SAFETY UPDATE NEWSLETTER

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

OFFICE OF ENVIRONMENTAL HEALTH AND SAFETY

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BIOSAFTEY CABINETS REFRESHER

Over the last year, a number of attendees at various training sessions have indicated that they do not know enough about how biosafety cabinets (also mis-named "tissue culture hoods" or "T/C hoods") operate. While what it does and how it operates is not complicated, it does not substitute for a fume hood which has air drawn from the room through the hood, and exhausted on the building's roof near the hood's fan.

Biosafety cabinets are divided into "classes", depending on what type of protection they offer. They can be further identified by where their exhaust air goes.

CLASSES OF BIOSAFETY CABINETS

Class I - Biosafety Cabinets are the closest approximation to a fume hood. Class I cabinets are connected to the building ventilation system and pass all exhaust air through a HEPA (High Efficiency Particulate Air) filter. These filters remove essentially ALL particulates, either solid or liquid (aerosols). The HEPA filter does NOT remove any chemical vapors or fumes. Class 1 cabinets are designed to "protect" the environment from whatever is in the cabinet, but not to protect the cabinet's contents from whatever may be in the room air.

Class II – Biosafety Cabinets are by far the most commonly used at UCSF. This cabinet uses HEPA filters to filter both the incoming air to protect the contents of the cabinet from particulate airborne contamination, and the exhausted air to protect the environment. Many of these are free-standing (not connected to building ventilation), and exhaust their air directly back into the laboratory. Depending on what you use in your Class II cabinet, you may want to be diligent about ensuring the timely certification of your cabinet and its filters.

Class III –Biosafety Cabinets are the oldest design of biosafety cabinets. These are "glove boxes", where the entire working area is completely sealed, and both supply and exhaust air are filtered. They are not commonly used because these cabinets are more cumbersome to work in and more expensive to purchase, but they do provide absolute containment.

VENTILATION / EXHAUST AIR

There are two ways a biosafety cabinet could be connected to the building ventilation system, and if your cabinet(s) are connected, you should know how they are connected. The simplest is a direct or "hard-ducted" connection, where the exhaust duct is connected to the cabinet without any gaps. The other method uses a "thimble". The building exhaust duct ends with a widened skirt (the thimble), and the exhaust duct from the cabinet fits up inside. The cabinet is not directly connected to the exhaust duct, but all of its exhaust air is captured by the building duct. This is because the building exhaust is taking more air out of the room than the cabinet is exhausting, and the difference is drawn from the room through the thimble.

ADVANTAGES OF VENTILATED CABINETS

The benefit of a "ventilated" cabinet is that you can use some hazardous vapors (not highly toxic chemicals) in these cabinets, since they, like fume hoods, exhaust outside of the laboratory. The disadvantage of a "ventilated" cabinet is that should the building exhaust system fail, one of two problems occurs.

A hard-ducted cabinet stops working completely until the building ventilation is restored because the building fan provides the exhaust flow. A thimble-connected cabinet still functions because it has its own exhaust fan; however, the HEPA-filtered, but possibly chemically-contaminated air will be exhausted into the laboratory through the thimble unless the cabinet has the capability to turn its fans off if the building exhaust stops. Either way you should not use the cabinet until building ventilation is restored.

OTHER TYPE OF VENTILATED EQUIPMENT

"Clean Benches" provide HEPA-filtered air to the cabinet, but exhausts the air directly into the room through the front of the cabinet. The filter may be the back wall of the cabinet and the air crosses the cabinet directly at the user. The other type has the filter above the work surface, but the air leaves the cabinet under the sash

(Continued on pg. 2, See Biocabinets)

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NEW STAFF AT OEH&S

Let's welcome Travis Clark and Peili Zhu to OEH&S as two of our new DSAs (Department Safety Advisors).

Travis Clark joined UCSF's Office of Environmental Health and Safety on March 1st. He graduated from UC Santa Cruz with an undergraduate degree in Biology (emphasis on biochemistry & molecular biology). Travis previously worked as an Environmental Health & Safety Manager at Medronic AVE in Santa Rosa and Incyte Pharmaceuticals in Palo Alto.

Travis will be the DSA for: Center for Diabetes, Dermatology, Hormone Research Institute, Medicine (Parnassus, MTZ, & VAMC), Metabolic Research Institute, Otolaryngology, Pathology.

Peili Zhu joined UCSF's Office of Environmental Health and Safety on March 25. She received her M.D. degree from Nanjing Medical College in China, an M.S, Medicine from Beijing Postgraduate Medical College, and a Ph.D., Pharmacology from Basel University, Switzerland. Peili's area of expertise is cardiology. For the last 5 years Peili was a UCSF Research Scientist, working at the VA Hospital.

Peili will be the DSA for: Cancer Center, Cancer Research Institute, Cardiology, Cardiovascular Research Institute, Enterprise Network Services, Howard Hughes Medical Institute, Neurological Surgery (MTZ).

Let us all extend a warm welcome to both Travis and Peili.

WHAT'S NEW AT ORS (OFFICE OF RESEARCH SERVICES)

The Cell Culture Facility is celebrating it's 30th Anniversary.

The event commemorating this occasion will be held at:

The Milberry Union May 29, 2002 from 10:00am to 12:00pm

All are welcome to join the Cell Culture in saying...

Happy 30th Anniversary!

Please have all personnel in your lab initial here as evidence of continuing education & keep this newsletter in your logbook.

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(Biocabinets, continued)

directly at the user. Use a clean bench only with materials that pose no hazard to people in the laboratory.

BIOSAFETY CABINETS USES

The way a biosafety cabinet is used is much different from using a fume hood, especially for Class II cabinets. Cabinet sterility is fairly easily compromised if air intakes are blocked by supplies, if there is too much equipment in the cabinet, or if you move your arms or body incorrectly while working. Air turbulence in front of the cabinet also compromises cabinet sterility. This can be caused by people walking by while you are working, room ventilation air passing by the cabinet from an open doorway, too many cabinets in too small a space causing "competition" for the air supply, or the swing of a nearby door.

The following factors should be considered when using the cabinet. You may want to close a nearby door, ask that others not walk behind you when you are using the cabinet, or use the cabinet when the laboratory is quiet. Also, remember to place an in-line HEPA filter between a filter flask and the laboratory vacuum connection on the inside wall of the cabinet, and replace it if it becomes contaminated or wet.

Certification is required every year if you use your biosafety cabinet with infectious agents or human-source materials (anything regarded on this campus as risk group 2 or risk group 3). Certification is not required if you are using the cabinet with only risk group 1 materials, but annual certification is strongly encouraged, especially if you want to maintain a sterile environment inside the cabinet. Certification must be to the highest standard appropriate to the equipment (usually NSF Standard 49), and the certifier should also be NSF-certified.

If you are having problems with materials inside a biosafety cabinet becoming contaminated, check with your laboratory supervisor first to try and identify the problem. If you need additional help, contact your DSA or call the Biosafety Officer at ext. 6-2097.

If you think that there may be a problem with the filters not working correctly, contact the company that certifies your cabinet or the Biosafety Officer. For a more complete description of biosafety cabinets, read "Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets, 2nd edition". This can be found at the CDC website: http://www.cdc.gov/od/ohs/biosfty/bsc/bsc.htm

Also, there is a short discussion of them in "Biosafety in Microbiological and Biomedical Laboratories 4th Edition" (the BMBL), available in multiple formats at the CDC website: http://www.cdc.gov/od/ohs/biosfty/biosfty.htm#PUBLICATIONS

Both are important references for any laboratory working with biohazards.

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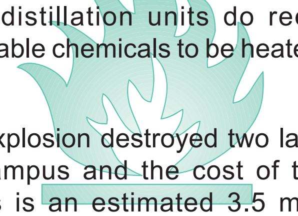
FIRE SAFETY

Within the last few months, two sister campuses have experienced extensive fires in their labs. The fire at one sister campus involved an older, clogged distillation device, which allowed benzene gas (which is a highly volatile gas) to escape and eventually explode in one of the labs. Unfortunately, it is unlikely the exact cause will be determined due to most of the evidence being lost in the fire. Unlike the newer distillation units that use a filtering system, the older distillation units do require flammable chemicals to be heated.



The explosion destroyed two labs at the campus and the cost of these losses is an estimated 3.5 million dollars. New distillation units alone would cost an estimated $5,000. The labs were designed in 1979, but physically built in 1990. At the time of construction, the building was built following the 1979 standards, which did not require sprinklers. A fire in a sprinklered building is usually contained to the room of origin in 97 % of fires.

The State Fire Marshal's office investigation discovered a number of other factors that substantially contributed to the severity of the fire. There were chemicals that were stored improperly, fire doors that were left ajar or propped open, and chemicals in quantities exceeding those stated in the National Fire Protection Agency (NFPA) 30 & 45 requirements. In addition, fire evacuation procedures failed as staff re-entered the building during the fire.

In a concentrated effort to prevent similar situations from occurring at UCSF, we are currently in the process of identifying labs on campus where distillation units are located. In addition, all our buildings at UCSF are sprinklered to some extent. Sprinkler coverage ranges from 90% to 98% in the older buildings, to 100% in the Library and newer buildings.

More recently at another campus, an accidental fire involved three laboratories. Investigation of this fire is currently being conducted. The latest information released regarding the cause of this fire is that it appears to have been started by an electrical appliance that was left on. Damage was extensive in the fire area, with many sections of the building damaged due to smoke and water. The loss from this fire is expected to reach the 4-5 million dollar range. Subsequent information will be reported as the investigation continues.

With this in mind, UCSF is in the process of upgrading our building evacuation procedures and implementing building evacuation drills. There will be evacuation and fire drills scheduled for all campus buildings as mandated by the State Fire Marshals Code of Regulations, Title 19 and California Fire Code. All departments are being asked to review and update the department Emergency Action Plan (EAP).

If you have any questions regarding the development of an EAP or updating already established EAP contact Linda Purves, Campus Emergency Preparedness Program at 476-5507. For more information regarding fire safety, contact the UCSF Campus Fire Marshal at 476-0570. With participation from all staff, we can continue to maintain a safe campus.

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MOLDS IN THE ENVIRONMENT

Molds are microscopic fungi that live on plant or animal matter. No one knows how many species of fungi exist but estimates range from tens of thousands to perhaps three hundred thousand or more. Most are filamentous organisms, and the production of spores is characteristic of fungi in general. These spores can be air, water, or insect-borne. Some examples of the common indoor molds are Cladosporium, Penicillium, Alternaria, Aspergillus and Mucor.

Some people are sensitive to molds. For these people, exposure to molds can cause symptoms such as nasal stuffiness, eye irritation or wheezing. Some people such as those with serious allergies to molds may have more severe reactions. Severe reactions may occur among workers exposed to large amounts of molds in occupational settings, such as farmers working around moldy hay. Severe reactions may include fever and shortness of breath. People with chronic illnesses such as obstructive lung disease may develop mold infections in their lungs.

Molds are found in virtually every environment and can be detected indoors and outdoors year round. Mold growth is encouraged by warm, humid conditions. Outdoors, they can be found in shady, damp areas or places where leaves or other vegetation is decomposing. Indoors they can be found where humidity levels are high, such as basements or showers.

Sensitive individuals should avoid areas that are likely to have mold, such as compost piles, cut grass, and wooded areas. Inside homes, keeping humidity levels below 40% and ventilating showers and cooking areas can slow mold growth. Mold growth can be removed with commercial products or a weak bleach solution (1 cup of bleach in 1 gallon of water).

Specific Recommendations:

√ Keep the humidity level in the house below 40%.

√ Use an air conditioner or a dehumidifier during humid months.

√ Be sure the home has adequate ventilation, including exhaust fans in kitchen and bathrooms.

√ Add mold inhibitors to paints before application.

√ Clean bathrooms with mold killing products.

√ Do not carpet bathrooms and basements.

√ Remove or replace previously soaked carpets and upholstery.

Areas with high mold potentials are: Antique shops, greenhouses, saunas, farms mills, construction areas, flower shops, summer cottages.

Some additional information on fungi and fungal diseases can be found at the CDC web site: www.cdc.gov/ncidod/dbmd.htm, or contact James Chung with OEH&S at ext.6-3635.

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U.S. EPA SELF-AUDIT RESULTS

In July 2001, the U.S. Environmental Protection Agency (EPA) invited UCSF to participate in a voluntary self-audit/self disclosure program to assess compliance with hazardous waste and hazardous materials regulations. Staff from the Office of Environmental Health and Safety conducted self-audits of the entire UCSF campus and all off-site locations during the months of October and November 2001.

In March-April, 2002, the UCSF Chemical Safety Committee will be sending letters to each respective Department Chair. The letter will commend the Departments with no violations for a job well done. For Departments with violations, the Department Chair will be notified of all violations found in their Department. The Chemical Safety Committee will recommend that each Department Chair review the violations with each responsible PI or Manager to implement corrective measures to ensure the violations are not repeated in the future.

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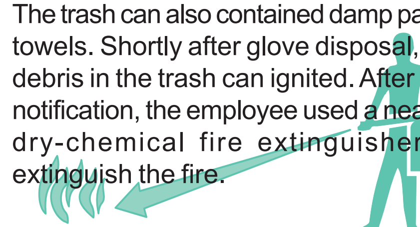
PERSONAL PROTECTIVE EQUIPMENT (PPE) DISPOSAL CAUSES TRASH CAN FIRE

Minute amounts (e.g., less than readily noticeable) of air-reactive chemicals can be a fire initiator. When working with air-reactive chemicals, precautions should be taken in disposing of materials including Personal Protective Equipment that may have come in contact with those chemicals. The cleanup and disposal activity associated with a job must not be overlooked.

An employee at a sister laboratory was making a transfer of a small (approximately ¾ inch by 2 inch) piece of potassium, its hexane storage medium, and some visible "fines" from a cracked jar to a new jar. The transfer was performed by pouring from the cracked jar to the new jar. There was no contact with the potassium and no spills occurred.

The latex gloves worn by the employee were disposed in a nearby trash can. The trash can also contained damp paper towels. Shortly after glove disposal, the debris in the trash can ignited. After 911 notification, the employee used a nearby dry-chemical fire extinguisher to extinguish the fire.



An investigation team was formed to review the event. Their report concluded that although the employee did not notice any material on the gloves when they were disposed, the fire was probably caused by a speck or an oxide of potassium that was on the gloves. This material came into contact with the damp paper towels and then ignited by chemical reaction.

Guidance for chemical safety should include guidance for proper disposal of materials (including PPE) that may have come in contact with air-reactive chemicals. This guidance should note that minute amounts (less than readily noticeable) of air-reactive chemicals can be an ignition source.

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