Double Replacement Reactions

This experiment demonstrates reactions that occur between two aqueous solutions. The driving force for the reaction is the formation of an insoluble product.

Materials

Substitutions

- 0.1 M NaCl
- 0.1 M CuSO$_4$
- 0.1 M AgNO$_3$
- 0.1 M Na$_3$PO$_4$
- 0.1 M NaOH
- Spot plate
- Droppers (5)

watch glasses (6)

Procedure

1. Number wells 1–6. Place 10 drops of NaCl solution in wells I and IV, 10 drops of NaOH in wells II and V, and 10 drops of Na$_3$PO$_4$ in wells III and VI.
2. Using the diagram above, add 10 drops of CuSO$_4$ to wells I, II, and III and 10 drops of AgNO$_3$ to wells IV, V, and VI.
3. Note any color changes or precipitate formation in the Data section.
4. Write a balanced equation for the reactions that occur. Include physical state symbols for the reactants and products. If no precipitate occurred, NO REACTION occurred.

## Data and Observations

<table>
<thead>
<tr>
<th>Well</th>
<th>Observations</th>
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<tbody>
<tr>
<td>I.</td>
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<td>II.</td>
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<td>III.</td>
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<td>IV.</td>
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<td>V.</td>
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<td>VI.</td>
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</table>
Teacher's Notes

I. \( \text{NaCl (aq)} + \text{CuSO}_4 \text{ (aq)} \rightarrow \text{No Reaction.} \)

II. \( 2\text{NaOH (aq)} + \text{CuSO}_4 \text{ (aq)} \rightarrow \text{Na}_2\text{SO}_4 \text{ (aq)} + \text{Cu(OH)}_2 \text{ (s)} \)

III. \( \text{Na}_3\text{PO}_4 \text{ (aq)} + \text{CuSO}_4 \text{ (aq)} \rightarrow \text{No Reaction} \)

IV. \( \text{NaCl (aq)} + \text{AgNO}_3 \text{ (aq)} \rightarrow \text{NaNO}_3 \text{ (aq)} + \text{AgCl (s)} \)

V. \( \text{NaOH (aq)} + \text{AgNO}_3 \text{ (aq)} \rightarrow \text{NaNO}_3 \text{ (aq)} + \text{AgOH (s)} \)

VI. \( \text{Na}_3\text{PO}_4 \text{ (aq)} + \text{AgNO}_3 \text{ (aq)} \rightarrow 2\text{NaNO}_3 \text{ (aq)} + \text{Ag}_3\text{PO}_4 \text{ (s)} \)

Disposal

All solids should be collected into a labeled waste solid container. Aqueous solutions can be flushed down the drain in the quantities suggested here.