

# 12 MONTHS OF RESEARCH SAFETY

## OCTOBER 2022

### FLAMES IN BSC GUIDELINES

## Biosafety Cabinets (BSCs)

Biological safety cabinets (BSCs) are designed to provide protection against biological hazards. Class II cabinets, which are the most common on campus, provides 3 levels of protection: personnel, product, and environmental. Personnel protection is provided by the inward and downward vertical laminar airflow to create an air barrier to prevent airborne particles, such as aerosols and microorganisms, from leaving the cabinet. High Efficiency Particulate Air (HEPA) filters are used to clean the air going into the work area (product protection) and out to the environment (environmental protection).

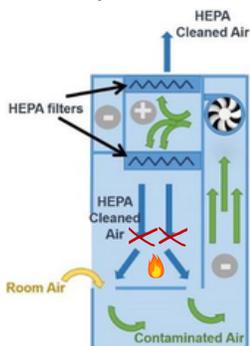
The use of open flames to create an updraft of air for sterility while working on the open bench is not needed in the sterile work space of a BSC. Additionally, use of flames to sterilize tools or instruments can be accomplished with safer alternatives. The use of open flames and flammable gas in a BSC can compromise its function and potentially lead to fires or explosions. For more information, see <https://ehs.ucr.edu/laboratory/biosafety/biologicalsafetycabinets>



## Issues with flames in a BSC

**EH&S strongly recommends that the practice of using open flames and Bunsen burners inside of biological safety cabinets be discontinued.**

- The heating of air from a Bunsen burner or open flame causes up-flow of air that mixes with the down flowing HEPA filtered laminar airstream to produce turbulence and cross circulation within the working area, jeopardizing product and personnel protection.
- Open flames cause excessive heat build-up within the cabinet and, in combination with the natural gas, can be a source of fires.



Side view of BSC. Heated air will disrupt the downward laminar flow and circulation of air within the cabinet.



Examples of fires and explosions in BSCs from open flames

## CONTACT US

Phone: 951-827-5528

Email: [ehsbiosafety@ucr.edu](mailto:ehsbiosafety@ucr.edu)

Website: <https://ehs.ucr.edu/laboratory/biosafety>

Report an Incident, Injury or Safety Concern [Here](#)



# Questions?

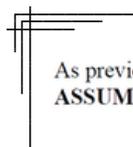
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## Issues with flames in a BSC (continued)

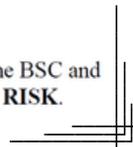
- The heat may damage the HEPA filter or melt the adhesive holding the filter together, compromising the HEPA filters' effectiveness leading to loss of sterility and containment.
- It could nullify manufacturer's warranties on the cabinet and automatically void UL approval. In the event of a fire, explosion, or worker exposure due to the use of a flammable gas in the cabinet, the manufacturers will assume no liability.



Example of damaged HEPA filter caused by heat



As previously stated, NuAire doesn't recommend the use of natural gas within the BSC and ASSUMES NO RESPONSIBILITY FOR ITS USE. USE AT YOUR OWN RISK.



Example statement from a BSC manufacturer

## Alternatives to Consider

1. **Disposable tools and supplies** - many vendors sell pre-sterilized disposable tools and supplies such as inoculating loops, spreaders, and needles.
2. **Pre-sterilize instruments** - instruments can be placed in autoclaveable trays/containers or special sleeves manufactured to autoclave tools prior to use.
3. **Non-flame alternatives:**
  - a. **Bacti-Cincerator** - utilizes infrared heat to incinerate organic material deep within the ceramic funnel
  - b. **Glass bead sterilizer** - glass beads in the well are maintained at a high temperature for complete destruction of microorganisms and spores in seconds
  - c. **Electric Bunsen burners** - directs radiant heat up in one direction so user can heat items regardless of shape. Caution: radiant heat can damage HEPA filters similar to an open flame.
4. **On-Demand flames** - provides flame only when needed. Caution: open flames and gas can still lead to fires and/or explosions



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