

Confectionery Bureau of Investigations Case #6040: Case of the Cookie Mystery

Materials Needed:

For each group:

6 small containers with different white powders labeled 1, 2, 3, 4, 5, & 6
(Baking soda, baking powder, corn starch, flour, powdered sugar, and baby powder)

3 small dropper bottles filled with testing liquids
(Water, vinegar, and iodine solution)

Box of toothpicks

Strips of wax paper

Squares of aluminum foil (for heating samples)

Tweezers or tongs or clothes pins

Small candle (with aluminum foil as holder)

Matches

Safety goggles

Mystery Samples

You will need to prepare 3 mystery samples by mixing equal amounts of each powder listed below. Each group should be given a small amount of each mixture to test.

Mystery Sample 1: Flour, corn starch, and powdered sugar

Mystery Sample 2: Flour, baking soda, and powdered sugar

Mystery Sample 3: Flour, baking soda, and baby powder

Expected Results:

Students should discover that Mystery Sample 2 is the correct mixture to make Grandma's special cookies. Her recipe calls for flour, baking soda, and powdered sugar. This sample will fizz in vinegar, turn black in iodine, and melt/bubble when heated.

The two other samples would not be used for her special cookies. Mystery Sample 1 does not fizz in vinegar, so it would not contain baking powder (or baking soda). Mystery sample 3 has a distinctive odor (from the baby powder) and would make nasty cookies.

Project Tips:

I divide students in groups of 3-4 students. Each student is responsible for testing at least one of the 6 powder samples. They will need to share results with the other group members. The group will need to decide their procedure for testing each sample. I stress the need to keep samples separate to prevent contamination and poor results. My 7th graders also need to review proper safety procedures.

* The original idea was titled North Pole Bureau of Investigation if you wanted to use this lab before Christmas break. It can be found at: T. Trimpe 2001 - <http://sciencespot.net/>

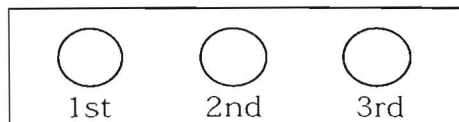
T. Trimpe 1999

Powder Testing Procedure
Case #6040: Case of the Cookie Mystery

IMPORTANT: Each person should test only one powder at a time!
DO NOT ALLOW SAMPLES TO MIX TOGETHER!

FOR EACH SAMPLE:

Step 1: Place 3 small samples of your powder (about half the size of a dime) on a piece of wax paper. Place the wax paper on a paper towel to prevent messes!



Step 2: Describe your powder sample and write your observations in the chart on the back of your worksheet.

Step 3: Add 4 to 5 drops of WATER to the 1st pile and mix using a clean toothpick. Record your observations in the chart.

Step 4: Add 4 to 5 drops of VINEGAR to the 2nd pile and mix using a clean toothpick. Record your observations in the chart. (HINT: Fizz or no reaction)

Step 5: Add 4 to 5 drops of IODINE to the 3rd pile and mix using a clean toothpick. Record your observations in the chart. (HINT: Black, brown, or no reaction)

CAUTION: Iodine will stain clothing, hands, and anything it touches!

Step 6: For the HEAT test, place a small amount of powder on a clean square of aluminum foil. Bend the edges up to create a “cup” and hold onto it using a pair of tongs or tweezers. Hold the sample over the candle flame for a few seconds. Record your observations in the chart.

CAUTION: Use care when working with heat! Long hair must be tied back. Sleeves must be rolled up. Keep papers (and anything flammable) away from the flame. Goggles must be worn, since the powder may melt and splatter!

CLEAN UP YOUR AREA BEFORE YOU LEAVE!

Confectionery Bureau of Investigations Case #6040: Case of the Cookie Mystery

Grandma needs your help! Grandma makes a batch of her special cookies for her grandchildren to give them all the energy they need. While making his delivery, the devious grocery delivery boy messed up all the special baking powders she ordered.

He has left a note with three mystery bags of white powder. The Confectionery Bureau of Investigations has provided samples of six white powders found at Grandma's house and three mixtures left by the delivery boy.

Without your help, Grandma will not be able to make her special cookies. Help save her special cookies.

I'm a devious grocery delivery boy,
That's plain to see;
Delicious cookies from Grandma
will not be,
I've taken the recipe just for me!



Part 1: Follow the directions to test each sample (#1-6) with water, vinegar, iodine, and heat. Record your observations on the top part of the chart on the back of this page.

Part 2: Follow the same procedure to test the three Mystery Mixtures (A, B, and C). Record your observations in the bottom portions of the chart. Use your results from Part 1 to determine which mixture is the special sugar cookie mix!

Grandma's Special Sugar Cookies

Mix 15 cups of flour, 6 teaspoons of baking powder, 5 cups of powdered sugar, 3 pounds of butter, and 10 eggs in a large red bowl. Add lots of tender loving care and a bit of Grandma's magic dust, then bake until golden brown.

Part A

Sample	Description	Water Test	Vinegar Test	Iodine Test	Heat Test
1					
2					
3					
4					
5					
6					

Part B

Sample	Description	Water Test	Vinegar Test	Iodine Test	Heat Test
A					
B					
C					

Which mystery mixture is Grandma's special cookie mix? _____

Why did you choose this mixture?