# EXETER SCHOOL

## 14+ Entrance Examination

# CHEMISTRY

**30 minutes**

*Name* .....

1. Underline the word or phrase which best completes each sentence.

(a) A substance which is a mixture and not a compound is

air ethanol salt water.

(b) A substance which gives off hydrogen when added to water is

calcium copper iron sulphur.

(c) When aluminium powder and solid iodine are mixed together and heated, a vigorous reaction occurs. The name of the product is

aluminium iodate iodine aluminate

aluminium iodide iodine aluminide.

(d) A possible remedy for acid indigestion is to take

lemon juice magnesium hydroxide sodium hydroxide vinegar.

(e) When the hydrocarbons in camping gas are burnt **completely** one of the products is

carbon monoxide hydrogen soot water.

(f) An element which forms an oxide which turns Universal Indicator solution blue is

calcium carbon copper sulphur.

(g) A gas which relights a glowing splint is

carbon dioxide hydrogen nitrogen oxygen.

(h) A gas which turns limewater milky is

carbon dioxide hydrogen nitrogen oxygen.

(i) Salt, when it is dissolved in water, is referred to as the

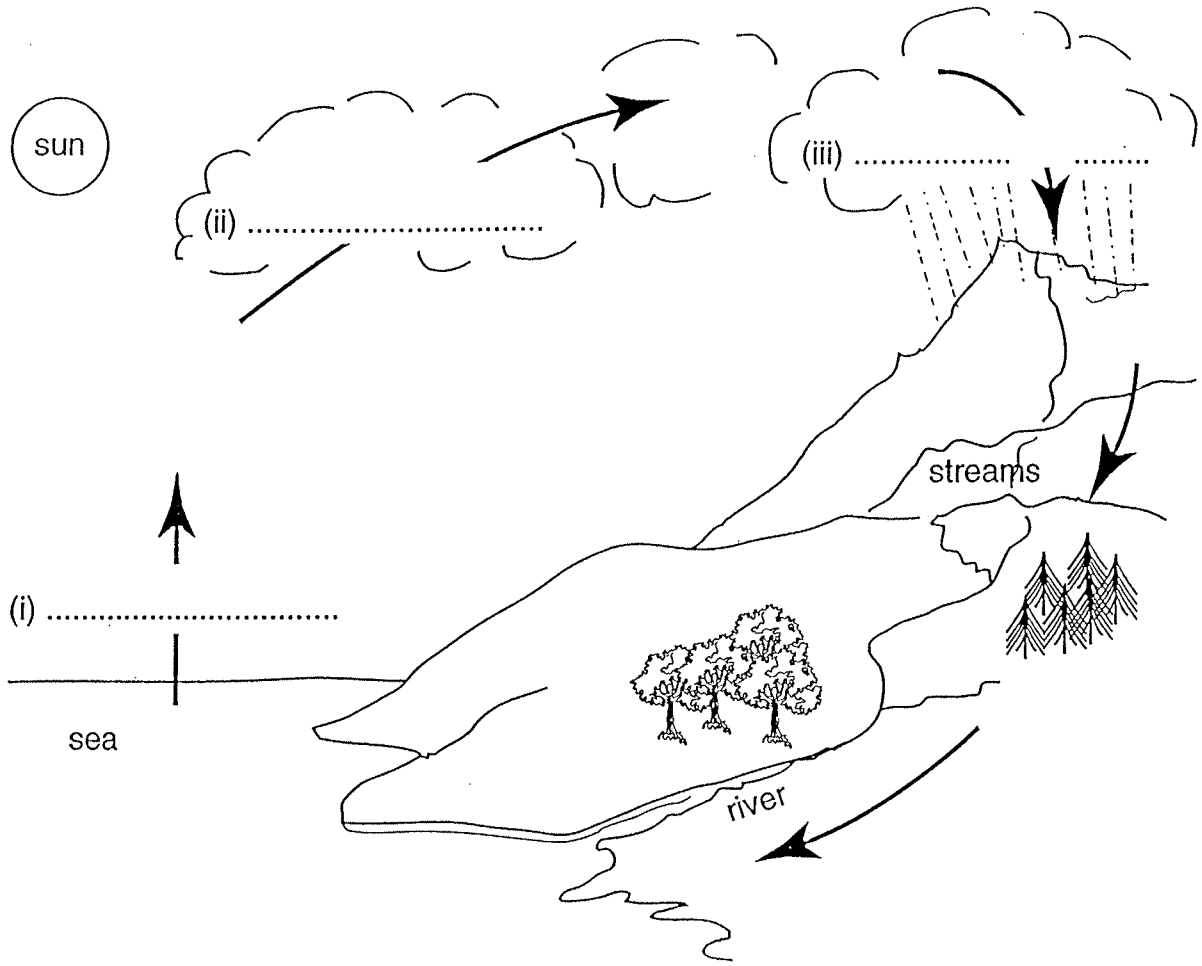
distillate solute solution solvent.

(j) A property which shows that sodium is a metal is that it

**burns in air** **conducts electricity** **has a low melting point** **is soft.**

(10)

2. This diagram shows the water cycle.



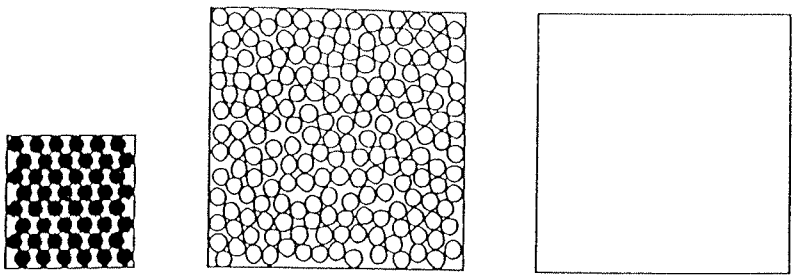

(a) Choose words from the list below to label the arrows (i), (ii) and (iii) correctly.

**condensation** **evaporation** **sublimation**

**decomposition** **precipitation** (3)

(b) Place an X on the diagram where the water is **least pure.** (1)

3. Look at these diagrams of the molecules of sugar in box A and of water in box B. In box C draw the molecules in sugar solution. (You need not fill box C completely with molecules.)



A B C

(2)

4. A burning candle is covered with a gas jar. It burns for a while and then goes out. A little condensation forms on the sides of the jar.

(a) Which gas in the air enables the candle to burn?

..... (1)

(b) Why does the candle go out?

..... (1)

(c) Explain the formation of condensation on the sides of the jar.

.....

..... (2)

5. Coal is burnt in power stations to generate electricity. Some substances in the flue gases which pass up the chimney lead to air pollution and, eventually, to the formation of acid rain.

(a) (i) Name **two** pollutants which can arise from the burning of coal.

1. ..... (1)

2. ..... (1)

(ii) Name **one** pollutant which causes acid rain.

..... (1)

(iii) Give **one** effect of acid rain.

..... (1)

6. Write a word equation to describe the reaction taking place when carbon and copper oxide are heated together.

carbon + copper oxide ⟶ ..... + .....

Which of the reacting substances has been oxidised?

..... (3)

7. State which gas or vapour (if any) you would expect to get when heating the following substances.

(a) hydrated copper sulphate

..... (1)

(b) magnesium oxide

..... (1)

(c) copper carbonate

..... (1)

(d) potassium manganate(VII)

..... (1)

8. Here are four metals in order of their reactivity (the most reactive first).

**magnesium zinc iron copper**

(a) Which metal is the most difficult to extract from its ore?

..... (1)

(b) What, if anything, will be produced when

(i) magnesium powder is added to iron(II) sulphate solution

.....

(ii) zinc powder is heated with magnesium oxide

.....

(iii) iron filings are heated with copper oxide?

..... (5)

(c) Aluminium powder, mixed with iron oxide, has been used to produce a lump of iron to weld railway lines together. What does this tell you about the reactivity of aluminium compared with that of iron?

..... (1)

Answer the following questions in the spaces provided.

9 Sodium hydrogen carbonate, known as bicarbonate of soda, is used in anti acid tablets and in the kitchen as baking powder.

(i) Explain why it is used in anti acid tablets.

(3)

(ii) Explain why it is used in baking powder.

(3)

(iii) Explain why sodium carbonate is **not** used in anti acid tablets.

(2)

(iv) Explain why sodium carbonate is **not** used in baking powder.

(2)

(v) Suggest the identity of the gas produced when acid is added to both solutions.

(2)

10 Another important carbonate is calcium carbonate, found as the sedimentary rocks limestone and chalk.

(i) Name another rock form of calcium carbonate

(1)

(ii) When heated, limestone undergoes thermal decomposition. Explain what is meant by thermal decomposition.

(2)

Name the products of the decomposition.

(2)

11 An element Y, when heated in air, gains in weight to form a white powder Z which partially dissolves in water to form an alkaline solution.

(i) Suggest a possible identity for Y .....

(ii) Suggest a possible identity for Z .....

(iii) Give reasons for your answers.

.....

.....

.....

.....

(4 marks)

12 Complete the following word equations; write down "no reaction" if the reaction will not proceed.

Magnesium + copper oxide —>

Zinc + iron (II) sulphate —>

Copper + lead oxide —>

Iron + hydrochloric acid —>

Calcium + water —>

(10 marks)