

# *Environmental Health and Safety Update*

## Flammable Gases in Biological Safety Cabinets

### Overview

Certain biological safety cabinets (BSCs) recirculate air within the cabinet. Most BSCs at the College are recirculating. The use of natural gas or other flammable gases within these BSCs may allow flammable gases to concentrate, potentially leading to an explosive atmosphere. The use of flammable gases within a BSC may alter the airflow pattern used to protect product and personnel. This update outlines which BSCs recirculate air and the procedures to increase safety and prevent flammable gas explosions within BSCs.

### Applicability

This update applies to the use of natural gas or other flammable gases inside biological safety cabinets that recirculate air. Natural gas within a BSC is typically “house” gas connected directly to the BSC.

### Procedure

Certain types of BSCs are designed to contain, not exhaust, most of the air within a cabinet. This makes them prone to the buildup of materials within the cabinet. The following 4 types of cabinets are located at the College:

<b><u>BSC Type</u></b>	<b><u>Former Name(s)</u></b>	<b><u>% Recirculated Air</u></b>
Class II Type A1	Class II Type A	70
Class II Type A2	Class II Type A/B3	70
Class II Type B1	N/A	30
Class II Type B2	N/A	0

BSCs that recirculate air are commonly found at the College. To determine the type of cabinet, locate the unique serial number on the cabinet. This area should also contain the BSC type. If unable to locate this information, contact EHS for further assistance.

If a gas leak occurs (e.g. valve left on or tube leak) inside a recirculating biological safety cabinet, over time the gas would become more concentrated and could reach explosive levels. Since it is within a BSC, the user may not detect the leak and, upon ignition, it could explode. Therefore, natural gas or other flammable gases should not be used within recirculating biological safety cabinets. Additionally, open flames can affect the airflow pattern of a BSC. According to the National Institutes of Health and the Centers for Disease Control and Prevention, “Open flames are not required in the near microbe-free environment of a biological safety cabinet. On an open bench, flaming the neck of a culture vessel will create an upward air current which prevents microorganisms from falling into the tube or flask. An open flame in a BSC, however, creates turbulence which disrupts the pattern of HEPA-filtered air supplied to the work surface.”

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## EHS Update – Flammable Gases in Biological Safety Cabinets

Open flames should not be necessary in the near microbe-free environment of a biological safety cabinet. Alternatives to the use of flammable gases to disinfect include:



The use of an electric bunsen burner (see example at: <http://www.daigger.com/catalog/product?deptId=Burners&prodId=3540>).



The use of a bact-cinerator (see example at the following VWR website: [http://www.vwrsp.com/catalog/product/index.cgi?object\\_id=0009475](http://www.vwrsp.com/catalog/product/index.cgi?object_id=0009475)).

Alternatives that avoid the need to disinfect instruments within a BSC include:

- the use of pre-sterilized inoculating loops and needles.
- pre-autoclaving forceps, scalpels, etc. in covered autoclavable plastic containers or the special sleeves supplied for this use by various companies. These can be taken into the BSC and used individually and placed in an autoclavable discard tray located in the BSC for used/contaminated utensils.
- the use of a Bunsen burner outside the BSC (> 2 feet away from the BSC) for some applications.

Flaming the necks of bottles is not necessary due to the protective airflow in the BSC. Using a flame for this purpose would disturb the airflow and may result in contamination of the tissue culture flasks.

## Responsibilities

### Facilities

New projects and maintenance requests will no longer add house natural gas to biological safety cabinets unless the BSC is verified to be a “total exhaust” cabinet by EHS. Natural gas lines to recirculating BSCs will be turned off as they are discovered. When applicable, natural gas lines to BSCs will be physically disconnected and capped during laboratory renovation projects.

### BSC Users

Refrain from using natural gas and other flammable gases within recirculating BSCs.

## References

**Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets**, 2<sup>nd</sup> edition. U.S. Department of Health and Human Services Public Health Service, Centers for Disease Control and Prevention and National Institutes of Health, September 2000.  
<http://www.cdc.gov/od/ohs/biosfty/bsc/bsc.htm>