

MICROSCOPE LAB

CHEMICAL REACTIONS

GRADE 11-12, AP CHEMISTRY

Purpose

The purpose of this lab is to observe three chemical reactions using the uHandy Microscope and a projector/document camera. Each chemical reaction will show three different chemical change indicators as well as microscope understanding of the reaction. Students will complete the attached handout to record their observations, complete an analysis, and draw conclusions. Students will see two single replacement reactions and one double displacement reaction.

Objectives

1. Engage students in observing chemical reactions and looking for the chemical indicators.
2. Observe chemical reactions on a microscale level to see the process is not instantaneous, but time consuming.
3. Explore the interactions between ions in double and single replacement reactions.

Time Requirement

If you have multiple methods of running these experiments on a tablet or phone with multiple microscopes, you could get all three started and check in on them as the reaction continues. This would take about 30 minutes total.

If you only have 1 microscope to work with, the experiments must be done one-by-one with wait time. Each experiment could be done a day for 3 days straight or you can spend an entire day observing the three reactions. The total time for all 3 would take about 55 minutes total.

Equipment and Materials

- uHandy Mobile Microscope - Teacher's kit
- Phone or tablet
- Droppers (1 for each solution)
- 5 mL 0.10 M sodium iodide
- 5 mL 0.050 M lead (II) nitrate
- 5 mL 0.20 M copper (II) sulfate
- 5 mL Dilute acetic acid (1:4)
- Magnesium strip
- Aluminum foil
- Sand paper



Safety and Disposal

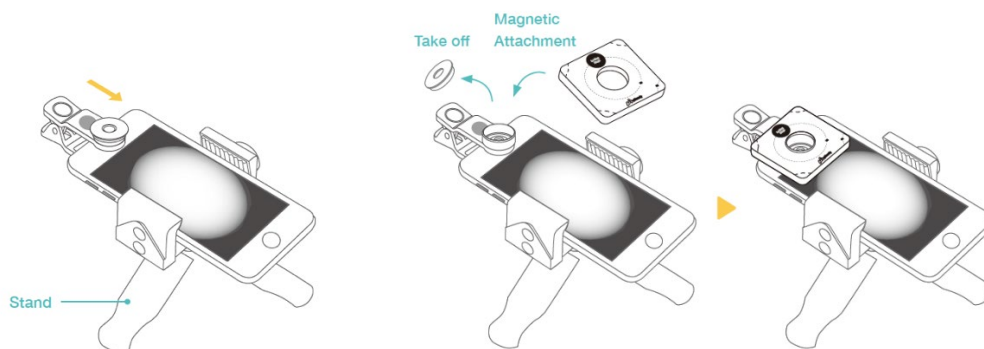
- **Discard Beaker #1:** Use filtration to separate the precipitate for waste disposal and you can allow the solution to wash down the drain.
- **Discard Beaker #2 and #3:** Remove solid from the solution for garbage disposal and wash the solution down the drain.
- Proper eye protection is required and gloves and apron are recommended.

Procedure

Set Up:

1. Install the uHandy Stand on smart device.
2. Take out #1 Lo-Mag Lens, #7 Lo-Mag stage, #8 60 mm petri dish, and the #9 tweezers.
3. Clip the #1 Lo-Mag lens over the selfie camera lens and check to make sure the field (white circle) is in the center of the screen. Place the #7 Lo-Mag Stage over the lens and check to make sure it is centered over the camera. (Refer to p.14 in the uHandy User Guide).

*#4 USB LED light is available in the Teacher's Kit to experiment lighting from different angles that create various visual effects.

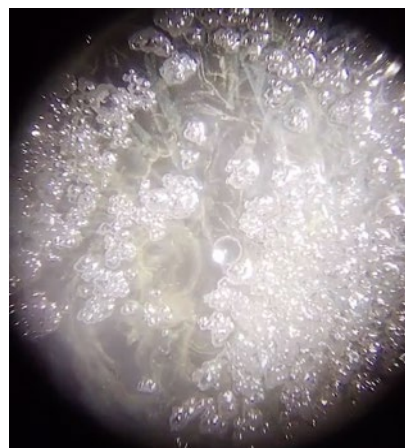


Procedure

Double Displacement #1:

1. Place a few drops of 0.10 M sodium iodide solution in the petri dish and place the petri dish on the #7 Lo-Mag stage. Hit record on the camera.
2. Place a few drops of 0.050 M lead(II)nitrate solution in the petri dish.
3. Describe the appearance of each solution.
4. Describe the results. Continue recording until nothing is changing any longer.
5. Describe the contents of the test tube after allowing the contents to settle for 25 minutes.
6. Complete & balance the molecular equation on your lab report.
7. Write the ionic equation for this reaction.
8. **Discard in Discard Beaker #1. Clean out the petri dish with a tissue paper and then with water or alcohol.**

What Will Students Observe on a Microscale Level

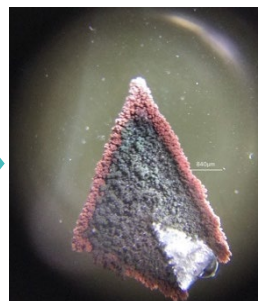
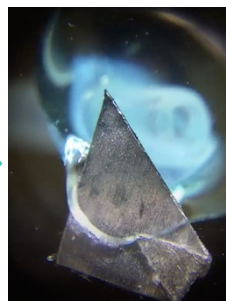
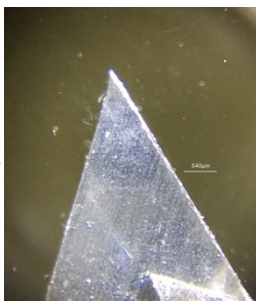
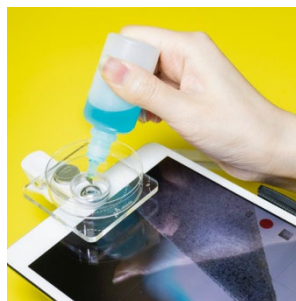


Procedure

Single Replacement #2:

1. Sand both sides of a tiny strip of aluminum and set into the petri dish. Hit record on the camera.
2. Place a few of copper(II) sulfate solution (**0.2 M**) into the petri dish.
3. Make initial observations then wait.
4. **After 15 minutes, make your final observations and stop recording.**
5. Complete & balance the molecular equation below.
6. Write the ionic equation for this reaction.
7. **Discard in Discard Beaker #2. Clean out the petri dish with a tissue paper and then with water or alcohol.**

What Will Students Observe on a Microscale Level

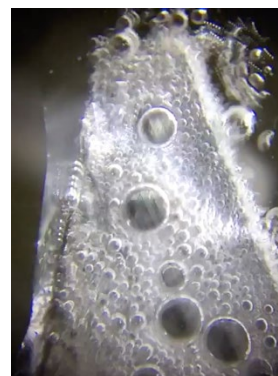
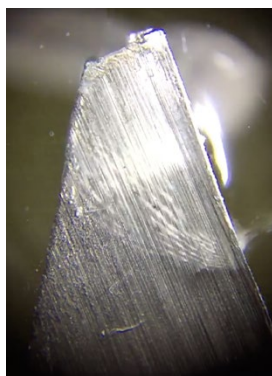
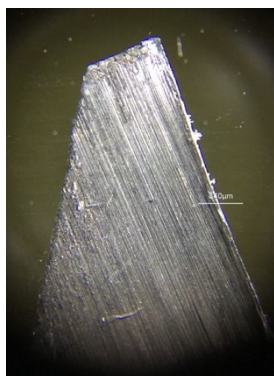


Procedure

Single Replacement #3:

1. Sand a small piece of magnesium strip and place into the petri dish. Hit record on the camera.
2. Place a few drops of acetic acid solution (**1:4**) into the petri dish.
3. Make initial observations and set the test tube aside for later.
4. **After 5 minutes, make your final observations.**
5. Write the molecular equation for the reaction of a magnesium strip with acetic acid.
6. Write the ionic equation for this reaction.
7. **Discard in Discard Beaker #3. Clean out the petri dish with a tissue paper and then with water or alcohol.**
8. Put all of the uHandy Microscope pieces back into the box.

What Will Students Observe on a Microscale Level



Thank you to Ms. Rogers of Neshannock Junior Senior High School for creating this inspiring teaching resource.

If you find this teaching resource helpful and would like to support Ms. Rogers to increase curiosity in chemistry of her 75 students, please visit the page to learn more about her project. <https://www.donorschoose.org/project/curiosity-in-chemistry-needs-microscopes/5733898/>



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