

## **Baggie Science**

**Title: Baggie Science**

**Purpose:**

This activity teaches students to observe, experiment, and make inferences.

**Background Information:**

This activity introduces students to the idea of chemical reactions and designing and conducting experiments.

**Materials:**

- 1 Tsp Sodium bicarbonate (Baking Soda) per reaction (as described)
- 2 Tsp Rock Salt (with CaCl) per reaction (as described)
- 5 ml Phenol Red (pre-diluted) per reaction (as described)
- 5 ml water per reaction (as described)
- 15 ml conical tube
- Graduated cylinder to measure (5 ml)
- Wooden Stick
- Markers
- Ziplock bags
- Measuring spoons (Tsp)

**Procedure: Divide the group into pairs**

**Part I – observations**

1. Give each pair 6 clear ziploc bags. Level any measurements using a wooden stick, NOT your finger.
2. Phenol red is a dye and may stain so be careful. It is diluted by adding 4 drops of phenol to 10 ml water (it will be pre-diluted in bulk [500 ml] before the experiment).
3. Each pair will mix all ingredients (except water) in a ziploc bag (1 Tsp Baking Soda, 2 Tsp Rock Salt and 5 ml diluted Phenol Red). Be sure to note observations (temperature of bag, color, sound, etc).

**Part II – Testing Predictions**

1. Based on your observations from Part I, test different combinations of the materials to determine which variables caused the different reactions.



**Paracelsus Outside the Classroom**

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2. Each pair should label the remaining 5 bags “A” through “E” using a magic marker.
3. Predict which ingredient caused the fizz and bubbles, the temperature change and the color change. Document your predictions on the “my notes” sheet.
4. In Bag A, add 1 Tsp of Baking Soda and 5 ml of diluted Phenol Red
5. Document the observation on the “my notes” sheet.
6. In Bag B, add 2 Tsp Rock Salt and 5 ml of diluted Phenol Red.
7. Document the observations on the “my notes” sheet
8. In Bag C, add 2 Tsp Rock Salt and 5 ml of water
9. Document the observations on the “my notes” sheet
10. In Bag D, add 1 Tsp of Baking Soda and 5 ml of water
11. Document the observations on the “my notes” sheet
12. In Bag E, add 1 Tsp Baking soda, 2 Tsp of Rock Salt and 5 ml of water
13. Document the observations on the “my notes” sheet



My Notes by \_\_\_\_\_, Scientist

## Baggie Science

### Part I – Observations and Hypothesis

1. What do you see when all the chemicals are mixed together?
2. Which ingredient do you think (hypothesis) will cause the fizz and bubbles?
3. Which ingredient do you think (hypothesis) will cause the color change?
4. Which ingredient do you think (hypothesis) will cause the change in temperature?

### Part II

1. Now test your hypotheses. Using the table below, set up a test of each combination possible. Mix them in your labeled bags with a partner and write the results in the “Results” column.
2. Results of combinations to test hypothesis

Sample	Baking Soda	Rock Salt	Water	Phenol Red	RESULTS
Bag “A”	X			X	
Bag “B”		X		X	
Bag “C”		X	X		
Bag “D”	X		X		
Bag “E”	X	X	X		

Results of the Experiment:

3. What happened with the different mixtures?
4. Did your hypotheses match your results?



## **Instructor Notes**

### **Part I and II**

1. Be sure the phenol has been diluted prior to beginning the experiment.
2. Discuss how each chemical may affect the reaction. See if the children can figure out which combinations are responsible for what properties.

### **Answers:**

- The Rock salt is responsible for the heat.
  - The Baking Soda is responsible for the cold.
  - The Rock Salt and Baking Soda mixed with phenol red causes color change.
  - The Rock Salt and Baking Soda cause the fizzing (gas).
3. More discussion:  
Rock Salt is often used on roads to help with icy conditions. Salt heats up and can melt the snow and also lowers freezing point for ice. Rock Salt damages our roads, cars, and the environment. An alternative to Rock Salt is sand.

Phenol Red is responsible for the color change. Water can be used but there will be no color change. Phenol Red is an indicator because it changes color in the presence of an acid (low pH – like lemons). It is red normally and when mixed with an acid it becomes yellow. This happened in Part I when all the reagents were mixed together.

In Bags A and D, the baking soda caused the temperature of the liquid to decrease. The baking soda absorbed the heat (endothermic reaction).

In Bags B and C, the rock salt caused the temperature of the reaction to heat up (exothermic).

In the bag from Part I and Bag E, the temperature changed, but it was slight. The rock salt caused the temperature to heat up, but then the baking soda cooled it.

