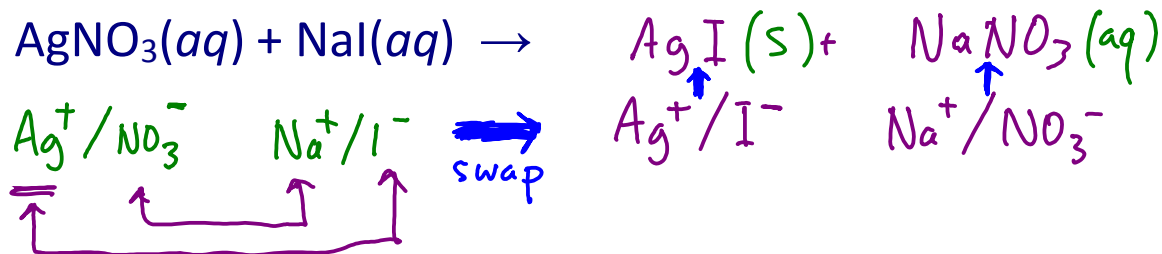


Double displacement, solubility, and precipitation

Double displacement reaction: two ionic reactants swap their ions



1. Write ion pairs for reactants
2. Swap ions, make new +/- pairs, writing + ion first
3. Make formulas for possible products from new ion pairs
4. Balance if necessary
5. Predict phase labels of products

Solubility of ionic compounds

Some ionic compounds easily dissolve in water (**soluble**)

ex. NaCl (aq)

Some never dissolve in water (**insoluble**)

ex. CaCO_3 : chalk dust

$\text{CaCO}_3 (s)$

Solubility Rules for Ionic Compounds

The following table will be given on the exam exactly as shown here.

<u>Compounds Containing the Following Ions Are Mostly Soluble</u>	<u>Exceptions</u>
$\text{Li}^+, \text{Na}^+, \text{K}^+, \text{NH}_4^+$ <i>ammonium</i>	None
nitrate, acetate	None
chloride, bromide, iodide $\text{Cl}^- \text{ Br}^- \text{ I}^-$	When any of these ions pairs with $\text{Ag}^+, \text{Hg}_2^{2+},$ or Pb^{2+} , the compound is insoluble $\rightarrow (s)$
sulfate SO_4^{2-}	When sulfate pairs with $\text{Sr}^{2+}, \text{Ba}^{2+}, \text{Pb}^{2+},$ or Ca^{2+} the compound is insoluble
<u>Compounds Containing the Following Ions Are Mostly Insoluble</u>	<u>Exceptions</u>
hydroxide, sulfide $\text{OH}^- \text{ S}^{2-}$	When either of these ions pairs with $\text{Li}^+, \text{Na}^+, \text{K}^+,$ or NH_4^+ , the compound is soluble (aq)
(s)	When sulfide pairs with $\text{Ca}^{2+}, \text{Sr}^{2+},$ or Ba^{2+} , the compound is soluble
CO_3^{2-} carbonate, phosphate	When hydroxide pairs with $\text{Ca}^{2+}, \text{Sr}^{2+},$ or Ba^{2+} , the compound is slightly soluble (for many purposes, these may be considered <u>insoluble</u>) (s) <i>our in this chapter</i>
	When either of these ions pairs with $\text{Li}^+, \text{Na}^+, \text{K}^+,$ or NH_4^+ , the compound is soluble

AgI (s) $\text{NaNO}_3 (aq)$ $\text{PbI}_2 (s)$

Na_3PO_4 soluble (aq) $\text{Ca}_3(\text{PO}_4)_2$ insol. (s)

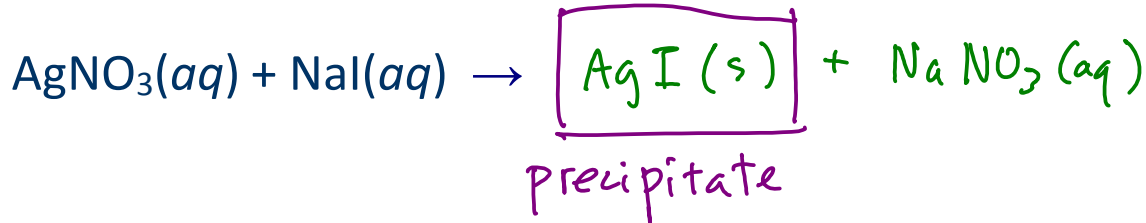
CaI (aq) $\text{PbI}_2 (s)$

$\text{Fe(OH)}_3 (s)$ $\text{Ca(OH)}_2 (s)$

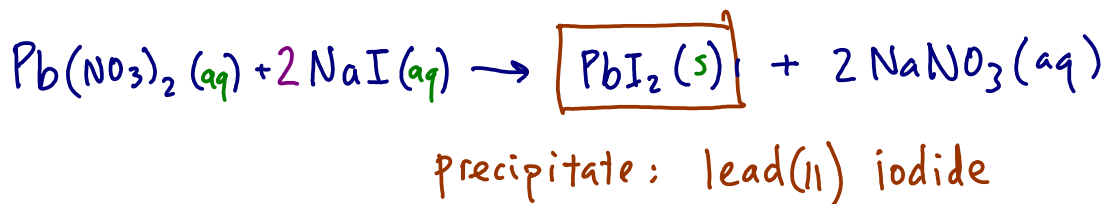
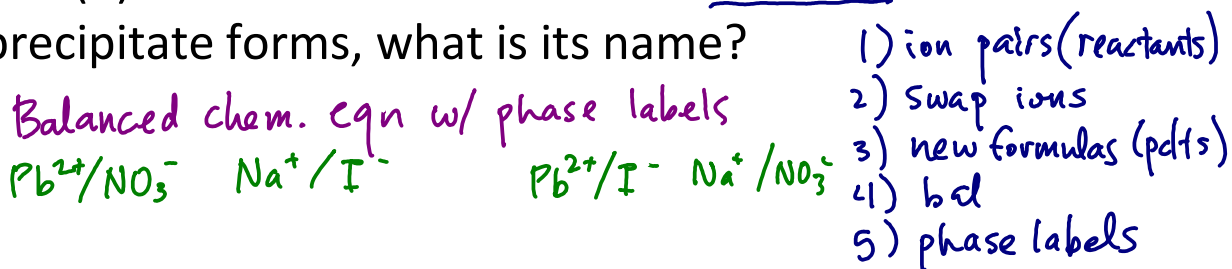
$\text{K}_2\text{CO}_3 (aq)$ $\text{CuCO}_3 (s)$
copper (II) carbonate

Precipitation reaction

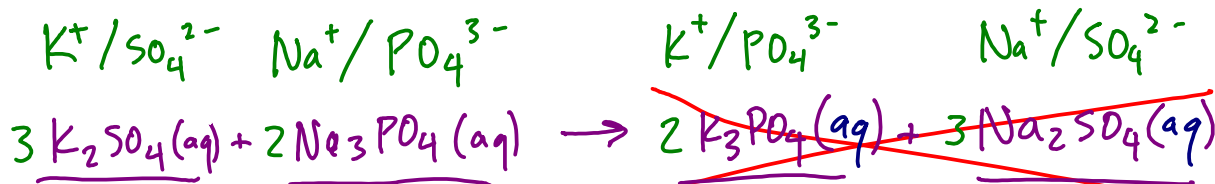
Precipitate: insoluble (s) product of a chemical reaction



Write the balanced chemical equation for the reaction of lead(II) nitrate and sodium iodide solutions. If a precipitate forms, what is its name?



Write the balanced chemical equation for the reaction of potassium sulfate and sodium phosphate solutions.



if all ppts and reactants are (aq)

NR

NO REACTION occurs - cross out products!