

Bunsen Burner and Hot Plate Safety

If there is one image that instantly evokes memories of science classes for most people, it is the Bunsen burner. Unfortunately, for some people, the images also bring back memories of pain. Burns caused by handling hot glassware or equipment and by touching hot surfaces are common accidents in school science labs. Accidents caused by the ignition or explosion of flammable liquids when working with flames are comparatively rare, but when they do occur, they are often catastrophic, resulting in severe injuries to teachers, students, and onlookers. The purpose of this safety training note is to review the hazards of working with Bunsen burners and hot plates in school science labs.

Duty of Care

Teachers owe their students a duty of care to instruct them in the proper use of laboratory equipment and to warn them of the potential dangers associated with their use. Regardless of whether you are using heat or flames to observe physical and chemical properties in introductory physical science or to sterilize inoculating loops in a senior-level microbiology elective, you cannot assume that your students know and understand the hazards of working with laboratory burners. Reviewing the safety rules every time you work with Bunsen burners or hot plates will reinforce safe laboratory practices, increase safety awareness, and reduce the risk of accidents.

Using Bunsen Burners Safely

- Remove all flammable and combustible materials from the lab bench and surrounding work area when Bunsen burners will be used. Do NOT use a Bunsen burner in any lab when working with flammable liquids or solvents.
- Review the basic construction of a Bunsen burner and inspect the burner, attached tubing, and gas valve before use. Check for holes or cracks in the tubing and replace the tubing if necessary.
- Use only heat-resistant, borosilicate glassware when using a Bunsen burner. Check the glassware for scratches, nicks or cracks before use and discard defective glassware—cracked glassware may shatter without warning when heated.
- Wear chemical-splash goggles whenever working with chemicals, heat or glassware in the science lab. Tie back long hair when working with a Bunsen burner, and do not wear loose, long-sleeved clothing. Never reach over an exposed flame!

- Instruct students in the proper procedure for lighting a Bunsen burner. Close or partially close the air vents on the burner to make it easier to light. Turn on the gas and bring a lighted match or lighter alongside the barrel of the burner, then slowly raise the flame over the top of the burner from the side.
- Adjust the air supply to obtain a small, bright blue, cone-shaped flame. For slow, uniform heating, brush the burner flame across the bottom of glassware or rotate a test tube in the flame when starting to heat. For boiling water baths, add boiling stones to the water to prevent superheating, “bumping,” and possible splattering.
- Never leave a lit burner unattended. Always turn off the gas at the gas source when finished using a Bunsen burner.
- To reduce heat stress, allow hot glassware or equipment to cool slowly before moving or removing the object. Remember that hot objects remain HOT for a very long time—use tongs and handle with care!

Using Hot Plates Safely

Hot plates offer convenience and important safety benefits for use in preparing hot water baths for mild to moderate heating.

- Use only heat-resistant, borosilicate glassware, and check for cracks before heating on a hot plate. Do not place thick-walled glassware, such as filter flasks, or soft-glass bottles and jars on a hot plate. The hot plate surface should be larger than the vessel being heated.
- Do not use the hot plate in the presence of flammable or combustible materials. Fire or explosion may result—the device contains components that may ignite such material.
- Place boiling stones in liquids being heated to facilitate even heating and boiling. Do not evaporate all of the solvent or otherwise heat a mixture to dryness on a hot plate—the glass may crack unexpectedly when heated directly on a hot plate.
- Use a medium to medium-high setting of the hot plate to heat most liquids, including water. Do not use the high setting to heat low-boiling liquids. The hot plate surface can reach a maximum temperature of 540 °C.
- Do not place metal foil or metal containers on the hot plate—the top can be damaged and a shock hazard may result.

- Be careful when removing hot glassware or pouring hot liquids from the hot plate. Use tongs or silicone rubber heat protectors (gripping devices).
- Turn off the hot plate when not in use. The surface of a hot plate stays hot for quite some time—and looks exactly the same as a “cold” hot plate! Place a bold, laminated “HOT” caution sign in front of the hot plate immediately after use.

Free Safety Fax

Please e-mail us at flinn@flinnsci.com to request a pdf of our safety demonstration “It Doesn’t Look Hot!” The Safety Fax contains three short activities to reinforce the safety warning that hot objects must be handled with care.

It Doesn’t Look Hot!

- Teach students that hot objects don’t necessarily look hot. Use caution whenever working with heat or flames—most minor laboratory burns result from carelessness when handling hot objects.
- Heated metals and glass remain very hot for a very long time. They should be set aside to cool and picked up with caution. Use tongs, heat-protective gloves, or hot vessel-gripping devices as needed.
- Do not place hot apparatus directly on the laboratory desk or bench. Always use an insulating pad, and allow plenty of time for hot apparatus to cool before touching it.
- Never look into a container that is being heated. When heating a test tube, make sure that the “mouth” of the test tube is not pointing at anybody (including yourself)!



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