



Hazards

The primary hazard with flame sterilization is the risk of fire when an open flame (e.g. Bunsen burner) is used in the presence of an open container of ethanol or other flammable solvent. If flaming ethanol is dripped or carried back to the container of ethanol, the subsequent fire can result in severe burns and significant property damage. In the presence of an open flame a fire can flash/travel back to the flammable liquid, even if the open liquid container and open flame are separated by several meters.

Working with open flame and flammable liquids requires extra precautions.

Recent Flame Sterilization Incident

A SFU employee recently suffered second-degree burns to their forearm while performing flame sterilization. The employee was sterilizing the benchtop and their gloves with ethanol in the presence of a lit Bunsen burner when the open ethanol container caught fire and spread to engulf the employee's hand, arm, lab coat and benchtop. If other lab personnel had not been nearby to extinguish the fire, the resulting injuries would have been much more severe.

Alternatives to Flame Sterilization

If possible, make the sterilization procedure safer through the use of

- a micro-incinerator (designed to sterilize metal without using an open flame);
- sterile, disposable inoculation loops;
- glass bead sterilizer.

Precautions and Best Practices for Flame Sterilization

Prior to commencing work, review best practices and develop a plan for mitigating the additional risks associated with flame sterilization.

Ensure all personnel are trained and know what to do in an emergency, and know where the nearest fire extinguisher, emergency shower and eye wash facilities are.

Don the appropriate personal protective equipment (PPE) prior to starting work with flammable solvents:

- Wear safety glasses (chemical splash goggles may be required if there is the possibility of splashing).
 - At minimum, a 100% cotton lab coat is recommended.
 - For work with large volumes of flammable material, a fire-retardant (Nomex®) lab coat is recommended.
 - Wear long sleeves, long pants and closed-toed/heeled shoes.
 - Don't wear synthetic fabrics which are flammable and can melt to your skin.
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Guidelines for Flame Sterilization

Use the least quantity of flammable solvent possible to achieve the desired result and clearly define acceptable volume limits.

Recap ethanol stock containers/bottles in-between use.

For repeated flame sterilization procedures, ensure a dedicated location is used with minimal flammable and combustible materials in the vicinity (paper, notebooks, Kim-wipes, flammable solvents).

Ensure you are not dripping flaming ethanol onto the gas hose of the Bunsen burner.

For the dipping container holding the ethanol: