

Net Ionic Equations

- For reactions taking place in water many substances dissociate (break apart) into ions
- For these reactions there are often ions that actually don't participate (they appear on both sides of the equation). We call these ions spectator ions.
- To write a net ionic equation we write dissolved salts in their ionic form and insoluble salts in their undissociated form.

Net Ionic Cont.

- Steps to writing a net ionic equation:
- Step 1: Molecular form:
 $\text{HCl}_{(aq)} + \text{NaOH}_{(aq)} \rightarrow \text{H}_2\text{O}_{(l)} + \text{NaCl}_{(aq)}$
- Step 2: Ionic form:
 $\text{H}^+_{(aq)} + \text{Cl}^-_{(aq)} + \text{Na}^+_{(aq)} + \text{OH}^-_{(aq)} \rightarrow \text{H}_2\text{O}_{(l)} + \text{Cl}^-_{(aq)} + \text{Na}^+_{(aq)}$
- Step 3: Net Ionic form: (cancel those ions that appear on both sides)
 $\text{H}^+_{(aq)} + \text{OH}^-_{(aq)} \rightarrow \text{H}_2\text{O}_{(l)}$

Net Ionic Cont.

How do you decide if you should write it in ionic or molecular form?

- Rule 1: *Binary Acids*: HCl, HBr, and HI are strong, all other binary acids and HCN are weak. Strong acids are written in ionic form, weak acids are written in molecular form
- Rule 2: *Ternary Acids*: If the number of oxygen atoms in the inorganic acid molecule exceeds the number of hydrogen atoms by two or more, the acid is strong. All organic acids will be considered weak.
- Rule 3: *Polyprotic Acids*: In the second and subsequent ionizations the acids are always weak, whether or not the original acid is strong or weak.

Net Ionic Cont.

- Rule 4: *Bases*: Hydroxides of the Groups 1 and 2 elements except beryllium are strong bases. All others are weak.
- Rule 5: *Salts*: Salts are written in ionic form if soluble and in undissociated form if insoluble. (Use table 8.3, page 218 to determine)
- Rule 6: *Oxides*: Oxides are always written in molecular or undissociated form.
- Rule 7: *Gases*: Gases are always written in molecular form.

Net Ionic Decision Making Tree

