

CHAPTER 7	Thought Lab 7.1: Identifying Unknown Aqueous Solutions	BLM 7.1.6
HANDOUT		

A student performed a series of precipitation reactions, flame tests, and observations of solution colour tests on a solution known to contain two metal ions. The student does not know the identities of the ions. Use the data collected by the student and the information provided in Table 7.2 and Table 7.3 to identify the two metal ions present in the aqueous solution.

### Procedure

1. Examine the observations in the Table of Evidence and then answer Analysis Questions 1–4.

**Table of Evidence: Testing a Solution of Unknown Metal Ions**

Test	Observation
1 solution colour	Solution is colourless.
2 effect of adding NaOH(aq) to solution	White precipitate is produced. Mixture is filtered and remaining solution (filtrate) is colourless.
3 flame test on precipitate from Test 2	Flame colour is red.
4 effect of adding Na <sub>2</sub> SO <sub>4</sub> (aq) to filtrate from Test 2	A second white precipitate is produced. Mixture is filtered and remaining solution is colourless.
5 flame test on precipitate from Test 4	Flame colour is red but different from the colour in Test 3.

### Analysis

1. List all the possible ions that give a red flame test and a precipitate in the presence of hydroxide ions.
2. List all the possible cations that give a red flame test and precipitate in the presence of sulfate ions.
3. If all traces of the two metal cations are removed from the solution at Test 4, what might the flame colour be when a sample of the solution is tested? Explain your prediction.

CHAPTER 7	Thought Lab 7.1: Identifying Unknown Aqueous Solutions (cont'd)	BLM 7.1.6
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4. Write predictions for what you would observe if you used solution colour and precipitation reaction tests to identify the metal ion in the following unknown solutions:

**Solution 1:** contains  $\text{Na}^+(\text{aq})$  only

**Solution 2:** contains  $\text{Cu}^{2+}(\text{aq})$  only

**Solution 3:** contains  $\text{Na}^+(\text{aq})$  and  $\text{Ag}^+(\text{aq})$

**Solution 4:** contains  $\text{Cu}^{2+}(\text{aq})$  and  $\text{Ag}^+(\text{aq})$