

## Precipitation Worksheet - Chemical Dropouts!

A **precipitation** reaction is a reaction in which two solutions are mixed to produce an insoluble solid called a precipitate.

**Materials:** White spotting plates and dropper bottles containing 0.1 M solutions of copper sulfate, mercury(II) nitrate, potassium chromate, potassium fluoride, potassium iodide, sodium chloride, sodium hydroxide, sodium sulfide, silver nitrate,

**Teacher:** Give directions in the handling & disposal of chemicals according to your risk assessment. Inform or check with students what the precipitate is for each reaction.

**Students:** 1. Complete the reactions which is an exchange of partners. Metals are named first.  
2. Mix the chemicals and write the (color/colour) of the precipitate.

1. Sodium hydroxide + silver nitrate → Sodium nitrate + \_\_\_\_\_

2. Sodium hydroxide + copper sulfate → \_\_\_\_\_ + \_\_\_\_\_

3. Potassium iodide + lead nitrate → \_\_\_\_\_ + \_\_\_\_\_

4. Potassium iodide + mercury nitrate → \_\_\_\_\_ + \_\_\_\_\_

5. Potassium iodide + silver nitrate → \_\_\_\_\_ + \_\_\_\_\_

6. Sodium chloride + silver nitrate → \_\_\_\_\_ + \_\_\_\_\_

7. Mercury nitrate + potassium fluoride → \_\_\_\_\_ + \_\_\_\_\_

8. Copper sulfate + potassium iodide → \_\_\_\_\_ + \_\_\_\_\_

9. Mercury nitrate + sodium sulfide → \_\_\_\_\_ + \_\_\_\_\_

10. Silver nitrate + potassium chromate → \_\_\_\_\_ + \_\_\_\_\_

## Precipitation Reaction Worksheet

A **precipitation** reaction is a reaction in which two solutions are mixed to produce an insoluble solid called a precipitate. A simplified set of solubility rules can be used to determine the precipitate.

**Simplified Solubility Rules** : If a compound contains one of the following chemicals it is always soluble

- A **Group I** element. Eg. Sodium,  $\text{Na}^+$  or potassium,  $\text{K}^+$
- An **ammonium** group,  $\text{NH}_4^+$
- A **nitrate** group,  $\text{NO}_3^-$
- An **acetate** group,  $\text{CH}_3\text{COO}^-$

### Student Instructions

- Complete the **word equation** for each precipitation reaction. Determine the precipitate.
- Write a **balanced equation** for each reaction. Include physical states (aq) = aqueous and (s) = solid

1. Sodium hydroxide + silver nitrate  $\rightarrow$  Sodium nitrate + \_\_\_\_\_

2. Sodium hydroxide + copper sulfate  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

3. Potassium iodide + lead nitrate  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

4. Potassium iodide + mercury nitrate  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

5. Potassium iodide + silver nitrate  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

6. Sodium chloride + silver nitrate  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

7. Mercury nitrate + potassium fluoride  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

8. Copper sulfate + potassium iodide  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

9. Mercury nitrate + sodium sulfide  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

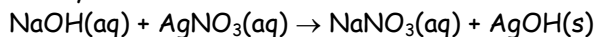
10. Silver nitrate + potassium chromate  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_

## CHEMICAL PRECIPITATION REACTIONS - ANSWERS

Depending on the year level you may or may not include the balanced chemical equations.

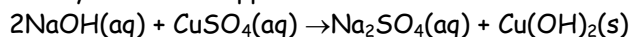
Physical states: (s) = solid and (aq) = aqueous.

1. Sodium hydroxide + silver nitrate → sodium nitrate + silver hydroxide(s)



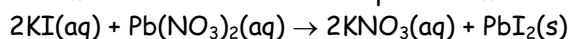
The precipitate is brown. **Note:**  $\text{Ag(OH)}_2$  actually becomes  $\text{Ag}_2\text{O}$  in aqueous solution.

2. Sodium hydroxide + copper sulfate → sodium sulfate + copper hydroxide(s)



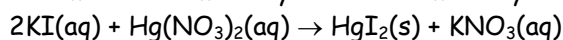
A blue gelatinous precipitate of copper hydroxide,  $\text{Cu(OH)}_2$  is produced.

3. Potassium iodide + lead nitrate → potassium nitrate + lead iodide(s)



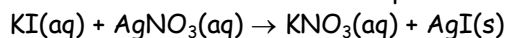
A bright yellow precipitate of lead iodide,  $\text{PbI}_2$  is produced.

4. Potassium iodide + mercury nitrate → mercury iodide(s) + potassium nitrate



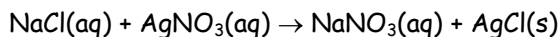
A bright orange precipitate of mercury iodide,  $\text{PbI}_2$  is produced. **Note:** This is an unusual reaction as the precipitate dissolves in excess iodide solution and disappears as a complex ion is formed.

5. Potassium iodide + silver nitrate → potassium nitrate + silver iodide(s)



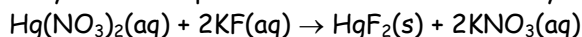
A yellow white precipitate of silver iodide,  $\text{AgI}$  is produced.

6. Sodium chloride + silver nitrate → sodium nitrate + silver chloride(s)



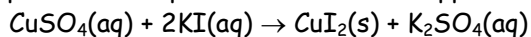
**Note:** Exposure of silver chloride,  $\text{AgCl}$  to UV light from the sun results in the decomposition of this compound. Black metallic silver is produced.  $2\text{AgCl(s)} \rightarrow 2\text{Ag(s)} + \text{Cl}_2\text{(g)}$

7. Mercury nitrate + potassium fluoride → mercury fluoride(s) + potassium nitrate



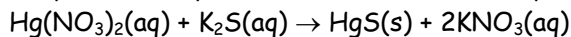
An orange brown precipitate of mercury(II) fluoride,  $\text{HgF}_2$  is produced.

8. Copper sulfate + potassium iodide → copper iodide(s) + potassium sulfate



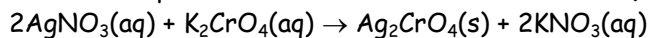
An olive green precipitate of copper iodide,  $\text{CuI}_2$  is produced.

9. Mercury nitrate + potassium sulfide → mercury sulfide(s) + potassium nitrate



A black precipitate of mercury(II) sulfide,  $\text{HgS}$  is produced.

10. Silver nitrate + potassium chromate → silver chromate(s) + potassium nitrate



A red-brown precipitate of silver chromate,  $\text{Ag}_2\text{CrO}_4$  is produced.