

Chemistry in a Ziploc Bag

Vanderbilt Student Volunteers for Science

2018-2019 VINSE/VSVS Rural

I. Introduction

- Tell students that knowledge in science is obtained through the scientific method. A question is investigated through careful and accurate recordings of observations.
- Assure students that the chemicals are safe.
- Ask students to record all of their observations on the Observation Sheet.
- For this lesson, students work in **pairs**.

Ila. Experiment A

- One VSVS member gives the explanation, while remaining members add phenol red to 15 1oz cups.
- Give each pair one ziploc bag containing baking soda, one 1oz cup containing 15 mL of phenol red solution, and one plate.

IIb. Experiment A

- One of the students should hold the bag upright over the pan while a VSVS member adds a teaspoon of Calcium Chloride
- The other student should then add the 15 mL of phenol red solution to the bag and seal it



Ilc. Experiment A

- The students should gently shake the contents of the bag over the plate
- Have the students feel the closed bag and record observations
- The reaction takes 3 to 5 minutes to go to completion
- Write student observations on the board



IId. Experiment B

- Take the students through the steps of systematically designing a procedure to test each observation by taking one variable (reagent) and combining it with one other reagent.
- **If sodium bicarbonate is the CONSTANT what are the other chemicals that would be the variables?**
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 - 1. NaHCO_3 plus water
 - 2. NaHCO_3 plus phenol red solution
 - 3. NaHCO_3 plus CaCl_2
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- **Continue building the list with CaCl_2 as the constant:**
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 - 4. CaCl_2 plus water
 - 5. CaCl_2 plus phenol red solution
 - 6. CaCl_2 plus NaHCO_3 BUT this is already listed in #3.
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- **Continue building the list with water (H_2O) as the constant:**
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 - 7. H_2O plus NaHCO_3 BUT this is already listed in #1.
 - 8. H_2O plus CaCl_2 BUT this is already listed in # 4.
 - 9. H_2O plus phenol red.

Ile. Experiment C

- Assign each pair one of the controls on their observation sheets. There will be at least 2 pairs for each control.
- Supply each pair with a ziploc bag and the chemicals necessary for their assigned experiment
- Tell students to add their chemicals to the ziploc bag over their plates and to seal the bag
- Have them record their observations



III. Observations and Explanation cont.

- Have **2 students** from one of the groups who did the experiment with **Control 1** come to the front of the class (or stand where they are). They will:
 - Demonstrate what they did
 - Tell the class their observations
- Ask the class for possible reasons for the observations (see chart below) and then tell them the answers.
- Repeat with students from **Control 2 and then the remaining student groups.**
- Write the results on the board so that all students can see them.

III. Observations and Explanation

- Ask the students what caused each of the specific observations.
- Tie in each observation's pertinent explanation found in your lesson plan
- Ask students: *How can you tell when a chemical change has occurred?*

Answers: 1. A color change, 2. A gas given off, 3. Temperature change

IV. Background Information

- The equations for the reactions that occur are in the manual
- Explain to the students why each of these reactions occur
- Explanations are found in the manual

Clean Up

- In the event one bag leaks or explodes, use paper towels to clean up any mess
- The VSVS team should collect all Ziploc bags and used cups, and put them in the trash bag
- Make sure the Ziploc bags with the reaction mixture is sealed before you put them in the trash bag
- Put everything else in the kit box along with the trash bag and return it to the VSVS lab