

_____ are the smallest particles into which matter can normally be divided. Examples of common **biologically important atoms** (elements) are: _____, _____, _____, _____. Atoms are composed of 3 types of _____ particles: (1) negatively charged _____, (2) positively charged _____, (3) uncharged _____. The latter two particles are found in the central _____ whereas electrons are located at various distances from the nucleus in regions called energy _____ or _____ where they travel in paths called _____, which are called "s", "p", "d", etc.

Model of Typical Atom

Most atoms have more than one electron (unlike _____). The first energy level or shell is closest to the nucleus and is completely filled when it contains _____ electrons. The second shell can hold a maximum of _____ electrons. Each shell can hold a maximum of _____ (equation) electrons. Diagrams which show ALL the electrons an atom possesses in all its shells are called **BOHR DIAGRAMS**.

Bohr Diagrams

The **Atomic #** of an element is determined by how many _____ it has. For Gold (symbol _____), this value is _____ whereas for Mercury (symbol _____), this value is _____.

The **Mass #** (atomic mass) is the number of **protons + neutrons**. For Calcium (symbol _____), this value is _____.

The number of **neutrons** in an atom can be determined by _____ - _____.
(ie. for Calcium: _____ - _____ = _____ neutrons).

Atoms of the same element which have different numbers of neutrons are called _____.

Isotopes

Atoms **bond** with each other in order to completely _____ or _____ their **outermost** energy level/shell. This is often referred to as the _____ rule since the atoms of most biologically important elements have outer shells that can hold _____ electrons (eg. _____, _____, _____).

Chemical bonds occur when atoms _____, _____, or _____ electrons. It is usually the **outermost** electrons which are involved in bond formation: these outer electrons are called _____ electrons. Diagrams which show only outer electrons are called **LEWIS DIAGRAMS**.

Lewis Diagrams

If an atom **LOSES electrons**, it acquires a _____ charge and becomes a _____ (eg. _____, _____). If an atom **GAINS electrons**, it acquires a _____ charge and becomes a _____ (eg. _____, _____). The electrical attraction between oppositely charged ions creates an **IONIC BOND**.

Lewis Illustration of Ionic Bond Formation

For an atom to gain an electron, it must pull the electron away from another atom. This pulling force is called _____ (E_n) and the greater this force, the more able the atom is to gain an electron (eg. F has an E_n of _____ whereas H has an E_n of _____; which one gets the electron? _____).

COVALENT BONDS are formed when atoms _____ electrons.

When _____ atoms bond, neither atom is more electronegative, therefore they share electrons equally (eg. _____, _____). The type of bond formed is a _____ covalent bond.

When **non-identical** atoms bond, one atom is more electronegative, therefore they don't share electrons equally (eg. _____, _____). Electrons spend more time around the more electronegative atom, giving it a partial _____ charge. The other atom, which is somewhat robbed of its electron(s), has a partial _____ charge. The type of bond formed by this unequal sharing is a _____ covalent bond. Depending on the **shape of the MOLECULE** (ie. symmetrical), the overall molecule may still be electrically "neutral" even though it has partially charged ends or poles.

Lewis Illustration of Non-polar and Polar Covalent Bonds

ASSIGNMENT:

1. Read Chapter 1, pp. 8-10.
2. Do "Understanding Concepts", #1-5, pg. 10.
3. Read pp. 11-19.
4. Make notes on the 3 types of intermolecular bonds: London forces, dipole-dipole forces, hydrogen bonds.
5. Draw Fig. 13 and Fig. 14 on pg. 18 (hydrogen bonding).