

## What makes matter matter?

Biochemical, chemical and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.

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## BONDING

In the following weeks you will come to know how atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds.

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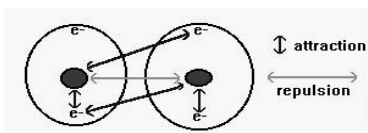
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## Bonding Overview

All bonding forces are due to **electrostatic charge**. Opposite charges attract, Like charges repel.

This diagram shows the attraction and repulsion between atoms: The outer ring (e-) is the *electron cloud*. The inner red ring is the *nucleus*.



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## Dog - Bone Bonds

- the natural attraction between dogs and bones is like the attraction between opposite charges and atomic bonds.

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## Ionic Bond

- ionic bond- a bond
- formed by the transfer of one or more electrons from one atom to another

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## Ionic bonds: One big greedy thief dog!



- Ionic bonding is like one big greedy dog stealing the other dog's bone.
- The bone represents the electron that is up for grabs.
- When the big dog gains an electron he becomes negatively charged and the little dog who lost the electron becomes positively charged.

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## Ions with Opposite Charges

The two ions (that's where the name ionic comes from) are attracted very strongly to each other as a result of the opposite charges.

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## Metallic Bond

### Metallic Bonding

Bonding between atoms with *low electronegativity* .ie 1,2 or 3 valence electrons, therefore there are many *vacancies in valence shell*.

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## Metallic Bonds:

Mellow dogs with plenty of bones to go around



- Think of a room full of puppies who have plenty of bones to go around and are not possessive of any one particular bone. This allows the electrons to move through the substance with little restriction. The model is often described as the "kernels of atoms in a sea of electrons."

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## Covalent Bond

**covalent bond-**  
a bond formed when atoms share  
electrons equally

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## Covalent Bonds: Dogs of equal strength

Think of two or more dogs  
with equal attraction to the  
bones.

The dogs (atoms) are  
identical, so the dogs  
share the pairs of available  
bones evenly.

Since one dog does not  
have more of the bone  
than the other dog, the  
charge is evenly  
distributed.



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