

LABORATORY HOODS

COURSE OUTLINE

- **Many of the materials we work with give off hazardous contaminants.**
 - Fumes.
 - Mists.
 - Vapors.
 - Particulates.
 - Aerosols.
- **To minimize exposure to these materials we must take special precautions.**
 - This often means working within a "hood".
- **We can look at how hoods function by using the "chemical exhaust hood" as an example. They:**
 - Prevent contaminants within the hood from entering the "breathing zone".
 - Create a protective barrier by pulling air into and through the hood.
- **The hood's "inward" airflow keeps hazards from escaping.**
 - Captured contaminants are filtered, diluted and exhausted through a duct system.
- **Hoods can also provide protection from "physical" threats.**
- **The sash protects workers from hazards such as:**
 - Chemical splashes.
 - Sprays.
 - Fires.
 - Minor explosions.
- **You should pull the sash down as far as possible when you are working.**
 - But keep it at a comfortable level.
- **When working within a hood, personal protective equipment is still required. This can include:**
 - Safety eyewear.
 - Lab coats.
 - Gloves.
 - Other protection if necessary.

- **To make sure that they are operating safely, hoods are thoroughly tested in several situations.**
 - When they are first installed.
 - Whenever a change is made in the lab's ventilation system.
 - Periodically throughout the year.
- **There are specific steps to follow to determine if a hood is operating correctly.**
- **Air circulation around the hood ("crossdraft") should be checked first.**
 - Measure it six inches from the front of the hood.
 - It should not be greater than 20 linear feet per minute.
- **Next, a smoke tube should be used to make sure airflow within the hood is correct.**
 - Smoke should head for the ventilation ducts.
- **The rate of air coming through the face of the hood ("face velocity") should be measured next. To do this:**
 - Open the sash.
 - Use instruments such as "anemometers" or "velometers" to get measurements.
 - Don't use sheets of tissue or other paper as a substitute.
- **Measuring this "face velocity" requires great precision.**
 - The hood face is divided into a grid pattern.
 - The air velocity is measured in each quadrant.
 - Values for specific points can vary +/- 25%.
 - But no measurement should be below 60 feet per minute.
- **The face velocity is also compared to the crossdraft.**
 - The crossdraft should never be greater than 20% of the face velocity.
- **If problems are apparent, several things will need to be checked or adjusted, including:**
 - Interior hood baffles.
 - Laboratory ventilation systems.
- **Checking for turbulence within a hood is also important.**
 - Use "smoke patterns" for this purpose.

- **If excessive turbulence is seen (or smoke is not captured) a number of things should be checked, including the:**
 - Location of equipment within the hood.
 - Hood's face velocity.
 - Location of air-input ports.
 - Physical location of the hood itself.
 - Volume of air coming into the hood.
- **If you suspect a hood isn't performing properly, talk to your supervisor about possible retesting.**
- **Laboratory hoods must also be used correctly to be effective.**
 - Maintain proper airflow within the hood.
 - Perform experiments at least six inches inside the hood.
 - Elevate equipment (especially large pieces) if necessary.
- **Hoods should not be used as storage cabinets.**
 - Overloading restricts the airflow.
 - This can result in dangerous build-up of hazardous vapors.
 - Chemicals stored in hoods can make an emergency or fire worse.
 - If you are not actively working with a material in the hood, put it away.
- **You should take steps to prevent contaminated air in hoods from entering the laboratory.**
 - Keep the sash closed as much as possible.
 - Pay attention to air monitors.
- **Checking face velocity of a hood regularly is important.**
 - Average velocities range from 80-100 linear feet per minute.
 - Higher velocities of about 125 linear feet per minute may be required for some experiments.
 - However, higher velocities can create turbulence and should not exceed 150 linear feet per minute.
- **It is also important to exercise caution around hoods.**
 - The airflow must not be disturbed.
 - Even velocities of 100 linear feet per minute can be overcome by rapid movements in front of the hood.

- **Solid objects should be kept from entering a hood's exhaust ducts, so they don't:**
 - Lodge in a duct or fan.
 - Adversely affect airflow.
- **Never place your head inside an exhaust hood.**
 - This disrupts airflow.
 - You risk being overcome by potentially hazardous fumes/vapors.
 - If a hood needs adjusting, consult your supervisor.
- **"Biohazard hoods" are different from exhaust hoods.**
 - They are designed to capture exotic and infectious particulates.
 - Most often they are used with clinical specimens or body fluids.
- **The main feature of biohazard hoods is their filtering system.**
 - It captures and removes hazardous aerosols before they can be recirculated or exhausted.
 - The most effective filtering system is the "high efficiency particulate air" (HEPA) filter.
- **HEPA filters have unique characteristics. They:**
 - Are disposable, dry-type filters.
 - Are constructed of "boron silicate" microfibers.
 - Can capture particles as small as 0.3 of a micron with 99.9% success rates.
- **Remember, HEPA filters do not guard against hazardous gases.**
 - If the substances you are working with give off both particle and gases, talk to your supervisor about the proper hood to use.
- **There are other specialized hoods for work involving specific materials, including:**
 - Perchloric acids.
 - Radioisotopes.
- **"Perchloric acid hoods" have unique characteristics and uses.**
 - They incorporate a "wash-down" capability.
 - This prevents dangerous build-up of reactive residues.
 - But never use these hoods with organic materials (it can cause explosive reactions).

- **A "radioisotope hood" should be used when working with radioactive material.**
It:
 - Is impermeable to such materials.
 - Will minimize dangerous exposure.
- **No matter what sort of hood you are using, and what precautions you take, things can still go wrong.**
 - It is important to be prepared for accidents.
 - Spills need to be dealt with immediately.
 - Follow your facility's cleanup procedures.
 - Soak up spills with absorbent materials.
 - Dispose of resulting residues properly.
- **Small fires can also occur in hoods.**
 - If possible, put out fires with extinguishers or through suffocation.
 - If they are uncontrollable, close the sash and evacuate the area.
 - Sound alarms and call for assistance, if needed.
- **Ventilation failures can also occur with hoods. They:**
 - Can be caused by malfunctions in electrical lines.
 - May result in the release of harmful fumes, vapors or particles.
- **So you need to know your facility's Emergency Plan.**
 - It will help prepare you for equipment failure or other problems.
 - Consult your supervisor to obtain a copy.

*** * * SUMMARY * * ***

- **Remember to be careful when using laboratory hoods.**
- **Hoods are used because materials are hazardous.**
- **Maximize your hood's ventilation.**
- **Keep experiments six inches inside the hood.**
- **Keep hood sashes down as far as possible.**
- **You will be safe if you choose the right hood for the job. But you must work with the hood correctly.**