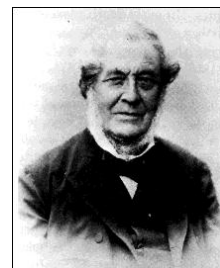


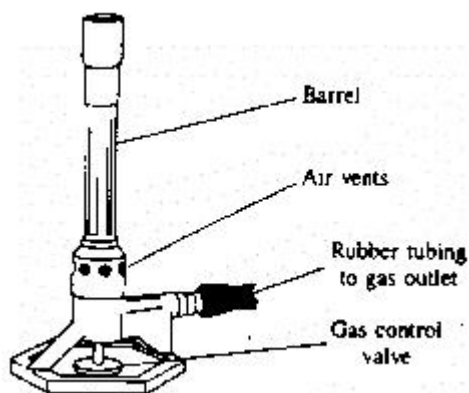
The Bunsen Burner

History of the Bunsen Burner

Robert Bunsen was a German scientist who made many discoveries in the field of organic chemistry and spectroscopy. He is also given credit for conceiving one of the most common sources of laboratory heat used today, the Bunsen Burner. Most heat sources of his time (mid-1800's) were smoky and inefficient. Bunsen found that by allowing the gas and air to mix prior to ignition, the resulting flame produced no smoke and very high temperatures (ideal for laboratory applications).



Structure & Operation of the Bunsen burner



A Bunsen Burner consists of a hollow metal barrel that has one or more openings at its base to allow the entry of air. Gas is piped in at the base, mixes with the air, and at the top of the barrel creates a flame of varying intensity (depending upon the ratio of air-gas).

Gas flow is usually controlled one of two ways. The first way is at the gas jet located on the lab desk. When the handle is *perpendicular* to the gas jet, the gas flow is *off*. When the handle is parallel to the gas jet, the gas flow is on. Gas flow can also be fine tuned using the gas control valve (also known as a “needle valve”).

To use the Bunsen Burner, the gas tubing should be attached to both the gas outlet on the burner and also to the gas jet on the lab table. Check that the needle valve is only open a $\frac{1}{2}$ turn. Adjust the metal jacket over the air vents so that they are ~~approximately halfway~~ **open**. Once these adjustments are made, ensure that the burner is able to sit flat on the lab tabletop and will not tip over. You may need to twist the gas tubing where it attaches to the burner to remedy this problem. When you have finished these preparations, you may light the burner. Be sure that all loose hair and clothing is out of the way, and hold the striker in one hand. With your other hand, turn the gas jet handle so that it is parallel to the jet nozzle. When you hear the gas hissing, hold the striker above the top of the barrel and squeeze the striker handle until the sparks ignite the burner. You can control the flame intensity with the needle valve. If you obtain a yellow flame, then there is too much air in the mixture; close the air vents to a little bit to obtain the proper, blue flame. When you are finished using the burner, turn the gas off at the gas jet.

CLOSED

Bunsen Burner Safety

Some things to keep in mind when working with a Bunsen Burner:

- Long hair should be tied back out of the way
- Loose clothing, cuffs, shirttails should be secured so that they do not accidentally dangle in the flame.
- Know where the hot parts of the burner are when it is lit; the needle valve and air vent jacket are cool enough to be touched and adjusted while the burner is ignited.
- Know where the safety equipment is, including the fire blanket, the gas main shut-off button, and the fire extinguisher.
- **NEVER** leave a lit Bunsen burner unattended!
- Always hold and carry a Bunsen burner by the base; the barrel might still be hot!



Types of Burner Flames

There are three main types of Bunsen burner flames:

1. **Safety flame** – The coolest of the three flames, this one has a yellow/orange color and burns at approximately 300°C.
2. **Blue flame** – Also known as a medium flame, this one is difficult to see from a distance. It burns at approximately 500°C.
3. **“Roaring” Blue flame** – This is the hottest flame available with a Bunsen burner, reaching temperatures as high as 800°C at its hottest location. The distinctive cone flame in the center can identify this flame and a “roaring” sound can be heard. Not all portions of the roaring blue flame burn at the same temperature, a fact that is important to know when trying to heat substances in lab. Below is a diagram that describes the approximate temperatures for different portions of the flame. The important fact to remember though is that the hottest part of the flame is just above the cone.

