



# **GCSE Chemistry**

## **Alcohols, Carboxylic Acids and Esters**

### **Mark Scheme**

**Time available: 64 minutes**  
**Marks available: 62 marks**

## Mark schemes



1.

(a) (i) ethanol

(ii) oxidised

(iii) **Test**

add any named carbonate or hydrogen carbonate

*the first mark is for the test; the second is for the result*

*if the test is incorrect award 0 marks.*

1

**Result**

**A** will effervesce (carbon dioxide) **or B** will not effervesce.

*if the result is incorrect, award the first mark only*

1

1



**or**

*candidates do not have to name a gas but penalise an incorrect gas.*

**Test**

add a named (magnesium, aluminium, zinc, iron or tin) metal  
*give credit to any test that will work.*

**Result**

**A** will effervesce (hydrogen), **B** will not  
*allow a test that would identify B.*

**or**

**Test**

add an acid-base indicator

**Result**

credit any acid colour for that indicator eg for universal indicator allow red, yellow or orange

give credit for the neutral colour for **B**

**or**

**Test**

add an alcohol (+ acid catalyst)

**Result**

sweet or fruity smell of esters.

(b) (i) H<sub>2</sub>O

1

(ii) ethyl ethanoate

1

(iii) any **one** from:

- flavourings
- perfumes
- solvents
- plasticisers

*allow any correct use of esters*

1

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2.

- (a) (i) the products are at a lower energy level than the reactants  
*accept products have less energy / less energy at the end than the beginning*
- (ii) because a catalyst provides an alternative / different pathway / mechanism / reaction route  
*accept adsorption or 'increases concentration at the surface'*  
*ignore absorption*

1

1

(that has) lower activation energy

*allow weakens bonds*

*allow idea of increased successful collisions.*

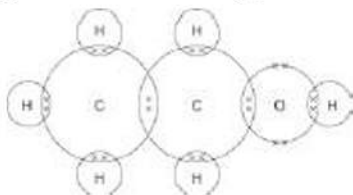
*DO NOT ALLOW answers stating catalysts provide energy for M1 and M2*

1

- (b) one pair of electrons in each overlap (8 pairs in total)  
*allow any combination of dots, crosses or other symbols*

1

the rest of the diagram correct with four non-bonding electrons on the oxygen giving a total of eight electrons in oxygen outer energy level.



*gains 2 marks*

1



(c) (i)  $\pm 3024$  (J)

correct answer with or without working gains **3** marks

if the answer is incorrect, award up to **2** marks for the following steps:

- $\Delta T = 14.4(^{\circ}\text{C})$
- $50 \times 4.2 \times 14.4$

allow ecf for incorrect  $\Delta T$

3

(ii) 0.015(2173913)

correct answer with or without working gains **3** marks

if answer is incorrect, allow 1 mark each for any of the following steps up to a max of 2.

- 0.70g
- $M_r$  of ethanol = 46
- $0.70 / 46$

allow ecf in final answer for arithmetical errors

3

(iii)  $\pm 198\,720$  (J / mole)

$c(i) \div c(ii)$

allow ecf from **(c)(i)** and **(c)(ii)**

0.015 gives 201600

0.0152 gives 198947

0.01522 gives 198686

1

(d) (as the molecules get bigger **or** the number of carbon atoms increases) the intermolecular forces

allow intermolecular bonds

1

(intermolecular forces) increase

allow more / stronger (intermolecular forces)

1

and therefore require more (heat) energy to overcome

breaking covalent bonds or unspecified bonds max **1** mark (M3)

1

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3.

(a) HCOOH

allow HCO<sub>2</sub>H

1

propanoic acid

1



(b) incomplete / partial ionisation  
*allow incomplete / partial dissociation*

(because) reaction is reversible  
*allow (because) reaction is in equilibrium*

1

(c) mass (of flask and contents) decreases

1

(because) carbon dioxide is produced

1

(and) carbon dioxide escapes (from the flask)

*allow 1 mark for the gas produced escapes (from the flask)*

1

(d) (0.01 mol/dm<sup>3</sup>) methanoic acid has a lower pH

*allow converse argument for ethanoic acid*

*allow (0.01 mol/dm<sup>3</sup>) methanoic acid is a stronger acid*

1

(so 0.01 mol/dm<sup>3</sup>) methanoic acid has a higher concentration of hydrogen ions

1

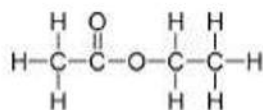
(therefore) more collisions per unit time

1

(e) ethyl ethanoate

1

(f)

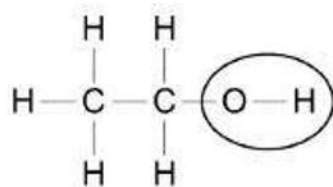


1

[12]

4.

(a)



1



(b)

Name of element	Symbol for element	Number of atoms in one molecule of ethanol
carbon	C	2
hydrogen	H	6
<b>oxygen</b>	O	1

*ignore O2*

1  
1  
1

(c) a solvent

1

(d) sugar

*allow named sugar*  
*allow saccharide*

1

(e) yeast

1

(f) ethyl ethanoate

1

(g) water

*ignore H<sub>2</sub>O*

1



(h)  $400 \text{ cm}^3 = 0.40 \text{ dm}^3$

$$\frac{1.00}{0.40} \times 20$$

*allow correct use of incorrectly converted or unconverted volume*

1

$$= 50 \text{ (g)}$$

1

**alternative approach:**

$$1.0 \text{ dm}^3 = 1000 \text{ cm}^3 \text{ (1)}$$

$$\frac{1000}{400} \times 20 \text{ (1)}$$

*allow correct use of incorrectly converted or unconverted volume*

$$= 50 \text{ (g) (1)}$$

[12]

5.

(a) oxygen

*allow correct answer shown in box if answer line blank*

1

(b) vinegar

*allow correct answer shown in box if answer line blank*

1

(c) C

1

(d) Ester

1

(e) pleasant smell

1

volatile

*allow low boiling point / evaporates*

1

[6]

