

Some Periodic Table highlights

Carbon (Group 4A) is abundant and widely distributed on our planet. *In elementary form, carbon occurs as the allotropes diamond and graphite.*

Graphite melts at the extraordinarily high temperature of 3,550 °C, so it is used to make crucibles for casting metals and to line electrical furnaces. Since it is also a reasonably good conductor of electricity, it is used to make electrodes for industrial processes. It is also soft and marks paper, so it is the 'lead' in pencils. It is commonly used as a lubricant. There are high-strength materials made by mixing graphite fibres with various plastics. You may have seen them in tennis rackets or golf clubs, but they are also used in less common places such as space shuttles and the cockpits of race cars.

The diamond allotrope has fascinated people since ancient times. Tons of diamonds are used annually, mostly *as industrial abrasives*. Natural diamonds do not completely satisfy this demand, so some diamonds are made from graphite.

Nitrogen (Group 5A) makes most of the air around us. Elemental nitrogen, N_2 , is a very useful material. *Because of its inertness, the largest quantity of gas is used to provide a non-*

oxidizing atmosphere for packaged food and wine, for example, or to pressurize cables and wires. Nitrogen is also easily converted into a liquid that is convenient to handle. In this form it may be used to freeze soft materials so they can be ground to a powder or to preserve biological specimen (e.g. blood and semen).

Oxygen (Group 6A) is the most abundant element on our planet. However elemental oxygen, O_2 , did, not appear in the atmosphere of the earth until *about two billion years ago*, when it began to arise from photosynthesis occurring in the earliest green plants.

O_2 is the most common allotrope of oxygen; ozone, or O_3 , is the other. *It is a blue gas with a strong odour. The gas is unstable with respect to decomposition back to O_2 , a reaction that is normally slow but can be speeded up by ultraviolet irradiation. These reactions occur in the stratosphere and serve not only to convert the sun's intense ultraviolet radiation to warm the earth's atmosphere but also to protect plants and animals from that radiation. Its primary use is to produce oxygen-containing compounds in industry and to purify drinking water.*

1

Ask questions to which the sentences in italics in Some Periodic Table Highlights are the answers.

2

Answer these questions about the passage Some Periodic Table Highlights.

- Can you give some examples of the different uses of graphite?
- What are some artificial diamonds made from?
- What is nitrogen used for?
- Why is nitrogen often converted into a liquid?
- What did oxygen in the earth atmosphere derive from?
- What is the main function of ozone in the stratosphere?