SAFETY AND HYGIENE REGULATIONS

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Servei de Prevenció de Riscos Laborals

BUNSEN BURNERS

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DESCRIPTION OF A BUNSEN BURNER

A Bunsen burner is an instrument used in laboratories to heat samples or reagents. This kind of burner should have a safety device (gas cut-off system) to stop the gas supply in the case of a fault or malfunction (after approximately 20 seconds), and a gas and air regulator. Models that have a gas cut-off system have a thermocouple situated close to the flame that shuts off the gas valve when the temperature falls below a certain value (see Photo 1).
All Bunsen burners must have **standardized hose couplers for connecting the gas supply with 1/2'' spiral wound gaskets** (see Photo 2).

Photo 1

Photo 2

PERSONAL PROTECTION EQUIPMENT TO USE

- **Thermal protection gloves** for handling hot test tubes, Florence flasks, etc.
- **Chemical protection gloves** for handling chemical products.
- **Safety goggles**
- **A respiratory protection mask** for use when you work outside a fume cabinet, depending on the kind of reagents that you are working with. Consult the **safety data sheet** for the specific chemical product.
- To handle any chemical products, to use burners, etc., you must **wear a laboratory coat**.

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BEFORE USING A BUNSEN BURNER

1. **Open the main gas valve** (yellow pipes) in the laboratory.
2. **Open the gas valve** for the burner, which will be located on the laboratory bench.
3. **Open the black gas valve** (see Photo 3).
4. If the Bunsen burner has a gas cut-off system, **press the valve button** (see Photo 3).
5. **Light** the burner **with a match or lighter**. If the burner is equipped with a gas cut-off system, keep the valve button pressed until the flame is established.
6. **Adjust the flame and the air flow using the collar** at the bottom of the burner. Do not suddenly open the collar as the burner could go out.

Blue flame = correct combustion of gas/air.
Yellow flame = insufficient air flow. Open the air hole.

The flame forms a cone, in which:
- **Outermost zone**: T = 1200–300ºC. Bluest point: **oxidizing flame**
- **Middle and innermost zone**: T = 500–1000ºC. **Reducing flame**

To heat Florence flasks, Erlenmeyer flasks or beakers, you should use a stand, clamps with nuts, a tripod or ring with a nut and/or a wire mesh (see Photo 4).

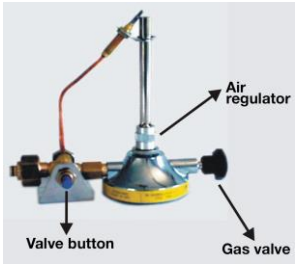

Photo 3

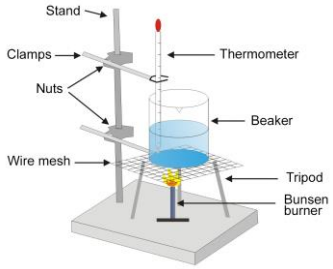

Photo 4

WHILE USING A BUNSEN BURNER

- Use a Bunsen burner in a well-ventilated work area.
- When you are heating test tubes, hold the top of them using a wooden clamp. Heat the bottom of the tube and shake it lightly. **Point the mouth of the test tube away from you** to avoid splashes of the liquid while it is boiling.
- To turn off the Bunsen burner, **close the black valve and the individual gas valve** on the laboratory bench. Finally, close the main gas valve for the laboratory.

In case of a **liquid chemical spill**:
1. **Turn off the Bunsen burner** and leave it to **cool**.
2. **Dry/clean up** the affected area using an **absorbent paper towel**.

In the case of splashes or burns, consult the basic first aid advice on the prevention website:
(http://www.upc.edu/prevencio/ca/accidents/primers-auxilis).

Carry out periodic maintenance on the burner: inspect at least the nozzle hole and the barrel.

Clamps

Absorbent sheets

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EXCERPT FROM THE INSTRUCTION MANUAL FOR A BUNSEN BURNER

1. DESCRIPTION

Bunsen burners are widely used as a source of heat in the laboratory. Their applications range from incineration of samples to moulding of glass tubes. When they are used correctly, they are safe and easy to apply.

There are different types of Bunsen burner with similar characteristics, but some of them may be better adapted to specific uses.

Bunsen burners with a thermocouple provide additional safety as they cut off the gas supply if the flame accidently goes out.

2. TYPES

Consult the supplier.

3. INSTALLATION

- DO NOT CONNECT a gas burner without a pressure regulator.
- DO NOT CONNECT a gas burner directly to a butane bottle.
- Before you connect a burner to the gas installation, ensure that the gas is supplied at the right pressure.
- Connectors and hoses must meet the requirements established by the gas supplier.
- Gas burners must always be installed by an authorized gas fitter. Consult the supplier if you have any doubts about the installation.
- Do not modify any Bunsen burner parts (nozzles, valves, etc.). The table in Section 2 provides the working pressures.

4. OPERATION

Checks to carry out before using the Bunsen burner:

- Check that the gas valves on all the Bunsen burners are closed before you open the main gas valve in the laboratory.
- Check that the gas hose is correctly attached to the gas inlet.
- Check that the gas valves for the installation are open.

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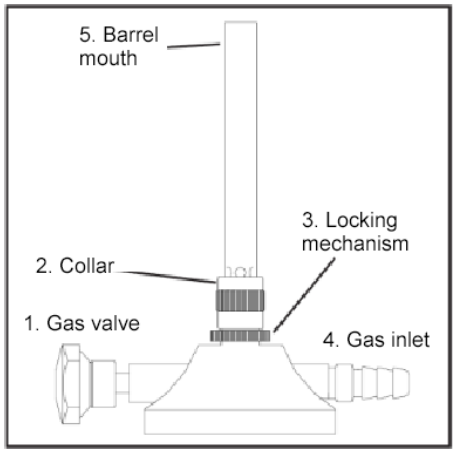
EXCERPT FROM THE INSTRUCTION MANUAL FOR A BUNSEN BURNER

4.1 LIGHTING THE BUNSEN BURNER

- Fully close the collar (2), slightly open the gas valve (1) and put a lit match near the side of the barrel mouth (5).
- Regulate the gas valve (1) until the flame has the desired height.
- Open the collar (2) gradually.
- DO NOT OPEN SUDDENLY AS THE FLAME MAY GO OUT.
- To obtain a higher temperature, open the gas valve (1) and the collar (2) to provide more gas and air.
- THE FLAME WILL GO OUT WHEN YOU CLOSE THE GAS VALVE (1).



4.2 ADJUST THE FLAME

To obtain a hotter flame, adjust the air flow to achieve the right amount of air for the gas flow.

If the burner is lit but the air hole is not open wide enough, combustion will be incomplete and the flame will be orange.

If the air flow is increased by turning the collar (2), combustion will be complete and two zones will be clearly seen in the flame, separated by a pale blue cone.

On the outside of the cone, combustion is complete and the heating value is high.

Inside the cone, combustion is incomplete and the temperature is lower. Once the air flow has been regulated, it can be fixed using the locking mechanism (4).

A practical way of checking the flame adjustment:

Hold a capsule of porcelain above the flame with a clamp:

- If the capsule is blackened by the smoke produced, it is a sign that the air flow is insufficient.
- If deposits of small drops of water can be seen, it is a sign that the air flow is correct.

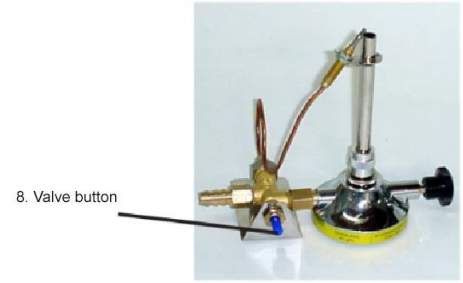
4.3 LIGHTING GAS CUT-OFF MODELS

Burners with a thermocouple provide additional safety as the gas flow shuts off if the flame accidently goes out.

The thermocouple is placed close to the flame and closes the gas valve when the temperature falls below a certain value.

To light the burner:

- Push the blue button (8). Hold the button in.
- Light the Bunsen burner according to the instructions in 4.1
- Keep the blue button pressed in for a few seconds and then release it.



4.4 MANTENANCE

Approximately once a year, clean the nozzle hole and the mouth of the barrel where the flame emerges. Check the state of O-rings in the gas valve.