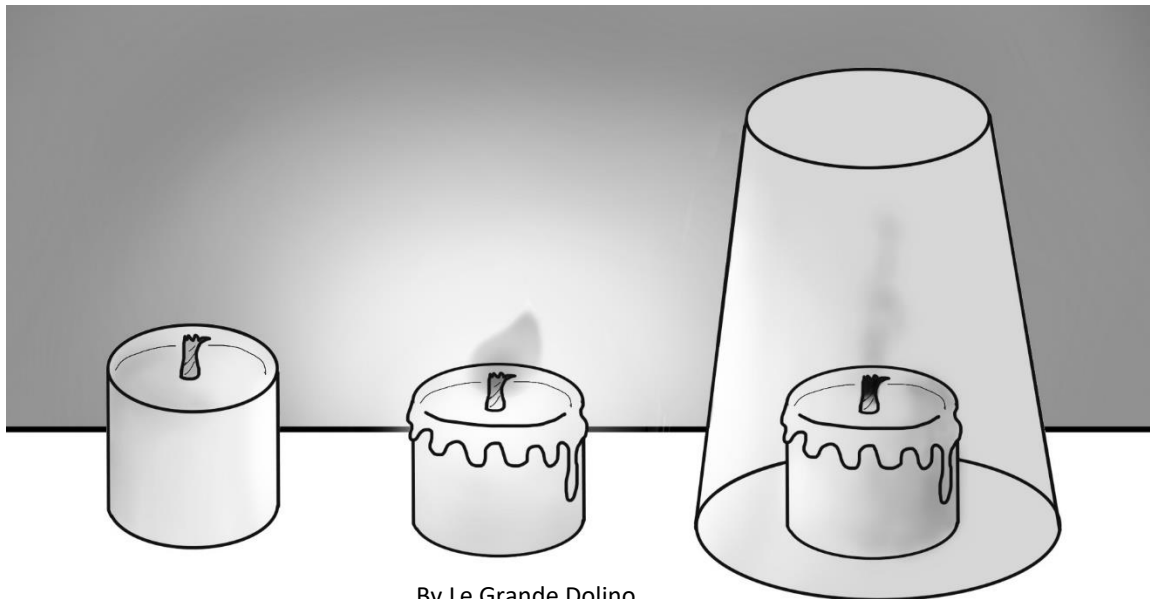


Section 2 – Doing Experiments in the Kitchen (Changes in Matter in the Presence or Absence of Oxygen)

Engage

What do you see?



What do you think?

From the previous lesson, you have learned that matter can undergo two types of changes– physical and chemical. Both physical and chemical properties have effects on matter. However, this lesson will focus on one chemical property of matter.

How does the absence of air affect the candle flame?

Record your ideas about this question in your notebook. Be prepared to discuss your responses with your small group and the class.

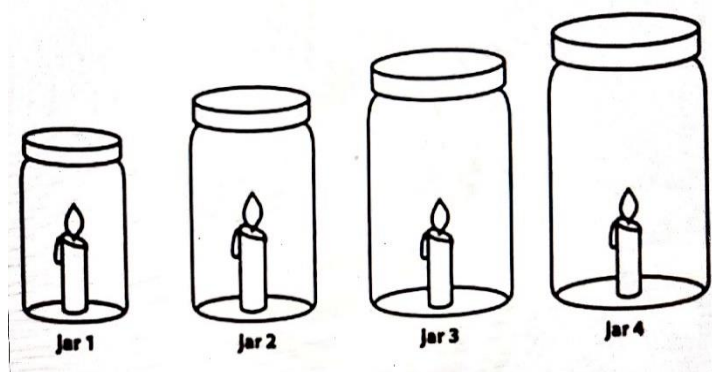
Explore/Investigate 1

Note: Do this activity with the supervision of an adult.

Materials: 4 jars in different sizes, 4 small candles with same size and length, match, timer, ruler. If you do not have jars, you can use other containers with lids.

Before you start the investigation, copy this chart in your notebook.

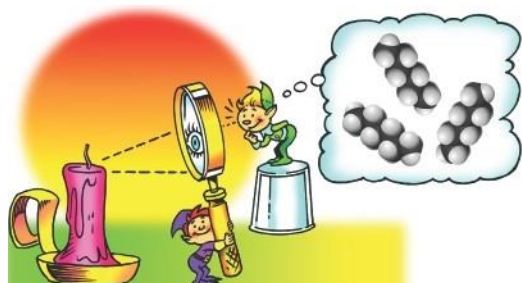
Jars	Time of the flame was put out	Length of the candle after burning
1		
2		
3		
4		



1. Light one of the candles.
2. Cover it with the smallest jar.
3. Using a timer (in a cellphone), measure how many seconds for the flame of the candle to be put out.

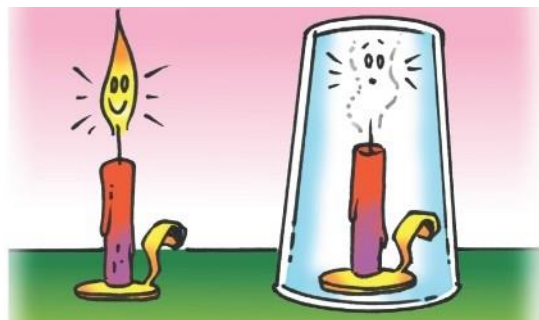
4. Measure the length of the candle after it burns out.
5. Repeat the procedure using the next size of jar up to the largest jar.
6. Find out which jar has the longest and shortest time of putting out the flame of the candle.
7. Find out which are the longest and shortest candles after burning.
8. Write answers to the following question:
 - a. Which candle flame lasted shortest? Why do you think this happened?
 - b. Which candle flame lasted longest? Why do you think this happened?

Explain: The Secret Science of...



The Wax Facts

If you could look way down into a candle, you'd see that wax is made up of long molecules. Each molecule is made up of carbon atoms, shown in dark gray, and hydrogen atoms, shown in white.



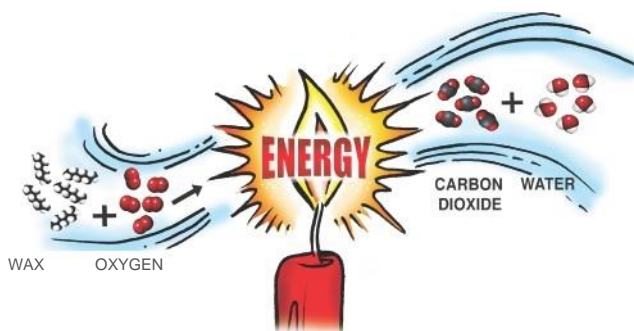
Wax is Not Enough

You need more than wax to make a flame. You also need oxygen. The oxygen that's needed to make the flame is in the air. If you cover a flame with a glass cup or jar, the flame uses up the oxygen and goes out.



Wick Trick

The wick is made of string and is covered in wax so that it lights easily. Once the wick is lit, heat from the flame melts some candle wax. Some of this liquid moves up the wick. The liquid evaporates and becomes a gas, which is the fuel for the flame.



One Hot Reaction!

Here is a picture showing the wax gas and the oxygen molecules coming together to make a flame. This is called a chemical reaction. This reaction also makes carbon dioxide and water. Both of these invisible gases go into the air.

What's happening in there?



Why does the flame go out when the jar is covering it?

The substance that reacts with the candle wax is oxygen. It comes from the air. Putting the jar over the candle keeps oxygen outside the jar

from getting in. The reaction can only use the oxygen that is already in the jar. So, when that oxygen is used up, the reaction can't keep going. Running out of oxygen makes the flame go out.

Watch this ACS videos to get a deeper understanding.

<https://youtu.be/cmaaQYe96BU>

<https://www.acs.org/content/acs/en/education/whatischemistry/adventures-in-chemistry/secret-science-stuff/flames/flames-interactive.html>

Elaborate/ Investigate 2

What environmental conditions are needed for iron to rust?

Can iron rust in dry air or is water needed? Does the presence of acids, such as acid rain, speed up rust? What about salt? Let's find out.

Materials: fine steel wool or paper clip, water, white vinegar, table salt, marker for labels, 4 similar jars.

Make saltwater by adding 2 teaspoons of salt per cup of water and stir.

Label the containers:

Water saltwater vinegar air

- 1) Pour $\frac{1}{2}$ cup of water into the first container.
- 2) Add $\frac{1}{2}$ cup saltwater to the second container.
- 3) Add $\frac{1}{2}$ cup white vinegar to the third container
- 4) Leave the 4th container dry and empty.
- 5) Break off balls of steel wool the size of a marble and roll into 5 small balls. Drop the steel wool into each container. Or, if you do not have steel wool, drop one paper clip into each container.
- 6) Check again after 24 hours. Write your observations in your science notebook.
- 7) Record your results again after 48 hours. What has changed?

Iron in nails or paper clips when exposed to air or water for a long-time change into rust. The chemical reaction is between the nail (iron) and oxygen molecules. Almost all metals rust or corrode but they can be protected by covering with a coating of paint, oil or grease. When iron rusts, it becomes red or brown, and the metal eventually becomes brittle.

Explain: Watch the following videos on rusting metals.

<https://www.youtube.com/watch?v=qd2B9yCKzc0>

https://www.youtube.com/watch?v=cn_Vom--b4A

<https://youtu.be/x49BtB5dOwg>

What Do You Think Now?

At the beginning of the section you were asked to think about the following question:

How does the absence of air affect the candle flame?

At this point in the section, it is time to reflect on what you think now. Do you have a better understanding of the changes that that occurs in a lighted candle in the presence or absence of oxygen? Would you call them chemical change?

Evaluate – You are going to do My Healthy Plate

MY HEALTHY PLATE (Physical and Chemical Changes)

We have learned that matter around us undergoes changes, be it a change in shape, size, color, formation of gas, odor or others. Now, you are ready to make your own physical and chemical changes happen in your kitchen by preparing food for your family table one of these days. You can prepare your own pasta noodle, kimchi rice, pickled cucumber, atsara, bibingka, or even cupcake if you like.

This worksheet will help you plan for the food recipe you are going to do in your kitchen. You ask an adult to help you plan and perform your healthy plate.

Part I. Food Recipe Identification (What do you wish to prepare/cook? Why did you choose to do this?)

Part II. Ingredients (What materials are you going to use? Are the materials available from your kitchen? If not, can you access those?)

Ingredients	Quantity	Already available (YES or NO)	If NO, who will and when to buy

III. Preparation of Food/Methodology (How do you plan to prepare your food? Write your step by step procedure).

After accomplishing this worksheet, submit this to your teacher and wait for the feedback.

Expected output:

You are to make a one-page brochure of your healthy plate. You need to place the following information (a to d) in your brochure. You can add other things in your brochure as well. The brochure should have:

- Name of the food you prepared
- Pictures of your final food and the procedures while preparing it
- The physical and chemical changes that happened from the materials to the final food
- Experience/new learning you gained while doing this project