2. Place a drop of the solution from bulb 1 into circles 1-A, 1-B, 1-C, and 1-D (the top row). Solution 1 contains all four of the dissolved ions, so these drops will show what a **positive** test for each ion looks like. **Be careful to keep the solutions in the appropriate circles. Any spills will cause poor results.**

3. Place a drop of the solution from bulb 2 into each of the circles in row 2. This solution is distilled water and should not contain any of the ions. It will show what a **negative** test looks like.

4. Place a drop from bulb 3 into each of the circles in row 3 and a drop from bulb 4 into each of the circles in row 4. Follow the same procedure for bulb 5 (into row 5) and bulb 6 (into row 6). These solutions may or may not contain ions. The materials list gives contents of each bulb.

5. Now that each circle contains a solution to be analyzed, use the solutions in bulbs A–D to test for the presence of the ions. Bulb A contains NaSCN, sodium thiocyanate, which reacts with any Fe^{3+} to form the complex ion $Fe(SCN)^{2+}$, which results in a deep red solution. Bulb B contains $Na_2C_2O_4$, sodium oxalate, which reacts with Ca^{2+} ions. Bulb C contains $AgNO_3$, silver nitrate, which reacts with Cl^- ions. Bulb D contains $Sr(NO_3)_2$, strontium nitrate, which reacts with SO_4^{2-} ions. The contents of bulbs B–D react with the specified ion to yield insoluble precipitates.

6. **Holding the tip of bulb A 1 to 2 cm above the drop of water to be tested,** add one drop of solution A to the drop of reference solution in circle 1-A and one drop to the distilled water in circle 2-A. Circle 1-A should show a positive test, and circle 2-A should show a negative test. In your data table, record your observations about what the positive and negative tests look like.

7. Use the NaSCN solution in bulb A to test the rest of the water drops in column A to determine whether they contain the Fe^{3+} ion. Record your observations in your data table. For each of the tests in which the ion was present, specify whether it seemed to be at a high, moderate, or low concentration.

8. Follow the procedure used for bulb A with bulbs B, C, and D to test for the other ions. Record your observations about the test results. Specify whether the solutions contained Ca^{2+}, Cl^-, or SO_4^{2-} and whether the ions seemed to be present at a high, moderate, or low concentration. A black background may be useful for these three tests.

9. If some of the results are difficult to discern, place your microplate on an overhead projector. Examine the drops for signs of cloudiness. Looking at the drops from the side, keep your line of vision 10° to 15° above the plane of the lid. Compare each drop tested with the control drops in row 2. If any sign of cloudiness is detected in a test sample, it is due to the Tyndall effect and is a positive test result. Record your results.

CLEANUP AND DISPOSAL

10. Clean all equipment and your lab station. Return equipment to its proper place. Dispose of chemicals and solutions in the containers designated by your teacher. Do not pour any chemicals down the drain or in the trash unless your teacher directs you to do so. Wash your hands thoroughly before you leave the lab and after all work is finished.

ANALYSIS AND INTERPRETATION

1. **Organizing Ideas:** Describe what each positive test looked like. Write the balanced chemical equations and net ionic equations for each of the positive tests.

CONCLUSIONS

1. **Organizing Conclusions:** List the solutions that you tested and the ions that you found in each solution. Include notes on whether the concentration of each ion was high, moderate, or low based on your observations.

2. **Predicting Outcomes:** Using your test results, predict which water sample would be the "hardest." Explain your reasoning.