Section 2: Nonmetals

MAIN IDEA

Nonmetals are located on the right side of the periodic table and are generally dull, brittle, and poor conductors.

K *What I Know*	**W** *What I Want to Find Out*	**L** *What I Learned*

Essential Questions

- How do nonmetals bond?
- What properties of hydrogen make it a nonmetal?
- What are the properties and uses of the halogens?
- Why are noble gases unreactive?

Vocabulary

Review

- sublimation

New

- nonmetal
- diatomic molecule

Properties of Nonmetals

Nonmetals are elements that usually are gases or brittle solids at room temperature**.**

- Most of your body's mass is made of oxygen, carbon, hydrogen, nitrogen and phosphorus.
- Calcium, a metal, and other elements make up the remaining four percent of your body's mass.
- Sulfur, and chlorine are among these other elements found in your body.
- Most nonmetals do not conduct heat or electricity well, and generally they are not shiny.

Elements in the Human Body

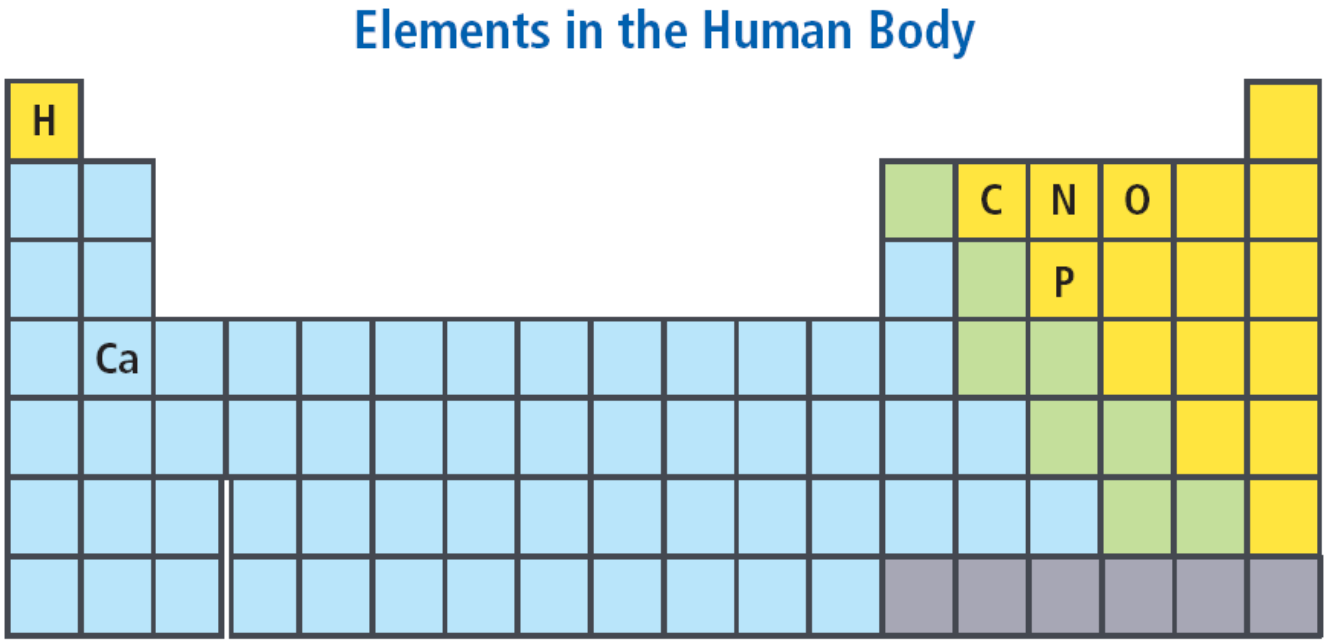
Animation

FPO

Add link to concepts in motion animation from page 526 here.

Nonmetals and the periodic table

- In the periodic table, all nonmetals except hydrogen are found at the right of the stair-step line.



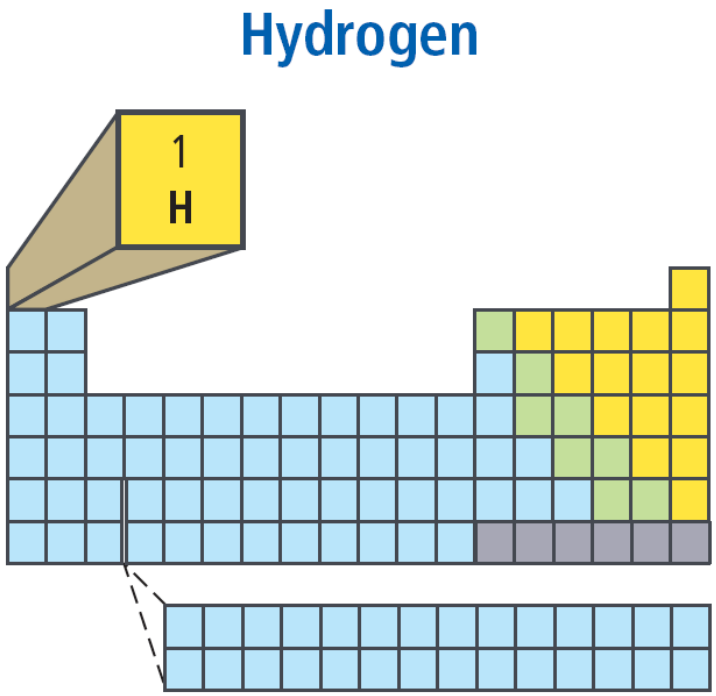
Bonding in nonmetals

- The electrons in most nonmetals cannot move freely. So, as a group, nonmetals are poor conductors of heat and electricity.
- Most nonmetals can form ionic and covalent compounds.
- When nonmetals gain electrons from metals, the nonmetals become negative ions in ionic compounds.
- When bonded with other nonmetals, atoms of nonmetals usually share electrons to form covalent compounds.

Hydrogen

A **diatomic molecule** consists of two atoms of the same element in a covalent bond.

- When water is broken down into its elements, hydrogen becomes a gas made up of diatomic molecules.

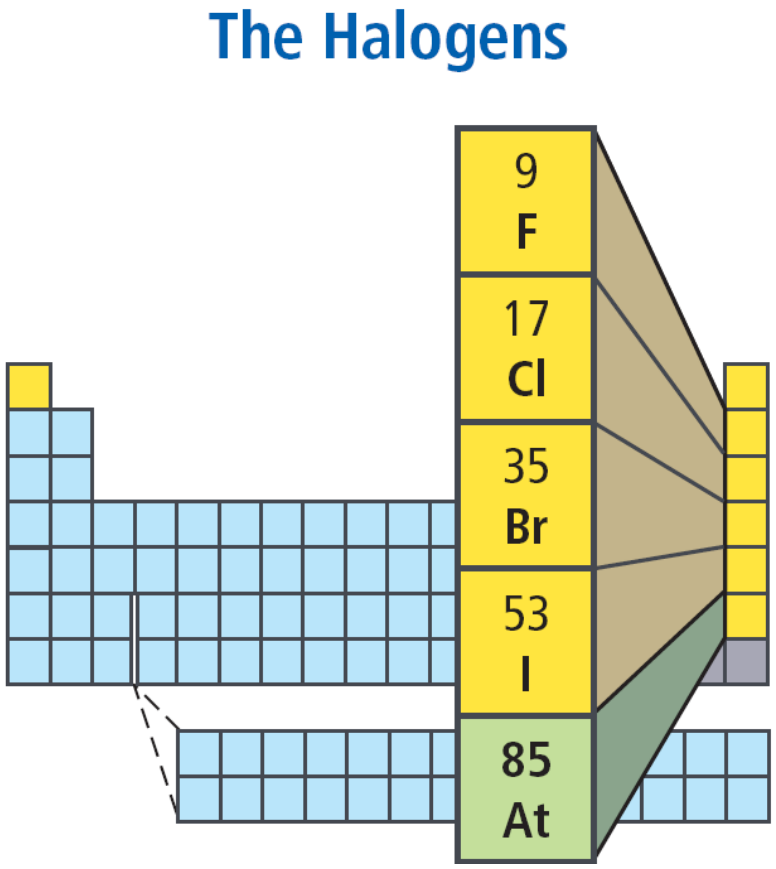


Hydrogen

- Hydrogen is highly reactive.
- A hydrogen atom has a single electron, which the atom shares when it combines with other nonmetals.
- Hydrogen can gain an electron when it combines with alkali and alkaline earth metals.
- The compounds formed are hydrides.

The Halogens

- Halogen lights contain small amounts of bromine or iodine vapor.
- Fluorine, chlorine, and astatine, are called halogens and are in Group 17.
- They are very reactive and their compounds have many uses.



The Halogens

- Because an atom of a halogen has seven electrons in its outer energy level, only one electron is needed to complete this energy level.
- If a halogen gains an electron from a metal, an ionic compound, called a salt is formed.
- In the gaseous state, the halogens form reactive diatomic covalent molecules and can be identified by their distinctive colors.
- Chlorine is greenish yellow, bromine is reddish orange, and iodine is violet.
- Fluorine is the most chemically active of all elements.

Chlorine

- Chlorine compounds are used to disinfect water.
- Chlorine, the most abundant halogen, is obtained from seawater at ocean-salt recovery sites.
- Household and industrial bleaches used to whiten flour, clothing, and paper also contain chlorine compounds.

Bromine

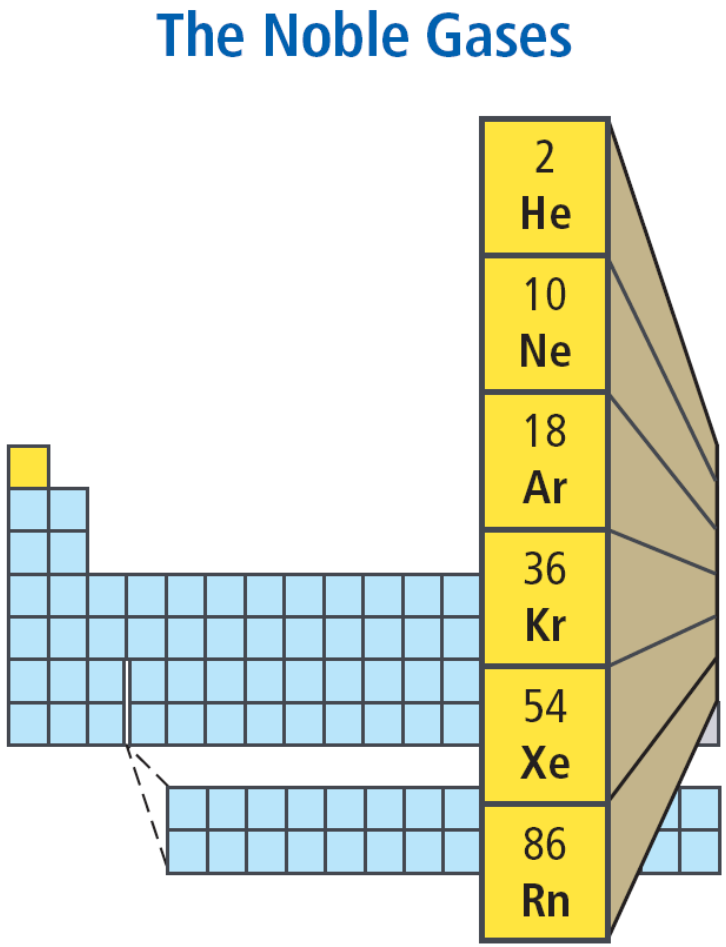
- Bromine, the only nonmetal that is a liquid at room temperature, also is extracted from compounds in seawater.
- The bromine compound ethidium bromide fluoresces and is used to stain DNA so that scientists can follow parts of the genetic code.

Iodine

- Iodine, a shiny purple-gray solid at room temperature, is obtained from seawater.
- When heated, iodine changes directly to a purple vapor.
- The process of a solid changing directly to a vapor without forming a liquid is called sublimation.

The Noble Gases

- The noble gases exist as isolated atoms.
- They are stable because their outermost energy levels are full.
- No naturally occurring noble gas compounds are known.
- The stability of noble gases is what makes them useful.



Review

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