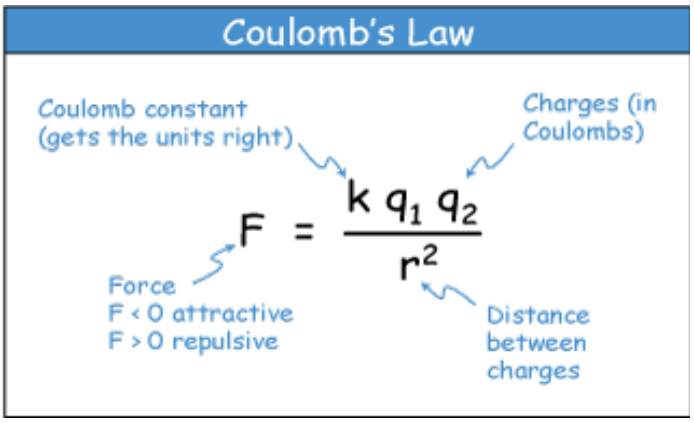
ELECTROSTATIC FORCES

The electrical force between charged particles (atomic or molecular ions, protons or electrons) is one of the four fundamental kinds of forces in the universe (the others are gravity and the strong and weak nuclear forces). We call this the **electrostatic force**.

We describe these forces using **Coulomb's law** (→). The Coulomb force is the strongest of the intermolecular forces; it accounts for the **ionic bonding** of salts, such as NaCl.

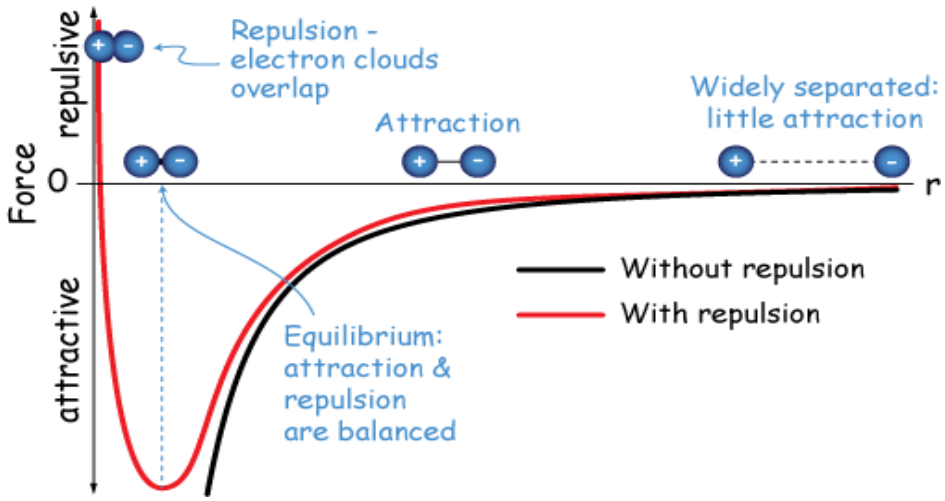


For oppositely-charged atoms, the electrostatic force is **attractive**, but that's an oversimplification of what really happens between atoms. All atoms are surrounded by negatively-charged electrons, so at very close range, when the electrons come into close contact, they actually begin to **repel** one-another.

This **repulsive** force is what causes objects not to fall right through objects upon which they sit, e.g. a lamp on a table. It's the repulsion between electrons that keep objects from actually "touching".

In the graph below, the **black** line is the electrostatic force for two oppositely-charged ions. It shows (unrealistic) infinite attraction at small distances, r.
The **red** curve incorporates the added repulsion at short distances, for a more realistic view of the force at work between charges.

Electrostatic Force vs. Separation Distance for Oppositely-charged Particles



The electrostatic force underlies all of the other intermolecular forces. They arise because of the electrostatic forces present between charged particles.

Source: http://www.drcruzan.com/IntermolecularForces.html