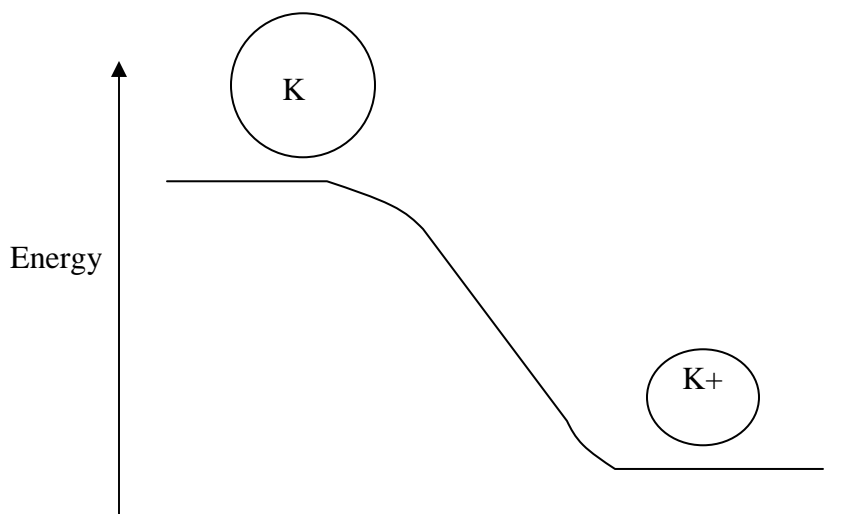


Ionic Bonding

Why do substances bond?

- More stability
- Atoms want to achieve a **lower energy state**
- Think of this like potential energy, what is the potential energy of a book to fall off a desk?
 - $PE = mgh$
- Look at potential energy graph
- What is the potential for Potassium to form a potassium ion?



- When a potassium ion forms, energy is released (negative value). This is exothermic
- When atoms form ions they are **electrostatically attracted** to ions of opposite charge → Ionic bond

How do ions bond?

- Ions bond so that the compound has no charge
- Positive charges are balanced by negative charges
 - Ex: NaCl, +1 charge of Na^+ balances the -1 charge of Cl^-
 - Ex: FeCl_2 , +2 charge of Fe^{+2} balances the two -1 charges of the Cl^- ions.

How do we write chemical formulas of ionic compounds?

- Write cation first, anion second
- Make sure charges cancel out
- When balancing charge using polyatomic ions, act as if polyatomic ion is one atom.
 - Ex: NaHCO_3 , +1 charge of Na^+ balances -1 charge of HCO_3^-

- Ex: NH_4OH , +1 charge of NH_4^+ balances -1 charge of OH^-
- When you have to use more than one polyatomic ion, use parentheses
 - Ex: $\text{Fe}(\text{OH})_3$
 - Ex: $\text{Al}_2(\text{SO}_4)_3$
- When dealing with two ions that have unequal charges, make the charge of one be the subscript of the other and vice versa
 - Ex: Al_2O_3 .
 - Charge of O^{2-} is 2, so make 2 subscript on Al
 - Charge of Al^{3+} is 3, so make 3 subscript on O

How do we write the names of compounds?

- Write the cation first than the anion
- For transition metals which have more than one oxidation state, use number in parentheses to describe charge.
 - FeCl_2 = Iron (II) Chloride
 - FeCl_3 = Iron (III) Chloride

Old names:

- If you use the old names, you don't need to use numbers in parentheses

Ferrous = Iron (II)

Ferric = Iron (III)

Cuprous = Copper (I)

Cupric = Copper (II)

Mercurous = Mercury (I)

Mercuric = Mercury (II)

Stannous = Tin (II)

Stannic = Tin (IV)

- Examples
 - FeCl_2 = Ferrous Chloride
 - CuCl_2 = Cupric Chloride