Earth's Chemistry

Chapter 4

Matter

Matter = the substances of which an object is made.

Matter is anything that takes up space and has mass.

Matter has 2 distinguishing properties:

- Physical --- can be observed without changing the substance. (Ex. Density, boiling point, etc.)
- Chemical --- how a substance interacts with other substances to produce different kinds of matter. (Ex. Iron interacts with oxygen to form rust)

Atomic Structure

- Smallest particle or unit of an element
- Atoms are made of smaller parts ---- protons, neutrons, and electrons
- Protons ----- positively charged
- Neutrons ---- no charge (neutral)
- Electrons ---- negatively charged
- Protons and Neutrons found in the nucleus --- **NOT ELECTRONS --- found outside in electron clouds**

Atomic number = equals the number of protons in the atom.

An uncharged atom has the same amount of protons & electrons so there's no charge. It's said to be neutral

Example --- Oxygen has an atomic number of 8 so it has 8 protons & 8 electrons

Atomic mass number = protons + neutrons

Protons & neutrons have an atomic mass of 1

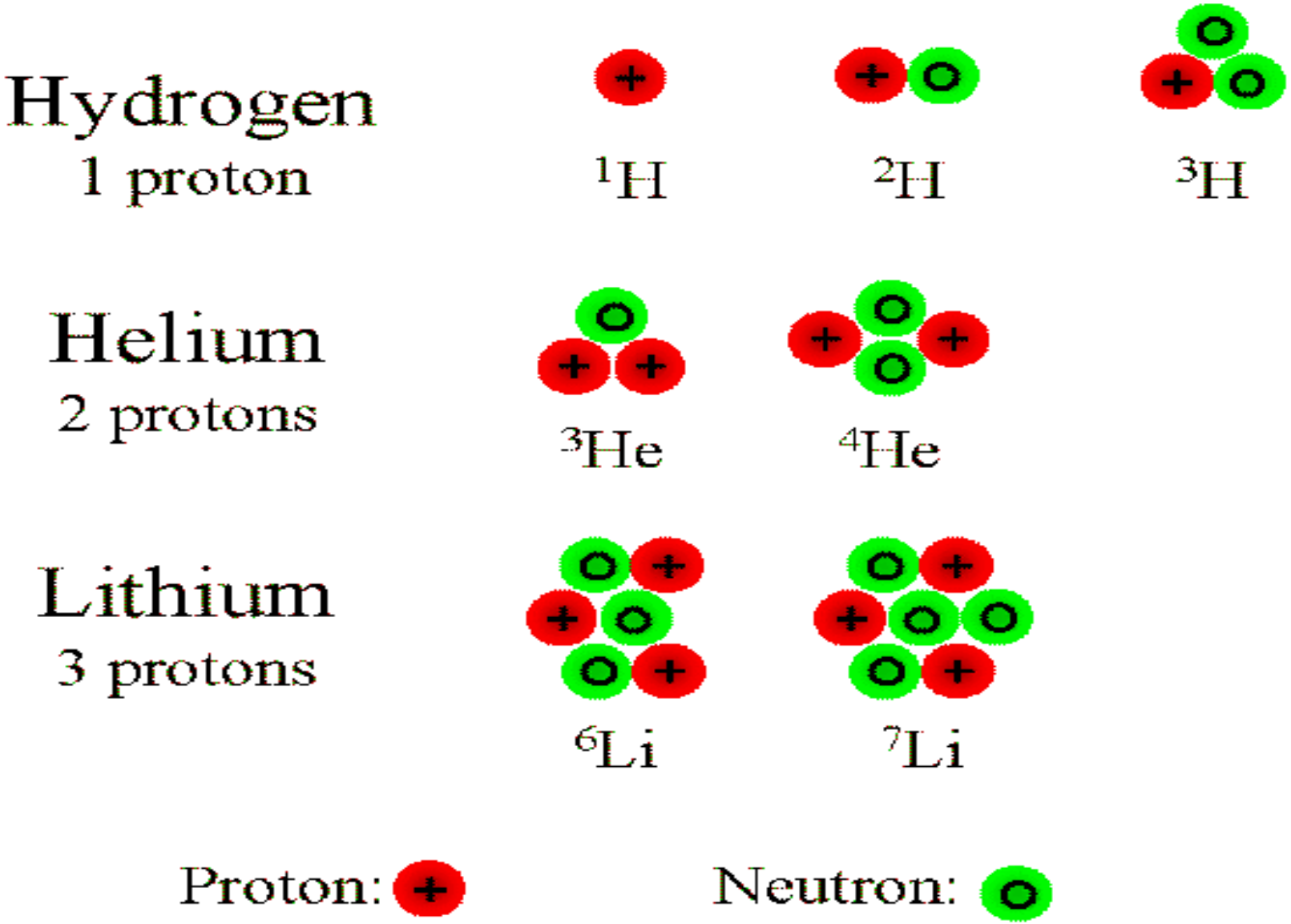
Isotopes

Some atoms don't have the same number of neutrons

Each additional neutron increases the mass number.

Isotopes = atoms of the same element that differ from each other by mass number.

Examples of Isotopes



Elements

All matter is made up of elements.

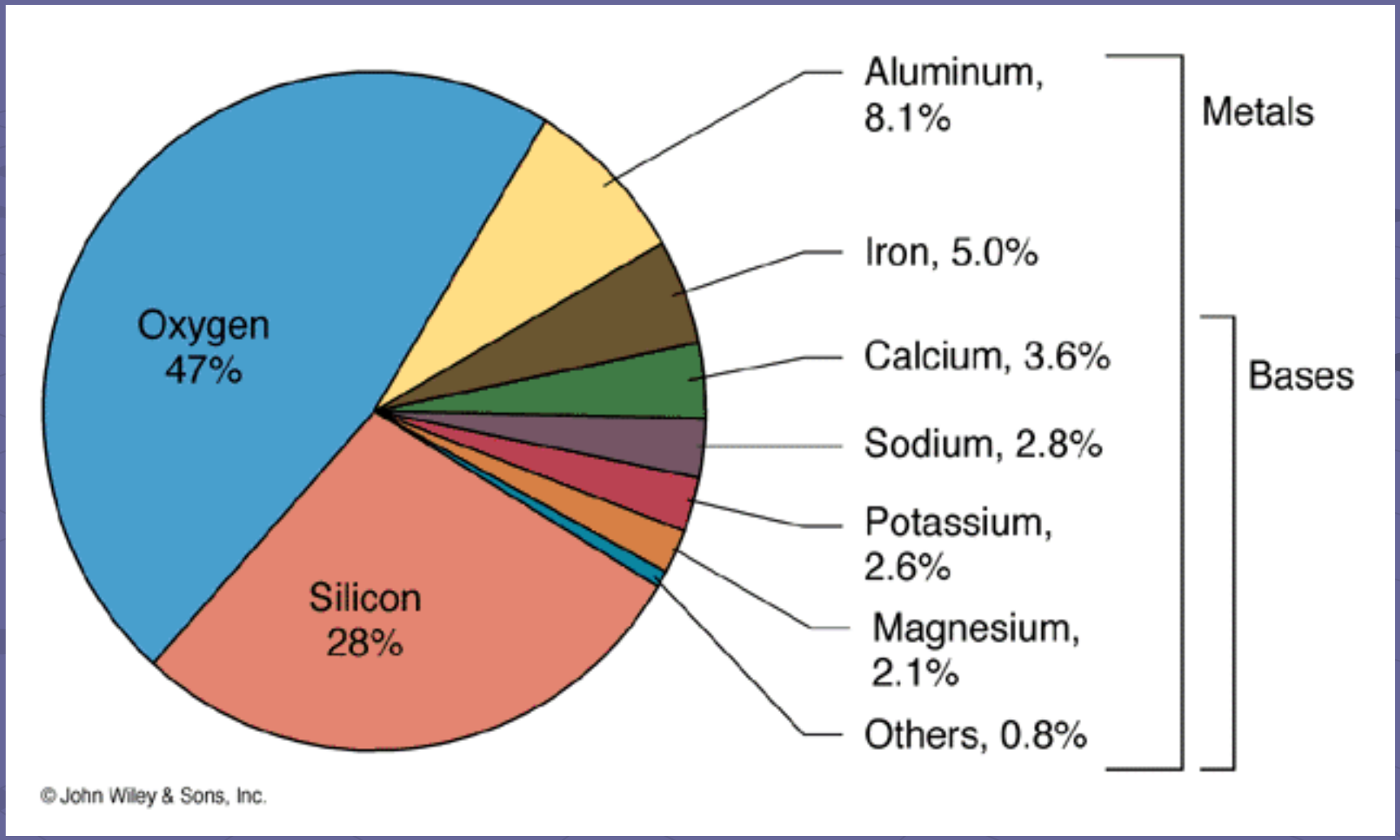
Element = any substance that can't break down any further (Ex. oxygen, iron, nitrogen, etc.).

Periodic table --- made up of elements.

Universal symbol for elements --- consists of either one letter or two (Note how it's written)

Over 90 elements occur naturally; others have been created.

Elements in Earth's Crust



Solids, Liquids, & Gases

Solids = particles that make this up are packed tightly together in fixed positions

Solids have definite shape & volume

Liquids = have definite volume but not shape

Liquids take the shape of the container

Particles tightly packed, but move freely in relation to each other

Gases = No definite shape or volume

Particles farther apart & move more freely & faster

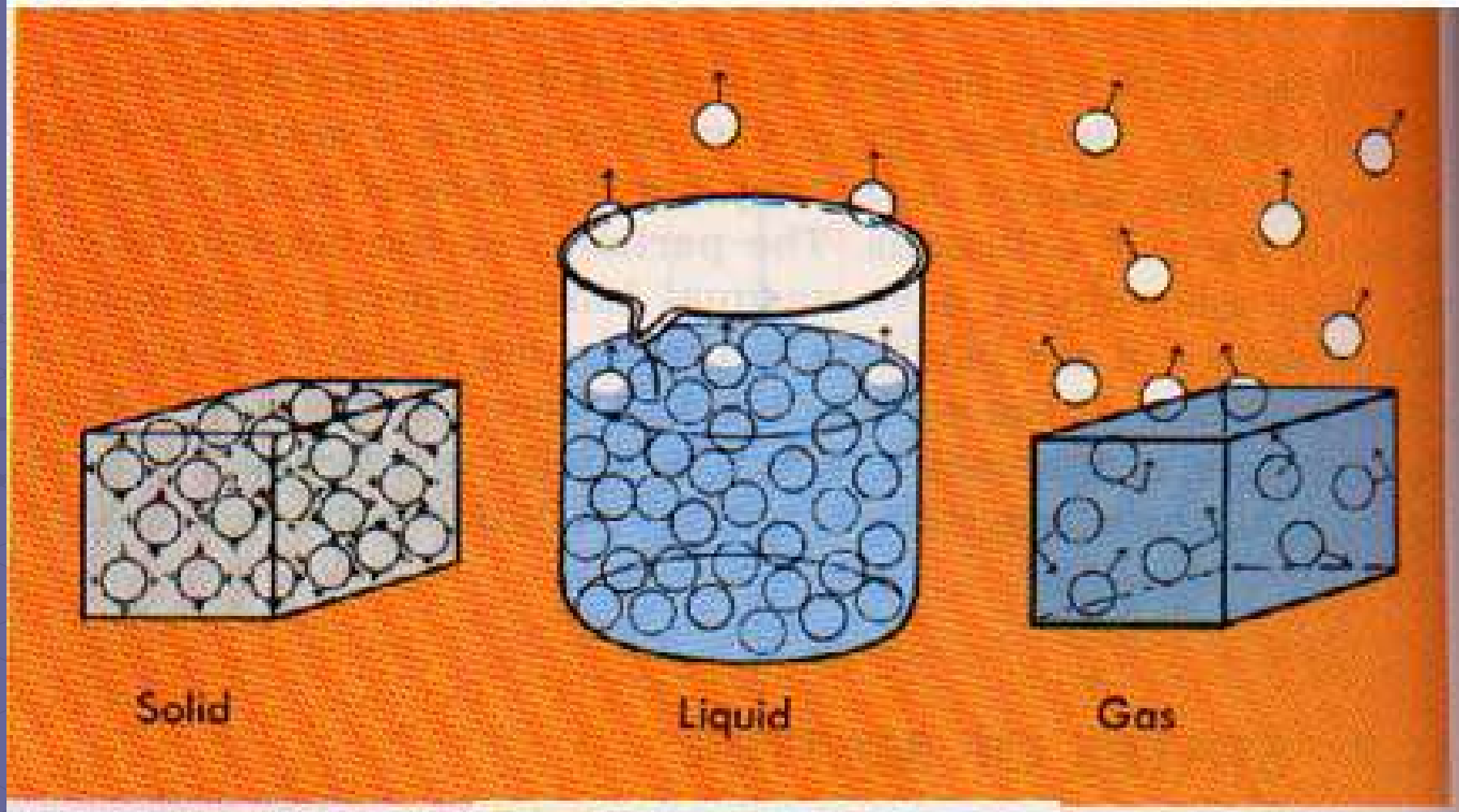


FIGURE 15-9. The particles of a solid vibrate about fixed points. The particles of a liquid vibrate about moving points. The particles of a gas travel in straight lines between collisions.

Combinations of Atoms

Compound --- 2 or more elements bonded together.

Example of a compound--- Water

Water is made up of the elements hydrogen and oxygen.

Molecule --- smallest unit of a compound.

Chemical Bonds

- Chemical bonds = forces that hold atoms together to make compounds
- Ionic bonds = electrons are transferred from one atom to another
- Ion = an atom or group of atoms that carry an electrical charge (positive or negative)
- Covalent bond = share electrons
- Chemical formulas = a representation of a compound (Ex. H_2O)

Mixture vs. Solution

Mixture = a material that contains 2 or more substances that are not chemically combined

Solutions = a mixture in which one substance is uniformly dispersed in another substance.