1 **(a)** Describe a chemical test which shows the presence of water.

test .....

colour change if water is present .....

..... [3]

(b) How could you show that a sample of water is pure?

.....[1]

(c) Describe how water is treated before it is supplied to homes and industry.

.....

..... [2]

(d) State **two** industrial uses of water.

.....

..... [2]

[Total: 8]

2 **(a)** Water is needed for industry and in the home.

(i) Rain water is collected in reservoirs. How is it treated before entering the water supply?

.....

..... [2]

(ii) State **two** industrial uses of water.

.....

..... [2]

(iii) State **two** uses of water in the home.

.....

..... [1]

(b) In many regions, drinking water is obtained by the distillation of sea-water. Explain how distillation separates the water from sea-water.

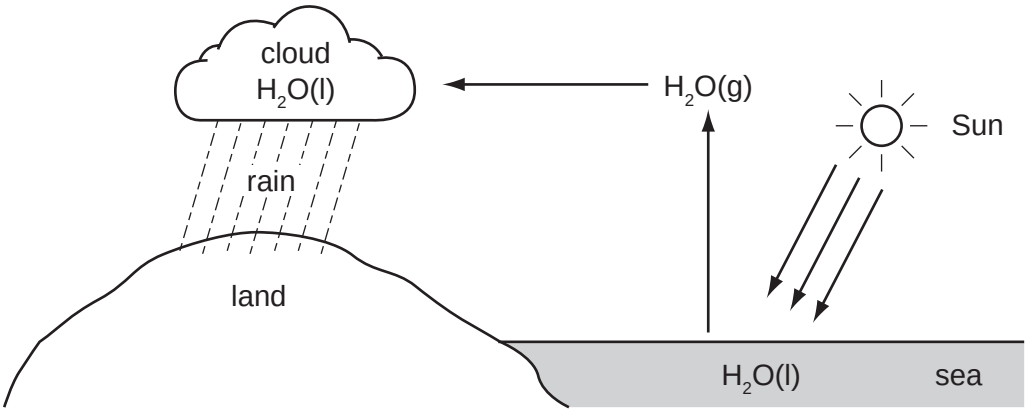
.....

.....

..... [2]

[Total: 7]

3 The diagram below shows part of the Water Cycle.



(a) State the name of each of the following changes of state.

$$H_2O(l) \rightarrow H_2O(g)$$

name .....

$$H_2O(g) \rightarrow H_2O(l)$$

name .....
[2]

(ii) Which **one** of the above changes of state is exothermic? Explain your choice.

.....

..... [1]

(b) The rain drains into rivers and then into reservoirs. Describe how water is treated before it enters the water supply.

.....

..... [2]

(c) Explain how acid rain is formed.

.....

.....

.....

..... [4]

(ii) Fish live in water which is neutral (neither acidic nor alkaline). Acid rain decreases the pH of water in lakes and rivers. Both of the bases, calcium oxide and calcium carbonate, can neutralise this acid and increase the pH. Explain why calcium carbonate is a better choice.

.....

..... [2]

[Total: 11]

4 Ozone is a form of oxygen. Ozone is present in the upper atmosphere and it prevents dangerous solar radiation from reaching the Earth's surface. Some of the chemicals that diffuse into the upper atmosphere decompose ozone. Chemicals that have this effect are methane (CH_4), chloromethane (CH_3Cl) and an oxide of nitrogen (NO_2).

(i) Which of these three chemicals diffuses the most slowly? Give a reason for your choice.

.....

.....

..... [2]

(ii) Chloromethane is formed when seaweed decomposes. Name the compounds in the environment from which seaweed might have obtained the following elements:

carbon; .....

hydrogen; .....

chlorine. ..... [3]

(iii) How can chloromethane be made from methane?

reagent .....

condition ..... [2]

(iv) The oxides of nitrogen are atmospheric pollutants. Describe how they are formed.

.....

.....

..... [2]

(v) Complete the equation for the decomposition of ozone.

..... $O_3 \rightarrow$ .....

[2]

[Total: 11]

5 **(a** The major gases in unpolluted air are 79 % nitrogen and 20 % oxygen.

(i) Name another gaseous element in unpolluted air.

..... [1]

(ii) Name **two** compounds in unpolluted air.

..... [2]

(b) Two common pollutants in air are carbon monoxide and the oxides of nitrogen.

(i) Name another pollutant in air.

..... [1]

(ii) Describe how carbon monoxide is formed.

.....

.....

..... [2]

(iii) How are the oxides of nitrogen formed?

.....

.....

..... [2]

(iv) Explain how a catalytic converter reduces the emission of these two gases.

.....

.....

..... [2]

[Total: 10]

6 This question is concerned with the following oxides.

sulfur dioxide
carbon monoxide
lithium oxide
aluminium oxide
nitrogen dioxide
strontium oxide

(a) Which of the above oxides will react with hydrochloric acid but not with aqueous sodium hydroxide?

..... [1]

(ii) Which of the above oxides will react with aqueous sodium hydroxide but not with hydrochloric acid?

..... [1]

(iii) Which of the above oxides will react with both hydrochloric acid and aqueous sodium hydroxide?

..... [1]

(iv) Which of the above oxides will not react with hydrochloric acid or with aqueous sodium hydroxide?

..... [1]

(b) Two of the oxides are responsible for acid rain.
Identify the **two** oxides and explain their presence in the atmosphere.

.....

.....

.....

.....

..... [5]

(c) Lithium oxide is an ionic compound.

(i) Identify another ionic oxide in the list on page 3.

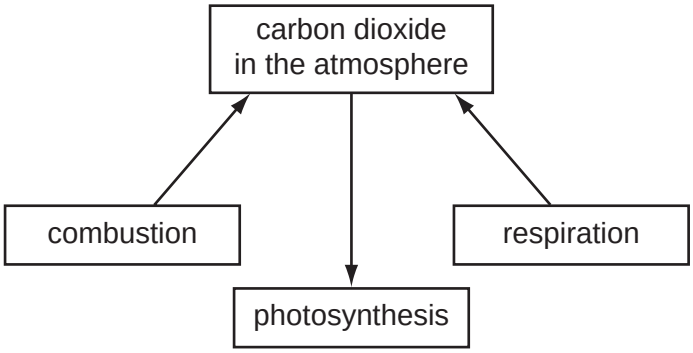
..... [1]

(ii) Draw a diagram which shows the formula of lithium oxide, the charges on the ions and the arrangement of the valency electrons around the negative ion.
Use x to represent an electron from an atom of oxygen.
Use o to represent an electron from an atom of lithium.

[2]

[Total: 12]

7 The diagram shows part of the carbon cycle. This includes some of the processes which determine the percentage of carbon dioxide in the atmosphere.



(i) Carbon dioxide is one greenhouse gas. Name another one.

..... [1]

(ii) Explain the term *respiration* and how this process increases the percentage of carbon dioxide in the atmosphere.

.....

.....

..... [3]

(iii) Explain why the combustion of waste crop material should not alter the percentage of carbon dioxide in the atmosphere.

.....

..... [2]

(iv) In 1960 the percentage of carbon dioxide in the atmosphere was 0.032% and in 2008 it was 0.038%. Suggest an explanation for this increase.

.....

..... [2]

[Total: 8]