Solubility Rules	
1	All compounds containing alkali metal cations and the ammonium ion (NH_4^+) *are always soluble*.
2	All compounds containing NO_3^- (nitrate), ClO_4^- (chlorate), ClO_3^- (perchlorate), and $C_2H_3O_2^-$ (acetate) anions *are always soluble.*
3	All chlorides, bromides, and iodides *are soluble* **except** those containing Ag^+, Pb^{2+}, or Hg_2^{2+}.
4	All sulfates (SO_4^{2-}) *are soluble* **except** those containing Hg_2^{2+}, Pb^{2+}, Sr^{2+}, Ca^{2+}, or Ba^{2+}.
5	All hydroxides (OH^-) *are insoluble* **except** compounds of the alkali metals, Ca^{2+}, Sr^{2+}, and Ba^{2+}.
6	All compounds containing PO_4^{3-} (phosphate), S^{2-} (sulfide), CO_3^{2-} (carbonate), and SO_3^{2-} (sulfite) ions *are insoluble* **except** those that also contain alkali metals or NH_4^+.

*When deciding which rules apply to a double replacement reaction, begin at the top and work your way down. The **FIRST** rule that aligns with the reaction will govern the solubility.*

Table 17.3 Solubilities of Ionic Compounds* aq = aqueous (dissolves in water); s = solid (does not dissolve in water)

Ions	Acetate	Bromide	Carbonate	Chlorate	Chloride	Fluoride	Hydrogen Carbonate	Hydroxide	Iodide	Nitrate	Nitrite	Phosphate	Sulfate	Sulfide	Sulfite
Aluminum	s	aq		aq	aq	s		s	—	aq		s	aq	—	
Ammonium	aq	aq	aq	aq	aq	aq	aq	—	aq	aq	aq	aq	aq	aq	aq
Barium	aq	aq	s	aq	aq	s		aq	aq	aq	aq	s	s	—	s
Calcium	aq	aq	s	aq	aq	s		s	aq	aq	aq	s	s	—	s
Cobalt(II)	aq	aq	s	aq	aq	—		s	aq	aq		s	aq	s	s
Copper(II)	aq	aq	s	aq	aq	aq		s		aq		s	aq	s	
Iron(II)	aq	aq	s		aq	s		s	aq	aq		s	aq	s	s
Iron(III)	—	aq			aq	s		s	aq	aq		s	aq	—	
Lead(II)	aq	s	s	aq	s	s		s	s	aq	aq	s	s	s	s
Lithium	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	s	aq	aq	aq
Magnesium	aq	aq	s	aq	aq	s		s	aq	aq	aq	s	aq	—	aq
Nickel	aq	aq	s	aq	aq	aq		s	aq	aq		s	aq	s	s
Potassium	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq
Silver	s	s	s	aq	s	aq		—	s	aq	s	s	s	s	s
Sodium	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq	aq
Zinc	aq	aq	s	aq	aq	aq		s	aq	aq		s	aq	s	s

Double Replacement Step by step-

1. Identity anions and cations in reactants

2. Write the formulas for new products using crisscross rule

3. Check solubility using rules and table

soluble --> (aq) = aqueous

insoluble--> (s)= precipitate = means a reaction occurs (or if a gas or water is formed rxn also occurs)

*if BOTH products are soluble = no reaction = STOP