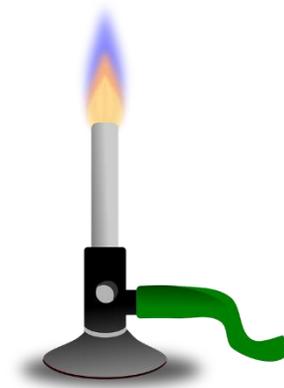


Lab Procedures Lab Activity - Teacher Edition

But Which Flame is Hotter?

Introduction:

The Bunsen burner has two types of flames – the yellow safety flame and the blue heating flame. This lab activity compares the two flames and tests which will allow 50ml of water to reach 80°C in the shortest time. The airhole at the base of the barrel controls the entry of air and therefore oxygen gas into the burner where it mixes with the gas, usually propane or butane. This gas is then ignited at the top of the barrel. By adjusting the collar, the amount of air that can be mix with the gas is also adjusted. An open airhole allows maximum air to be mixed with the gas and causes complete combustion and a therefore a clean burning, blue flame. When the airhole is shut incomplete combustion occurs due to the lack of air and a sooty, orange flame is the result.



Teacher Notes:

This lab is intended to give students practice lighting the Bunsen, setting up simple heating equipment and collecting a recording data in a systematic way. Prior to starting the lab allocate the type of flame each group will be using. Give each group a group with the alternative-colored flame with whom to swap answers once the results have been collected.

Learning objectives:

- Compare the heating ability of the yellow and blue Bunsen flames.

Materials:

- Bunsen
- Tripod
- Gauze mat
- Heat proof mat
- Beaker with 50mL water
- Thermometer
- Clamp stand
- Stopwatch

Procedure:

1. For this lab you will need to work with another group to obtain answers. One group will use the blue flame for heating while the other will use the yellow safety flame.
2. Set up the equipment as is seen in the diagram below.

Name: _____ Period: _____ Date: _____

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3. Light the Bunsen burner. If you are the group using the yellow flame, then keep the air hole closed for the whole experiment. Otherwise open the air hole to obtain a blue flame before starting the experiment.
4. Measure the initial temperature of the water and record this value.
5. Start the stopwatch and measure and record the temperature of the water each minute until 80°C is reached.
6. Swap answers with another group so that you have two sets of data, one for each type of flame.

Hypothesis

(Make a prediction about which flame will heat the water the fastest):

Any sensible answer e.g., the blue flame will heat the water faster than the orange flame.

Results:

1. Complete the table answers will vary

Time (min)	Temperature of water (°C)	
	Orange flame	Blue flame

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2. Draw a line graph of the results for each test in the space below.

Graph will:

- ✓ be a line graph
- ✓ have time on the horizontal axis and temperature on the vertical axis.
- ✓ have each axis have appropriate units (time – minutes, temperature °C).
- ✓ have data points plotted with 'x' or dots.
- ✓ have ruled lines between data.
- ✓ be given an appropriate title.
- ✓ have a key/legend to show orange vs. blue flame.

Post-Lab Questions:

1. Which flame was the hottest?

Blue

2. Once the beakers have cooled down, lift each one and check the underside. What do you observe?

Beakers heated with an orange flame have black soot covering their underside. Beakers heated with the blue flame will be clean.

3. Which flame is easier to see?

Orange

4. Why is it important to light the burner with the airhole closed?

So that you can see when the gas has been lit (a blue flame is difficult to see).

5. What is the purpose of the gauze mat in this experiment?

It spreads/disperses the heat evenly and allows the contents of the beaker to heat faster.