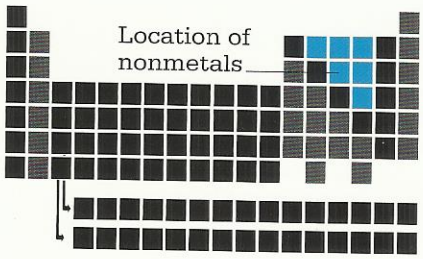
Nonmetals [Poor conductors]



PERIODIC TABLE

There are only a few nonmetals. These gases and dull, brittle materials are poor conductors of electricity and heat. But don't dismiss this bunch of elements lightly—nonmetals make up most of Earth, the atmosphere, and even your body!

15 P PHOSPHORUS

Phosphorus

There are two sides to this element. Phosphorus is used in dangerous stuff such as explosives, but it also helps build bones and form vital molecules in your body, such as the DNA in your cells.

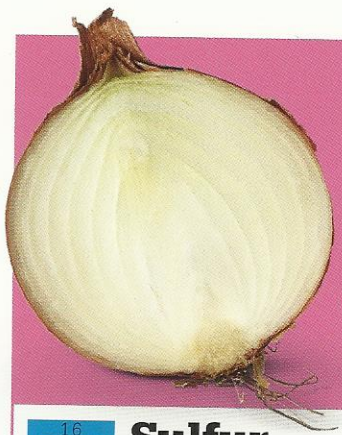
DNA molecule
This substance contains all the instructions your body needs to grow and function.

What it is	An explosive white, red, or black nonmetal
Melting point (white)	111.6°F (44.2°C)
Boiling point (white)	531°F (277°C)

Elements for growth

For healthy growth, plants need phosphorus and nitrogen, which they obtain naturally from the soil. Some farmers use fertilizers to give their crops a helping hand. The fertilizers provide extra nitrogen and phosphorus to boost plant growth.

Spreading fertilizer
Farmers sometimes use nitrogen and phosphorus in fertilizers to help their crops produce bigger harvests.



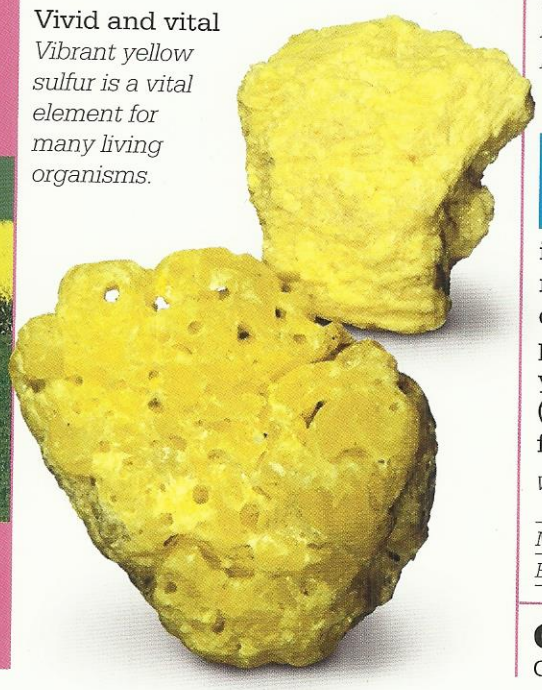
Chopped onions release sulfur compounds—they make you cry

16 S SULFUR

Sulfur

This element occurs naturally near hot springs and volcanic craters. Sulfur is used to make sulfuric acid, the most important industrial chemical.

What it is	Bright yellow crystals
Melting point	239.38°F (115.21°C)
Boiling point	832.5°F (444.72°C)



Vivid and vital
Vibrant yellow sulfur is a vital element for many living organisms.

Go nuts!
A diet that includes nuts, such as Brazils, helps you maintain your selenium levels.

34 Se SELENIUM

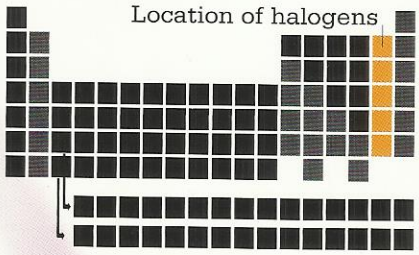
Selenium

Named after the Greek word for *moon*, selenium is a nutrient that we need in the right amount to stay healthy. A diet low in selenium causes heart problems; too much of it can make you sick. There are semiconducting (see page 73) and nonconducting forms of selenium.

What it is	A purplish-gray semimetal; also glassy black and crystalline red
Melting point	430°F (221°C)
Boiling point	1,265°F (685°C)

Other nonmetals:
Carbon (C); Oxygen (O)

Halogens [Caution required!]



PERIODIC TABLE

Everything about the halogens is intense. This is a group of colorful, feisty, nonmetallic elements on the right of the periodic table. The halogens react violently with most things, and it takes a lot of energy to break up the compounds that they form.

Evaporating iodine
When heated, iodine quickly evaporates to form a beautiful purple gas.

53 **I** IODINE

Iodine

Make sure you eat your greens—they contain lots of iodine, which helps your body develop healthily. Iodine is also a great antiseptic, used to keep wounds free from infection.

What it is	A purplish-black solid
Melting point	236.66°F (113.7°C)
Boiling point	363.7°F (184.3°C)

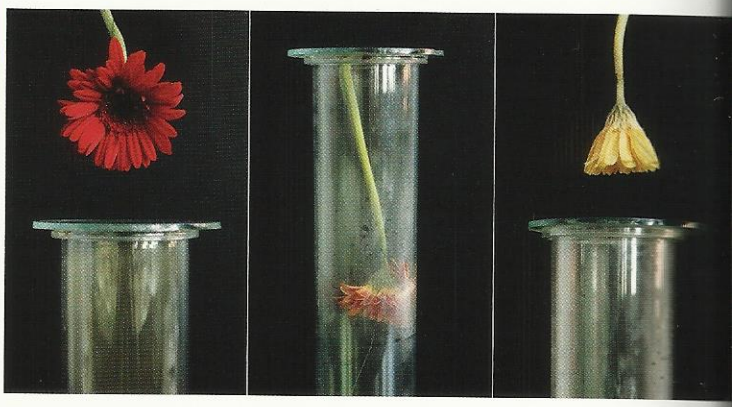
17 **Cl** CHLORINE

Chlorine

Chlorine can be lethal to living things. But tiny amounts of chlorine are added to drinking water to kill germs. It has saved millions of people from dying of waterborne diseases such as cholera and typhoid.

What it is	A pale green gas
Melting point	–150.7°F (–101.5°C)
Boiling point	–29.27°F (–34.04°C)

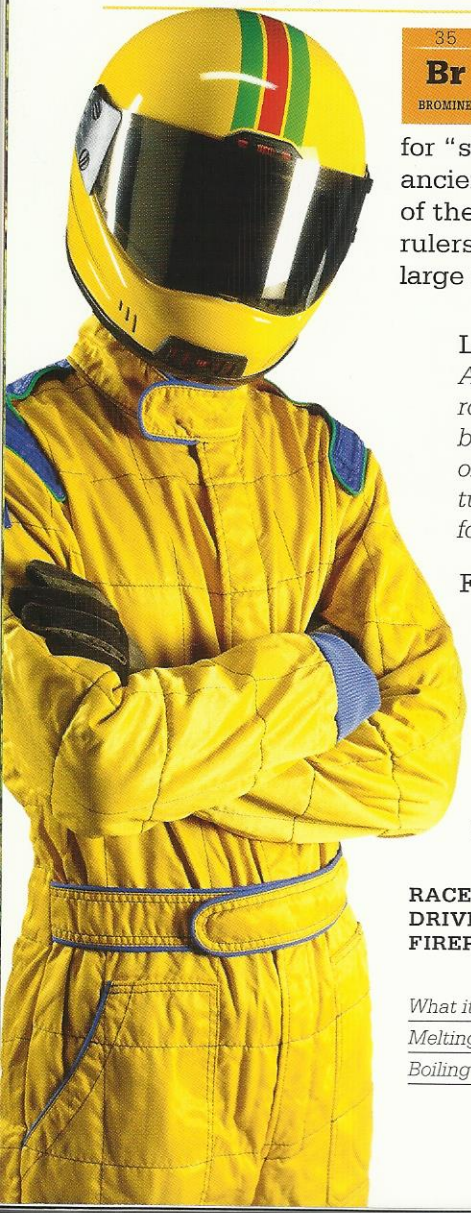
Swimming smell
Chlorine kills germs in pools, but its smell lingers in the water.



The color thief
In the presence of water, chlorine makes short work of bright colors.

1 *A wet, bright red flower is placed into a jar of chlorine gas. There is a rapid reaction.*

2 *The chlorine bleaches the color from the flower, turning it almost white.*



RACE-CAR DRIVER IN FIREPROOF SUIT

35 **Br** BROMINE

Bromine

Brown bromine stinks—its name comes from the Greek for "stench of goats"! Known since ancient times, it was an ingredient of the purple dye worn by the rulers of Rome. Bromine occurs in large quantities in the Dead Sea.

Liquid brown
Although liquid at room temperature, bromine is always on the point of turning into a foul-smelling gas.

Flame fighter
Bromine compounds are great at resisting flames, so they are used in fireproof materials.

What it is	A smoking red-brown liquid
Melting point	19°F (–7.3°C)
Boiling point	138°F (59°C)

1 oz. (30 g) of astatine exists in the crust of Earth

85 **At** ASTATINE

Astatine

One of the world's rarest elements, astatine forms only from the radioactive decay (see pages 64–65) of other elements. Astatine quickly decays after it forms—then it's gone again! It was first made artificially in 1947.

What it is	A radioactive black solid
Melting point	576°F (302°C)
Boiling point	639°F (337°C)