PEARSON EDEXCEL GCSE CHEMISTRY · 1CH0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 9: SEPARATE CHEMISTRY 2 (PACK 2)

SCORE	PERCENTAGE
/135	%

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Q1.

A technician had two bottles containing solid salts.
One bottle contained a potassium salt and the other contained a sodium salt.
Unfortunately the labels had fallen off the bottles.
The technician tested the salts to find the ions present.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Both salts contained the same anion.

A solution of one salt was made and some dilute nitric acid was added.
Drops of silver nitrate solution were added.
A yellow precipitate formed.

This test shows the anion in the salt is

(1)

☒ **A** bromide, Br^-

☒ **B** chloride, Cl^-

☒ **C** iodide, I^-

☒ **D** sulfate, SO_4^{2-}

(ii) The technician wanted to find out which bottle contained the sodium salt and which bottle contained the potassium salt.

Explain how the technician should do this.

(2)

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Q2.

(a) Substance **X** is an ammonium salt.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

A test was carried out to find which anion is present in substance **X**.
Dilute hydrochloric acid was added to a sample of substance **X**.

There was effervescence and the gas given off turned limewater milky.

The anion present in substance **X** is

(1)

☒ **A** carbonate ion, CO_3^{2-}

☒ **B** chloride ion, Cl^-

☒ **C** nitrate ion, NO_3^-

☒ **D** sulfate ion, SO_4^{2-}

(ii) Describe how sodium hydroxide solution can be used to show that ammonium ions are present in substance **X**.

(2)

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(b) Aluminium ions, Al^{3+}, react with hydroxide ions in solution to give a white precipitate of aluminium hydroxide.

Write the ionic equation for this reaction.

(3)

.....

*(c) A technician found some colourless crystals of a substance left, unlabelled, in a beaker in a laboratory.

She knew the substance was one of potassium sulfate, potassium iodide, sodium sulfate or sodium iodide.

Explain how, using chemical tests, the technician could find out if the substance left in the beaker was potassium sulfate, potassium iodide, sodium sulfate or sodium iodide.

You may include equations in your answer.

(6)

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(Total for Question = 12 marks)

Q3.

Figure 3 shows two tests carried out on a white solid and the results of the tests.

	test	results
test 1	flame test carried out	a yellow flame
test 2	dilute hydrochloric acid added gas given off passed into limewater	effervescence occurs the limewater goes milky

Figure 3

(i) State the name of the gas given off in test 2.

(1)

.....

(ii) State the name of the ion shown to be present in the white solid by the result of test 2.

(1)

.....

(Total for question = 2 marks)

Q4.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Ethanol can be produced by the fermentation of glucose solution.

Which of these shows the word equation for the fermentation of glucose solution?

(1)

☒ **A** glucose → ethanol + water

☒ **B** glucose → ethanol + carbon dioxide

☒ **C** glucose → ethanol + hydrogen

☒ **D** glucose → ethanol + water + carbon dioxide

(Total for question = 1 mark)

Q5.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A chloride ion, a fluorine atom and a nanoparticle are all types of particle.
Which of the following shows the particles in order of size, starting from the smallest?

(1)

☒ **A** nanoparticle, fluorine atom, chloride ion

☒ **B** nanoparticle, chloride ion, fluorine atom

☒ **C** fluorine atom, nanoparticle, chloride ion

☒ **D** fluorine atom, chloride ion, nanoparticle

(Total for question = 1 mark)

Q6.

Polymer molecules can be made by joining together large numbers of small molecules called monomers.

A molecule of propene has the structure shown in Figure 6.

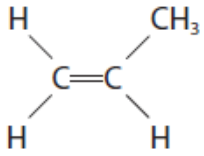
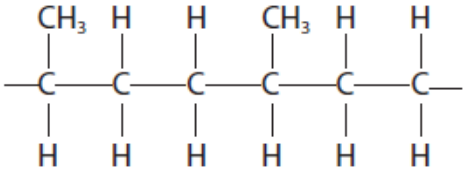


Figure 6

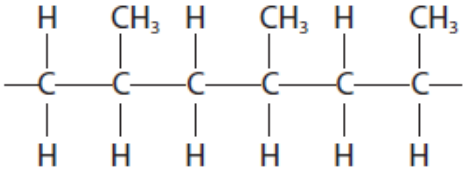
Which of the following shows the structure of part of a poly(propene) molecule?

(1)

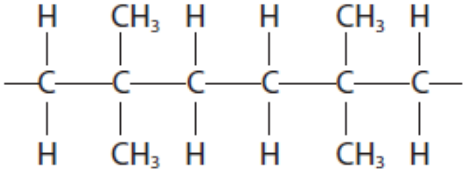
☒ **A**



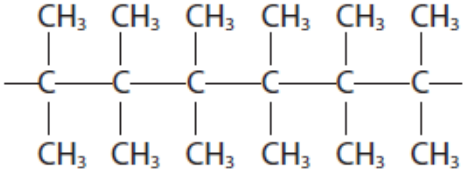
☒ **B**



☒ **C**



☒ **D**



(Total for question = 1 mark)

Q7.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

(i) Nanoparticles are very small.

Some nanoparticles have a radius of 17 nm.
The radius of a magnesium atom is 0.16 nm.

Approximately how many times larger is the radius of these nanoparticles than the radius of the magnesium atom?

(1)

☐ **A** 0.01

☐ **B** 0.10

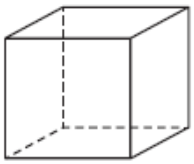
☐ **C** 10

☐ **D** 100

(ii) A catalyst contains cube-shaped nanoparticles.

Figure 3 shows a diagram of a cube-shaped nanoparticle.

The length of each side of the cube is 9 nm.



© Gauravjuvekar

Figure 3

Calculate the surface area of the cube, in nm^2.

(2)

.....

.....

.....

surface area = ... nm^2

(iii) Nanoparticles have many uses.

Some scientists are concerned about the possible risks of using nanoparticles.

Give **one** possible risk of using nanoparticles.

(1)

.....

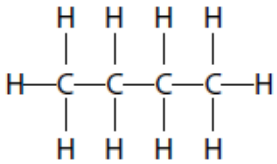
.....

(Total for question = 4 marks)

Q8.

Alkanes and alkenes are hydrocarbons.

The structure of a molecule of butane is shown.



Which of the following is the empirical formula for butane?

(1)

☒ **A** CH

☒ **B** CH_2

☒ **C** C_2H_5

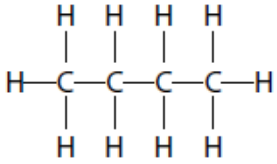
☒ **D** C_4H_{10}

(Total for question = 1 mark)

Q9.

Alkanes and alkenes are hydrocarbons.

The structure of a molecule of butane is shown.



Which of the following is the empirical formula for butane?

(1)

☒ **A** CH

☒ **B** CH_2

☒ **C** C_2H_5

☒ **D** C_4H_{10}

(Total for question = 1 mark)

Q10.

A nanoparticle has a diameter of 25 nm.

What is the diameter of this nanoparticle, in metres?

(1)

☒ **A** 2.5×10^{-4}

☒ **B** 2.5×10^{-6}

☒ **C** 2.5×10^{-8}

☒ **D** 2.5×10^{-10}

(Total for question = 1 mark)

Q11.

Figure 4 shows a molecule of the alcohol, ethanol.

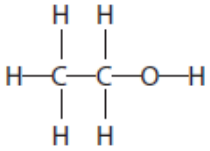


Figure 4

Circle the alcohol functional group in Figure 4.

(1)

(Total for question = 1 mark)

Q12.

Poly(chloroethene) is a polymer made from chloroethene.
A molecule of chloroethene is shown in Figure 5.

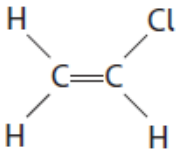


Figure 5

(i) On Figure 5, draw a circle around the functional group in this molecule.

(1)

(ii) Draw a section of a poly(chloroethene) molecule containing three repeating units, showing all bonds.

(3)

(iii) What type of polymer is poly(chloroethene)?

(1)

.....

(iv) Calculate the relative formula mass of a poly(chloroethene) molecule made from 2850

chloroethene molecules, C_2H_3Cl.

(relative atomic masses: H = 1.00, C = 12.0, Cl = 35.5)

Give your answer to three significant figures.

Show your working.

(3)

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.....

relative formula mass = ...

(Total for question = 8 marks)

Q13.

Butene reacts with steam to produce butanol.

$$C_4H_8 + H_2O \rightarrow C_4H_9OH$$

What type of reaction takes place between butene and steam?

(1)

☒ **A** addition

☒ **B** dehydration

☒ **C** neutralisation

☒ **D** substitution

(Total for question = 1 mark)

Q14.

Butene reacts with steam to produce butanol.

$$C_4H_8 + H_2O \rightarrow C_4H_9OH$$

What type of reaction takes place between butene and steam?

(1)

☒ **A** addition

☒ **B** dehydration

☒ **C** neutralisation

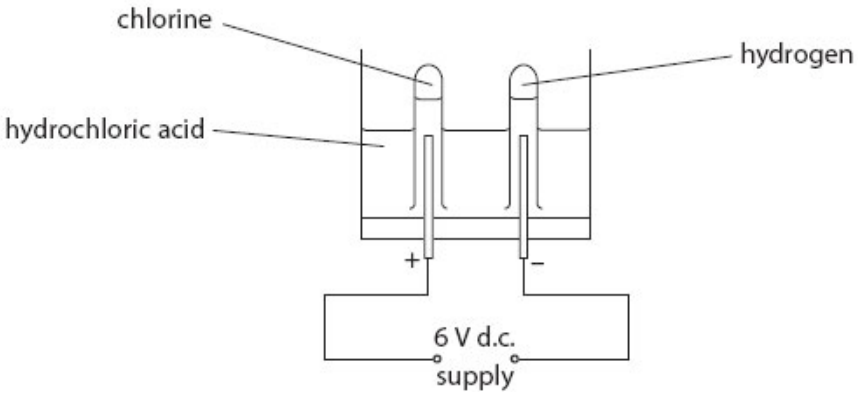
☒ **D** substitution

(Total for question = 1 mark)

Q15.

(a) Electrolysis of hydrochloric acid produces chlorine and hydrogen.

The apparatus used is shown.



(i) Explain what is meant by **electrolysis.**

(2)

.....

.....

(ii) Describe the test to show that a gas is chlorine.

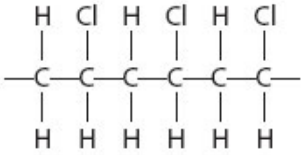
(2)

.....

.....

.....

(iii) Chlorine is used in the manufacture of a polymer.
Part of this polymer molecule is



State the name of the polymer.

(1)

.....

(b) Dilute hydrochloric acid reacts with silver nitrate solution to form silver chloride and nitric acid.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The reaction produces silver chloride as a precipitate.
In an equation this would be shown as

(1)

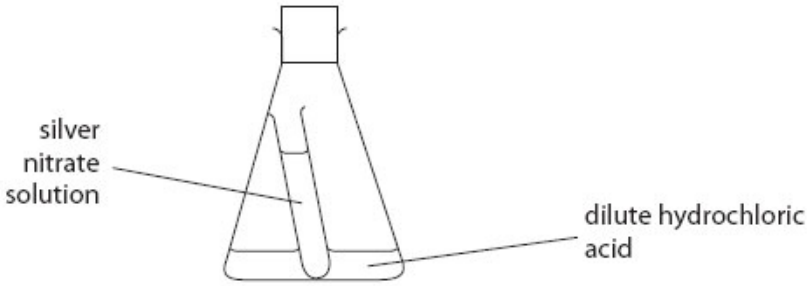
☒ **A** AgCl(aq)

☒ **B** AgCl(g)

☒ **C** AgCl(l)

☒ **D** AgCl(s)

(ii) This apparatus is used to investigate the mass of the reactants and the mass of products in this reaction.



The total mass of this apparatus was measured.
The flask was shaken to allow the silver nitrate solution and dilute hydrochloric acid to react.
After the reaction the total mass of the apparatus was measured again.

State how the total mass of the apparatus after the reaction will compare with the total mass of the apparatus before the reaction.

(1)

.....

(iii) Write the balanced equation for the reaction of silver nitrate solution, $AgNO_3$, with dilute hydrochloric acid to form silver chloride, AgCl, and nitric acid.

(2)

.....

(Total for Question = 9 marks)

Q16.

Propene is a gaseous hydrocarbon.

Draw the structure of a molecule of propene, showing all bonds.

(2)

Q17.

The following tests were carried out on a substance containing two ions.

1. A flame test on the solid substance produced a yellow colour.

2. Dilute hydrochloric acid was added to a solution of the substance followed by a few drops of

barium chloride solution.
A white precipitate formed.

Give the name and formula of the substance.

(2)

Name of substance
.....

Formula of substance
.....

(Total for question = 2 marks)

Q18.

Bromine water is used to distinguish between alkenes and alkanes.

Describe what would be **seen** when an alkene and an alkane are shaken with separate samples of bromine water.

(3)

alkene

.....

.....

alkane

.....

.....

Q19.

Sodium sulfate is tested to show the ions present in it.

The sodium sulfate is dissolved in water to make a solution.

Describe how to show that sulfate ions are present in this solution.

(3)

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(Total for question = 3 marks)

Q20.

Sodium sulfate is tested to show the ions present in it.

The sodium sulfate is dissolved in water to make a solution.

Describe how to show that sulfate ions are present in this solution.

(3)

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(Total for question = 3 marks)

Q21.

Figure 4 shows a molecule of the alcohol, ethanol.

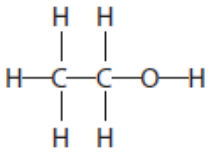


Figure 4

A dilute solution of ethanol is obtained by fermentation.

Explain how a more concentrated solution of ethanol can be obtained from this dilute solution.

(3)

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(Total for question = 3 marks)

Q22.

* Polymers have different uses depending on their properties.

Three common polymers are

poly(propene)
poly(chloroethene) (PVC)
poly(tetrafluoroethene) (PTFE)

Explain how the uses of these polymers depend on their properties.

(6)

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(Total for question = 6 marks)

Q23.

Ethanol can be used as a liquid fuel.

A student investigates how much heat energy is released when a known mass of ethanol is burned.

The apparatus is set up as shown in Figure 15.

A known volume of water is placed in a metal can.
The temperature of the water is measured.
The ethanol is ignited and placed under the beaker so that the flame is touching the beaker.
The water is heated by the flame.
The flame is extinguished.
The final temperature of the water is measured.

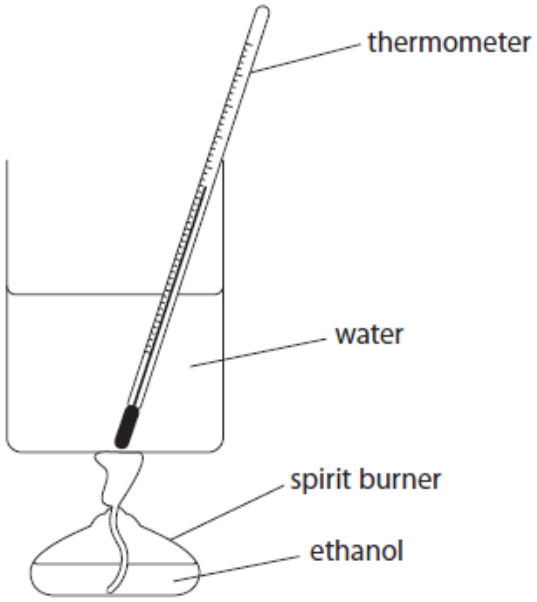
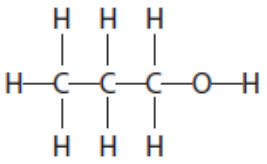
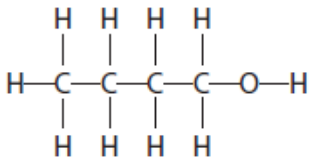


Figure 15

Propanol and butanol are both members of the same homologous series as ethanol.



propanol



butanol

Propanol and butanol can also be burned in the apparatus shown in Figure 15.

Give **three** reasons why ethanol, propanol and butanol are members of the same homologous series.

(3)

reason 1

.....

.....

reason 2

.....

.....

reason 3

.....

.....

(Total for question = 3 marks)

Q24.

Ethanol can be used as a liquid fuel.

A student investigates how much heat energy is released when a known mass of ethanol is burned.

The apparatus is set up as shown in Figure 3.

A known volume of water is placed in a metal can.
The temperature of the water is measured.
The ethanol is ignited and placed under the beaker so that the flame is touching the beaker.
The water is heated by the flame.
The flame is extinguished.
The final temperature of the water is measured.

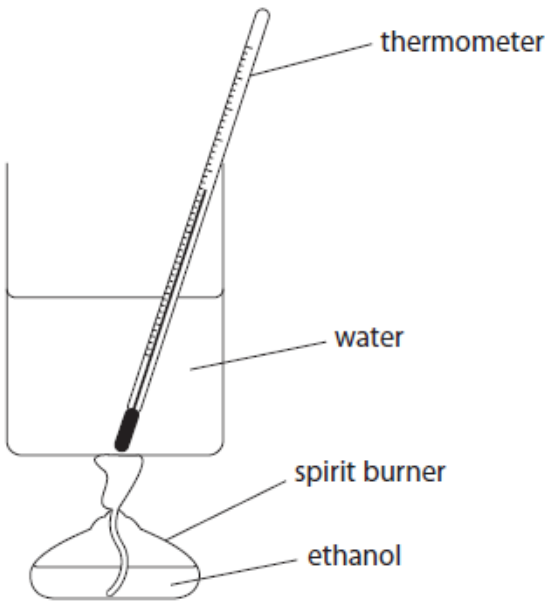
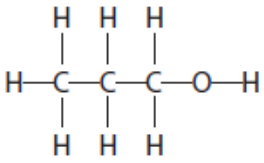
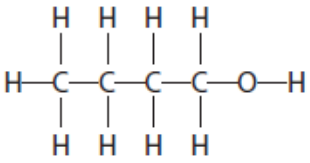


Figure 3

Propanol and butanol are both members of the same homologous series as ethanol.



propanol



butanol

Propanol and butanol can also be burned in the apparatus shown in Figure 3.

Give **three** reasons why ethanol, propanol and butanol are members of the same homologous series.

(3)

reason 1

.....

.....

reason 2

.....

.....

reason 3

.....

.....

(Total for question = 3 marks)

Q25.

Some polymerisation reactions produce ammonia as a waste product.

A student is given a sample of pure, dry ammonia gas.

The student suggests the following method to test for ammonia gas.

step 1 take some dry, blue litmus paper

step 2 place the dry litmus paper into the dry gas

step 3 observe any change in colour of the litmus paper

This test for ammonia will not work.

Give **two** changes that should be made to this test for it to work.

(2)

change 1 .....

.....

change 2 .....

.....

(Total for question = 2 marks)

Q26.

Bottles can be made of polymers, such as poly(ethene), and of glass.

Give **one** advantage of a bottle made of a polymer rather than a bottle made of glass.

(1)

.....

.....

(Total for question = 1 mark)

Q27.

A student carried out some tests on copper sulfate.

A solution of the copper sulfate was tested in a flame photometer.

(i) Give an advantage of using a flame photometer, rather than a flame test, to test for copper ions.

(1)

.....

(ii) Figure 7 shows some values obtained when producing a calibration graph for copper ions in a flame photometer.

Draw a line of best fit through the points.

(1)

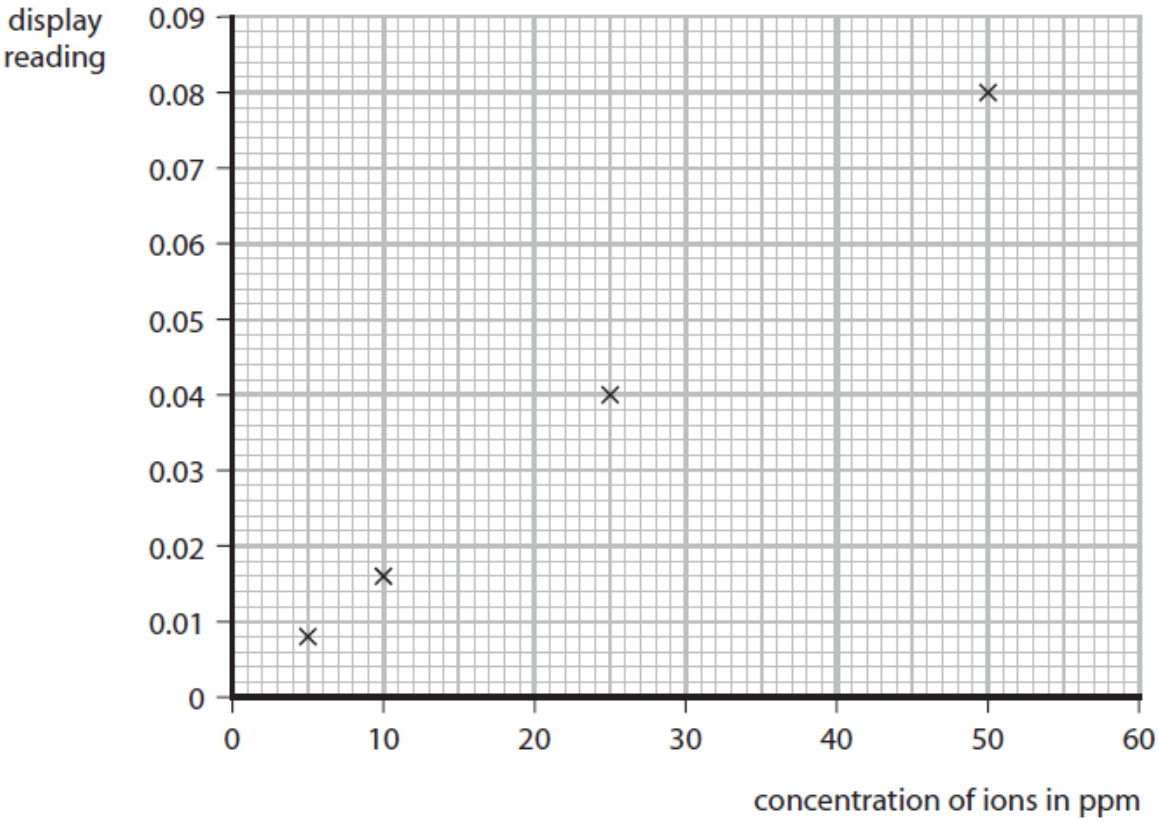


Figure 7

(iii) A solution containing copper ions gave a display reading of 0.030.

Use the calibration graph in Figure 7 to find the concentration of copper ions in this solution.

(1)

concentration of copper ions = ... ppm

(Total for question = 3 marks)

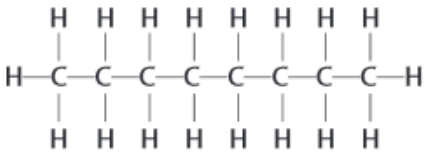
Q28.

Fuels

(a) Petrol is obtained by the fractional distillation of crude oil.

One substance present in petrol is octane, C_8H_{18}.

The structure of a molecule of octane is shown.



(i) Octane is a saturated hydrocarbon.

Explain what is meant by **saturated hydrocarbon**.

(3)

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(ii) Octane is mixed with bromine water and shaken.

Complete the sentence by putting a cross (☒) in the box to show your answer.

On shaking, the colour of the mixture

(1)

☒ **A** remains orange

☒ **B** remains colourless

☒ **C** changes from clear to orange

☒ **D** changes from orange to colourless

(b) In the oil industry some fuel oil fraction is converted into petrol.

This is done by heating the fuel oil fraction to thermally decompose it and produce smaller molecules.

(i) State the name given to this process.

(1)

.....

Give **two** reasons why it is necessary to carry out this process to make more petrol.

(2)

reason 1.....

.....

reason 2.....

.....

(c) Methane can be burned in excess oxygen to form carbon dioxide and water.

(3)

.....

(Total for question = 10 marks)

Q29.

(a) Some fuels are better fuels than others.

State one factor that makes a good fuel.

(1)

.....

.....

(b) Bioethanol is a fuel that can be obtained from the plant, sugar beet.

(i) Bioethanol and petrol can both be used as fuels.

Explain one advantage of using bioethanol produced from sugar beet, rather than petrol produced from crude oil.

(2)

.....

.....

.....

.....

(ii) The main component of bioethanol is ethanol.

When burnt completely, ethanol, C_2H_5OH, reacts with oxygen to produce carbon dioxide and water.

Write the balanced equation for this reaction.

(3)

.....

Q30.

The formula of a molecule of propene is C_3H_6.

Draw the structure of a molecule of propene, showing all covalent bonds.

(2)

Q31.

Aluminium ions, Al^{3+}, react with hydroxide ions in solution to give a white precipitate of aluminium hydroxide.

Write the ionic equation for this reaction.

(3)

.....

Q32.

Ethanol can also be produced by fermentation.

Describe how ethanol can be produced from sugar by fermentation.

(2)

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.....

Q33.

Ethanol is produced by the fermentation of glucose solution.

(i) Describe how this fermentation is carried out.

(2)

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(ii) Complete the word equation for the fermentation of glucose.

(2)

glucose → ..... +
.....

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Fermentation produces a dilute solution of ethanol.

A concentrated solution of ethanol is produced from a dilute solution by

(1)

☒ **A** cracking

☒ **B** dehydration

☒ **C** fractional distillation

☒ **D** polymerisation

(iv) State a possible harmful effect of consuming too many alcoholic drinks.

(1)

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Q34.

* Polymers are addition or condensation polymers.

Polymers can be formed by using the monomers shown in Figure 12.

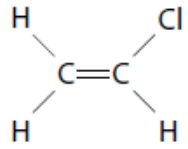
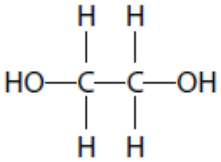
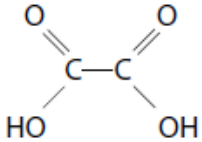
monomer	structure
chloroethene	
ethane-1,2-diol	
ethanedioic acid	

Figure 12

Explain, using appropriate monomers from Figure 12, how different polymers can be formed.

(6)

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(Total for question = 6 marks)

Q35.

*Figure 12 shows information about some compounds in the same homologous series.

name	structural formula	formula mass	density in g cm^{-3}	boiling point in °C	does it react with an alcohol?	does it react with sodium hydroxide solution?
butanoic acid	$CH_3CH_2CH_2COOH$	88	0.96	164	yes	yes
ethanoic acid	CH_3COOH	60	1.05	118	yes	yes
hexanoic acid	$CH_3CH_2CH_2CH_2CH_2COOH$	116	0.93	205	yes	yes
pentanoic acid	$CH_3CH_2CH_2CH_2COOH$	102	0.94	186	yes	yes
propanoic acid	CH_3CH_2COOH	74	0.99	141	yes	yes

Figure 12

Explain, using the data in Figure 12, why these compounds belong together in the same homologous series.

(6)

(Total for question = 6 marks)

Q36.

Ethanol is made by fermentation of a carbohydrate dissolved in water, in the presence of yeast.

The reaction is carried out at 30 °C.

Explain why the reaction is carried out at a temperature of 30 °C rather than at a temperature of 80 °C.

(2)

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(Total for question = 2 marks)

Q37.

Ethanol is made by fermentation of a carbohydrate dissolved in water, in the presence of yeast.

The reaction is carried out at 30 °C.

Explain why the reaction is carried out at a temperature of 30 °C rather than at a temperature of 80 °C.

(2)

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(Total for question = 2 marks)

Q38.

Ethene, C_2H_4, is an unsaturated hydrocarbon.

Explain why ethene is an **unsaturated hydrocarbon**.

(2)

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(Total for question = 2 marks)

Q39.

Qualitative tests are used to identify ions.

A student carries out a flame test on an unknown solid.
A red flame is seen.
The student concludes that the solid is lithium carbonate.

Explain why this conclusion is **not** justified.

(2)

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(Total for question = 2 marks)

Q40.

A student tests solutions of three ionic substances, **K**, **L** and **M**.

The student carries out the same two tests on each of the three solutions.

Test 1 add dilute nitric acid and then silver nitrate solution.

Test 2 add a few drops of sodium hydroxide solution and warm the mixture.

Figure 7 shows the results of the tests and the student's conclusions about the identity of each substance.

ionic substance	test 1	test 2	student's conclusion
K	white precipitate	colourless solution	ammonium chloride
L	white precipitate	white precipitate	aluminium chloride
M	no precipitate	green precipitate	iron(II) sulfate

Figure 7

None of the student's conclusions are fully justified.

Explain which part of each conclusion is justified and what further work can be carried out to fully justify each conclusion.

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(Total for question = 6 marks)

Q41.

Figure 2 shows information about three different materials, a composite, a glass and a metal.

	a composite	a glass	a metal
density	low	high	high
ability to conduct electricity	poor	poor	good
resistance to corrosion	good	good	poor

Figure 2

Explain which material in Figure 2 is the most suitable material to use in electrical circuits.

(2)

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(Total for question = 2 marks)

Q42.

The student tested an unknown solution for sulfate ions by

1. adding a few drops of dilute sulfuric acid to the unknown solution
2. then adding a few drops of barium chloride solution.

A white precipitate was formed.

The student cannot conclude from this result that the unknown solution contains sulfate ions.

Explain what the student should change to obtain a valid result.

(2)

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(Total for question = 2 marks)

Q43.

Two liquid hydrocarbons, **A** and **B**, were tested with bromine water.
One hydrocarbon was known to be an alkane.
The other hydrocarbon was known to be an alkene.

Each hydrocarbon was shaken with a few drops of bromine water.

The results of the tests were

hydrocarbon A + bromine water: the mixture turned from orange to colourless.
hydrocarbon B + bromine water: the orange colour remained.

Explain these results.

(2)

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(Total for question = 2 marks)

Q44.

Explain the advantage of using catalysts made of nanoparticles rather than larger particles.

(2)

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(Total for question = 2 marks)

Q45.

Figure 2 shows the structure of a molecule of dichloroethene.

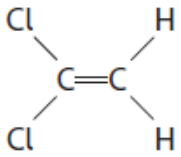


Figure 2

Poly(dichloroethene) was used to wrap food to keep it fresh.

Explain **one** property that a plastic food wrapping must have.

(2)

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(Total for question = 2 marks)

Q46.

Figure 16 shows the structure of a molecule of dichloroethene.

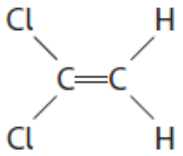


Figure 16

Poly(dichloroethene) was used to wrap food to keep it fresh.

Explain **one** property that a plastic food wrapping must have.

(2)

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(Total for question = 2 marks)

Q47.

Substance X is an unsaturated hydrocarbon.
The structure of a molecule of substance X is shown in Figure 10.

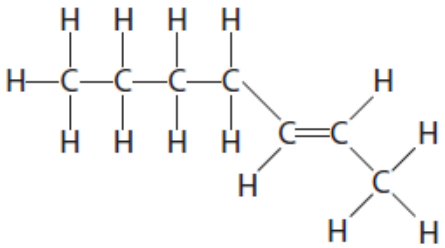


Figure 10

Explain how the structure of substance X shows that it is an **unsaturated hydrocarbon**.

(2)

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(Total for question = 2 marks)

Q48.

Explain a possible risk associated with nanoparticulate materials.

(2)

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(Total for question = 2 marks)

Q49.

Ethanol can be used as a liquid fuel.

A student investigates how much heat energy is released when a known mass of ethanol is burned.

The apparatus is set up as shown in Figure 15.

A known volume of water is placed in a metal can.
The temperature of the water is measured.
The ethanol is ignited and placed under the beaker so that the flame is touching the beaker.
The water is heated by the flame.
The flame is extinguished.
The final temperature of the water is measured.

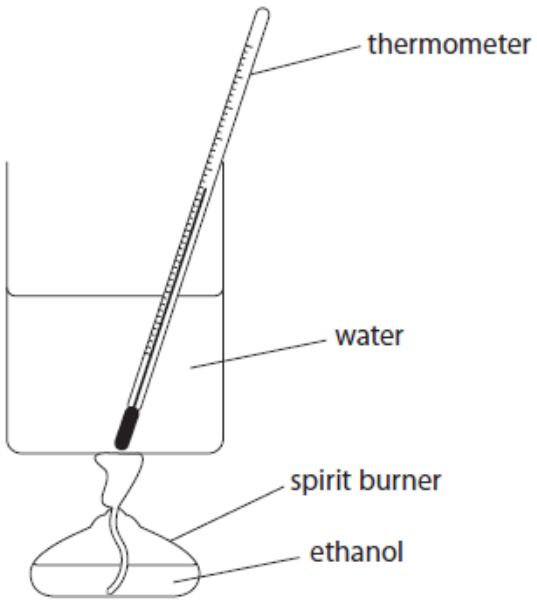


Figure 15

The theoretical temperature rise for burning a given mass of ethanol is 82.4 °C.

In the experiment the actual temperature rise for burning this mass of ethanol was only 34.8 °C. One reason why the temperature rise is less than expected is that the ethanol does not burn completely.

(i) Give a reason why, even if the ethanol burns completely, the actual temperature rise is much less than the theoretical value.

(1)

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(ii) Explain how the method described above could be improved to give a temperature rise closer to the theoretical value.

(2)

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(iii) The amount of heat energy used to raise the temperature of the water by 34.8 °C can be calculated using

heat energy = 210 × temperature rise

Calculate the amount of heat energy used.

(2)

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.....

heat energy = ... (energy units)

(Total for question = 5 marks)

Q50.

Ethanol can be used as a liquid fuel.

A student investigates how much heat energy is released when a known mass of ethanol is burned.

The apparatus is set up as shown in Figure 3.

A known volume of water is placed in a metal can.
The temperature of the water is measured.
The ethanol is ignited and placed under the beaker so that the flame is touching the beaker.
The water is heated by the flame.
The flame is extinguished.
The final temperature of the water is measured.

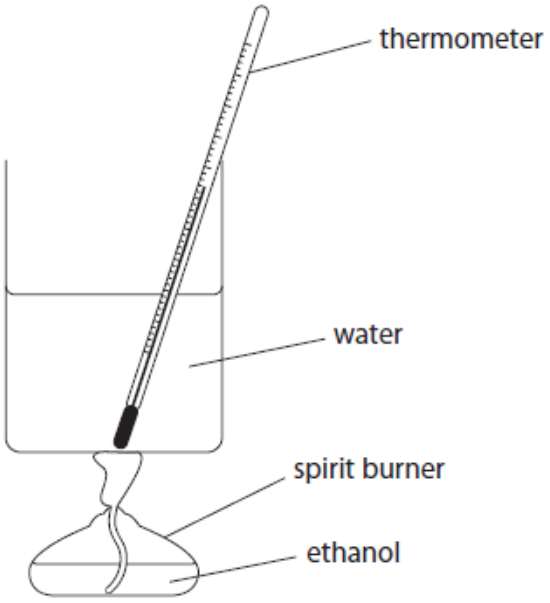


Figure 3

The theoretical temperature rise for burning a given mass of ethanol is 82.4 °C.

In the experiment the actual temperature rise for burning this mass of ethanol was only 34.8 °C. One reason why the temperature rise is less than expected is that the ethanol does not burn completely.

(i) Give a reason why, even if the ethanol burns completely, the actual temperature rise is much less than the theoretical value.

(1)

.....

(ii) Explain how the method described above could be improved to give a temperature rise closer to the theoretical value.

(2)

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(iii) The amount of heat energy used to raise the temperature of the water by 34.8 °C can be calculated using

heat energy = 210 × temperature rise

Calculate the amount of heat energy used.

(2)

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.....

.....

heat energy = ... (energy units)

(Total for question = 5 marks)

Q51.

(i) Ethene is an unsaturated compound.

State what is meant by **unsaturated**.

(1)

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(ii) Describe what is **seen** when ethene is passed into bromine water.

(2)

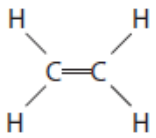
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Q52.

The diagram shows the structure of a molecule of ethene, C_2H_4.



(i) The complete combustion of ethene produces carbon dioxide and water.

Balance this equation by putting numbers in the spaces.

(2)

C_2H_4 + ...O_2 → .....CO_2 + ...H_2O

(ii) Ethene can form the polymer poly(ethene).

Draw a diagram to show the part of a poly(ethene) molecule formed by the reaction of two ethene molecules.

(2)

(Total for question = 4 marks)

Q53.

A bottle of wine is opened and left exposed to the air for a few days.

The ethanol in the wine reacts with oxygen from the air to form ethanoic acid.

Complete the sentence by putting a cross (☒) in the box next to your answer.

In this reaction the ethanol is

(1)

- ☒ **A** hydrated
- ☒ **B** neutralised
- ☒ **C** oxidised
- ☒ **D** reduced

Q54.

Ethanol

Ethanol is present in alcoholic drinks.

(a) Ethanol is produced by fermentation of carbohydrates.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The conditions used for fermentation are

(1)

- ☒ **A** add manganese(IV) oxide, temperature below 20°C
- ☒ **B** add yeast, temperature of about 35°C
- ☒ **C** add manganese(IV) oxide, temperature of 45°C
- ☒ **D** add yeast, temperature above 60°C

(b) Ethanol, C_2H_5OH, is also produced by the reaction of ethene with steam.

Write the balanced equation for this reaction.

(2)

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(c) Ethanol is a member of the homologous series, the alcohols.

(i) Describe what is meant by an **homologous series**.

(2)

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(ii) Draw the structure of a molecule of methanol, CH_3OH.

Show all the covalent bonds.

(1)

(d) When a bottle of wine is left open for a few days, ethanol in the wine changes into ethanoic acid.

(i) State the type of reaction that occurs when ethanol changes into ethanoic acid.

(1)

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(ii) Describe what you would **see** when a piece of magnesium ribbon is added to dilute ethanoic acid.

(2)

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.....

(Total for question = 9 marks)

Q55.

(a) Ethanol can be produced by reacting ethene with steam.

Write the balanced equation for this reaction.

(2)

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(b) Ethanol can also be produced by fermentation.

Describe how ethanol can be produced from sugar by fermentation.

(2)

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(c) A country has large amounts of available fertile land.
It has no reserves of crude oil.
It is not a wealthy country.

Explain why this country produces the ethanol it needs by fermentation rather than from ethene.

(3)

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(d) An atom of phosphorus contains 15 electrons.

Describe how these 15 electrons are arranged in a phosphorus atom.

(2)

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(c) A country has large amounts of available fertile land.
It has no reserves of crude oil.
It is not a wealthy country.

Explain why this country produces the ethanol it needs by fermentation rather than from ethene.

(3)

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(d) Ethanol is a member of the homologous series of alcohols.
The first three members of the series are

methanol CH_3OH

ethanol C_2H_5OH

propanol C_3H_7OH

Use the formulae of these molecules to explain why these alcohols are members of the same homologous series.

(2)

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(Total for Question = 9 marks)

Q56.

Ethanol

Ethanol can be made by fermentation.

(a) (i) In a fermentation reaction, yeast is added to sugar solution.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The yeast is added to the sugar solution because it

(1)

☒ **A** slows down the reaction

☒ **B** heats up the reaction

☒ **C** is an alcohol

☒ **D** provides enzymes

(ii) A teacher demonstrated the effect of temperature on fermentation.

She made a mixture of water, sugar and yeast.
Half of the mixture was kept in a flask at 40°C and the other half was kept in a flask at 75°C.

Ethanol was formed by fermentation at 40°C.

Explain how the contents of the flask at 75°C would be different from the contents of the flask at 40°C.

(2)

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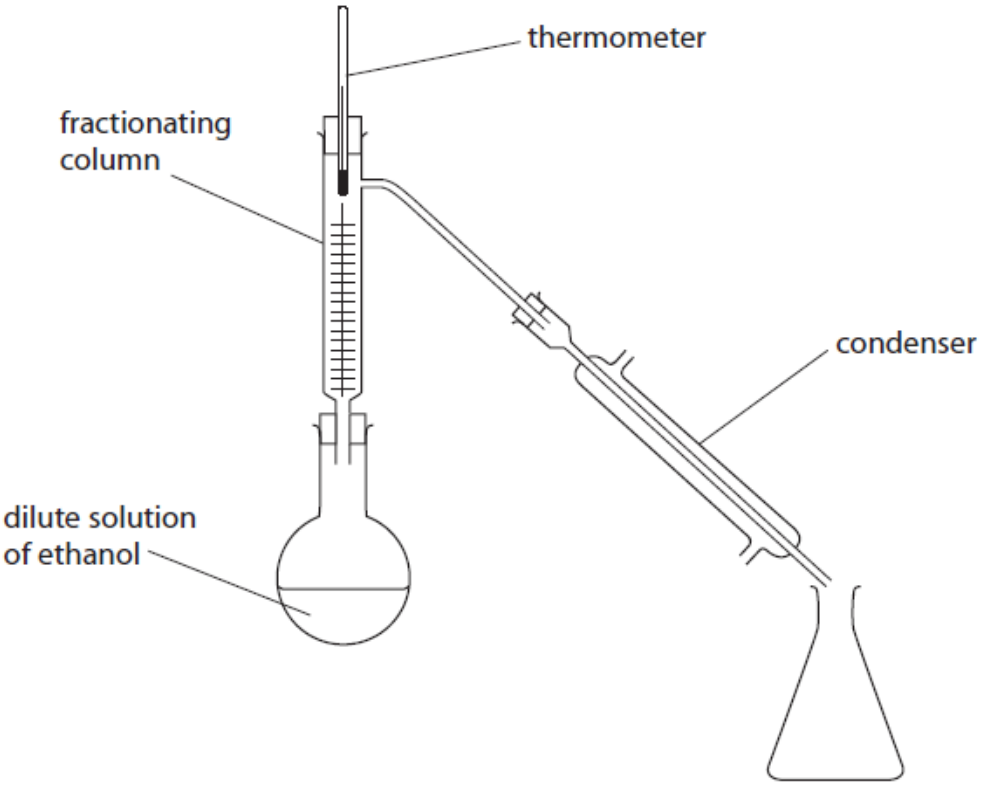
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(b) A dilute solution of ethanol is concentrated by fractional distillation.



Describe how this apparatus is used to obtain a more concentrated solution of ethanol.

(2)

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(c) Alcoholic drinks contain ethanol.

Explain why people should not drink alcoholic drinks before driving.

(2)

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(d) Ethanol is a member of an homologous series. The members of this homologous series are called alcohols. Methane and ethane are members of another homologous series.

Give the name of this other homologous series.

(1)

.....

(Total for question = 8 marks)

Q57.

Ethanol is produced by the fermentation of glucose solution.

(i) Give the name of the substance added to the glucose solution to provide the enzymes needed for fermentation.

(1)

.....

(ii) Fermentation produces a dilute solution of ethanol.

Which process is used to obtain a concentrated solution of ethanol from this dilute solution?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** cracking

☒ **B** crystallisation

☒ **C** filtration

☒ **D** fractional distillation

(iii) Alcoholic drinks contain ethanol.
State the effect of drinking alcohol on a personâ□□s reaction times.

(1)

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.....

Q58.

Ethanol is produced by the fermentation of glucose.

Yeast is needed for the fermentation reaction.

(i) State **two** other conditions for fermentation.

(2)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

A dilute solution of ethanol can be converted to a concentrated solution of ethanol by

(1)

☒ **A** filtration

☒ **B** fractional distillation

☒ **C** dehydration

☒ **D** cracking

(iii) Write the balanced equation for the fermentation of glucose, $C_6H_{12}O_6$.

(2)

.....

Q59.

Complete the sentence by putting a cross (☒) in the box next to your answer.

Ethanol, C_2H_5OH, can be converted into ethanoic acid, CH_3COOH.

In this reaction, ethanol is

(1)

☒ **A** dehydrated

☒ **B** neutralised

☒ **C** neutralised

☒ **D** reduced

Q60.

(a) A bottle of wine is opened and left exposed to the air for a few days.
The ethanol in the wine reacts with oxygen from the air to form ethanoic acid.

Complete the sentence by putting a cross (☒) in the box next to your answer.

In this reaction the ethanol is

(1)

☒ **A** hydrated

☒ **B** neutralised

☒ **C** oxidised

☒ **D** reduced

(b) Vinegar is a dilute solution of ethanoic acid.

Complete the sentence by putting a cross (☒) in the box next to your answer.

Vinegar is used as a

(1)

☒ **A** fibre

☒ **B** fuel

☒ **C** perfume

☒ **D** preservative

(c) State the colour of Universal indicator in a solution of ethanoic acid.

(1)

.....

(d) The word equation for the reaction of dilute ethanoic acid with sodium hydroxide solution is

ethanoic acid + sodium hydroxide → sodium ethanoate + water

Complete the balanced equation for this reaction.

CH_3COOH + ... → CH_3COONa + ...

(e) When magnesium is added to dilute ethanoic acid, a colourless gas is formed. This gas gives a squeaky pop when mixed with air and ignited.

Give the name of the gas given off in this reaction.

(1)

.....

(f) Ethanoic acid reacts with ethanol to form ethyl ethanoate.

(i) Write the word equation for this reaction.

(2)

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(ii) Ethyl ethanoate is an ester.

Explain **one** use of esters.

(2)

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(Total for Question = 10 marks)