

Biosafety Cabinets and Fume Hoods (OHS_BIO304)

Introduction

Welcome to the Biosafety Cabinets and Fume Hoods Training Course (OHS_BIO304). This training is **required** for anyone that will be conducting work and/or research that requires the use of a biosafety cabinet, Fume hood, or Clean Air Station.

Objectives

At the conclusion of this course, participants should be able to:

1. Understand the difference between fume hoods, biosafety cabinets, and clean air stations.
2. Explain the consequences that could happen if improper use of equipment is happening.
3. Know how to use the correct ventilation equipment properly.
4. Recognize what the various signage and postings in your area mean.
5. Summarize the proper ways to protect yourself and surroundings by using sound work practices.

Fume Hoods

Fume hoods are comprised of the hood and a sash.

The primary purpose of laboratory fume hoods is to keep toxic or irritating vapors out of the general laboratory working area.

A secondary purpose is to serve as a shield between the worker and the equipment when there is the possibility of an explosive reaction, or to protect the specimen.



There are different types of fume hoods on campus at UAB. However, OH&S does **NOT** recommend the purchase or use of ductless fume hoods.

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About the Fume Hood...

The Sash

Sash is the term used to describe the movable glass panel that covers the face area of a fume hood, which opens and closes to maximize access and minimize airflow. Sashes can be vertical, horizontal, or combination of the two.

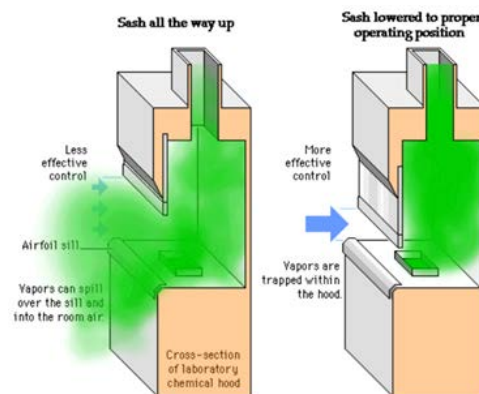
Things to remember about the sash:

- Work at least six inches back from the face of the hood. A stripe on the bench surface is a good reminder.
- Do not let items block sash closure. This affects the airflow.
- Keep the sash height **at the level marked for safe use or the level specified in your SOP and always between you and your experiment.**
- Close the sash when not working in the hood. This acts as an extra layer of protection should there be an explosion or fire inside the hood.
- Work slowly and remove your arms slowly to reduce the creation of eddy current that may disrupt the containment ability of the hood

The Sash and Airflow

When a person walks by a fume hood, turbulence can be created causing contaminants to be drawn outside the hood. In addition, if the air diffuser is located directly above the fume hood, air turbulence may be created causing contaminants to escape into the room.

The airflow into the room has an effect on the fume hood. Close all doors to maintain the negative pressure of the lab with respect to the corridor.



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This ensures that any contaminants in the lab will be exhausted through the fume hood and not escape into the hallway.

Inside the Fume Hood

While working inside a fume hood, there are practices that you should always follow.

About PPE and You

OH&S recommends the PPE listed below. However, **the PPE should be determined by your protocol.**

- Wear the appropriate work clothes – shoes that cover the entire foot, long pants, and long sleeves *if* the lab coat does not cover from shoulder to wrist.
- Don (wear) a clean, buttoned lab coat or disposable gown and the appropriate gloves for the work.
- Always use splash goggles, and wear a full-face shield if there is possibility of an explosion or eruption.



Never stick your face, body, or head into a fume hood. This defeats the purpose of the fume hood so that you and the product are not protected.

The Hood Surface

You should:

- Keep the hood surface free of stored chemicals and paper towels/Kimwipes
- Place instruments two inches above the hood surface to allow airflow under the instrument
- Avoid placing items so that the back baffles are blocked

The Should Never Do Practices

There are a few practices that you should never do. OH&S has seen this many times. Some of the following are practices that could cause the Principal Investigator (PI) to receive a citation during an audit.

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- Never use a fume hood as a canopy hood to draw away heat. This will create airflow disruptions.
- Never over pack a fume hood. Air must be able to flow around objects.
- **Never** use the fume hood to store chemicals. This prevents the hood from being used.

Alarms

Many of the newer variable air volume (VAV) hoods are installed with alarms, sensors, controls, and gauges.

Hoods usually go into alarm mode because:

- the sash has been raised to a height at which the hood can no longer exhaust a sufficient amount of air,
- the building air exhaust system is not working properly, or
- there has been a power outage.

When a hood alarms, no work should be performed. Additionally, lab workers should not attempt to stop or disable hood alarms. Call OH&S. They will come to analyze the cause of the alarm and take care of the issue.

Testing

Routine performance testing shall be conducted at least annually or whenever a significant change has been made to the operational characteristics of the hood system. There is no charge for the annual testing.

Out-of-Service Notice

When a fume hood is taken out of service for any reason, it shall be posted with a “**Restricted Out-of-Service Notice.**” The Restricted Out-Of-Service Notice shall state the requisite precautions concerning the type of materials permitted or prohibited for use in the fume hood.



Do **NOT** remove Out-of-Service tags! You should **NEVER** remove one of these signs down and continue to work.

Do **NOT** use the fume hood for storage because it is out-of-service! This tag/posting is there for the health and safety of you and those in the area.

Using it for storage or continuing to work in it may cause serious health and safety problems.

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Biological Safety Cabinets (BSC)

Biosafety cabinets are required when working with infectious materials. They are designed to keep personnel from catching something. However, humans carry organisms that could severely affect the outcome of the product.

By using the proper equipment, the appropriate PPE, and following the correct procedures, you can protect the personnel, the product, and the environment.

In varying degrees, a laminar flow biological safety cabinet is designed to provide three basic types of protection:

- **Personnel** protection from harmful agents inside the cabinet
- **Product** protection to avoid contamination of the work, experiment, or process
- **Environmental** protection from contaminants contained within the cabinet

Class II Protection	From Particulates	From Vapors and Gases
Type A Type A2	Personnel, work area (products) and environment	If exhausted to room: none; not for use with vapors and gases If exhausted to facility exhaust system, protects personnel If exhausted to a treated facility exhaust system protects personnel, the work area and the environment
Type B1	Personnel, work area (products) and environment	Offers more protection to personnel and the work area the closer the vapor source is located toward rear of work area (Offers protection to the environment if exhausted to treated system)
Type B2	Personnel, work area (products) and environment	Offers protection to personnel (Offers protection to environment if exhausted to treated system)

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Pre-Checklist

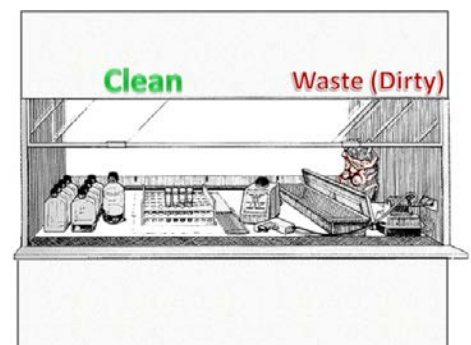
Before you begin your work inside the biosafety cabinet, you should:

- Always wash your hands.
- Next don (or put on) the appropriate PPE. The PPE should be determined by your protocol.
- Airflow and possible contamination will be lower if you do not have to move in and out. Therefore, load the supplies first.
- Turn the biosafety cabinet on and allow it to run for 10 to 15 minutes.
- Check the inward airflow by securely attaching a piece of tissue to the face hood. As you can see in this picture, the lab coat appears to be pulled in toward the cabinet.
- Make sure the sash is at the certification levels posted on the BSC.
- Adjust seat height so that the bottom edge of the sash is level with your underarms.



Work Clean to Dirty

Always designate a clean side and a dirty side. Work from clean to dirty, and work on centerline of work surface. Note the location of discard trays and how other items are positioned to avoid compromising the airflow.



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Working Inside the BSC

- Work on the approximate centerline. This is the recommended best location to maintain the integrity of proper airflow.
- Move slowly and deliberately into and out of the biosafety cabinet. Slow and deliberate movement has very little effect on the airflow, but *rapid* and *sudden* movements can disrupt the airflow dramatically causing issues with contamination.
- Avoid blocking the front grill. When front grill is blocked, airflow can be disrupted. Blocking the front grill also allows the room air to enter the biosafety cabinet.
- Place lab supplies and materials inside the biosafety cabinet. Place them in a location where the airflow is not disrupted.

Post- Checklist

When you have completed your work inside the BSC:

- Disinfect all of the items to be removed from the cabinet
- Remove all waste products and place in appropriate receptacles
- Wipe down the interior of biosafety cabinet with an appropriate disinfectant
- Allow cabinet to run for 10 - 15 minutes before shutting off

If you are using a UV light, make sure you still follow proper procedures. A UV light will not destroy all microbes so an appropriate disinfectant must be used. UV lights should be wiped down at least once per week when the light is off.

Care and Maintenance of BSCs

Decontamination

Decontaminating a biosafety cabinet is not performed on a regular basis. Paraformaldehyde gas or vaporized hydrogen peroxide (VHP) is used when decontaminating.

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There are three reasons for decontamination:

- If the biosafety cabinet is to be moved; or
- For repairs that would involve entering a potentially contaminated space; or
- If cabinet is suspected of contaminating work. However, all other sources that could cause contamination must be eliminated first.

Certification

Class II biosafety cabinets are regulated by the National Sanitation Foundation (or NSF). They have mandated the certification procedures [listed here](#).

Certification procedures assure the user that the protection factors of personnel, product, and environment are maintained by verifying that the down flow velocities, in-flow velocities, and HEPA filters are within specification.

OH&S recommends that certification should be performed initially after receiving any type of new and/or used ventilation equipment. However, there is a charge for certification.

A BSC should be certified:

- After the unit has had repairs that necessitate re-certification
- After the unit has been relocated
- At least annually thereafter



If you are considering the purchase of a new biosafety cabinet or obtaining a used one from another department, contact the OH&S Biosafety Program first. We can help you determine the risk factors as to which type of biosafety cabinet would best suit your needs.

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Clean Air Work Bench

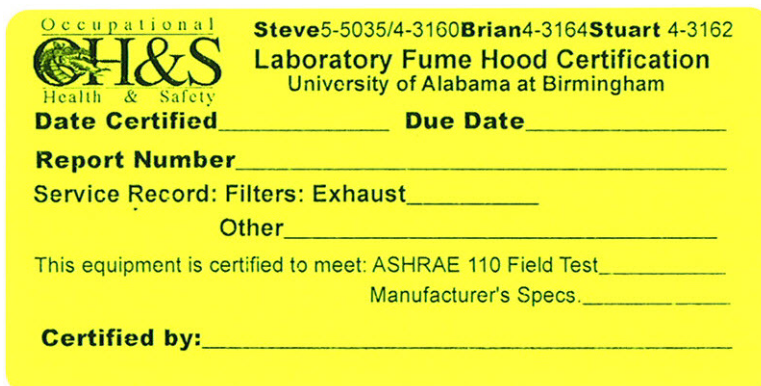
The laminar flow clean air workbench is a workbench or similar enclosure, which has its own filtered air supply. The bench is recommended for work with non-hazardous materials where clean, particle-free air quality is required. The bench is recommended for work where clean, particle-free air quality is required.

The bench provides product protection by ensuring that the work in the bench is exposed only to HEPA-filtered air.

- It does not provide protection to personnel or to the ambient environment.
- It is not designed to contain aerosol generated by the procedure; the user is exposed to these aerosols.
- The clean bench provides product protection by ensuring that the work in the bench is exposed only to HEPA-filtered air.
- It does not provide protection to personnel or to the ambient environment. It is not designed to contain aerosols generated by the procedure; the user is exposed to these aerosols.

Signage and Postings

All signage and postings in any area should always be read and followed to protect everyone in the area whether inside or outside the lab. Below are some of the signs and postings you may see in areas using nanomaterials with other hazards such as biological and/or radiation. Please read these carefully and follow them vigilantly. They are posted for everyone's health and safety.



Biosafety Cabinets and Fume Hoods (OHS_BIO304)

Occupational Health & Safety
OHS
 Health & Safety

Steve 5-5035, 4-3162, Stuart 4-3160/Brian 4-3164
Biological Safety Cabinet Certification
 University of Alabama at Birmingham

Date Certified _____ **Due Date** _____

Report Number _____

Service Record: Filters: Supply _____ Exhaust _____
 Other _____

This equipment is certified to meet: NSF 49 _____ Bldg _____
 Manufacturer's Specs. _____ Room# _____

Certified by: _____

Occupational Health & Safety
OHS
 Health & Safety

Steve 5-5035 / 4-3160 / Stuart 4-3162 Brian 4-3164
Clean Air Work Station Certification
 University of Alabama at Birmingham

Date Certified _____ **Due Date** _____


Report Number _____

Service Record: Filters: Exhaust _____ Bldg _____
 Other _____ Room# _____

This equipment is certified to meet: Fed. Standard 209E _____
 Manufacturer's Specs. _____ I.S.O. _____

Certified by: _____

WARNING:
 DO NOT USE THIS FUME HOOD
 KEEP SASH IN CLOSED POSITION



- Building: _____ Room: _____
- Exhaust Fan # (if known) _____
- Tagged out: Date: _____
- By: _____
 - Notified PI
 - Notified Maintenance
 - Notified OHS
- Problem description _____
- Repair Summary: Date: _____
- By: _____
 - Repaired
 - Notified OHS 4-2487
- Returned to service: Date: _____
- By: _____
 - Unit re-certified
 - Unit performance validated
 - Notified PI

HOOD IS NOT FUNCTIONING PROPERLY

**DO NOT USE HOOD UNTIL RELEASED BY
 OCCUPATIONAL HEALTH AND SAFETY**

QUESTIONS CALL 5-5035

WARNING:
 DO NOT USE THIS Biosafety Cabinet
 for Personnel Protection



- Building: _____ Room: _____
- Tagged out: Date: _____
- By: _____
LVS Signature
- Problem description _____
- Notified Lab Representative _____
Lab Rep Signature
- Repair Summary: Date: _____
- By: _____
 - Repaired
 - Filter(s) changed
 - Unit re-certified
 - Unit performance validated
 - Notified PI
- Returned to service: Date: _____
- By: _____

BSC IS NOT FUNCTIONING PROPERLY

**DO NOT USE BSC FOR PERSONNEL PROTECTION
 UNTIL RELEASED
 BY OCCUPATIONAL HEALTH AND SAFETY**

QUESTIONS CALL 5-5035



**Radiation or Radioactive
 Materials Are Present**

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Basic Review

- A biological safety cabinet (BSC) does **NOT** offer protection from volatile chemicals. It is used for biological materials and affords product, personnel, and environmental protection.
- A fume hood only affords personnel protection and should never be used with hazardous biological materials!
- A Clean Air Work Station provides product protection by ensuring that the product in the bench is exposed only to HEPA-filtered air. It does not provide protection to personnel or to the ambient environment.
- All signage and posting are there for everyone's health and safety. Read and obey them!

Conclusion

This concludes the Biosafety Cabinets and Fume Hoods (OHS_BIO304) Training Course.

Please take the assessment at this time. You must score 80% or higher to pass. You have three chances to pass. If you fail all three times, you will have failed the course and must re-register for the course. This means that you will have a failed course on your transcript.

When you pass, please print and retain the certificate. You may be asked to present proof of your training.

Want to Learn More?

OH&S has many training courses available to all UAB active employees and students. This includes topics such as in depth radiation training, biosafety, bloodborne pathogens, chemical safety, controlled substances, building life safety, hazardous and medical waste, universal waste, PPE, hazard communication, etc.

We have a [decision tree](#) to assist you in choosing the right course to match the knowledge/skills you may need at work every day as well.

If you have any questions or comments, please feel free to contact OH&S at 934-2487.