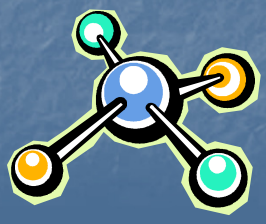
Chemical Bonding

Chemical Bonds

- Atoms of different elements can be held together by bonds
- These bonds are held together with a force stronger than gravity

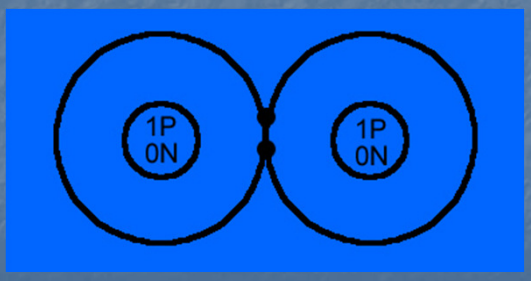
Covalent Bonds

- Covalent bonds form when atoms share electrons
- The combined atoms are called **molecules**
- They usually form between two non-metals

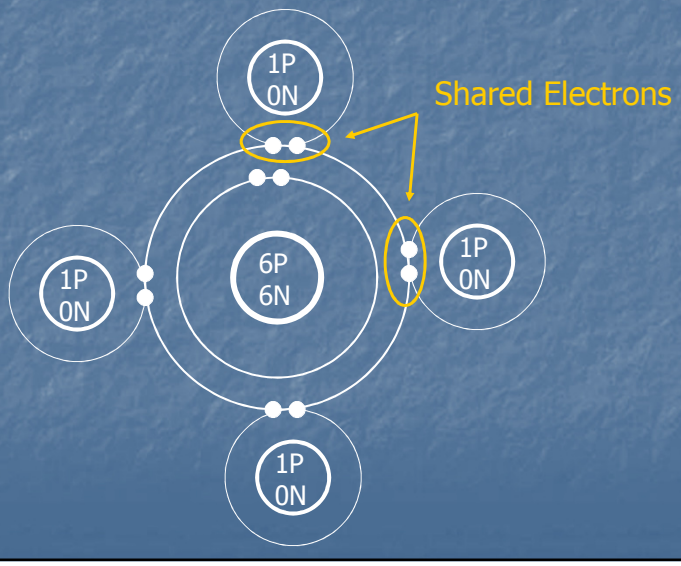


Covalent Bonds

- Elements will **share** valence electrons in order to achieve a full valence shell



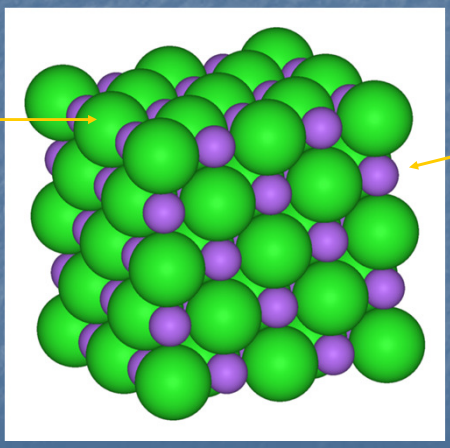
Covalent Bonds



Ionic Bonds

- Ionic bonds form between oppositely charged ions
- They form extended arrangements called **crystal lattices**
- They usually form between a metal and a non-metal

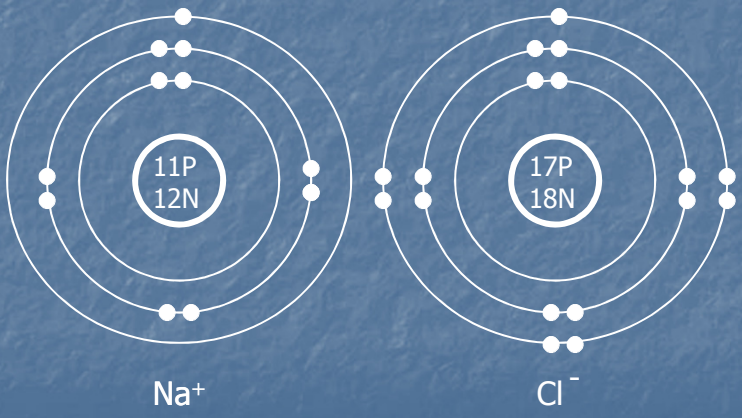
Ionic Bonds



Ionic Bonds

- Elements which easily form ions can **transfer** electrons between each other to fill their valence shells
- Since one gives up an electron and the other gains it, they have opposite charges
- The attraction between those charges holds the atoms together

Ionic Bonds



Chemical Bonding

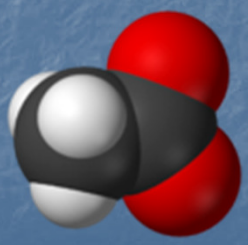
Part II - Polyatomic Ions

Polyatomic Ions

- Simple compounds like water (H_2O) and salt (NaCl) are easy to classify as covalent or ionic
- More complex compounds like sodium bicarbonate ($NaHCO_3$) can contain both covalent and ionic bonds

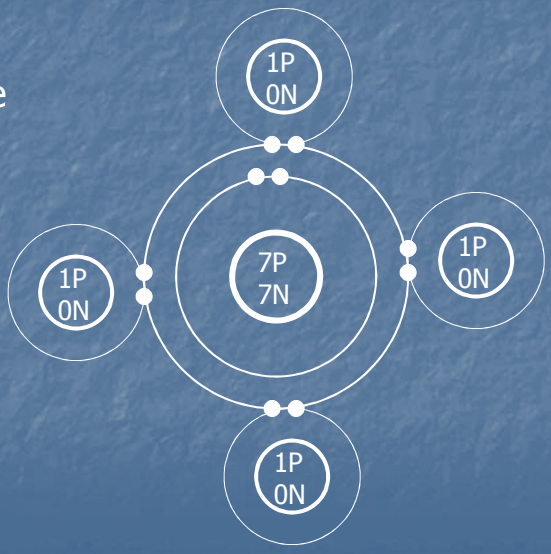
Polyatomic Ions

- A polyatomic ion is made up of two or more atoms covalently bonded together, but with an overall ionic charge



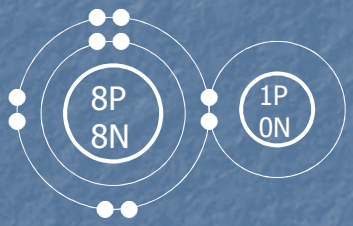
Ammonium Ion

- Ammonium has one atom of Nitrogen and four atoms of hydrogen
- Each atom has a full valence shell
- The net charge is +1
- The symbol is NH_4^+



Hydroxide Ion

- Hydroxide has one atom of oxygen and one atom of hydrogen
- Each atom has a full valence shell
- The net charge is -1
- The symbol is OH^-



Ammonium hydroxide

NH_4^+ OH^-

- Positive and negative ions are attracted together in solution
- NH_4^+ and OH^- combine in equal quantities to form NH_4OH