SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

LEVEL 2

CHEMISTRY

Specimen Paper

(for first examination in Autumn 2017)

Please read this information before the examination starts.

- This examination is 40 minutes long.
- Answer **all** the questions.
- Calculators may be required.

28315S31

© Independent Schools Examinations Board

1. Underline the option which best completes each of the following.

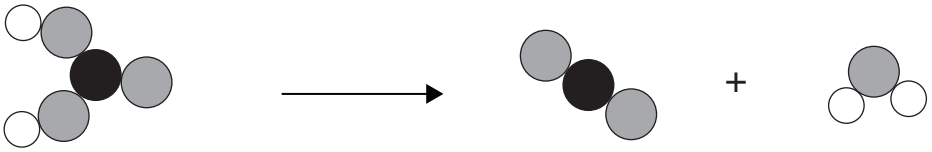
(a) An element which would react with iron oxide to produce iron is

carbon **copper** **nitrogen** **oxygen**

(b) Water is an example of

an atom **a compound** **an element** **a mixture**

(c) The chemical reaction shown below,



is an example of

combustion **decomposition**

displacement **reduction**

(d) When zinc is added to copper sulfate solution, a red-brown solid is formed.
The red-brown solid is

copper **copper oxide** **zinc oxide** **zinc sulfate**

(e) Ice has a lower density than liquid water.

This is because

the molecules in ice are closer together than those in liquid water

the molecules in ice are further apart than those in liquid water

the molecules in ice are heavier than those in liquid water

the molecules in ice are lighter than those in liquid water

(5)

2. Sulfuric acid is a strong acid which is widely used in laboratories and industry.

(a) (i) Write the chemical formula for sulfuric acid. ..... (1)

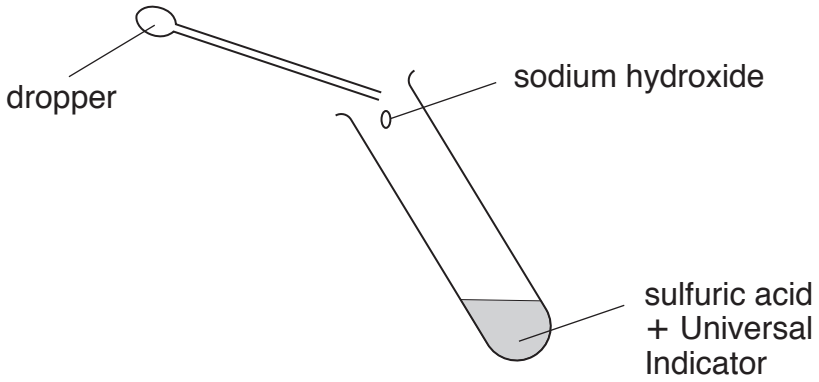
(ii) Suggest the pH value of a solution of sulfuric acid. ..... (1)

A small amount of dilute sulfuric acid was placed in a test tube and a drop of Universal Indicator added.

(b) State the colour of the Universal Indicator when added to sulfuric acid.

..... (1)

Drops of the alkali, sodium hydroxide (NaOH), were then added to the sulfuric acid.



When 18 drops of alkali had been added, the solution turned green.

(c) (i) State the name given to this type of reaction.

..... (1)

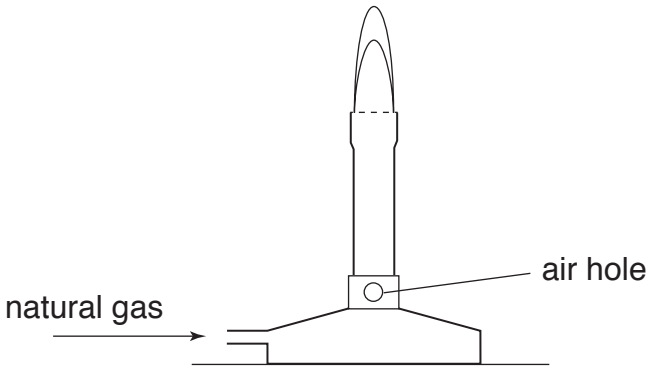
(ii) Complete the word equation:

sodium hydroxide + sulfuric acid → .....+ water (1)

(d) Describe what you would have seen as a few more drops of sodium hydroxide were added to the green solution.

..... (1)

3. A lit Bunsen burner is shown below.



(a) (i) State the position of the air hole needed to achieve the hottest flame.

..... (1)

(ii) Explain why this position achieves the hottest flame.

..... (1)

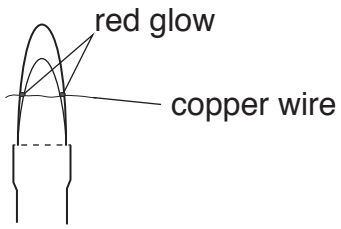
Natural gas contains the hydrocarbon, methane (CH_4) .

(b) Give the names of the two products which are made when natural gas is fully burnt.

1: .....

2: ..... (2)

A copper wire was placed into the flame as shown below.



(c) (i) Explain why the wire glows in the two places indicated.

.....

..... (2)

(ii) Suggest what you would see if the wire were slowly raised up through the flame.

.....

.....

..... (3)

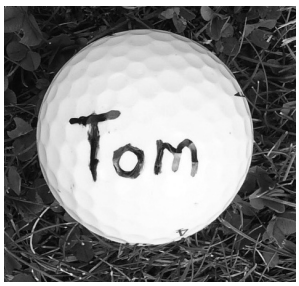
When the copper wire cooled down, a black solid was seen on the surface of the copper.

(d) Give the name of the black solid.

..... (1)

4. Tom used a black permanent marker pen to write his name on his golf ball.



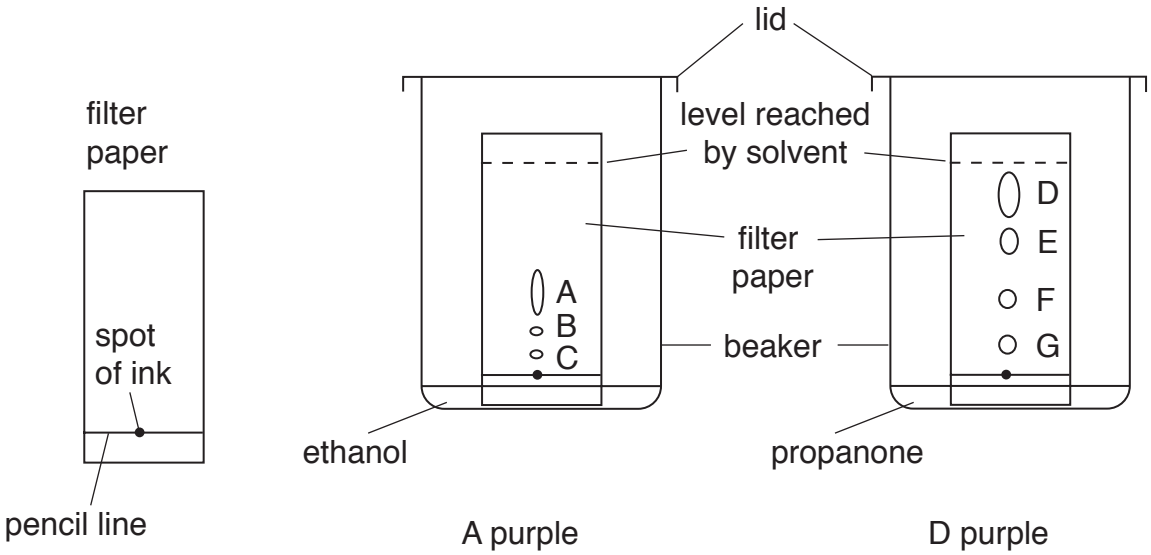


He decided to carry out a chromatography experiment on the ink in the pen using two different solvents, ethanol and propanone.

He drew a pencil line on two pieces of filter paper and put a drop of the ink on each line.

He put one piece in a small amount of ethanol and the other in a small amount of propanone.

The set-up and results of his experiment are shown below.



A purple
B light blue
C yellow

D purple
E purple
F light blue
G yellow

(a) (i) Explain why Tom did not use water as a solvent.

.....

(1)

(ii) Suggest why he put a lid on the beaker.

.....

(1)

He used a pencil to mark the original position of the spot of ink.

(b) (i) Explain why he used a pencil for this.

..... (1)

(ii) Explain why he put the ink spot above the surface of the solvent.

..... (1)

He allowed each solvent to rise up the filter paper until it had almost reached the top.

(c) Suggest a reason why the two solvents produced a different number of spots on the chromatography paper.

.....

..... (2)

(d) Tom wanted to remove his name from the golf ball.

Using the results of his experiment, explain which would be the better solvent, ethanol or propanone, to do this.

The better solvent is .....

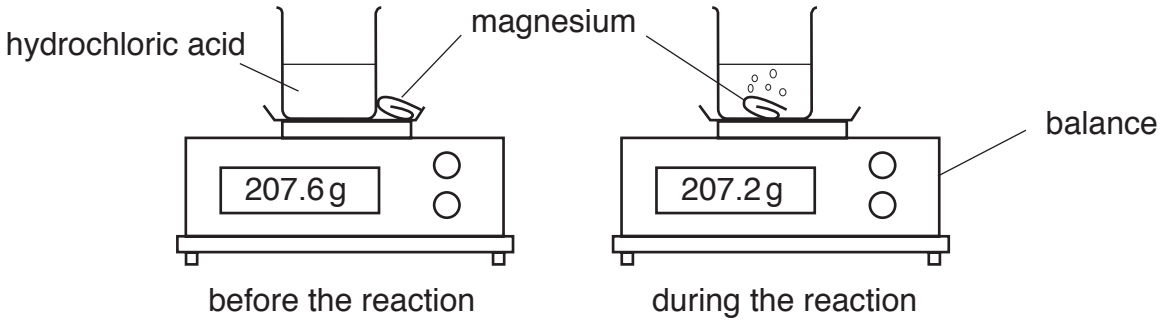
because .....

.....

..... (3)

5. Emily was investigating the mass change when magnesium reacts with hydrochloric acid.

The apparatus she used is shown below.



Before, during and after her investigation she kept notes.

(a) Using only the words shown in the box below, state which word is the best description of each statement made by Emily in her notes.

explanation	**measurement**	**method**
	observation **prediction**	

statement in Emily's notes	best description
I think the mass will go down as the reaction happens.	
I weighed the beaker of acid and magnesium together and then added the magnesium to the acid. I then weighed them during the reaction until it stopped.	
The magnesium fizzed until all of it dissolved in the acid.	
Initial mass of beaker, acid and magnesium = 207.6 g Final mass after reaction had stopped = 206.9 g	
The mass decreased because hydrogen gas was given off.	

(4)

(b) Explain why the reaction eventually stopped.

.....

(1)

(c) From Emily's results, work out the mass of hydrogen which was produced.

.....

..... mass = ... g (2)

(d) Write the word equation for the reaction.

..... (2)

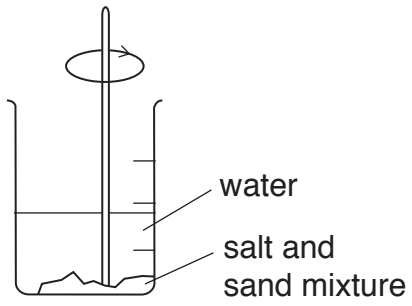
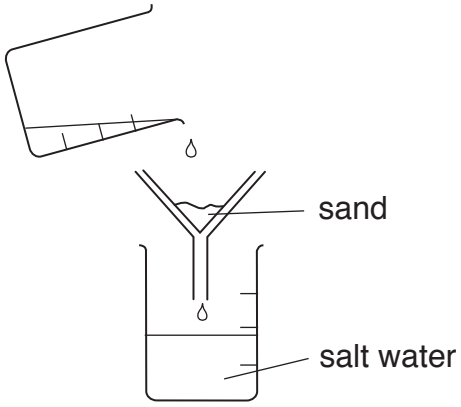
(e) Give **one** safety precaution which Emily should have taken in her investigation.

safety precaution: .....

reason for taking this precaution: .....

..... (2)

6. Becky was given a mixture of salt and sand to separate.
She carried out the following two steps:

step 1	step 2
	
She stirred the mixture with a sufficient amount of water to dissolve all the salt.	She then filtered the liquid.

(a) Using only the words in the box below, complete the paragraph which follows.
Each word may be used once, more than once or not at all.

insoluble	**residue**	**soluble**
solute	**solution**	**solvent**

The water acts as a ....., dissolving the salt to make a .....

The sand is ..... and when the mixture is filtered, it remains as a

..... on the filter paper.

(4)

(b) Explain how Becky could obtain pure salt from the salt water in step 2.

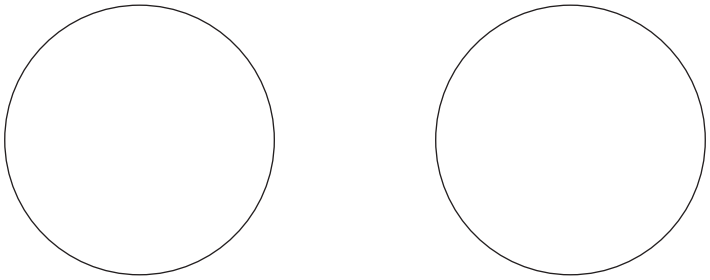
.....

..... (2)

(c) Name the method which Becky could use to obtain pure water from the salt water in step 2.

..... (1)

Becky found that she had two different types of filter paper, both the same size.



(d) Describe an experiment which she could do to find out which filter paper is the most effective for removing the sand in this experiment.

You should describe what she would do, which measurements she should make and how she would make sure it is a fair test.

.....

.....

.....

.....

.....

.....

.....

..... (4)

TURN OVER FOR QUESTION 7

7. The element bromine is a dark red liquid which readily turns into a red gas.

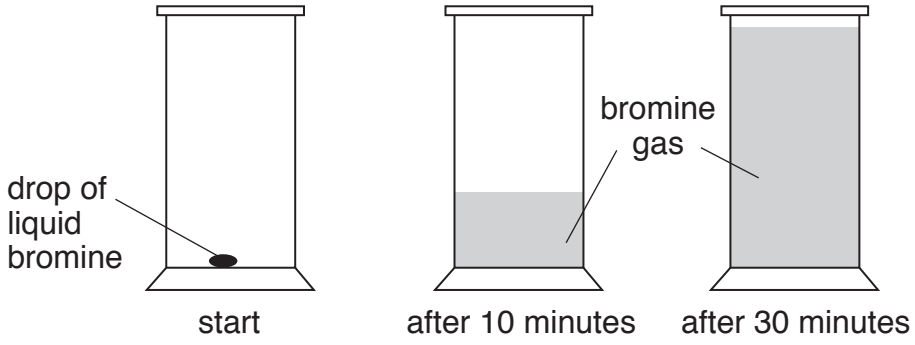
(a) Describe the arrangement and movement of particles in a liquid such as bromine.

.....

..... (2)

A drop of bromine was put at the bottom of a jar and a lid placed on the jar.

The bromine turned into a pale red gas which spread through the jar in about 30 minutes.



(b) (i) State the name given to the change from liquid to gas.

..... (1)

(ii) Explain, in terms of particles, why the bromine gas is a much paler red colour than the liquid.

..... (1)

(c) (i) Give the name which is used to describe the spreading out of a gas.

..... (1)

(ii) Explain why the gas spreads out.

.....

..... (2)

(iii) Suggest why the gas spreads out quite slowly.

..... (1)

(Total marks: 60)