

Bunsen Burner Safety

The Bunsen burner, named after and co-designed by Robert Bunsen in 1854, is a common laboratory instrument that produces a hot, soot-less, non-luminous flame. The Bunsen burner allows for precise regulation of the mixing of gas and oxygen in its central barrel before combustion, which ignites the flame.

Components:

The collar, which is located at the bottom of the barrel, can be adjusted to control the air intake and the heat of the flame. The collar can be turned to allow for more air to enter the burner by revealing air vents or it can be rotated to occlude them.

The air intake openings in the collar draw in air by the Venturi Effect. That is, when the collar is opened, a reduction in air pressure within the burner tube occurs, pulling the air into the barrel.

The needle, or gas flow valve, is also located at the bottom of the barrel and screws into the base of the Bunsen burner. Like the collar, the needle valve can be turned counterclockwise or clockwise to control the flow of gas. Adjusting the needle valve allows the size of the flame to be controlled.

The barrel screws into a base, which keeps the Bunsen burner stable and remains cool to allow safe relocation of the instrument during or after use.

The gas inlet connects the Bunsen burner to the gas jet through a rubber gas intake tube. A spark lighter is commonly used for igniting the combustion of the gas and air.

Rubber tubing connects the Bunsen burner to the gas outlet nozzle on the work bench. Natural Gas connections may be made with rubber connections rated for hazardous/flammable gas. Inspect rubber tubing for defects or degradation that could lead to leakage of natural gas or improper seal around the gas outlet nozzle. Replace rubber tubing if it is damaged or defective.



**Bunsen Burner Safe Operating Procedure:**

1. To use a Bunsen burner, first make sure the collar, barrel, and needle are correctly attached to the base and that the collar is closed.

2. To ensure that you have the hottest, cleanest flame possible, make sure your rubber tubing is securely connected to the gas jet and to the gas inlet valve. Inspect the tubing for cracks, holes, or other signs of wear.

3. A heatproof mat can be placed under the Bunsen burner as an extra safety precaution to prevent damage to your bench top and to catch stray sparks.

4. Before lighting, place the Bunsen burner at least 12 inches in front of any overhead shelving or equipment and be mindful of loose hair or clothing, like your lab coat. Always keep safety equipment, like fire extinguishers and safety blankets, close at hand. If present, know the location of the emergency gas shutoff switch.

5. Then fully open the gas jet. Use a spark lighter to light the flame. Never use a match or lighter.

6. With the collar fully closed, the “safety flame” - a brighter, dirty, less intense flame – will appear. This flame is cooler and is generally used to indicate that the burner is “on”. The safety flame doesn’t burn as hot, because with the collar closed, there is minimal airflow through the burner tube, resulting in an incomplete combustion reaction.

7. Now begin turning the collar counterclockwise. As the collar opens, two distinctive flames appear. The blue outer flame is hotter than the safety flame and makes no noise. This flame can be difficult to see, so be careful when the burner is in this state.

8. The blue inner flame burns the hottest, particularly at the tip. In addition to being the hottest flame, it is also the cleanest and loudest flame, making a kind of “roaring” sound.

9. Once you have adjusted the collar to get the flame at the desired temperature, open or close the needle valve to increase the size of the flame or close it to make it smaller. Never leave a lit burner unattended.

10. When your work is done, remember to turn off the gas.

11. Allow burner to cool before handling or put into storage.

12. **The use of Bunsen burners inside of a biological safety cabinet is not allowed without an EHS Department evaluation and written authorization.**