

Reaction Types

Polyatomic ions

1+ ions

- Ammonium = NH_4^+

1- ions

- Nitrate = NO_3^-
- Hydroxide = OH^-
- Bicarbonate = HCO_3^-
- Permanganate = MnO_4^-
- Acetate = $\text{C}_2\text{H}_3\text{O}_2^-$

2- ions

- Sulfate = SO_4^{2-}
- Carbonate = CO_3^{2-}

3- ions

- Phosphate = PO_4^{3-}

Ion dissociation

- Many ionic compounds will dissolve in water
 - They are referred to as “soluble” in water
- the ions “*dissociate*” from each other
- $\text{NaCl}_{(s)} \rightarrow \text{Na}^+_{(aq)} + \text{Cl}^-_{(aq)}$

What's in your dish?

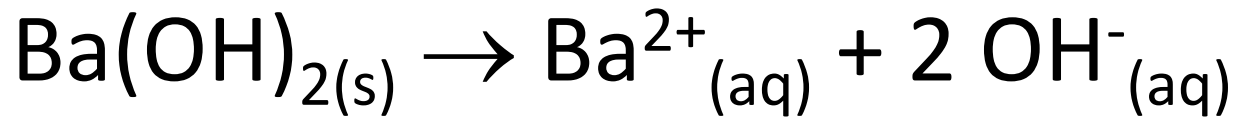
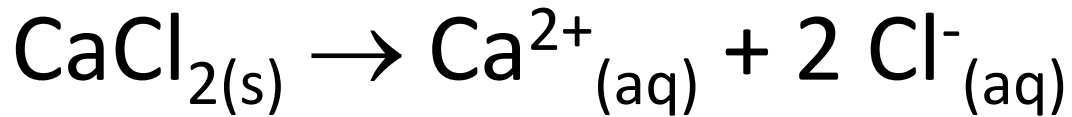
- Solutions of aqueous ionic compounds do not contain any of the “compound” at all
- All that is really present are separate aqueous ions

What's in your dish?

- Ex: what is really present (besides mostly H₂O) in a bottle labeled: 0.1M **Na₃PO₄**?
- **Na⁺_(aq)** and **PO₄³⁻_(aq)** – *there isn't any Na₃PO₄*
- The aqueous ions from one solution can react with the aqueous ions from another solution if they are mixed together

Ion dissociation

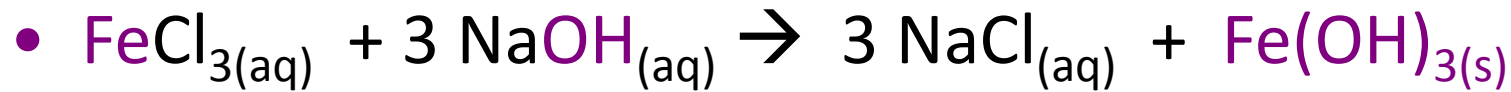
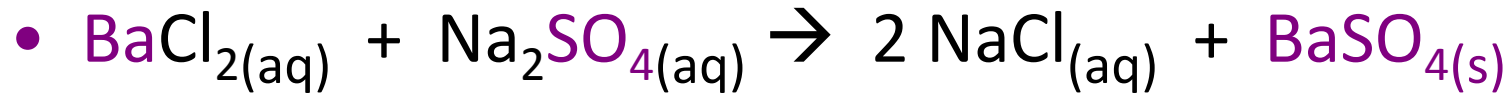
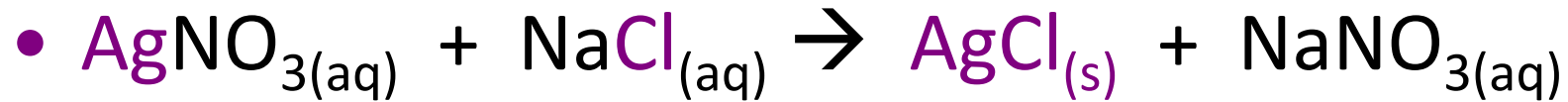
- Subscripts in a formula from balancing charges become coefficients for the ions when they are in solution (dissolved)



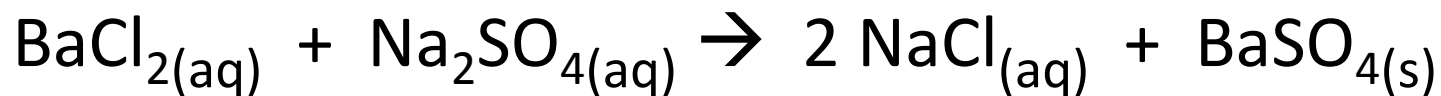
Double Replacement reactions

- *General Form: $AB + CD \rightarrow AD + CB$*
- note: *elements listed first in the reactant formulas (metals) are listed first in their new product formula as well*
- **MUST be 2 aqueous reactants forming one solid and one aqueous product** for the reaction to occur
- *The solid product is called a “precipitate”*

Double Replacement examples

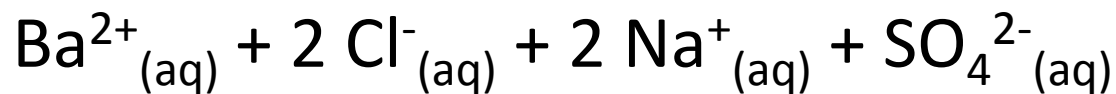


What's in your dish?

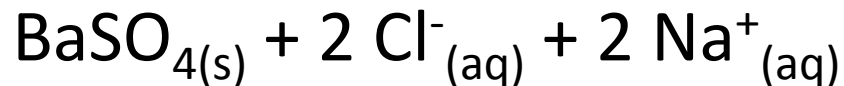


What's really "in the dish":

Reactants:



Products:



The $\text{Cl}^{-}_{(\text{aq})} + \text{Na}^{+}_{(\text{aq})}$ are called "spectator ions"

-They do not change throughout the reaction