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.
IIa. 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
IIc. 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?
  - 1. NaHCO₃ plus water
  - 2. NaHCO₃ plus phenol red solution
  - 3. NaHCO₃ plus CaCl₂

- Continue building the list with CaCl₂ as the constant:
  - 4. CaCl₂ plus water
  - 5. CaCl₂ plus phenol red solution
  - 6. CaCl₂ plus NaHCO₃ BUT this is already listed in #3.

- Continue building the list with water (H₂O) as the constant:
  - 7. H₂O plus NaHCO₃ BUT this is already listed in #1.
  - 8. H₂O plus CaCl₂ BUT this is already listed in #4.
  - 9. H₂O plus phenol red.
IIe. 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