Kitchen Chemistry

Lesson Concept Observe chemical reactions and design single-variable experiments with mystery powders

Link Introduction to chemical reactions

Time 1 class period

Materials

Whole Class

Labeled beakers (or similar container) with approximately 240 mL of the following:

A=Flour

B=Epsom salts

C=Powdered lemonade

D=Calcium chloride *available at pool supply

E=Washing soda (sodium carbonate) *available at pool supply

F=Corn starch

Labeled water bottles (.5 L) with the following:

1=Water

2=Water (250mL) with red cabbage juice (250 mL)

3=Vinegar (250 mL) with red cabbage juice (250 mL)

4=Sodium carbonate solution (250 mL) with red cabbage juice (250 mL)

5=Diluted lemon juice (15 mL) with red cabbage

6=Diluted tincture of iodine solution (5 mL)

Per Group (groups of 2)

9 empty Ziploc™ sandwich bags

6 plastic spoons

9 condiment cups

1 Sharpie™ pen

Individual

Science Notebook

Mystery Powders and Liquid lab sheet

Goggles

Advance Preparation

1. Prepare red cabbage juice: Place one head of chopped red cabbage in a pot, cover with two liters of water and boil cabbage for about 30 minutes. Allow time for liquid to cool, use a strainer to separate solid and liquid and pour liquid into a 1 or 2 liter bottles.

2. Set up stations with 6 beakers (or similar container) of the dry substances (w/ spoon in each cup) and 6 water bottles with solutions (labeled as above).

2. Distribute 9 Ziploc™ bags and a Sharpie™ to each group.

3. Set up teacher station with supplies.

4. Copy lab papers.

Procedure:

Engage ***(10 minutes) Design single-variable experiments with mystery powders***

1. Explain that students will do simple experiments with “mystery” powders and “mystery” liquids. Students will use their observational skills to describe the product of each experiment, determine whether a chemical change has taken place, and use this knowledge to design a testable question and experiment.

2. Model how to conduct an experiment while the students write down their observations of what the teacher does on their lab paper. This information will become the procedure for the experiment.

3. Pair up students so that one student is the observer who then tells his or her partner what to record.

4. Select two powders from the list above.

5. Place one scoop of each in a Ziploc™ bag.

6. Record the letters of the powders on the whiteboard and on the Ziploc™ bag.

7. Carefully pour one of the liquids into a condiment cup and place it upright in the bag, writing down the number of the liquid on the board/baggie, as well.

8. Carefully push out the extra air in the bag and seal it completely.

9. Suddenly shake the bag so that the liquid and powders mix completely.

10. Finish the equation on the whiteboard with observations of the reaction, using the 5 senses. The following is an example of what may be written on the whiteboard:

    A + D + 4 = fizz, change in color from yellow to purple, air inflates the bag, heat is produced, no change in odor

11. Give the students an example of what a hypothesis might be for this experiment. For example, when powder D is combined with liquid #4, fizzing occurs. Emphasize that there can only be six trials, so it is necessary to limit the experiment to one variable. Discuss the need for two constants and one variable.

12. Have students think-pair-share about a possible lab procedure. Have students share out and design a universal lab procedure.

13. Write the universal lab procedure on the board. Have students record the procedure on their lab paper.

14. Distribute Mystery Powders and Liquids lab sheet. Instruct pairs of students to take a Sharpie™ and a baggie back to the science tables. Have students select two powders and one liquid and use a Sharpie™ to label each baggie with the substances they are putting into the bag. Have students conduct one experiment following the exact procedures.

15. Have students record the equation and product (results) on their lab paper.

16. Students must design an experiment that can be completed in no more than six trials. Students record their proposed experiments.

16. Have some students share their experiments to see if it is possible to conduct them in six trials.

17. Make sure the students understand this experiment must have two constants and one variable.

18. Send students to stations to conduct and record their experiments.

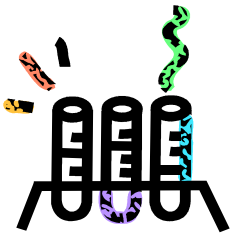
19. After students are finished, discuss each group's results and have students draw conclusions.

Extend (10 minutes) Design a single variable experiment

20. If students finish early, they may conduct a new experiment or write about what would happen with more ingredients.

Evaluate (5-10 minutes) 3, 2, 1

21. Have students write a 3, 2, 1 in their science notebooks, i.e., Three things that you learned today, two things you are not sure about, and one question,



Name: _____
Homeroom: _____

Mystery Powders and Liquids

A. Experiment Procedure:

What I see the teacher do…	Agreed-Upon Procedures

B. <u>Initial Experiment:</u> **<u>Product</u>**

\+ \+ = _____

Was there a chemical change? _____ Why or why not? _____

_____

_____

C. My proposed hypothesis:

_____

_____

_____

D. My testable hypothesis:

_____

_____

_____

Experiment #1 **Product**

 = _____

Experiment #2 **Product**

 = _____

Experiment #3 **Product**

 = _____

Experiment #4 **Product**

 = _____

Experiment #5 **Product**

 = _____

Experiment #6 **Product**

 = _____

E. Questions

1. Did the evidence support my hypothesis? _____

Why or why not?_____

_____

2. Did a chemical change happen in my experiment? _____

Why or why not? _____

3. The next question I would like to test is:

_____?