

SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

CHEMISTRY

Practice Paper 2008–2009

Please read this information before the examination starts.

- This examination is 40 minutes long.
- The answers should be written on the question paper.
- Answer **all** the questions.
- Calculators may be required.

1. Underline the word or phrase which best completes each of the following:

(a) A gas which burns with a 'pop' is

carbon dioxide hydrogen nitrogen sulphur dioxide

(b) A substance changes colour from blue to pink when water is added. The substance could be

anhydrous cobalt chloride anhydrous copper sulphate
copper oxide limewater

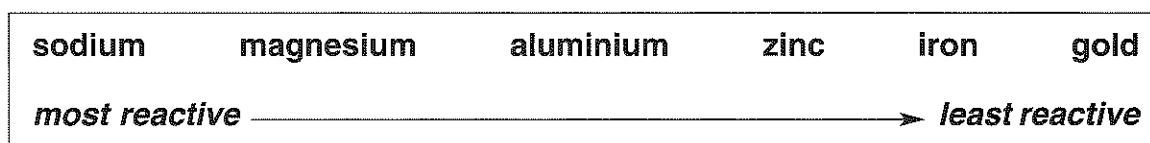
(c) A substance which is **not** a fossil fuel is

coal hydrogen natural gas petrol

(d) Air is best described as

a compound an element a mixture of elements and compounds a mixture of elements only

(e) Zinc is a metal which is placed in the reactivity series as shown:



Therefore, a substance which will react with zinc is

aluminium oxide iron oxide magnesium sulphate sodium oxide

(5)

2. Below is a list of substances all containing copper:

copper oxide	copper carbonate	copper sulphate	copper
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(a) Write down the name of the substance from the list above which

(i) produces a blue solution when dissolved in water.

.....

(ii) is a compound of two elements.

.....

(iii) is formed when copper oxide is heated in a test tube with carbon.

.....

(3)

(b) Suggest why copper is used for making water pipes in houses.

.....

.....

(1)

(c) (i) Describe a simple experiment which would show how a solution of dilute sulphuric acid may be used to show the difference between copper carbonate and copper oxide.

.....

.....

(1)

(ii) Describe and explain what you would expect to see.

.....

.....

.....

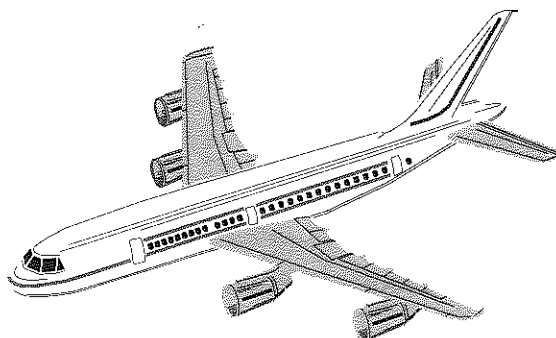
.....

(3)

3. The fuel for jet engines in aircraft is a mixture of hydrocarbons. Jet fuel is a liquid which boils between 80 °C and 120 °C.

In a jet engine, the fuel burns to produce

- carbon dioxide
- water
- heat energy



(a) What do you understand by the word *hydrocarbon*?

.....
.....

(2)

(b) What is the evidence above that jet fuel is a **mixture** of substances?

.....

(1)

(c) (i) Complete the word equation



(1)

(ii) When flying high, jet aircraft produce vapour trails like this:



Suggest a reason why you think these vapour trails form.

.....
.....

(2)

(iii) How could you show experimentally that a sample of the exhaust gas from a jet engine contains carbon dioxide?

test:

expected result:

(2)

(iv) Why are we becoming increasingly concerned about the amount of carbon dioxide we are releasing into the atmosphere?

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

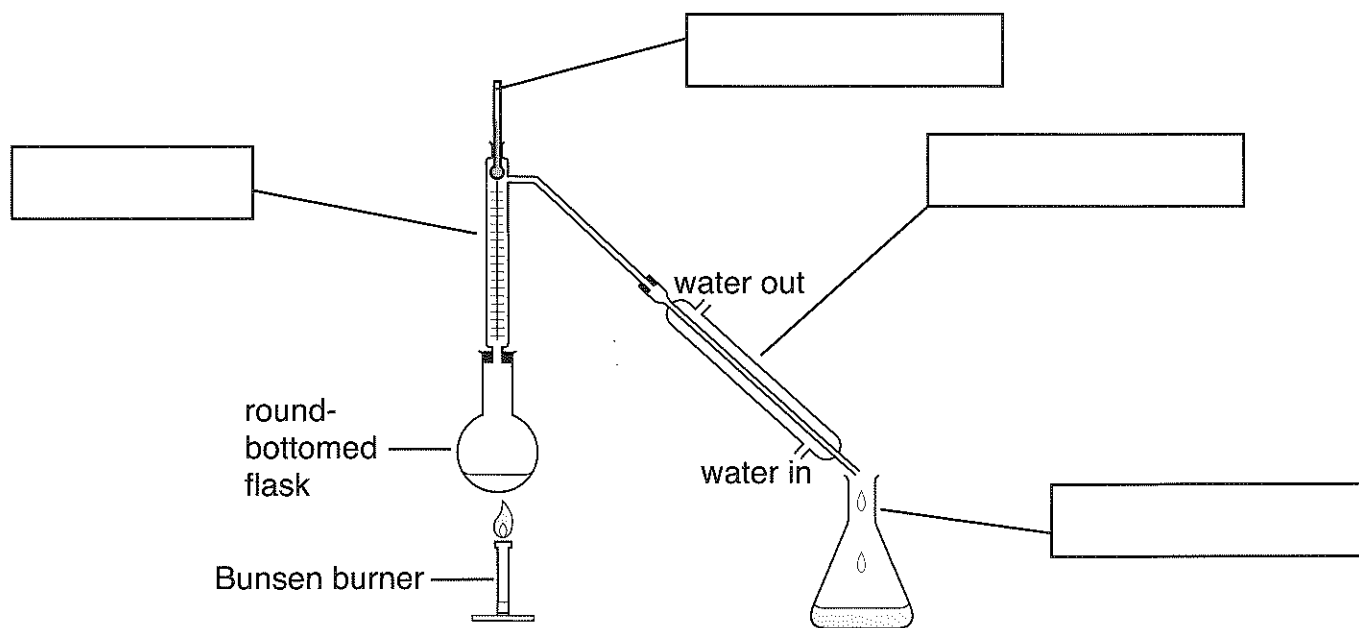
(2)

(d) Why would it not be possible to use a jet engine on a spacecraft to take a man to the Moon?

.....
.....

(1)

4. The apparatus below can be used to separate some liquid mixtures.

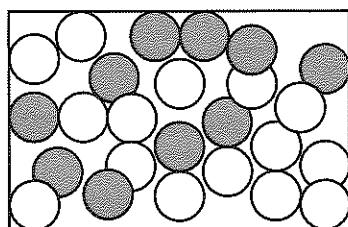


(a) Write, in the four boxes above, the name of each piece of apparatus shown. (4)

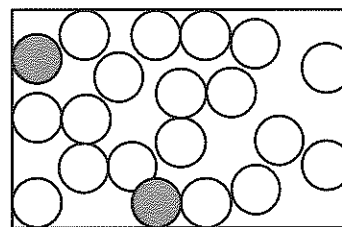
(b) What is the name of the separation technique shown?

..... (1)

The first diagram shows particles of liquids **A** and **B** in the round-bottomed flask, before separation takes place. The second diagram shows the particles in the liquid collected after the separation.



before separation



after separation

● is a molecule of **A**, and ○ is a molecule of **B**

(c) Show, by calculation, that the percentage of molecules of **A** in the starting mixture is 40%.

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

(2)

(d) The liquid collected was not pure **B**.

(i) How can you tell from the diagrams that it was not pure?

.....

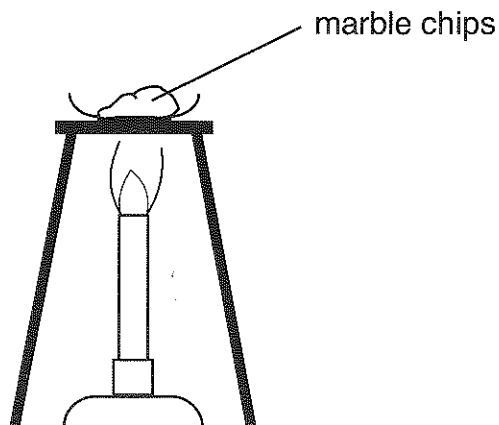
(1)

(ii) Suggest a way in which the liquid collected could be made purer.

.....
.....

(1)

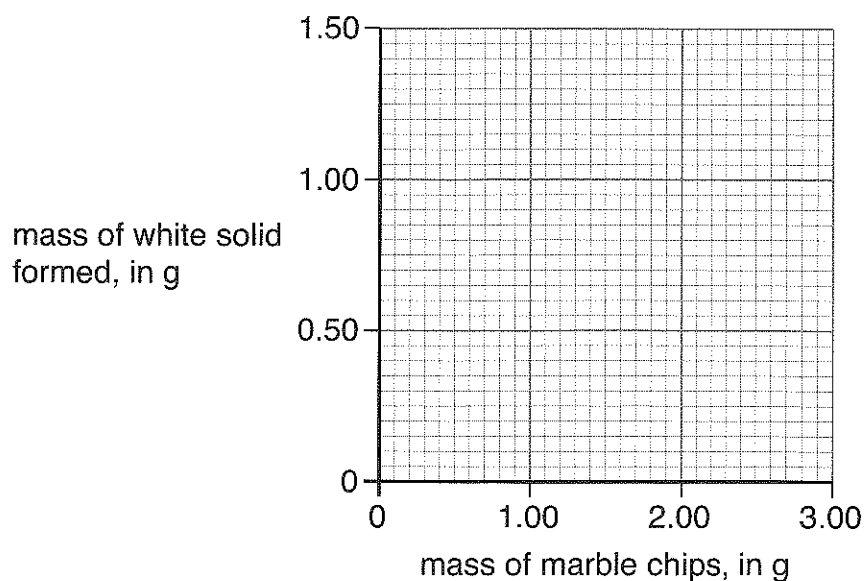
5. Marble chips (calcium carbonate), when heated strongly, will form a new white powder as one of the products. An experiment was carried out to see how the mass of product changed when different masses of marble chips were heated.



The following results were obtained:

mass of marble chips, in g	mass of white solid formed, in g
0.30	0.17
0.80	0.45
1.25	0.70
1.60	1.00
2.00	1.12
2.40	1.35

(a) Plot these results on the grid below.



(2)

(b) On the graph, circle the result which does not fit the pattern. (1)

(c) Suggest one **experimental** reason why this result may have been incorrect.

..... (1)

(d) Draw a line of best fit through the other five points. (1)

(e) Complete the word equation below which shows what is happening in the reaction:

calcium carbonate → + **carbon dioxide gas** (1)

(f) Explain why the mass of white solid formed is always less than the mass of the marble chips which was being heated.

.....
..... (1)

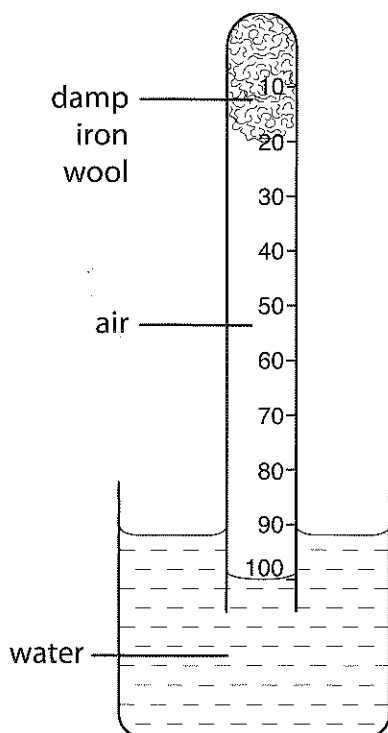
(g) (i) Use your graph to determine the mass of white solid which would form if marble chips of mass 1.90 g were heated.

..... (1)

(ii) Then calculate the mass of carbon dioxide gas given off when 1.90 g of marble is heated.

..... (1)

6. Some damp iron wool was pushed down to the end of a long test tube which holds about 100 cm³ of air. The tube was held upside down in a beaker of water as shown in the diagram.



After a few days, the iron wool had rusted and the water level had risen up the tube.

- (a) (i) What would be the appearance of the rusted iron wool?

..... (1)

- (ii) Which gas in the air has reacted with the iron?

..... (1)

- (b) (i) Explain why the water level in the tube changed.

..... (1)

- (ii) Show on the diagram to where the water level would have risen.

(1)

- (iii) Explain why you think it would rise to this level.

..... (1)

(c) The gas in the tube was tested with a burning splint. What would you expect to happen?

..... (1)

(d) When the experiment was repeated using copper instead of iron, the water level did not rise at all. Explain why this was so.

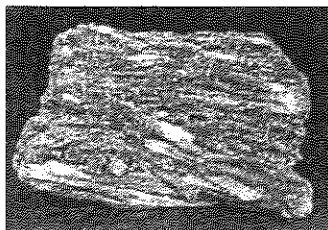
.....
..... (2)

(e) State two practical ways in which an iron object can be prevented from rusting.

1:

2: (2)

7. Antimony is an element which has a melting point of $631\text{ }^{\circ}\text{C}$ and a boiling point of $1635\text{ }^{\circ}\text{C}$. The picture below shows a lump of antimony.

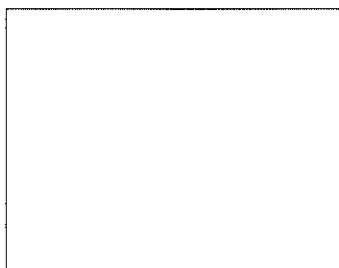


Some antimony was heated to a temperature of $1000\text{ }^{\circ}\text{C}$.

- (a) Underline the physical state of antimony at $1000\text{ }^{\circ}\text{C}$.

gas **liquid** **solid** (1)

- (b) Draw in the box below to show the arrangement of the particles of antimony at $1000\text{ }^{\circ}\text{C}$.



(2)

Richard heats some antimony in pure oxygen to make a new solid substance. He records the mass of the antimony and the mass of the solid product formed.

The solid product is then added to water and some pH indicator added. The indicator turns blue when it is added to water.

- (c) Suggest the name of the new substance formed.

..... (1)

- (d) Explain what happens to the mass of the antimony as it forms the new compound.

.....
..... (2)

- (e) Use the information above to deduce whether antimony is a metal or a non-metal element. Explain your choice.

.....
..... (2)

(Total marks: 60)