

## Why and how do atoms bond and form molecules and compounds?

Atoms bond to become stable – by having a filled outer energy level atoms become nonreactive or less reactive:

- 2 electrons for the 1<sup>st</sup> energy level – applies to hydrogen and helium
- 8 electrons for other energy levels – this is called the “octet rule”

React/reactive – refers to an atom’s ability and readiness to lose, gain or share electrons to have a full outer E-level

Chemical bond – force of attraction that holds 2 or more atoms together resulting from the rearrangement of electrons between them. Only valence electrons are involved in bonding.

Chemical reaction – when atoms share, lose or gain electrons a bond is formed between these atoms and a new substance is formed.

For example:

When a sodium atom reacts with a chlorine atom, creating an ionic bond between them, a new substance is formed – NaCl which is sodium chloride – table salt. NaCl has different properties than sodium and chlorine.

Very Reactive PT Groups: groups 1, 2 and 17 are very reactive – readily give up or take electrons

Not reactive group – group 18, the noble gases – already have a full outer E-level, including He (there are rare conditions in which they can bond with other atoms, such as with fluorine)

Somewhat or mostly not reactive – metals in groups 3-12 are less reactive than groups 1-2, which is why some can be found in nature in a pure state (gold is a good example). Reactivity of metals decreases, in general, moving across the PT from group 1 to group 12.

Reactivity of Metalloids – can either share or lose electrons so can behave as either metals or nonmetals depending on what other elements they encounter

What element is considered the most reactive? Fluorine

**There are three main ways that atoms will interact to form groups of bonded atoms:**

1. ionic bonding - electrostatic attraction between positive and negative ions
2. covalent bonding – the electrostatic attraction between the atoms’ nuclei and their shared pair of electrons
3. metallic bonding – electrostatic attraction between the positive metal ions and the electrons surrounding them

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## Why do atoms bond and what types of chemical bonds can form?

Atoms bond \_\_\_\_\_ – by having a filled outer energy level atoms become nonreactive or less reactive:

- 2 electrons for the \_\_\_\_\_ energy level – applies to \_\_\_\_\_
- 8 electrons for other energy levels – this is called the \_\_\_\_\_

\_\_\_\_\_ – refers to an atom's ability and readiness to lose, gain or share electrons to have a full outer E-level

\_\_\_\_\_ – force of attraction that holds 2 or more atoms together resulting from the rearrangement of electrons between them. Only \_\_\_\_\_ are involved in bonding.

\_\_\_\_\_ – when atoms share, lose or gain electrons a bond is formed between these atoms and a new substance is formed.

For example:

When a sodium atom reacts with a chlorine atom, creating an ionic bond between them a new substance is formed – NaCl which is \_\_\_\_\_ – table salt. NaCl has different properties than sodium and chlorine.

\_\_\_\_\_ – groups 1, 2 & 17 are very reactive – readily give up or take electrons

\_\_\_\_\_ – group 18, the noble gases – already have a full outer E-level, including He (are rare conditions in which they can bond with other atoms, such as with fluorine)

\_\_\_\_\_ – metals in groups 3-12 are less reactive than groups 1-2, which is why some can be found in nature in a pure state (gold is a good example). Reactivity of metals decreases, in general, moving across the PT from group 1 to group 12.

\_\_\_\_\_ – can either share or lose electrons so can behave as either metals or nonmetals depending on what other elements they encounter.

What element is considered the most reactive? \_\_\_\_\_

### There are three main ways that atoms will interact to form groups of bonded atoms:

1. \_\_\_\_\_ bonding – electrostatic \_\_\_\_\_ between positive and \_\_\_\_\_ ions

2. \_\_\_\_\_ bonding – the electrostatic \_\_\_\_\_ between the atoms' \_\_\_\_\_ and their shared pair of electrons

3. \_\_\_\_\_ bonding – electrostatic \_\_\_\_\_ between the \_\_\_\_\_ metal ions and the electrons surrounding them