

Experiment worksheet

4.3 The solubility rules predict the formation of precipitates

Pages 94–95 and 204

Experiment 4.3: Precipitation reactions

Aim

To determine which compounds form precipitates and write equations for the reactions occurring.

Materials

- Plastic document sleeve
- Dropper bottles containing 0.1 M solutions of:
Group A:
calcium nitrate ($\text{Ca}(\text{NO}_3)_2$), copper(II) nitrate ($\text{Cu}(\text{NO}_3)_2$), magnesium nitrate ($\text{Mg}(\text{NO}_3)_2$), silver nitrate (AgNO_3), copper(II) sulfate (CuSO_4)
Group B:
sodium chloride (NaCl), sodium hydroxide (NaOH), sodium sulfate (Na_2SO_4), sodium carbonate (Na_2CO_3)

Method

- Draw up a large table as shown here with group B solutions listed across the first row and group A solutions in the first column as shown here:

	NaCl	NaOH	Na ₂ SO ₄	Na ₂ CO ₃
Ca(NO ₃) ₂				
Cu(NO ₃) ₂				
Mg(NO ₃) ₂				
AgNO ₃				
CuSO ₄				

- Make a second copy of your results table on a piece of A4 paper and place this table into the plastic document sleeve. Place this on the laboratory bench. This now becomes your working area for the experiment and you will add drops of the solutions to corresponding cells on the results table, which is now protected by the plastic sleeve.
- Place 1 drop of each of the group A solutions in each cell of the results table in the correct row.
- Add 1 drop of each of the group B solutions to the drops of the group A solutions in the correct columns.



Name: _____

Class: _____

Results

- 1 Record whether a precipitate forms, as well as its appearance, on your other copy of the results table.
- 2 Use Table 4.1 (page 94) to help you answer the following questions. For each precipitate formed:
 - a identify the ions that have combined to form the precipitate and write the formula of the ions
 - b write the formula of the precipitate
 - c write a word equation for the reaction.

Discussion

- 1 The sets of compounds tested included a range of anions: NO_3^- , OH^- , CO_3^{2-} , Cl^- and SO_4^{2-} . Of these, which:
 - a did not form any precipitates?

 - b only formed precipitates with one or two cations?

- 2 The sets of compounds tested included a range of cations: Na^+ , Ag^+ , Cu^{2+} , Ca^{2+} and Mg^{2+} . Of these, which:
 - a did not form any precipitates?

 - b formed precipitates with only one or two anions?

- 3 Did the precipitation reactions you observed match those predicted from Table 4.1? Discuss why or why not.



Name:

Class:

4 Write balanced chemical equations for the reactions between:

a silver nitrate and sodium chloride

b magnesium nitrate and sodium hydroxide.

5 Why is it important not to touch the tip of the dropper bottles on the top of the solution already on the plastic sleeve?

6 What other factors may affect the outcome of these precipitation reactions?

Conclusion

What do you know about predicting precipitation reactions?