

# Fume hoods, biological safety cabinets, clean benches...What's the difference?



Fume hoods, biological safety cabinets and clean benches are three common laboratory ventilation devices designed to protect the worker and/or the experiment. It is important to know when each is necessary and under which conditions each should be used.

Fume hoods are used to keep flammable, toxic or odorous materials from entering the worker's breathing zone. Fume hoods pull ambient air out of the working area, into the fume hood and exhaust it outside the building. Gases, vapors and fumes generated inside the hood are exhausted along with all the moving air. Information about the proper use of fume hoods can be found at <http://www.ohio.edu/ehs/docs/newsletters/FumehoodSafetynewsletter.pdf>. Work with some highly hazardous materials (such as air reactive chemicals) may require more protection than offered by a fume hood; contact EHS for more information.

Biological safety cabinets (BSCs) are primary containment devices for use with biological materials. For information on the correct use of BSCs, see the Ohio University Biosafety Manual [http://www.ohio.edu/ehs/docs/Biosafety\\_Manual\\_2007.pdf](http://www.ohio.edu/ehs/docs/Biosafety_Manual_2007.pdf). BSCs are broken into three

classes, each class has a specific purpose. Class I BSCs protect the worker and the environment, but provides no protection to the experiment. Ambient air is pulled from the working space into the cabinet and across the experiment. This ambient air can introduce contaminants into the experiment. All the airflow is into the cabinet, so the worker is protected from the experiment. The air is passed through a HEPA filter, and then is exhausted; use of the filter protects the workers and the environment from the exhaust.

Class II BSCs (the most common at Ohio University) protect the workers, the environment and the experiment. Ambient air is pulled from the work space into the cabinet, where the air is initially passed through a HEPA filter. The filtered air is then passed over the experiment being conducted. After passing over the experiment, the air is again passed through the HEPA filter. Some of the filtered air is used for the experiment and some of the filtered air is exhausted. Class II BSCs can either exhaust filtered air into the work space or exhaust the filtered air outside. Filtering only removes particles; filtering does not remove vapors and gases. Therefore, BSCs that exhaust the filtered air into the work space cannot be used with hazard-

ous chemicals since these chemicals would be recirculated into the room. If biological work requires a class II cabinet with chemical use, the air from that cabinet must be filtered then exhausted outside of the building through permanent ducts.

Class III BSCs protect the workers, the environment and the experiments. The cabinet is gas-tight with a non-opening view window, and has rubber gloves attached to ports in the cabinet that allow for manipulation of materials in the cabinet. Class III BSCs are typically used for the most hazardous biological work; this level of hazardous biological work is not permitted at Ohio University so no class III BSCs are used.

A clean bench supplies particle free HEPA-filtered air to a product. Clean benches are typically used to provide a dust and particle free air supply when working with some medical or electronic devices. The ambient air is pulled into the cabinet and passed through a HEPA filter. The filtered air is passed over the experiment or devices and exhausted directly onto the worker. Do not use biohazardous materials or chemicals in a clean bench because contaminated air is directed towards the workers.