

Lab Ventilation and Safety!



SAFE SCIENCE: BE PROTECTED

By Dr. Ken Roy

Email: safesci@sbcglobal.net

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Given the potential production of toxins, flammables, corrosives, particulate matter, and other hazards, science laboratories need appropriate engineering controls including ventilation and fume hoods. Unfortunately, many academic science labs have faulty ventilation, including ventilation which is not operational as designed. In this way, teachers and students are both exposed to hazards and resulting risks to health and safety. Given this critical issue, teacher and their supervisors need to be aware of lab ventilation and if it is operating correctly to meet the needs of laboratory work with hazardous biologicals, chemicals and physical hazards.

Legal Safety Standards and Better Professional Safety Practices for Ventilation

The OSHA Laboratory Standard (CFR #1910.1450) requires that the employer develop a Chemical Hygiene Plan, which will satisfy a number of requirements, including ventilation. Appendix A to 1910.1450 - National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory) reflects better professional safety practice. In order to provide adequate ventilation to prevent exposure to airborne substances and to prevent their escape into the working atmosphere, use of hoods and other ventilation devices are recommended (32,198). OSHA in appendix A: specifically quotes the following

- a.)** General laboratory ventilation. This system should: Provide a source of air for breathing and for input to local ventilation devices (199); it should not be relied on for protection from toxic substances released into the laboratory (198); ensure that laboratory air is continually replaced, preventing increase of air concentrations of toxic substances during the working day (194); direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building (194).

- b.)** Hoods. A laboratory hood with 2.5 linear feet of hood space per person should be provided for every 2 workers if they



spend most of their time working with chemicals (199); each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use (200, 209). If this is not possible, work with substances of unknown toxicity should be avoided (13) or other types of local ventilation devices should be provided (199). See pp. 201-206 for a discussion of hood design, construction, and evaluation.

- (f)** Performance. Rate: 4-12 room air changes/hour is normally adequate general

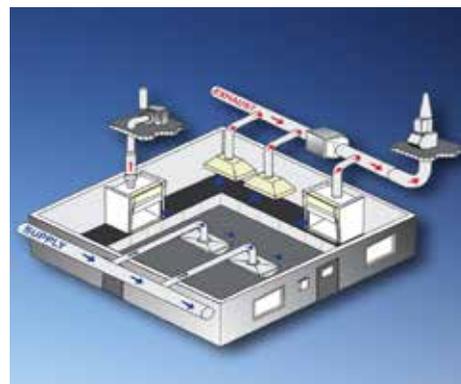
ventilation if local exhaust systems such as hoods are used as the primary method of control (194).

- (h)** Evaluation. Quality and quantity of ventilation should be evaluated on installation (202), regularly monitored (at least every 3 months) (6, 12, 14, 195), and reevaluated whenever a change in local ventilation devices is made (12, 195, 207). See pp 195-198 for methods of evaluation and for calculation of estimated airborne contaminant concentrations.

These standards and recommendations are applicable to science labs, preparation room and storerooms.

The National Fire Protection Association (NFPA) in the NFPA 45 standard or The NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals in 2011+ Chapter 8 Laboratory Ventilating Systems and Hood requirements states the following:

#8.2.1 Laboratory ventilation system shall be designed to ensure that fire hazards and risks are minimized.



#8.2.2 states the following: Laboratory units

and laboratory hoods in which chemicals are present shall be continuously ventilated under normal operating conditions.

The NFPA standard basically is designed to insure that the ventilation system meets the needs of the situation – that is to prevent unsafe levels of flammable and other chemical hazards in the lab environment.

Bottom-line:

Effective laboratory ventilation is to be addressed in the Chemical Hygiene Plan or CHP. . During an OSHA inspection by a compliance officer, the school's Hygiene Plan is the bible or employer's expectation! The CHP should be based on appropriate OSHA, NFPA and other appropriate laboratory safety standards. It will help to insure the safety of students and school employees in the short and long term. If employees believe there is a ventilation problem, they need to register their concern with the district's chemical hygiene officer. . In turn, the hygiene officer must share these concerns with the superintendent of schools. . OSHA's Laboratory Standard is unique in that it was the first standard to charge the CEO or superintendent wof schools in this case, with direct responsibility for implementing, monitoring and rectifying problems concerned with school science laboratories. . The NFPA 45 standard could also be reviewed by the local fire marshal via a requested inspection to make sure the ventilation system is meeting the needs of the laboratory.

One legal note – if you know or realize that the ventilation system does not meet the needs of the lab demo or activity, don't do it! If you do, you could be found to be “reckless” should there be an incident and followed litigation again you and your school.

About the author:

*By Dr. Ken Roy
K-12 Director of Environmental Health &
Chemical Safety
Glastonbury Public Schools
Glastonbury, CT 06033-3099;
Chief Safety Compliance Advisor/Blogger
National Science Teachers Association;
Safety Compliance Officer
National Science Education Leadership
Association
Email: safesci@sbcglobal.net*

For current safety updates five days a week, follow Dr. Ken on [Twitter@drroysafersci](https://twitter.com/drroysafersci).

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