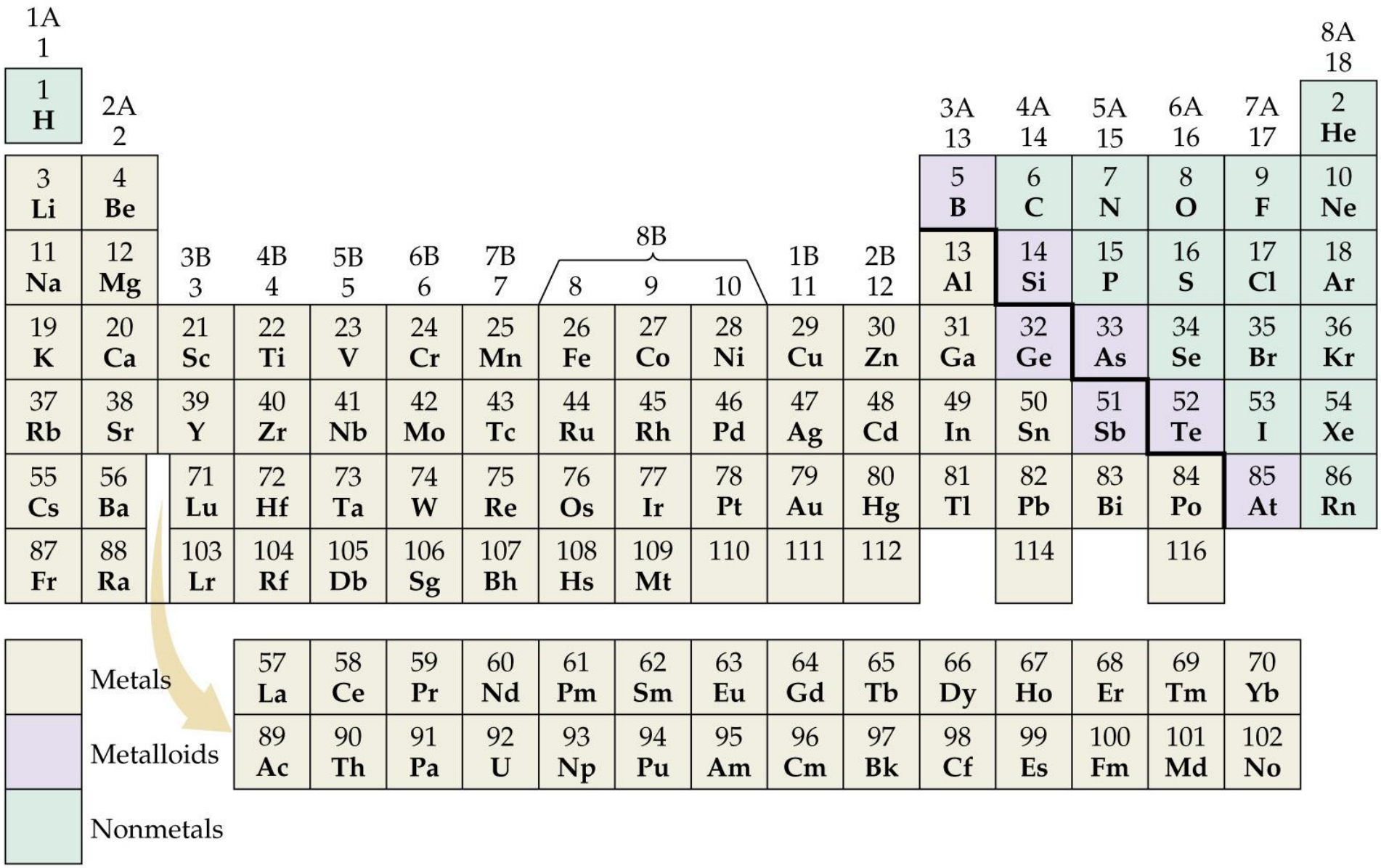
The Periodic Table



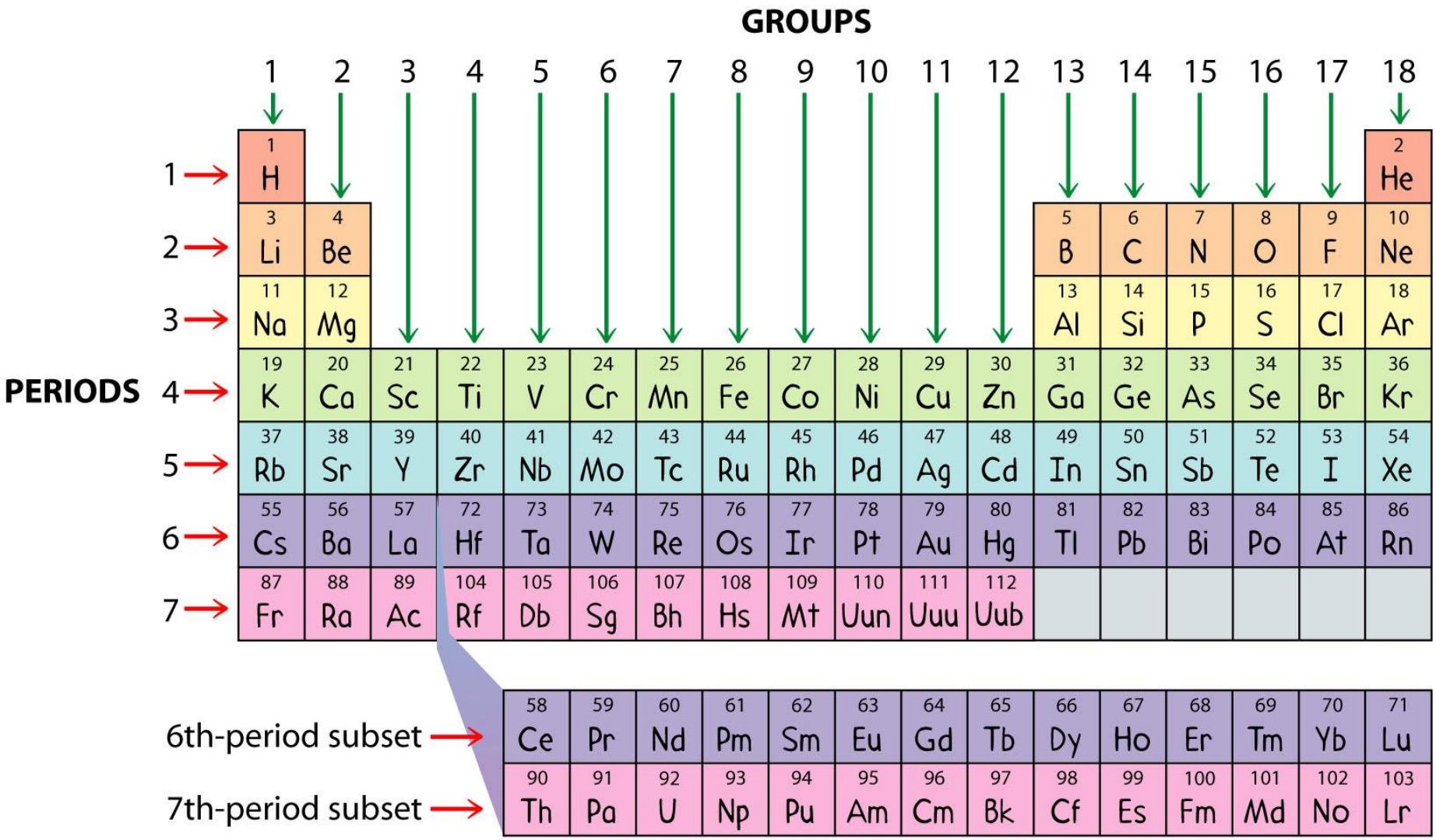
Reading the Periodic Table - The Basic

Families or groups – vertical columns **(18)**

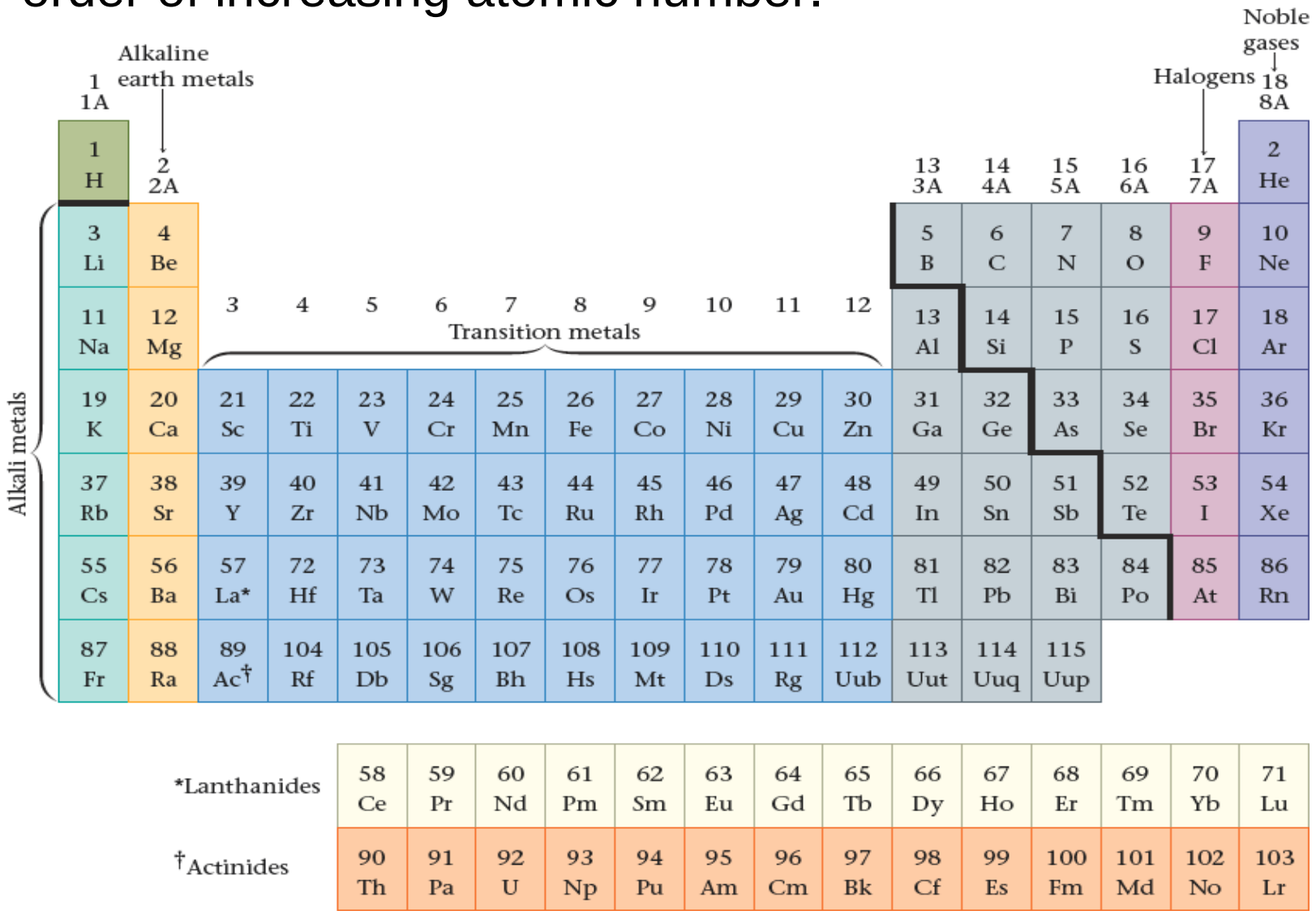
- have similar properties
- contain the same outer electron configuration
- show similar chemical behavior because it is the outer electrons involved in chemical reactions
- Various ways of labeling and naming
  - Roman numerals + letter (European)
  - Arabic numerals + letter (American)
  - Arabic numerals 1-18 (IUPAC)

Rows in the periodic table are called **periods.**

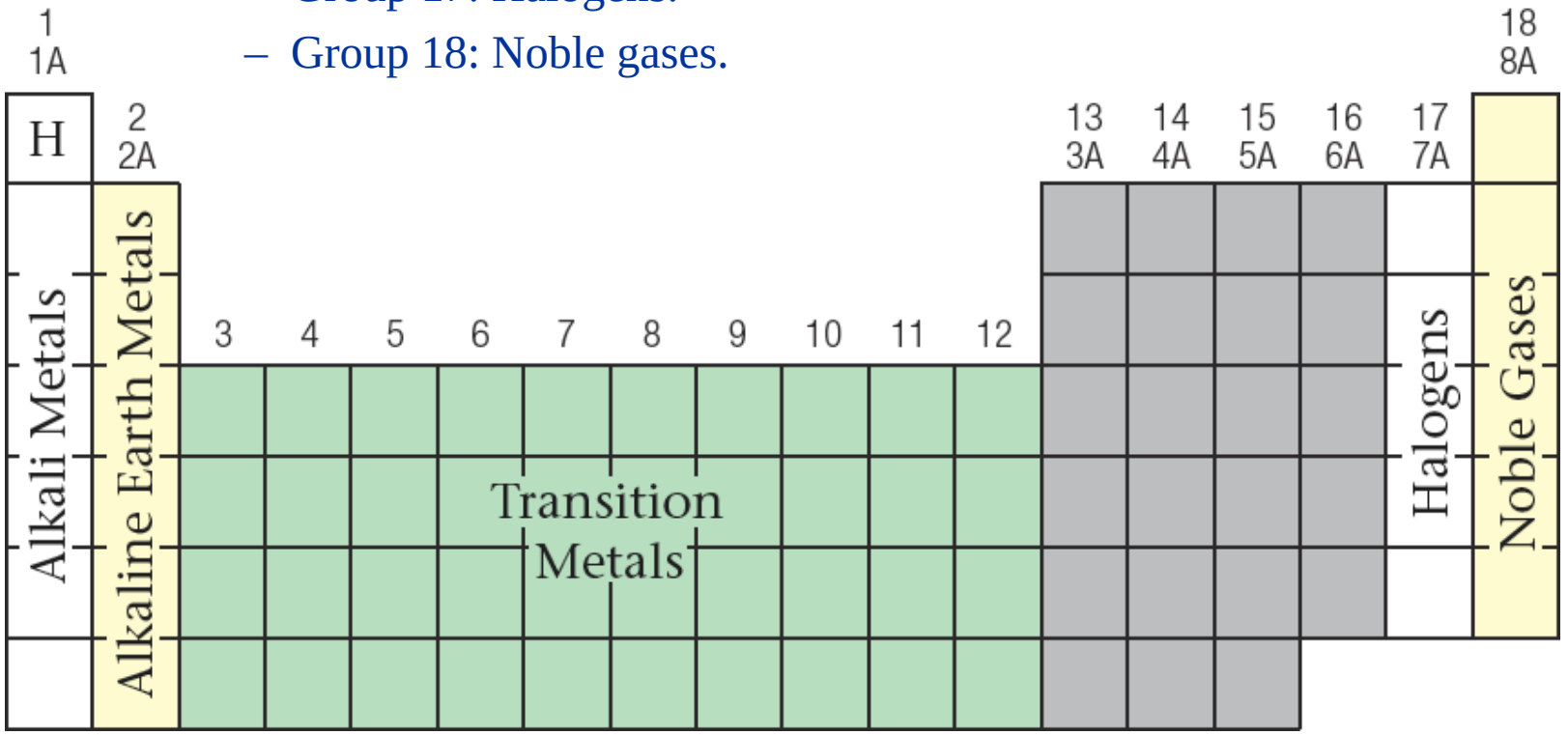
(There are 7)



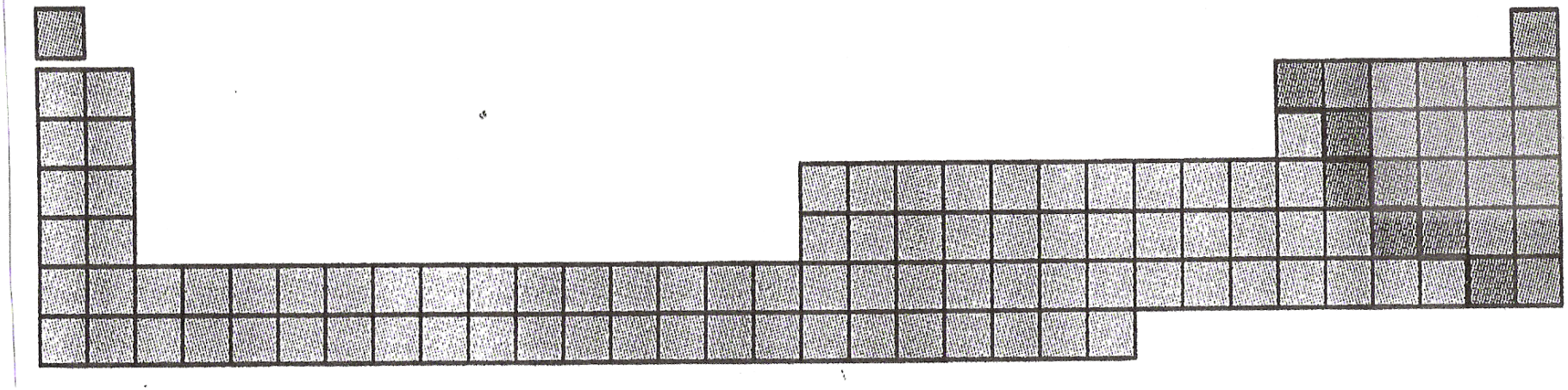
- The periodic table shows all of the known elements in order of increasing atomic number.



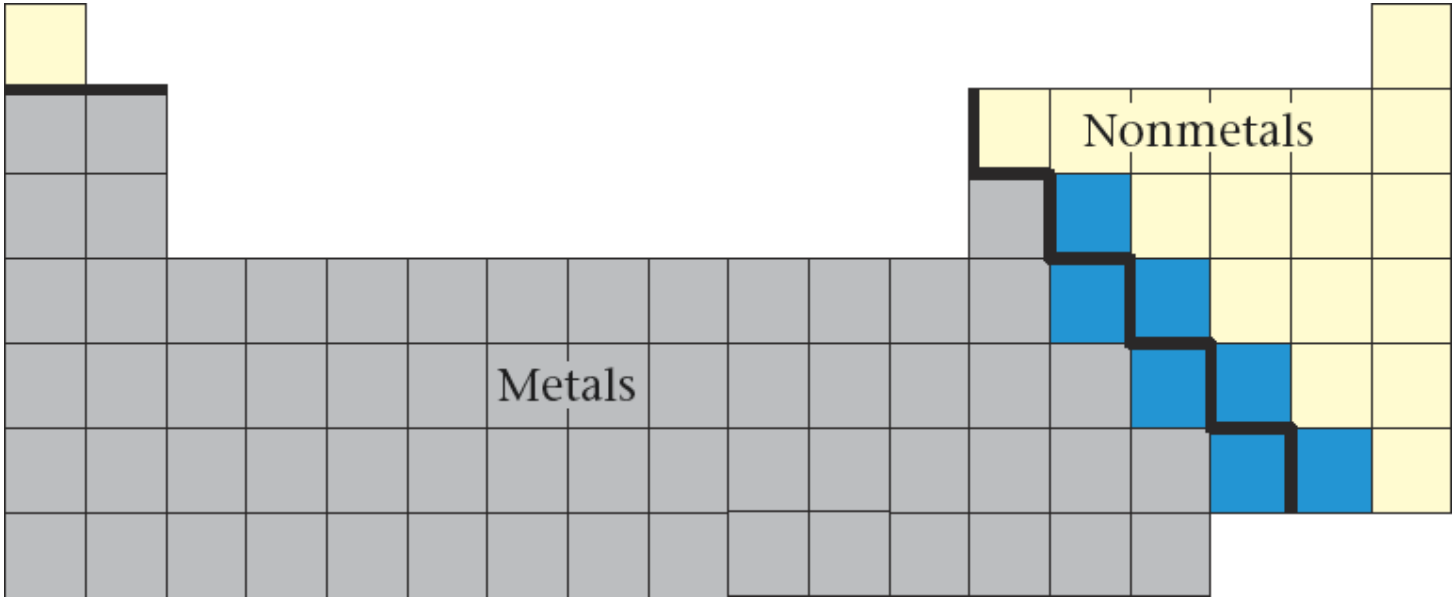
- The periodic table is organized to group elements with similar properties in vertical columns.
- Some of the groups in the periodic table are given special names.
- These names indicate the similarities between group members:
  - Group 1: Alkali metals.
  - Group 2: Alkaline earth metals.
  - Group 17: Halogens.
  - Group 18: Noble gases.



The Periodic Table with the Inner Transition Elements in Place



Patterns of Elements….



- Most elements are metals and occur on the left side.
- The nonmetals appear on the right side.
- Metalloids are elements that have some metallic and some nonmetallic properties.

Comparison of Metals and Nonmetals

Metals

- Found on the left side of the periodic table. (Most elements are metals.)

Metals tend to lose electrons!

Metallic Properties:

- *Luster*: most metals have a silvery white "metallic" color because they reflect light of all wavelengths.
- *Ductile,* (capable of being drawn out into a wire)
- *Malleable* (can be hammered into thin sheets)
- Most *semisolids* @ room T^{o}
- *High electrical conductivity & thermal conductivity*

Nonmetals

- Found on the right side of the periodic table

Nonmetals tend to gain electrons!

Nonmetallic Properties:

- *Poor reflectors of light,*
- *Hard or brittle, some are gases or soft solids*
- *Not malleable or ductile*
- *Do not conduct electricity,*
- *Poor conductor of heat*

Metalloids or Semimetals

- Found along jagged line on table
- ***Metalloids lose or gain or SHARE electrons depending on "who they're with!“***
- Mixture of both types of properties, or intermediate type

Examples: B, Si, Ge, As, Sb, Te, At
(the only metal on the solid "semimetal" line is Al.)

Natural States of the Elements

Most elements are very reactive.

Elements are not generally found in uncombined form.

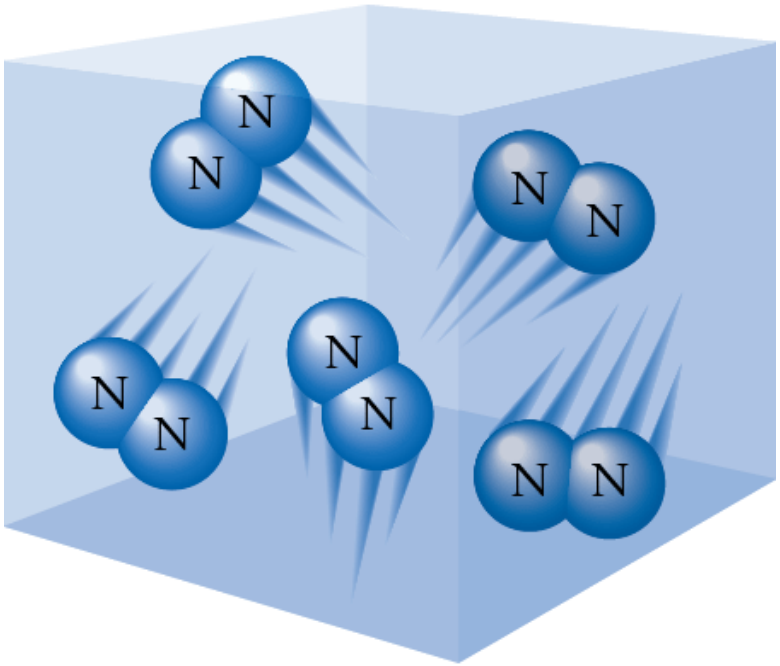
Exceptions are:

Noble metals – gold, platinum and silver

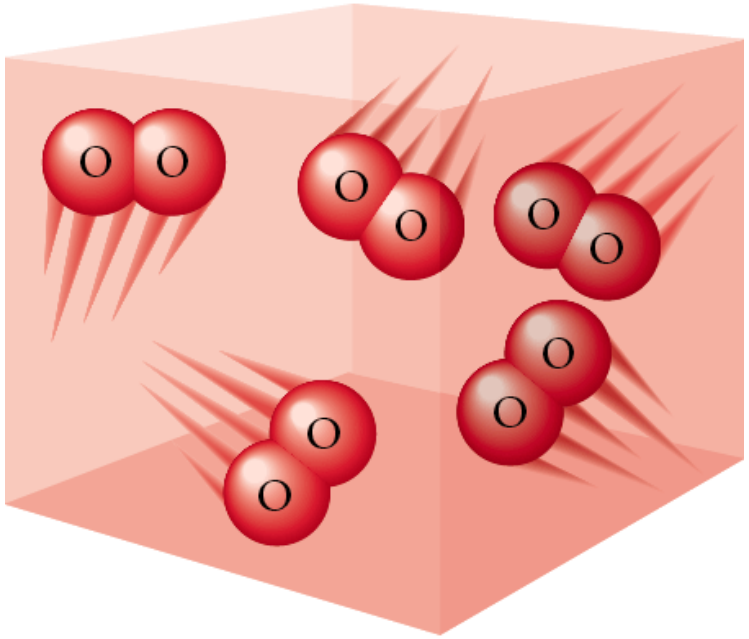
Noble gases – Group 8

B. Natural States of the Elements

- Diatomic Molecules



Nitrogen gas contains N_2 molecules.



Oxygen gas contains O_2 molecules.

B. Natural States of the Elements

- Diatomic Molecules

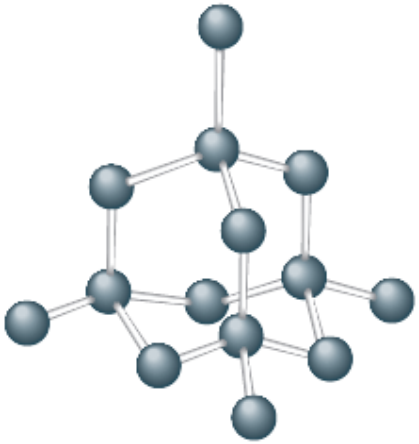
Table 3.5

Elements That Exist as Diatomic Molecules in Their Elemental Forms

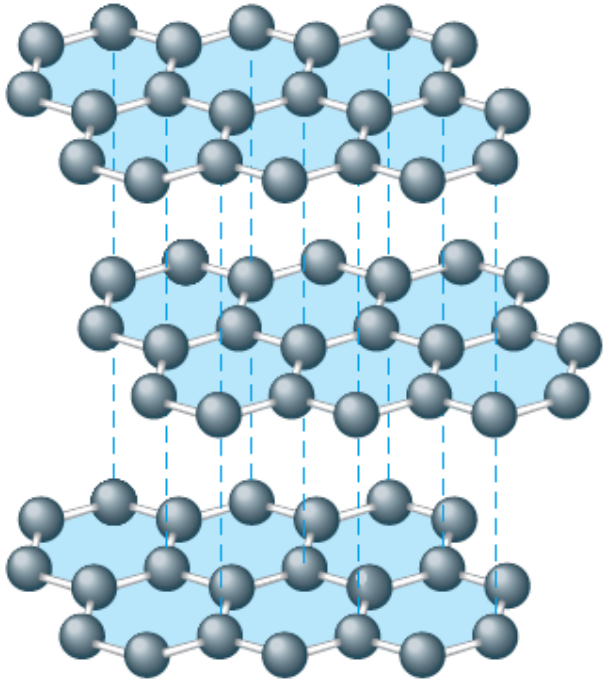
Element Present	Elemental State at 25 °C	Molecule
hydrogen	colorless gas	H_2
nitrogen	colorless gas	N_2
oxygen	pale blue gas	O_2
fluorine	pale yellow gas	F_2
chlorine	pale green gas	Cl_2
bromine	reddish-brown liquid	Br_2
iodine	lustrous, dark-purple solid	I_2

B. Natural States of the Elements

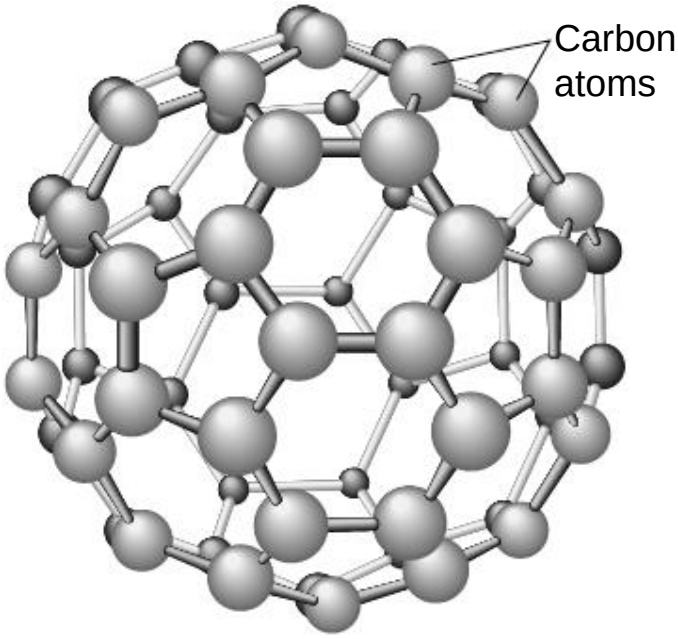
- Elemental Solids



Diamond



Graphite



Buckminsterfullerene