

PHYSICAL & CHEMICAL CHANGES



- *Goggles must be worn by each person in the group while there is a flame at the table.
- *Point test tubes AWAY from people while heating contents.

Background Information:

A **physical change** is one in which the form or appearance of matter changes, but not its composition.

Physical changes are easy to identify. If only the form of a substance changes, you have observed a physical change.

During a **chemical change**, substances are changed into different substances. In other words, the composition of the substance changes.

There are several signs of a chemical change:

- Change in color
- Release or gain of energy (frequently in the form of **heat**)
- Change in odor
- Formation of a gas
- Formation of a solid

The substances produced during a chemical change cannot be changed back into the original substances by physical means.

PROBLEM:

To observe a chemical and physical change.

MATERIALS:

Graphing calculator
LabPro
Temperature sensor
Candle
Petri Dish
Graduated cylinder

Matches
Water
Triple Beam Balance
Test Tube w/ holder
Safety goggles

PROCEDURE:

1. Put on safety goggles.
2. Observe the candle. Record observations.
3. Light the candle, observe the melted wax. Record your observation.
4. Pour a few drops of melted wax into the petri to attach the candle to the dish.
5. Find the mass of the dish and the candle. Record data.
6. Use the graduated cylinder to pour 10 mL of water into the test tube.
7. Connect the LabPro to the graphing calculator. Turn the data collector ON. Press the PRGM key on the calculator. Choose the PHYSCI or CHEMBIO program.
8. Press **ENTER** until you come to the *****MAIN MENU*****.
9. Select **1: SET UP PROBES**. *Follow the on screen instructions.* After you have set up the probe, press **ENTER** to return to the *****MAIN MENU*****.
10. Select **2: COLLECT DATA**.
11. Select **2: TIME GRAPH**.
12. Enter "**1**" as the time between samples in seconds. Press **ENTER**.
13. Enter "**180**" as the number of samples. Press **ENTER**.
14. Press **ENTER** again. Select **1: USE TIME SET UP**. Press **ENTER**.
15. Enter "**0**" as the **Ymin**. Press **ENTER**.
16. Enter "**50**" as the **Ymax**. Press **ENTER**.
17. Enter "**1**" as the **Yscl**. Press **ENTER**.
18. Place the temperature sensor in the test tube.
19. *Wait 30 seconds.*
20. Press **ENTER** on the calculator.
21. Use the test tube holder to hold the test tube over the candle flame.
22. Point the test tube AWAY from yourself and others, gently move the tube in small circles.
23. When you are finished collecting data, the calculator will read: **Time in L1 Data in L2**.
24. Press **ENTER** to see a graph of your data. Sketch the graph in the data section.
25. Use the **TRACE** button to see the exact temperature at each second.
26. Record your starting and ending temperature in the data section.
27. Blow out the candle. Find the mass of the dish and the candle. Record data.

DATA:

Observations of the physical properties of the candle:

Observations of the physical properties of the melted wax:

Mass of candle & dish BEFORE burning (g)		Temperature of water BEFORE heating (° C)	
Mass of candle & dish AFTER burning (g)		Temperature of water AFTER heating (° C)	

Sketch your graph: Include title, labels, and units

DATA ANALYSIS:

1. Look at your graph. What relationship is shown?

2. What does the relationship tell you about the chemical change that took place? Hint – think about *energy*.

QUESTIONS & CONCLUSIONS:

1. What physical change took place in this investigation? Explain your answer (why was it a **physical** change?).

2. What chemical change took place in this investigation? Explain your answer (why was it a **chemical** change?).

3. How do you explain the difference the mass of the candle before and after burning?

4. Why was a line graph used to show this data?

5. What was the independent variable in this investigation?

6. What was the dependent variable in this investigation?
