

CHEMISTRY IN A BAG

Safety Precautions:

- Calcium Chloride is a corrosive material. Be sure to use extra care when handling. Wash hands/skin if contact is made.
- Wear goggles

In this lab you will:

- Make good observations
- Use Acid-Base Indicators
- Experience an Endo/Exothermic Reaction
- Perform a burning splint test
- Draw conclusions based on the experiment performed.

Background:

In this experiment, a chemical reaction takes place inside a zip lock bag. During the reaction, an indicator is added to monitor the changes in pH. It is not a reactant. An indicator may be many different chemicals. Indicators change colors as the pH changes. In this lab, we will use:

| Indicator | Strong Acid | Acid | Neutral | Base | Strong Base |
|---------------------|-------------|---------------|---------|------|-------------|
| Universal Indicator | Red | Orange/Yellow | Green | Blue | Purple |

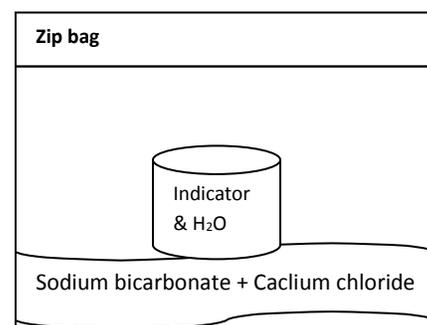
A chemical reaction may also be accompanied by a change in energy. In this experiment, you will be asked to identify the reaction as exothermic or endothermic.

Materials:

| | | | |
|-----------------|------------------|--------------------|--------------------|
| Zip lock bag | Calcium chloride | Sodium bicarbonate | Graduated Cylinder |
| pH indicator(s) | Medicine cup | Match | Wooden splint |

Procedure:

1. Measure 4.2g of sodium bicarbonate into the bag
2. Reseal sodium bicarbonate
3. Measure 8.5g of calcium chloride into the bag
4. Reseal calcium chloride
5. Mix the two chemicals and record any observations
6. Measure 5mL of the universal indicator.
7. Place indicator in vial.
8. Measure 10 mL of water.
9. Add to the vial with indicator.
10. VERY CAREFULLY place the vial of indicator solution into the bag
******DO NOT SPILL the LIQUID******
11. Press all of the air out of the bag (without spilling the contents) and seal the bag.
12. Place the bag that contains the solids and the vial of liquid on the balance.
13. Record the mass of the bag with *all of its contents*
The bag should be zipped close
14. Tip the vial over allowing the liquid to pour into the bag.
15. Mix the liquid with the solids.
16. Record observations- be sure to include changes in temperature.
17. DO NOT OPEN BAG!!!
18. Place the bag back on the balance.
19. Record the mass of the bag again.
20. BE CAREFULL!!!! Use a match to light the wooden splint.
21. Have your partner NOW open the bag and place the burning end of the splint inside the bag.
22. The wooden splint should not touch the contents in the bag.
23. Record observations.



Clean-Up :

Empty the bag's contents into the sink, wash out medicine cup, and wash out bag.



Name: _____ CHEMISTRY IN A BAG

Data:

| Mixing | Observations | | Mass (g) | |
|----------------------------|--------------|-------|----------|-------|
| | Before | After | Before | After |
| Universal Indicator | | | | |

Observations of the wooden splint test: _____

Results and Conclusion:

1. Give at least two indications that a chemical reaction has occurred?

2. Write out the reaction using chemical formulas, label each reactant & product as solid(s), liquid (l), gas (g), or aqueous (aq), & balance the reaction.

sodium bicarbonate + calcium chloride → calcium carbonate + sodium chloride+ water + carbon dioxide

3. Describe the change in temperature in this experiment. Is the change in temperature endothermic or exothermic? Explain how you know.

4. Write out the thermochemical equation if the enthalpy is -666.80 kJ (hint: same as number two just add the enthalpy)

5. Draw a reaction path diagram for this experiment, label the activated complex, the activation energy and include the reactants, products, and enthalpy (see question 4) **from this lab**. Be sure to label each axis.



6. Give two indications that a gas was given off in the experiment?

7. What would be a good "real-life" use for this gas?

8. Compare the mass of the reactants to that of the products. Does this make sense? Explain why or why not.

9. What was the purpose of the indicator(s) in this experiment?

10. What conclusion can be made about the overall products pH? Explain.

| Indicator | Strong Acid | Acid | Neutral | Base | Strong Base |
|---------------------|-------------|---------------|---------|------|-------------|
| Universal Indicator | Red | Orange/Yellow | Green | Blue | Purple |