The air

Air is all around us, and because we cannot see it, we often take it for granted. At times we may forget it is there. Air is, however, needed by every living thing.

Air is a mixture of several different gases. The amount of each gas varies very slightly. 99 per cent of the air is made up from just two gases, nitrogen and oxygen.

Air also contains a variable amount of water vapour. The humidity is a measure of how much water vapour there is in the air.

Respiration is an oxidation reaction. It is the oxidation of carbohydrates and takes place in all living things. The purpose of respiration is to provide energy.

Carbohydrates are chemicals made from the elements carbon, hydrogen and oxygen. Starch and sugar are examples of carbohydrates.

One of the simplest sugars is called glucose.

When glucose is oxidised, carbon dioxide and water are produced.

Photosynthesis is a process that takes place in all green plants. In the presence of sunlight, green plants convert carbon dioxide and water into carbohydrates and oxygen. The reaction is the reverse of respiration. Chlorophyll – the green colour in plants – is a catalyst. So while it is light, all green plants are using up carbon dioxide and making oxygen.

Respiration and photosynthesis maintain fairly constant percentages of oxygen and carbon dioxide in the air.

Nitrogen makes up about 80% of the air. It is essential to all living things as it is in all proteins. Proteins are body buildings materials. As an element, however, nitrogen is very unreactive and only a few other elements will combine with it directly.

Unfortunately animals and most plants cannot use nitrogen gas from the atmosphere directly. Plants must have their nitrogen combined with oxygen in the form of nitrates which they absorb from the soil. Animals get theirs by eating plants. In this way nitrogen passes along food chains. Eventually, nitrogen passes back into the air. The circulation of nitrogen compounds in the environment is called nitrogen cycle. Some plants have nitrogen-fixing bacteria in their roots which enable them to use nitrogen gas from the air. The bacteria convert the atmospheric nitrogen into compounds that the plant can make use of.

Plants are either eaten by animals or die and decay in the soil. Animals excrete waste material containing nitrogen compounds and then die and decay. These processes all return nitrogen compounds to the soil.

In the soil, bacteria convert some of these compounds to ammonium compounds and nitrates. Other bacteria (denitrifying bacteria) change the nitrogen compounds back to nitrogen gas. The conversion of nitrogen into its compounds is called the fixation of nitrogen.

(from: Stone-Andrews-Williams, *Examining GCSE-Science*, Stanley Thornes Ltd.)

1 *Answer these questions about* The air.

a. What is the air made up of?

b. What are the products of the oxidation of glucose?

c. How do we get the nitrogen compounds we need?

d. What is the function of nitrogen-fixing bacteria?

e. What is the function of denitrifying bacteria?

2 *Choose the right meaning of the underlined words.*

a. We often take air for granted.
1. we are so familiar with it that we no longer appreciate its value **2.** we assume it is true

b. At times we may forget it is there.
1. always **2.** sometimes

c. Starch and sugar are examples of carbohydrates.
1. food substance found in cereals and potatoes **2.** stiffening substance

d. Green plants convert carbon dioxide and water into carbohydrates and oxygen.
1. change their religious beliefs **2.** transform

e. Nitrogen makes up about 80% of the air.
1. forms **2.**wears cosmetics

f. Proteins are body-building materials.
1. exercises to strengthen the body **2.** food substances necessary for the growth and replacement of body tissues

3 *Choose the correct option among the adjectives and adverbs in italics in the following sentences.*

a. Compounds are not *easy/easily* made back into their constituent elements.

b. It is fairly *easy/easily* to separate mixtures into their constituents.

c. In solids, particles are *close/closely* together.

d. In gases, particles are not packed *close/closely* together, they are *wide/widely* spaced.

e. There is a *wide/widely* variety of chemical substances.

f. All the atoms in an element are *chemical/chemically* the same.

g. An alkali is the *chemical/chemically* opposite of an acid.

h. Both protons and electrons have an *electric/electrically* charge.

i. All atoms are *electric/electrically* neutral.

j. Some chemical reactions take place *immediate/immediately*, whereas others are less *immediate/immediately* and take longer.

4 Oxygen, nitrogen, carbon dioxide *and* ozone *are among the gases which are all around us. Can you complete the sentences below with the name of the right gas?*

a. ..... appeared in the atmosphere of the Earth about two billion years ago when it began to arise from photosynthesis occurring in the earliest green plants.

b. ..... compounds are used to make fertilizers, explosives, dyes and drugs.

c. ..... dilutes oxygen in the air.

d. ..... forms a blanket which surrounds the earth and protects us from dangerous radiation from the sun.

e. In its liquid state ..... is used to freeze substances and to preserve biological samples (e.g. blood and semen).

f. In its solid form ..... is used to refrigerate foods.

g. ..... is a colourless gas at room temperature, it is blue in the liquid and solid states.

h. ..... is taken up by plants and converted to sugars and other substances essential for life.

i. ..... is the most abundant element on our planet.

j. ..... is used in fizzy drinks and in fire extinguishers.

k. ..... is used to provide a non-oxidising atmosphere for packaged food.

l. The layer of ..... around the Earth is being depleted because of its reactions with organic compounds deriving from human activities.