THE BUNSEN BURNER

The Bunsen burner is the most commonly used device for supplying heat in the laboratory. The "Bunsen burner" seems to have been invented by Michael Faraday, who used a burner consisting of a tube on top of an open funnel with a gas jet inside it. Faraday's burner was adjusted by moving the funnel up and down. The Bunsen burner, as developed by Robert Wilhelm Bunsen, was a modification of coal gas burners in use during the mid-nineteenth century and was designed for laboratory heating. The Bunsen burner was adjusted by opening air vents in the barrel of the burner. A typical modern Bunsen burner is diagrammed in Figure B-1. Most burners are used with natural gas (methane), but can be easily converted for burning propane or other gases by changing the orifice inside the burner.
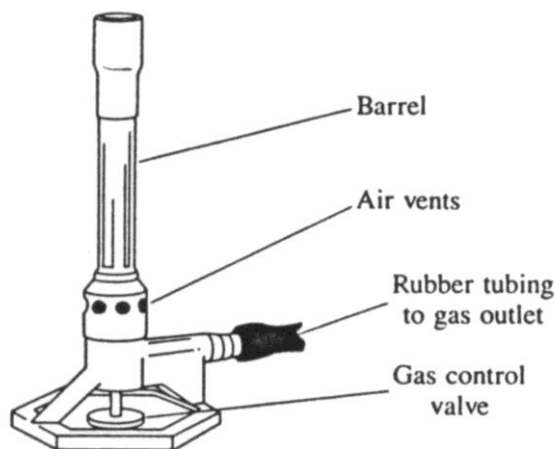

Figure B-1. A Tirrill type burner. This variation of a Bunsen burner has a needle valve to regulate gas flow.

Lighting the Burner

Attach the rubber tubing from the burner to the gas outlet. Rotate the barrel of the burner in a clockwise direction to close the air vents. Rotate the gas control valve, on the bottom of the burner, counter-clockwise to close the gas valve. Open the gas outlet on the bench by turning the handle until it points straight out toward the rubber tubing. Hold the striker, or a lighted match, next to the top of the burner and slowly rotate the gas control valve in a clockwise direction. After about one full turn of the gas control valve, (you may be able to hear the hissing sound of the gas flowing through the burner valve) the burner should ignite, or, if you are using a striker, squeeze the striker to ignite the gas. If the burner does not light, continue to open the gas control valve slowly, sparking your striker about every half turn.
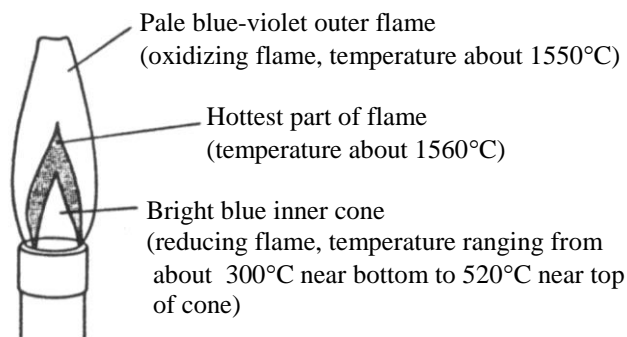

Figure B-2. The flame of a properly adjusted Bunsen burner

After the burner is lit, you will observe a bright yellow luminous flame. Use the gas control valve to adjust the flame to an appropriate height of about 10 cm. Rotate the barrel of the burner counter-clockwise, opening the air vents, until the flame is pale blue in color with a bright blue colored cone in the lower center of the flame. The burner will be making a slight "roaring" sound. This is characteristic of the hottest flame of the burner (See Figure B-2).

Practice adjusting the burner. Open and close the gas control valve on the bottom of the burner and observe how this affects the height of the flame. (Be prepared to relight the burner if the flame goes out.) Rotate the barrel of the burner, holding it near the air vents on the bottom (the upper part of the barrel gets hot), and observe the effects of increasing and decreasing the air flow through the barrel. In the event that the burner "flashes back" and starts burning at the bottom of the barrel, immediately shut off the gas supply at the gas outlet and allow the burner to cool before readjusting and relighting it.

For maximum efficiency in heating apparatus, you should always adjust the height of the apparatus so that the tip of the inner cone (the hottest part) is always visible just below the bottom of the apparatus. If you require only gentle heating, the apparatus may be positioned about 3-4 cm above the inner cone. You will never need to position any apparatus below the tip of the inner cone.

The Meeker Burner

The Meeker burner is designed to produce a greater amount of heat than a Bunsen burner. The grid top not only produces a higher maximum temperature (up to about 1720°C), but it spreads the flame over a larger area. This burner is used for heating crucibles to decompose samples or to ash analytical samples contained in filter paper.

The Meeker burner is similar to a Bunsen burner in operation except that the barrel does not rotate. The burner has a collar which is rotated to open the air vents.

The hottest part of the Meeker burner flame is just slightly above the bright blue array of cones spread across the grid top.

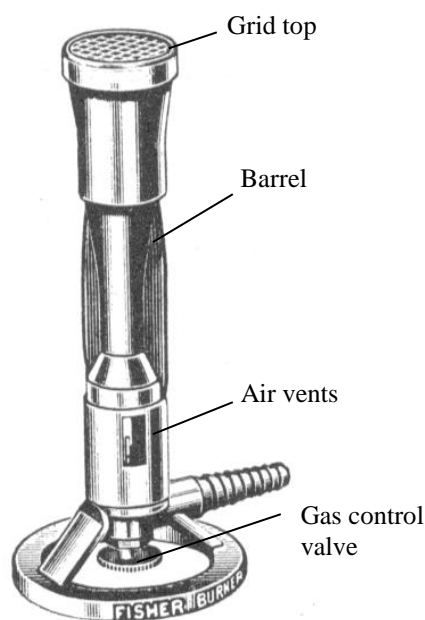Similar to a Bunsen burner, the top of the Meeker burner barrel will get hot during use.

Figure B-3. A Meeker burner

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