

Precipitation (Drop Out) Reactions:

1. Which of the following substances would you expect to be insoluble in water?

Barium hydroxide

Hydrochloric acid

Lithium sulfate

Ammonium nitrate

Silver chloride

Lithium carbonate

Calcium carbonate

Barium sulfate

Ammonium acetate

Lead acetate

Strontium hydroxide

Ammonium nitrate

Silver nitrate

Cadmium acetate

2. Solutions of lead (II) nitrate and potassium iodide are mixed.
- Does a precipitation reaction occur?
 - Write balanced molecular, total ionic, and net ionic equations.
3. When 300.0 mL of a 0.500 M solution of calcium nitrate is combined with 200.0 mL of a 0.500 M solution of sodium carbonate, a precipitate forms. How many grams of precipitate are obtained?

Acid-Base Reactions:

4. An aqueous sample of calcium hydroxide of unknown concentration is titrated with hydrochloric acid. It takes 40.55 mL of 0.1250 M hydrochloric acid to reach the endpoint of the titration of 25.00 mL of calcium hydroxide.
- What is the original concentration of the calcium hydroxide solution?
 - What is the concentration of the calcium chloride salt at the endpoint of the titration?

Redox Reactions:

5. Balance each of the following equations by inspection (not by the half-equation method), then write the oxidation number below the symbol of each atom that changes oxidation state in the course of the reaction.
- $\text{PF}_2\text{I} (l) + \text{Hg} (l) \longrightarrow \text{P}_2\text{F}_4 (g) + \text{Hg}_2\text{I}_2 (s)$
 - $\text{KClO}_3 (s) \longrightarrow \text{KCl} (s) + \text{O}_2 (g)$
 - $\text{NH}_3 (g) + \text{O}_2 (g) \longrightarrow \text{NO} (g) + \text{H}_2\text{O} (g)$
 - $\text{As} (s) + \text{NaOH} (l) \longrightarrow \text{Na}_3\text{AsO}_3 (s) + \text{H}_2 (g)$

For the following five precipitation reactions:

- Correctly write the formulas for the reactants and predicted products.
- Fill in the states for all four substances.
- Write the total ionic equation.
- Write the net ionic equation.
- Identify the spectator ions and precipitate.
- Remember that sodium compounds and nitrate compounds are generally soluble.

6. barium chloride and silver nitrate

Balanced Equation

Total Ionic Equation

Net Ionic Equation

_____ Spectator Ions

_____ Precipitate

9. copper II nitrate and calcium hydroxide

Balanced Equation

Total Ionic Equation

Net Ionic Equation

_____ Spectator Ions

_____ Precipitate

7. iron III chloride and sodium hydroxide

Balanced Equation

Total Ionic Equation

Net Ionic Equation

_____ Spectator Ions

_____ Precipitate

10. sodium chromate and strontium nitrate

Balanced Equation

Total Ionic Equation

Net Ionic Equation

_____ Spectator Ions

_____ Precipitate

**8. magnesium sulfate and potassium phosphate
(potassium produces a soluble compound)**

Balanced Equation

Total Ionic Equation

Net Ionic Equation

_____ Spectator Ions

_____ Precipitate

11. Solutions of iron (II) sulfate and barium hydroxide are mixed.

Balanced Equation

Total Ionic Equation

Net Ionic Equation

_____ Spectator Ions

_____ Precipitate

For each of the following combinations of reactants, do the following:

- Predict possible products with phase labels
- Write the balanced chemical equation. If no visible reaction occurs, write NR. If a precipitate forms, give the formula and name of the precipitate.

12. Solutions of calcium chloride and potassium phosphate are mixed.

13. Solutions of calcium nitrate and sodium chloride are mixed.

14. Solutions of potassium chloride and silver nitrate are mixed.

15. Solutions of sodium sulfide and nickel (II) sulfate are mixed.

16. Solutions of ammonium sulfate and barium chloride are mixed.

17. $\text{Na}_2\text{S}(aq) + \text{ZnSO}_4(aq) \rightarrow$

18. $\text{Al}(\text{NO}_3)_3(aq) + \text{Na}_3\text{PO}_4 \rightarrow$

19. $(\text{NH}_4)_2\text{CO}_3(aq) + \text{MgSO}_4(aq) \rightarrow$

20. $\text{Na}_2\text{SO}_4(aq) + \text{K}_2\text{S}(aq) \rightarrow$

21. $\text{Ca}(\text{OH})_2(aq) + \text{Na}_2\text{SO}_4(aq) \rightarrow$

22. $\text{Pb}(\text{NO}_3)_2(aq) + \text{LiI}(aq) \rightarrow$