

Name _____

Period _____

Lab 1
90 minutes

Candle Lab

Problem: Is a candle flame matter?

Part 1 Write the change in mass of the candle and the time of burning.

Part 2: Take at least ten minutes to sketch the candle several times. Make it good like in art class. Add notes about the color and how it changes. Look closely and see something you never saw before!

You should have ten or more observations. Continue on the back of the sheet.

OBSERVATIONS	INTERPRETATIONS
1.	1.
2.	2.
3.	3.

Test # _____

Your Name _____

Observations

[words AND drawings from your 5 senses]

Interpretations

[List all the matter that you think you see]

Based on *this* test, is there matter in the candle flame? Explain.

Test # _____

Your Name _____

Observations

[words AND drawings from your 5 senses]

Interpretations

[List all the matter that you think you see]

Based on *this* test, is there matter in the candle flame? Explain.

INSTRUCTIONS

CANDLE LAB

Test 1 – the screen

- Hold the screen horizontally, look down through it, and use it to cut the flame in half.
- As you look straight down, record what you see with *pictures* and with *words*.
- Repeat this for at least two more locations in the flame.

Test 2 – the shadow

- Find the place in the room where the teacher has set up a light shining on the wall to show the shadow of a candle flame. When the station is available ask permission and take your group there.
- Sketch the flame itself.
- Sketch the shadow of the flame.

Test 3 – the zones of the flame

- List as many colors as you can and sketch where they are in the flame.

Test 4- pipe to flame interior

This is the trickiest test; it only works for about half of the groups that try it:

- Stick a tube into the flame and try to get some grey vapor to come out from the far end of the tube.
- Try to light this vapor on fire.
- If it doesn't work, write down in your observations what you tried and what didn't work.

If this test failed remember that failure counts as a result too and is sometimes useful in understanding a science experiment!)

Test 5 - foil

- Hold a piece of foil horizontally, stick it into the flame for less than a second, remove it.
- Sketch and describe what is on the foil. This tells you about a cross section of what matter is in the flame at that level.
- Repeat this test for two more levels. Sketch and describe each.

Test 6 – mass change

- a) If scales are available, record the before and after mass and burning time of a long burning candle. Or use class data from the chalkboard.

Test 7 – smoke?

- a) Blow out the candle, sketch what you see.
- b) Relight. Blow out the candle and with a lit match, touch the top of the 'smoke', and see how the fire jumps through the smoke and down to the wick to re-light the candle.
- c) True smoke is not flammable! Record in your *interpretations* what you think this grey vapor is made from.

Test 8 – Temperature of the Zones

- a) Get a used match that is well-blackened so it won't burn.
- b) Holding the match at different heights in the flame and above the flame, count the seconds it takes to start glowing in that region. This is a rough estimate of the temperature in that location.

Optional Questions. Please do not write on this instruction sheet. If you have time, answer the following on your own paper and attach to your lab notes.

Answer in complete sentences

- 1) In the screen test (Test 1) you observed that the flame is hollow: glowing on the surface but colorless on the inside. Is "matter" glowing? Is non-matter glowing? Make your best guess.
- 2) In the colors test, why would the bottom of the flame be a different color than the top; what is different about the top of the flame?
- 3) Real smoke, like from cigarettes, is a type of microscopic ashes. In the test where you blew out the candle and relit it ~~*(xx)~~ the rising "smoke" you observed was not really smoke. What do you think would be rising up out of a hot, waxy candle wick?

NOTES TO TEACHER:

How to photocopy: First page is all they get on day one where they light the candle, watch it burn, sketch it, come back to seats.

Second page, is a blank data recording sheet for day two. I make page two available loose and they take as many as they need to record all their tests.

Page three is the instructions. I put one copy per table and it stays there through the day for the periods to re-use.

If there is time before the lab, or the day before the lab it is good to have students *predict* the results of some tests, especially Tests 2, 4, or 6, before they go to tables. Predicting Test 2 I give as a Do Now on that day.

They will play and drip wax and burn pencil tips, depending on what you let them do. I allow some of this but it can get out of hand.

The chief hazard is fire. Show them where the blanket is and how to put it over their lab partner's burning head. Bring scrunchies from the 99 cent store to tie back hair: always one or two girls per period need this and don't have one.

Dripped wax on table scrapes off pretty well when cool with a CD cover, credit card, etc.

Materials:

Candles

Aluminum foil or spatulas

Screens or tea pouring strainers

Glass tubes

Matches in small boxes (dump out all the matches except 4 per box—they can get refills from you as needed)