

Reactions in Which a Solid Forms

Double Replacement (aka Precipitation Reactions)

Name _____

- Assume that all of the reactant compounds (salts) below are put into water.
 - Use the solubility chart to determine if a reaction can occur.
(Remember, for a reaction to occur, both reactants must be soluble AND then one (or both) of the products must be insoluble. If all products are soluble, no reaction occurs.)
 - If a reaction does **not** occur be sure to state why it does not occur.
 - If a reaction does occur, predict the products, and write a skeleton equation, then balance.
Include the appropriate (s) or (ppt) symbol. (You may leave the (aq) off.)
 - If a reaction does occur, rewrite the “molecular” equation as a net ionic equation. Because spectator ions are removed, you may be able to reduce the coefficients and simplify the balancing.
1. lead(II) nitrate is combined with aluminum chloride
 2. sodium phosphate is combined with strontium chloride
 3. calcium carbonate is combined with copper(II) sulfate
 4. calcium iodide is combined with silver chlorate
 5. nickel(II) chloride is combined with potassium ferrocyanide
 6. ammonium carbonate is combined with lithium sulfate
 7. ammonium sulfate is combined with magnesium phosphate
 8. copper(I) sulfate is combined with lead(II) acetate
 9. sodium hydroxide is combined with lead(IV) chlorate
 10. tin(II) chromate is combined with sodium nitrate
 11. potassium chlorate is combined with copper(II) bromide
 12. ammonium phosphate is combined with zinc chloride
 13. calcium chloride is combined with mercury(I) chlorate
 14. silver nitrate is combined with sodium bromide

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1. $3 \text{Pb}(\text{NO}_3)_2 + 2 \text{AlCl}_3 \rightarrow 3 \text{PbCl}_2(\text{ppt}) + 2 \text{Al}(\text{NO}_3)_3$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $\text{Pb}^{2+} + 2 \text{Cl}^- \rightarrow \text{PbCl}_2$
2. $2 \text{Na}_3\text{PO}_4 + 3 \text{SrCl}_2 \rightarrow \text{Sr}_3(\text{PO}_4)_2(\text{ppt}) + 6 \text{NaCl}$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $2 \text{PO}_4^{3-} + 3 \text{Sr}^{2+} \rightarrow \text{Sr}_3(\text{PO}_4)_2$
3. Calcium carbonate is not soluble \therefore no reaction can occur.
4. $\text{CaI}_2 + 2 \text{AgClO}_3 \rightarrow 2 \text{AgI}(\text{ppt}) + \text{Ca}(\text{ClO}_3)_2$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $\text{Ag}^+ + \text{I}^- \rightarrow \text{AgI}$
5. $2 \text{NiCl}_2 + \text{K}_4\text{Fe}(\text{CN})_6 \rightarrow 4 \text{KCl} + \text{Ni}_2\text{Fe}(\text{CN})_6(\text{ppt})$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $2 \text{Ni}^{2+} + \text{Fe}(\text{CN})_6^{4-} \rightarrow \text{Ni}_2\text{Fe}(\text{CN})_6$
6. $(\text{NH}_4)_2\text{CO}_3 + \text{Cu}_2\text{SO}_4 \rightarrow \text{Cu}_2\text{CO}_3(\text{ppt}) + (\text{NH}_4)_2\text{SO}_4$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $\text{CO}_3^{2-} + 2 \text{Cu}^+ \rightarrow \text{Cu}_2\text{CO}_3$
7. Magnesium phosphate is not soluble therefore no reaction can occur.
8. $\text{Cu}_2\text{SO}_4 + \text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \rightarrow \text{PbSO}_4(\text{ppt}) + 2 \text{CuC}_2\text{H}_3\text{O}_2$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $\text{SO}_4^{2-} + \text{Pb}^{2+} \rightarrow \text{PbSO}_4$
9. $4 \text{NaOH} + \text{Pb}(\text{ClO}_3)_4 \rightarrow \text{Pb}(\text{OH})_4(\text{ppt}) + 4 \text{NaClO}_3$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $4 \text{OH}^- + \text{Pb}^{4+} \rightarrow \text{Pb}(\text{OH})_4$
10. tin(II) chromate is not soluble \therefore no reaction can occur.
11. both copper chlorate and potassium bromide products are soluble therefore no reaction can occur.
12. $2 (\text{NH}_4)_3\text{PO}_4 + 3 \text{ZnCl}_2 \rightarrow \text{Zn}_3(\text{PO}_4)_2(\text{ppt}) + 6 \text{NH}_4\text{Cl}$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $2 \text{PO}_4^{3-} + 3 \text{Zn}^{2+} \rightarrow \text{Zn}_3(\text{PO}_4)_2$
13. $\text{CaCl}_2 + 2 \text{HgClO}_3 \rightarrow 2 \text{HgCl}(\text{ppt}) + \text{Ca}(\text{ClO}_3)_2$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $\text{Cl}^- + \text{Hg}^+ \rightarrow \text{HgCl}$
14. $\text{NaBr} + \text{AgNO}_3 \rightarrow \text{AgBr}(\text{ppt}) + \text{NaNO}_3$
 formation of a precipitate \therefore a reaction occurs.
 Net ionic Rx: $\text{Br}^- + \text{Ag}^+ \rightarrow \text{AgBr}$