol is shown in **Figure 1**.

Figure 1



(i) Draw a circle around the functional group in the structure of the alcohol. (1)

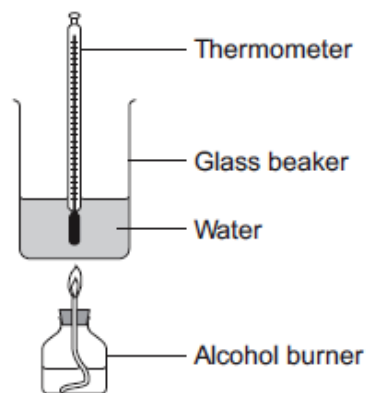
(ii) What is the chemical name of this alcohol?
..... (1)

(b) Alcohols are used as fuels.

A student plans an experiment to find the energy released per gram of alcohol burned.

The student uses the apparatus shown in **Figure 2**.

Figure 2



(i) Suggest **two** ways that this apparatus could be improved to obtain accurate results.

.....
.....
.....
.....

(2)

- (ii) Wine left in a glass for several days turns sour.
The sour taste is caused by ethanoic acid.



Complete the sentences.

The ethanoic acid is produced from a reaction between ethanol
and

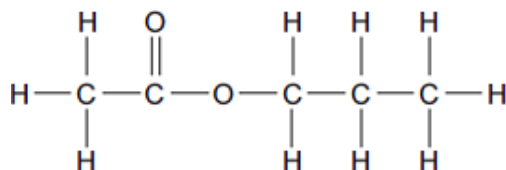
This type of reaction is

(2)

- (b) Propyl ethanoate, a fragrance, can be produced by reacting ethanoic acid with an alcohol.

Propyl ethanoate is a member of a series of organic compounds. The members of the series all have the same functional group.

The displayed structure of propyl ethanoate is:



- (i) Draw a ring around the functional group for this series on the displayed structure of propyl ethanoate.

(1)

- (ii) Name the series of organic compounds with this functional group.

.....

(1)

- (iii) The alcohol used to make propyl ethanoate has the formula $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

Name this alcohol.

.....

(1)

(Total 6 marks)

Q3. Vinegar can be added to food. Vinegar is an aqueous solution of ethanoic acid.



Ethanoic acid is a *weak* acid.

(a) Which ion is present in aqueous solutions of all acids?

.....

(1)

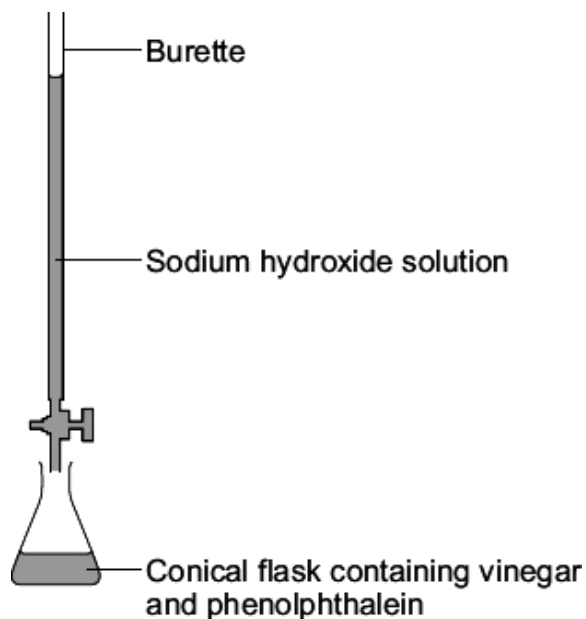
(b) What is the difference between the pH of a *weak* acid compared to the pH of a strong acid of the same concentration?

Give a reason for your answer.

.....
.....
.....
.....

(2)

- (c) The diagram shows the apparatus used to find the concentration of ethanoic acid in vinegar.



- (i) Why should phenolphthalein indicator be used for this titration instead of methyl orange?

.....

(1)

- (ii) 25.00 cm³ of vinegar was neutralised by 30.50 cm³ of a solution of sodium hydroxide with a concentration of 0.50 moles per cubic decimetre.

The equation for this reaction is:



Calculate the concentration of ethanoic acid in this vinegar.

.....

Concentration of ethanoic acid in this vinegar = moles per cubic decimetre

(2)

- (d) The concentration of ethanoic acid in a different bottle of vinegar was 0.80 moles per cubic decimetre.

Calculate the mass in grams of ethanoic acid (CH_3COOH) in 250 cm^3 of this vinegar.

The relative formula mass (M_r) of ethanoic acid = 60.

.....

.....

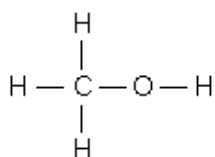
.....

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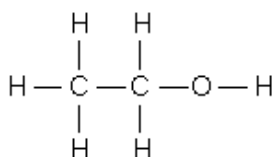
Mass of ethanoic acid = g

(2)
(Total 8 marks)

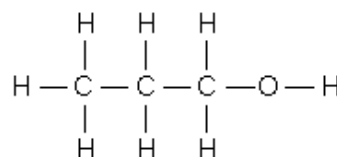
- Q4.** The structures shown are of the first three members of a homologous series of alcohols.



Methanol

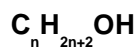
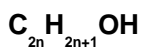
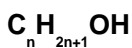


Ethanol



Propanol

- (a) (i) Draw a ring around the correct general formula for alcohols.



(1)

- (ii) What is the formula of the functional group for alcohols?

.....

(1)

- (b) Ethanol is the alcohol used in alcoholic drinks.

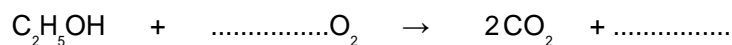
- (i) When ethanol dissolves in water the solution formed is **not** alkaline.

Tick (✓) the reason why the solution formed is **not** alkaline.

Reason	Tick (✓)
Ethanol can be used as a solvent.	
Ethanol dissolves in water to form hydroxide ions.	
Ethanol has only covalent bonds in its molecule.	

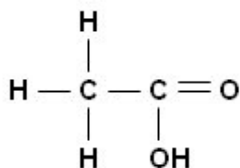
(1)

- (ii) Ethanol is used as a fuel because ethanol burns in oxygen.
Complete and balance the chemical equation for this reaction.



(2)

- (c) Ethanol can be oxidised to produce the compound shown.



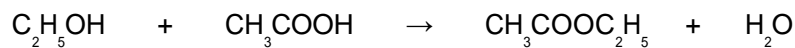
- (i) Draw a ring around the correct answer to complete the sentence.

When this compound dissolves in water, the solution formed is

- | |
|-----------|
| acidic. |
| alkaline. |
| neutral. |

(1)

- (ii) Ethanol reacts with this compound to produce the organic compound shown.



Complete the sentence.

The type of organic compound produced is

(1)

(Total 7 marks)

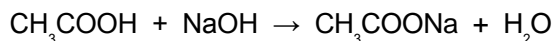
- Q5. (a) This label has been taken from a bottle of vinegar.



Vinegar is used for seasoning foods. It is a solution of ethanoic acid in water.

In an experiment, it was found that the ethanoic acid present in a 15.000 cm³ sample of vinegar was neutralised by 45.000 cm³ of sodium hydroxide solution, of concentration 0.20 moles per cubic decimetre (moles per litre).

The equation which represents this reaction is



Calculate the concentration of the ethanoic acid in this vinegar:

- (i) in moles per cubic decimetre (moles per litre);

.....

Concentration = moles per cubic decimetre

(2)

- (ii) in grams per cubic decimetre (grams per litre).

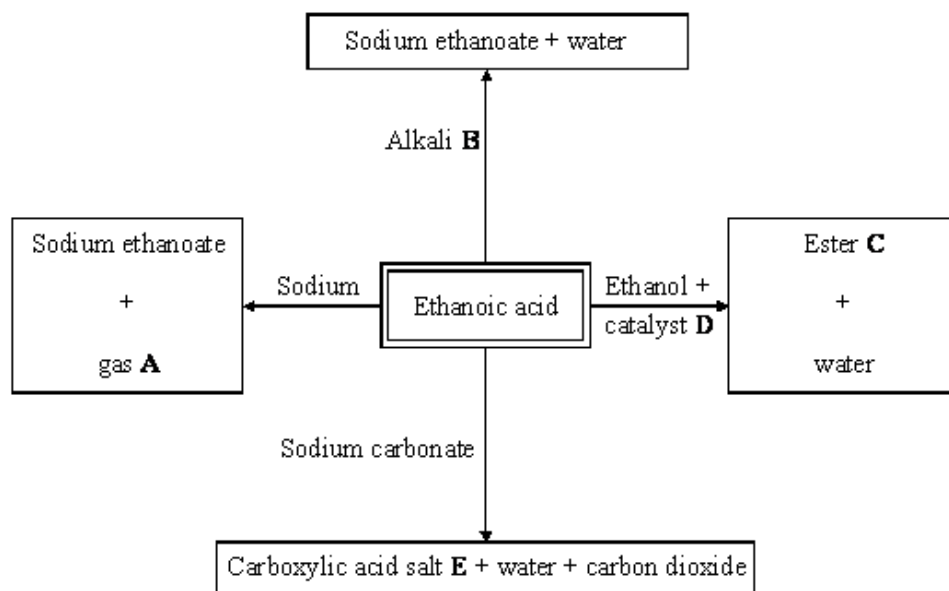
Relative atomic masses: H = 1; C = 12; O = 16.

.....

Concentration = grams per cubic decimetre

(2)

- (b) The flow diagram shows some reactions of ethanoic acid.



Give the name of:

(i) gas **A**,

.....

(1)

(ii) alkali **B**,

.....

(1)

(iii) ester **C**,

.....

(1)

(iv) catalyst **D**,

.....

(1)

(v) carboxylic acid salt **E**.

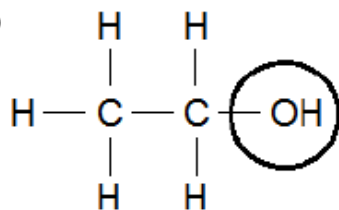
.....

(1)

(Total 9 marks)

M1.

(a) (i)



1

(ii) ethanol

allow ethyl alcohol
*do **not** accept ethanal*
ignore all formulae

1

(b) (i) any **two** from:

- lid
- *metal* calorimeter
allow metal beaker
- insulation (around sides of beaker)
*do **not** allow flammable insulation / beaker*
- excluding draughts
- stirrer
allow stirring

2

(ii) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1–2 marks)

*There is a description of part of an experimental method **or** a measurement which should be taken.*

Level 2 (3–4 marks)

*There is a description of some parts of an experimental method **and** a measurement which should be taken.*

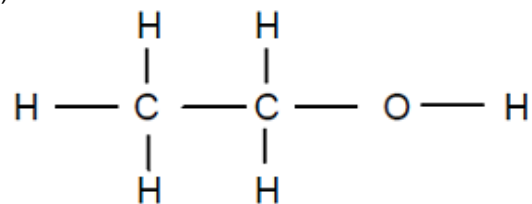
Level 3 (5–6 marks)

*There is a description of an experimental method **and** measurements which should be taken.*

Examples of the point that may be made in the response

- *light ethanol and heat water*
- *extinguish ethanol*
- *after suitable temperature rise **or** after a suitable time*
- *stir water*
- *measure mass / volume of water*
- *measure initial temperature of water*
- *measure final temperature of water*
- *measure temperature rise*
- *measure initial mass of ethanol (and burner)*
- *measure final mass of ethanol (and burner)*
- *measure change in mass of ethanol*

M2. (a) (i)



allow other arrangements provided connectivity is correct

allow — OH

1

(ii) oxygen

accept O₂

allow O

1

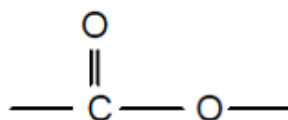
oxidation

allow oxidisation / oxidising / oxidised

allow redox

1

(b) (i) ring around



1

(ii) ester(s)

*do **not** allow ether(s)*

1

(iii) propanol

propanol accept propan-1-ol

allow propyl alcohol

1

[6]

M3. (a) Hydrogen / H⁺

ignore state symbols

ignore proton / H

1

(b) *it = weak acid*

pH of weak acid is higher than the pH of a strong acid

allow converse for strong acids

allow correct numerical comparison

1

any **one** from:

allow converse for strong acids

- only partially dissociated (to form ions)
allow ionises less
- not as many hydrogen ions (in the solution)
allow fewer H⁺ released

1

(c) (i) (titration of) weak acid and strong base

1

(ii) 0.61

correct answer with or without working gains 2 marks

if the answer is incorrect:

moles of sodium hydroxide = (30.5 × 0.5)/1000 = 0.01525 moles

or

(0.5 × 30.5/25) gains 1 mark

2

(d) 12

correct answer with or without working gains 2 marks or even with incorrect working.

if the answer is incorrect:

0.8 × 60 = 48g

or

evidence of dividing 48g (or ecf) by 4

or

$$\frac{0.8 \times 250}{1000} = \frac{0.8}{4} = 0.8 \times 0.25 = 0.2 \text{ mol}$$

or

*evidence of multiplying 0.2mol (or ecf) by 60
would gain 1 mark*

2

[8]

M4. (a) (i) C_nH_{2n+1}OH

1

(ii) OH

1

(b) (i) ethanol has only covalent bonds in its molecule

1

(ii) 3 (O₂)

1

3H₂O

1

- (c) (i) acidic 1
- (ii) an ester 1

[7]

- M5.** (a) (i) e.g. moles NaOH = moles of acid
or formula:

$$0.2 \times \frac{45}{1000} = 0.009$$

$$15M_1 = 0.2 \times 45$$

1

rounding to 0.01 loses mark

$$= 0.009 \times \frac{1000}{15} = 0.6(M)$$

$$M_1 = 0.6(M)$$

ecf for arithmetical error
correct answer 2 marks

1

- (ii) 36

ecf – (a)(i) × 60
correct answer 2 marks
0.6 × 60 gets 1 mark
relative formula mass of ethanoic acid
= 60 for 1 mark
0.6 × incorrect molar mass gains second mark only

2

- (b) (i) A = hydrogen / H₂ 1
- B = sodium hydroxide / NaOH or
sodium oxide / Na₂O 1
- (iii) C = ethyl ethanoate (acetate) /
CH₃COOC₂H₅ / CH₃CO₂C₂H₅ 1

(iv) D = (concentrated) sulphuric acid /
 H_2SO_4

do not accept dilute sulphuric acid

1

E = sodium ethanoate (acetate) / CH_3COONa / $\text{CH}_3\text{CO}_2\text{Na}$

1

[9]

