

# Indoor Air Quality Concerns in School Laboratories



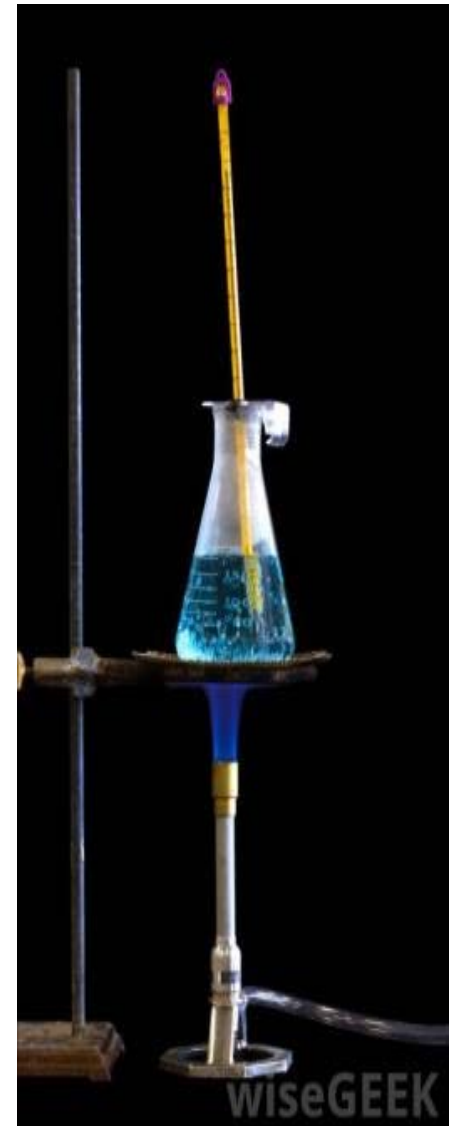
United Federation of Teachers  
A Union of Professionals

# What Causes Indoor Air Pollution?

- Chemical storage
- Animals/ Plant Demonstrations
- Building conditions
  - Ventilation Systems
  - Cleanliness – dust mites, pest
  - Mold
- Construction
  - Asbestos
  - Dust Control
  - Lead

# Laboratory stock as an IAQ contaminant source

- Materials in labs can become airborne during improper storage and handling and/or in regular use of chemicals.
- Method for being airborne...
  - by evaporation at room temperature
    - Example: VOCs such as acetone
  - by release of gases, aerosols, and fumes by combustion and other chemical reactions.
    - Example: methanol (Beacon HS)
  - by the generation of dust particles
    - Example: aluminum powder



# Common indicator of off gassing

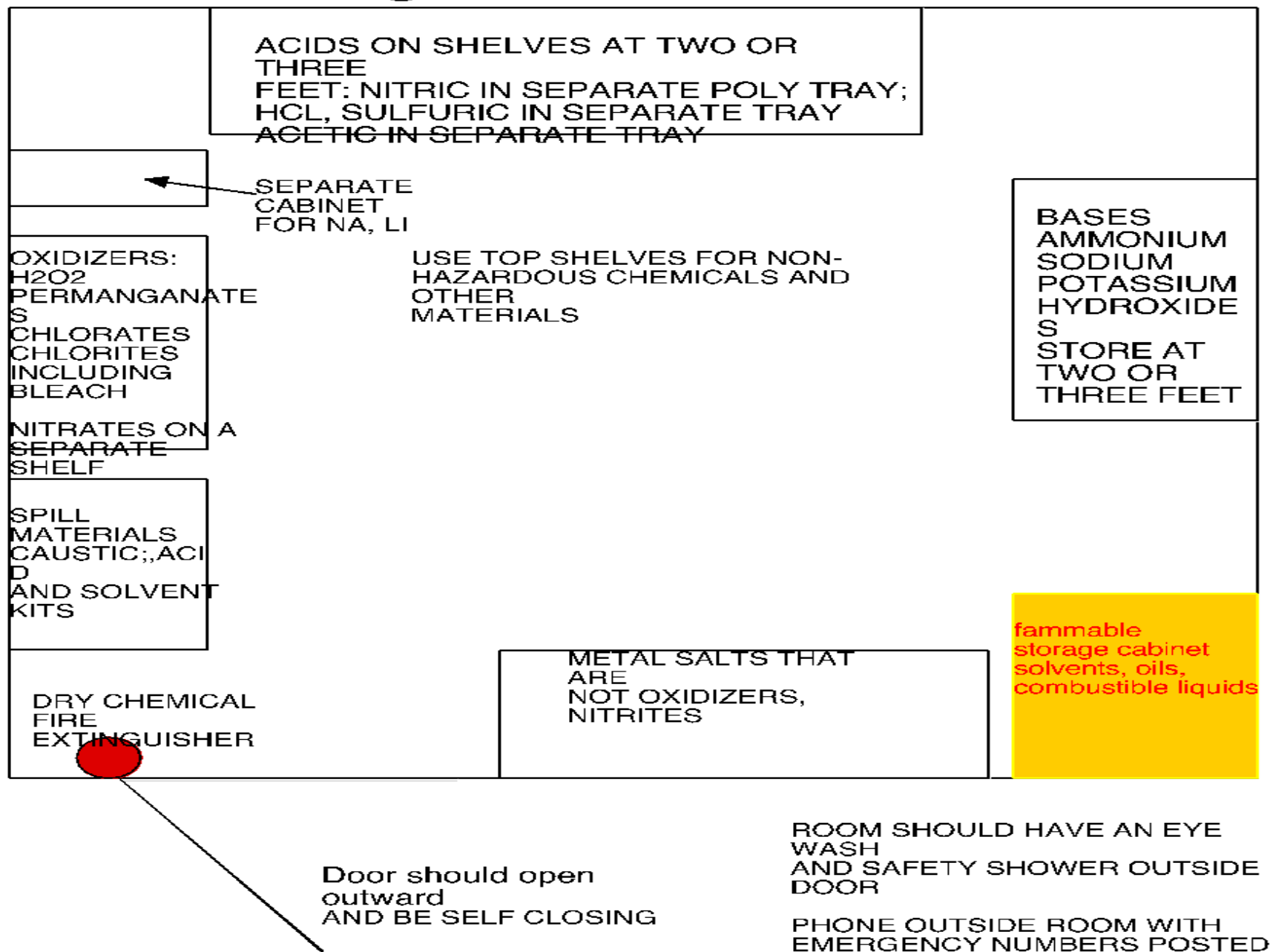
- Rusty cabinets - Signs of corrosion on metal can indicate chemical off-gassing.
- Strong odor in cabinets or storage room may indicate that the cabinets or storage room is not adequately ventilated or that the chemicals are not stored properly.



# Preventing your chemical stock from becoming an IAQ problem.

- Ensure proper storage
- No open containers or deteriorated containers
- Eliminate hazardous chemicals.  
Chloroform, carcinogens, elemental mercury should be eliminated.
- Use of fume hood or any local exhaust ventilation
- Personal protective equipment

# Storage Scheme for School Labs

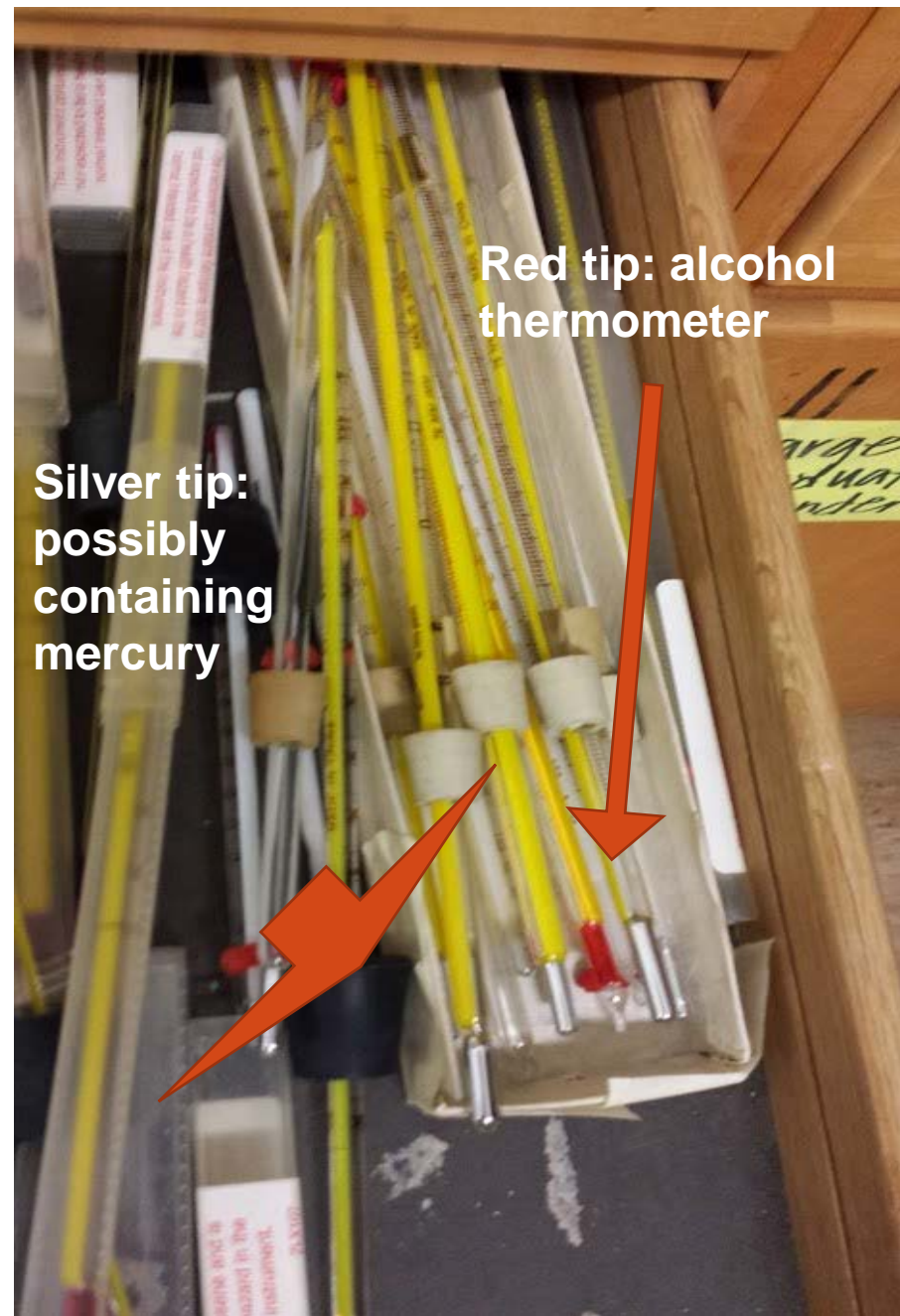
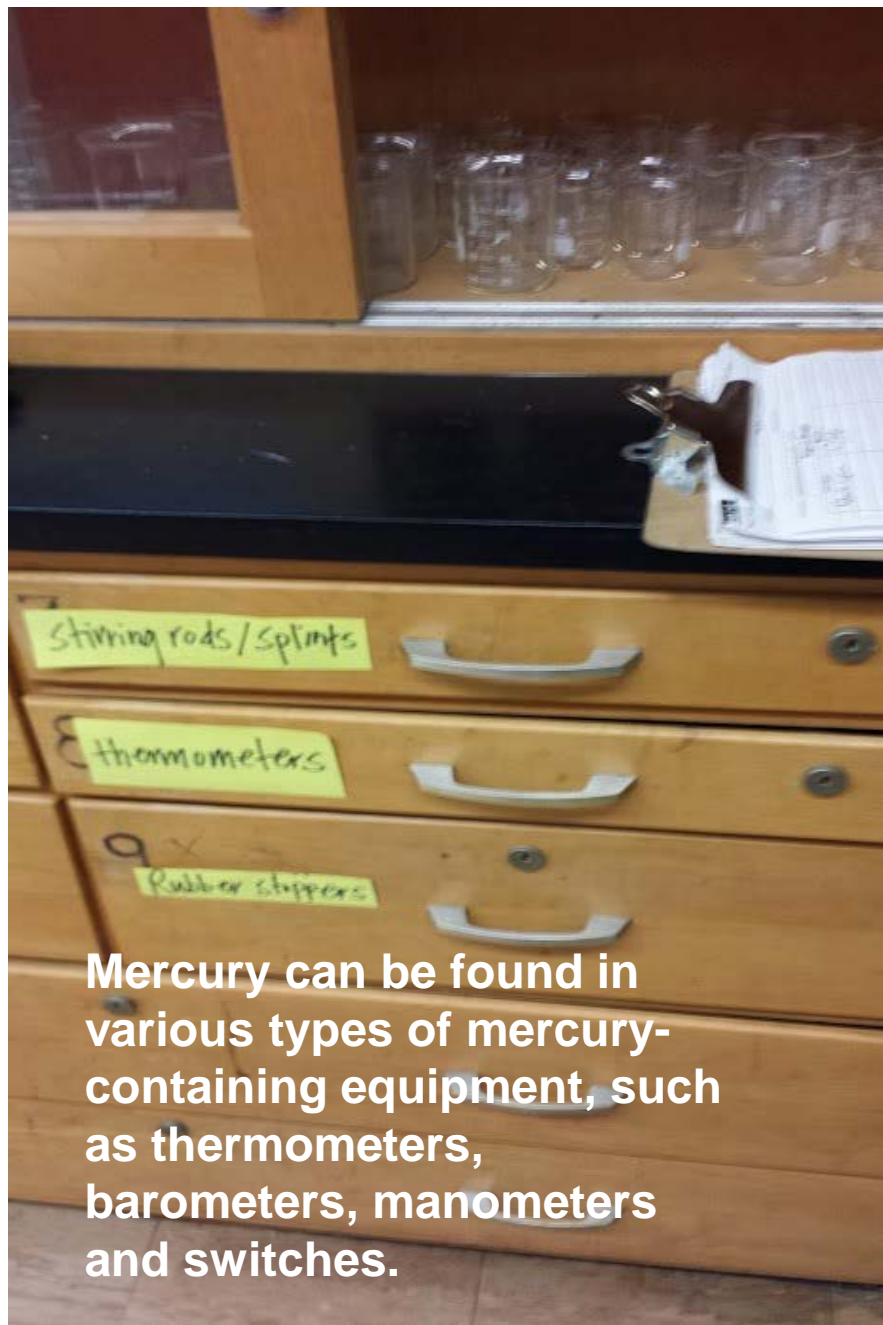


# Mercury Containing Equipment

- Banned in 2004 in NYS.
- Can be found in thermometers, barometers, etc
- Mercury vapor is a hazardous material that can cause serious health effects. Mercury vapors can affect different areas of the brain.
  - Long term exposure can include memory headache, sleeplessness, irritability and
  - Short-term exposure to high levels can cause coughing, shortness of breath, nausea, vomiting, diarrhea, fever, high blood pressure and skin rashes









# Mercury Spills

- **DO NOT ATTEMPT TO CLEAN ANY MERCURY SPILL**
  - Heat from a vacuum cleaner will accelerate the vaporization of mercury and contaminate the vacuum cleaner, which must then be disposed of as hazardous waste. Using a mop or broom will only spread the mercury around the floor, contaminating the mop and broom, which must then be disposed of as hazardous waste.
- Contain spill and evacuate room
- Contact Custodian and principal

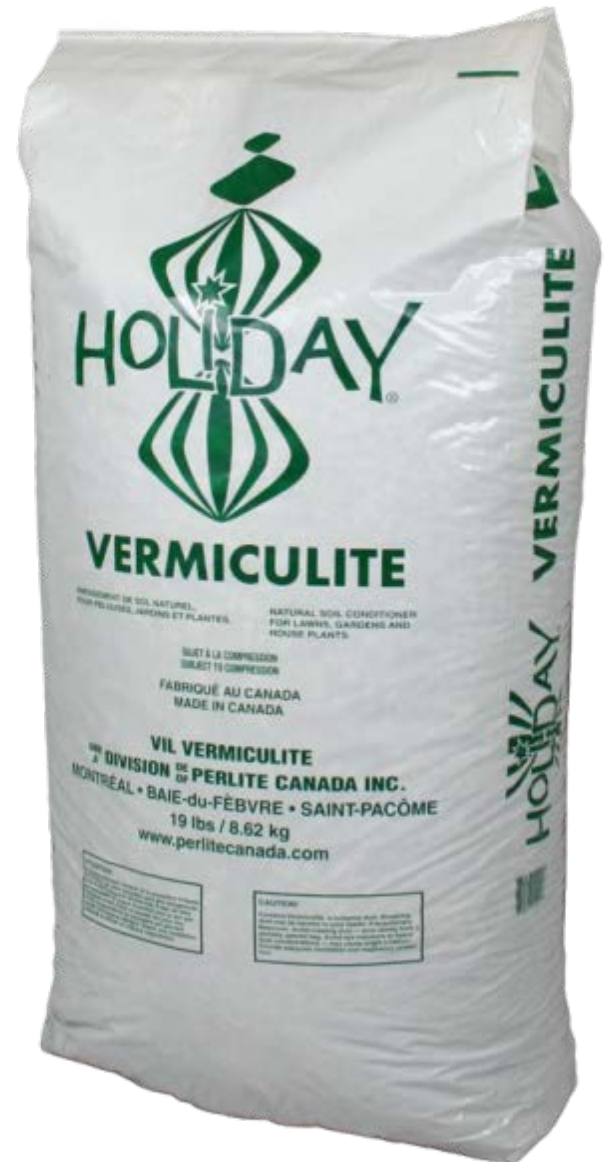
# Asbestos

- A carcinogen that causes lung cancer and mesothelioma ; excellent thermal resistant
- Older heating elements such as, hot plates, hair dryers, “centers” of wire gauze, and gloves for handling hot items contained asbestos.



# Vermiculite

- Although not all vermiculite contains asbestos, some products were made with vermiculite that contained asbestos until the early 1990s.
- Vermiculite mines throughout the world are now regularly tested for it and are supposed to sell products that contain no asbestos.





# Formaldehyde



- Formaldehyde can cause irritation of the skin, eyes, nose, and throat. High levels of exposure may cause some types of cancers.
- This substance was used historically for preserving and storing biological specimens.
- Most of these alternatives contain ethylene glycol as a major ingredient.



# Animals and plant exhibit

- Ensure that the animals and their cages, bedding, etc. do not become reservoirs of disease-carrying parasites and infectious agents.
- Animal hair, dander, pollen, fungal spores may cause allergic reactions (respiratory and skin) in staff and students.



# Indoor Ventilation

***Air must circulate by means of cross ventilation***



## **Air Can Be Provided By:**

- Ventilation system (HVAC)
- Operable windows
- Exhaust ventilation

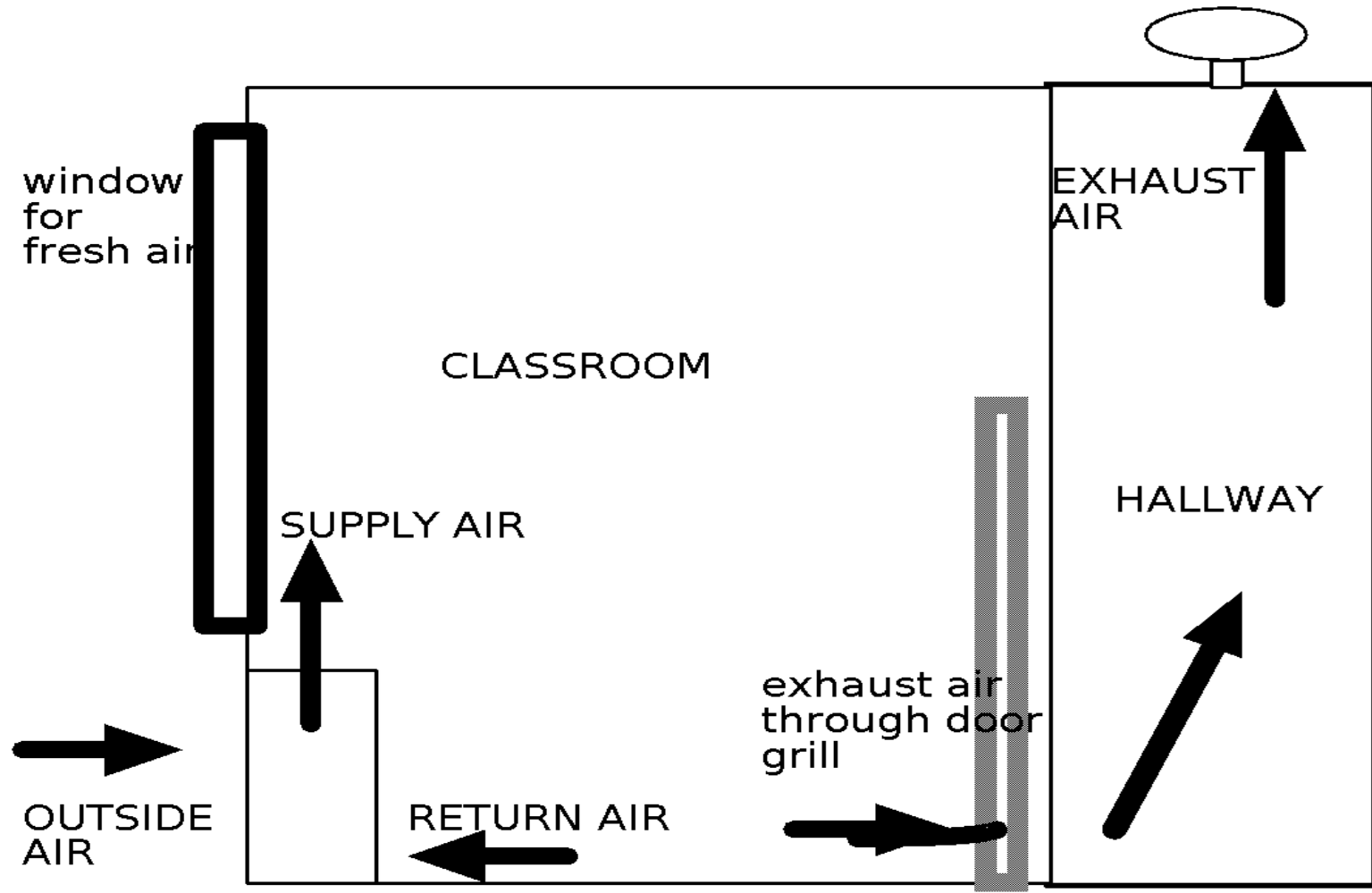




# Room ventilation

- ASHRAE Standard 62-1989, Ventilation for Acceptable Indoor Air Quality, recommends 20 cubic feet per minute (cfm) of outdoor air per person for general dilution ventilation of laboratories.
- Negative pressure is best maintained by exhausting more air from a room than is mechanically supplied.

# Typical Unit Ventilation



# Fume hoods – local exhaust ventilation

- As a general guideline, it is recommended that chemicals with an industrial exposure limit (i.e., OSHA Permissible Exposure Limit or ACGIH TLV) of 100 parts per million (ppm) or less (gas or vapor) or  $0.1 \text{ mg/m}^3$  (solid) be handled inside a laboratory hood.
- i.e. nitric acid has PEL of 2 ppm and acetic acid has a PEL of 10 ppm.



# Fume Hoods

- Hoods are not storage cabinets
- Temporary storage for experiments is acceptable
- Excess storage interferes with air flow
- FDNY requires an air velocity average of 80 to 150 feet per minute at a sash height range of 12 to 18 inches.
- Exhaust systems are inspected and tested annually by qualified inspectors.
- Fume hoods failing to satisfy any of the above criteria should be removed from service until such time as a remedy is established. Fume hoods taken out of service should be marked as such (e.g. “**DO NOT USE**”).

# Storage Room Ventilation

- Per FDNY, ventilation in chemical storage rooms should be at 6 air changes per hour.
- Preferably should be on continuously.

# What is IPM?

(Integrated Pest Management)



An integrated, proactive approach utilizing a range of methods to manage pest control in buildings.

**IPM relies on common sense practices!**

***For a safe effective pest management:***

- Eliminate sources of food, water, and shelter

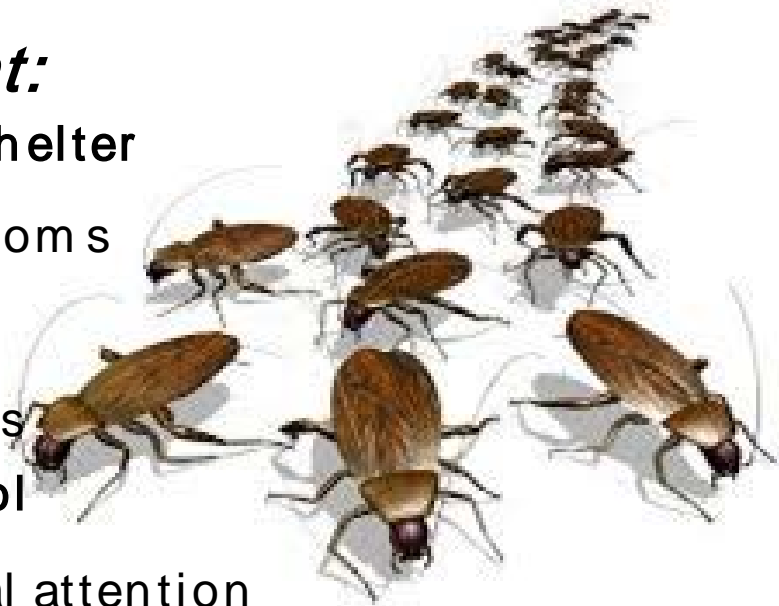
Food service, storage areas, classrooms

- Close points of entry

Building Foundation and entrances

- Communication with DOE Pest Control Technician

Identify areas of activity for special attention



# Water Damage/Mold

Signs there can be a problem

- Visible mold growth
- Evidence of visible water damage
- Condensation
- Elevated relative humidity
- Roof or wall leaks
- Pipe leaks
- Mildew odor

***All are indicators of a problem!***





# Peeling Paint



**Paint may contain lead which is a particular concern for children under the age of 6 years and for students who have hand-to-mouth activity.**

# Damaged Plaster



**Report damaged plaster because there may be a more serious exposure situation:**

- Asbestos or Asbestos Containing Material (ACM)
- Lead
- Mold (due to water damage)





# Construction & Renovation



# Asbestos

Asbestos Hazard Emergency Response Act (AHERA)

**AHERA** reports include information about where asbestos-containing building materials are located in your school and must be on-site.



# Asbestos Abatement





# Dust Control





# Controls

- Schedule to minimize occupant exposure
- Isolating technique – barriers, negative pressure
- Ventilation & filtration controls
- Work practices
- Daily clean-up/housekeeping
- Material storage
- Don't transport materials through the building if possible.



# Eleanor Roosevelt HS



# Dust Control During Construction and/or Renovation

- Respectful of occupants
- Control dust
- Maintain a clean environment
- Prevent water damage
- Respond to emergencies
- Provide documentation
- Be trained & communicate





**Daily clean-up and removal of debris must be done!**



# Construction & Renovation

**Before every construction & renovation project, there must be a protocol meeting and the Chapter Leader must be present.**

## **UNITED FEDERATION OF TEACHERS**

# PROTOCOL

**For  
School Construction Authority**

**CONSTRUCTION PROJECTS  
IN  
SCHOOL**

**Job Committee meeting should be held every 2 weeks during the project.**

**Asbestos abatement must be done when the building is unoccupied.**

## LABORATORY/PREPARATION ROOM RENOVATION CHECKLIST

- Get involved early in the planning stages of the renovation.
- Offer your best professional opinion as to what is needed in the renovation process (i.e. gas service, emergency cut off systems, additional lighting, leaks repaired) during the planning stages.
- Prioritize needs. Consider that budget will be cut.
- UFT protocol meetings are held before every renovation. See your chapter leader and assistant principal for information.
- Be aware of the time frame. Know what is happening and when.
- Consult with your assistant principal and have all old and obsolete equipment and materials removed before the renovation - all old, overstocked, chemicals should be removed and disposed of properly in accordance with state and local guidelines before the renovation.
- Consult with your assistant principal and decide on a safe storage place (away from the renovation area) for the relocated chemicals.

Thank  
you