

ANSWER KEY

Part C: Products of combustion: Water and Carbon Dioxide [Teacher Demonstration]

1. The teacher will demonstrate the test for the presence of water. Dry Cobalt Chloride paper (blue in colour) will be placed in water. Describe what happens to BLUE cobalt chloride paper when it is placed in water. the paper turns PINK

2. **Test for the presence of water as a product of combustion:** The teacher will place a dry Erlenmeyer flask upside down over a burning candle flame until the flame is extinguished. There should be some drops of a clear liquid formed on the inside of the flask. The teacher will then touch the BLUE cobalt chloride paper to a drop of the liquid. What happens to cobalt chloride paper? What does the result mean? (what is the clear liquid?) turns PINK

meaning that water has been produced

3. The teacher will put a candle into a beaker or petri dish, and will pour water into the container to a depth of about 1 cm. The candle will then be lit, and an Erlenmeyer flask will be placed over the candle so that the flask dips into the water. Describe with WORDS and DIAGRAMS:

a. What happens to the flame?

- gradually dies out, finally extinguishing

b. What happens to the wax part of the candle?

- becomes covered with water, but otherwise is unchanged

c. What happens to the water in the beaker or Petri dish?

- water is sucked into the flask



4. **Test for the presence of Carbon Dioxide [CO₂] as a product of combustion:** After students have completed their observations for questions 3, the teacher will lift the Erlenmeyer flask vertically off the candle and out of the water, quickly turning it upright. Limewater will then be poured into the flask and swirled around to mix it with the gasses within the flask. [Note: "Limewater" has nothing to do with the citrus fruit, the lime. Rather, the chemical "limewater" is a mixture of calcium hydroxide Ca(OH)₂ in water]

a. What colour was the limewater before it was mixed with the gases in the Erlenmeyer flask?

clear (no colour - looks like pure water)

b. What colour was the limewater after it was mixed with the gases in the Erlenmeyer flask?

- cloudy : white precipitate (powder) emerges in the water

Note: When limewater is mixed with carbon dioxide, a chemical reaction occurs creating calcium carbonate and water. The calcium carbonate does not dissolve in water, so it forms a white precipitate that makes the liquid look milky or cloudy. The chemical equation is: $\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

c. What does the change in colour of limewater mean? Is CO₂ present in the Erlenmeyer flask?

there is CO₂ in the flask

Analysis Questions: In the space below, write your answers to all the Analysis Questions.

1) Did the candle change size during the burning process? (did mass and height increase? or decrease?)

2) yes mass and height decreased
List evidence of PHYSICAL CHANGES that you observed happening to the candle in this lab:

- solid wax melted into liquid wax

3) List evidence of CHEMICAL CHANGES that you observed happening to the candle in this lab:

- heat ~~and~~ light (flame) were produced (= combustion)
energy AND new substances (smoke/soot)

4) If the mass of the candle decreased, that means the wax must have been lost or transformed into something else. What was it transformed into? (refer to the chemical equation for the combustion of wax on the next page - page 6)

carbon dioxide = CO_2
water = H_2O } = products of combustion

5) What evidence did you see that energy was released during combustion? (there are 2 forms of energy)

heat and light were produced.

6) When the copper wire and coil were placed within the flame, the size and shape of the flame changed. The copper removed something that the flame needed - What did the copper wire remove? 15

heat was
conducted by the
copper metal, away
from the flame

Reactants

wax + oxygen +
heat

(combustion)

Products

→ carbon dioxide + water
+ (heat + light)
energy

