

Appendix 5.3. Safety Goggles for Your Laboratory

What is your obligation?

An important obligation of science teachers is to provide students with safe, appropriate eye protection. All safety goggles need to comply with ANSI 87.1—2003. Only safety goggles marked with “Z87.1” should be purchased; the “Z87.1” mark will appear on the frame or the lens. As a responsible teacher, you must select eyewear that provides you and your students with the most suitable protection for the hazards of your science activities.

What circumstances require eye protection?

Protection of the eyes is essential in any laboratory activity.

Eye protection is required for (but not limited to) the following instances:

- When chemicals, glassware, or heating sources are being used
- When working with materials or equipment under stress, pressure, or force that might cause fragmentation or flying particles
- When an activity generates projectiles, uses elastic materials under stress (e.g., springs, wires, rubber, glass), or causes collisions
- When dust or fumes are present (eye protection reduces the dust or fumes reaching the eye)
- When using preserved specimens

Eye protection is a must in any laboratory activity in biology, chemistry, or physics. Effective eye protection must include adequate instruction on the hazards of the particular activity and the precautions to be taken to reduce the risk of injury.

What is the best eye protection for your science activities?

Ordinary spectacles or safety glasses, with side shields or without side shields, do not provide adequate protection for laboratory activities.

Only safety goggles provide the level of protection needed for your laboratory activities. A safety goggle snugly fits the face surrounding the eyes; the goggle should have a soft, pliable flange that seals around the eyes snugly to protect the eye from a variety of hazards.

There are two major types of safety goggles. Safety goggles can be designed as chemical splash goggles and/or impact goggles.

- Impact goggles are generally directly vented and appropriate for flying particles, fragmented materials, projectiles, elastic materials, and collision activities.
- Chemical-splash goggles, like impact goggles, fit the face surrounding the eyes snugly. The soft, pliable flange seals around the eye. Because goggles need ventilation to reduce fogging, chemical-splash goggles are required to have hoods or caps over the vent

openings to prevent splashes from entering the goggle and causing injury to the eye. The system of hoods or caps therefore prevents chemical splashes from entering the goggle. This type of goggle is indirectly vented.

Chemical-splash goggles should be the standard for eye protection when chemicals, glassware, a heating source, or preserved specimens are being used.

What is the current recommendation for wearing contact lenses?

The American Chemical Society (ACS) Committee on Chemical Safety states that contact lenses can be worn in the laboratory provided that approved eye protection is worn as required of others in the laboratory.

The National Institute for Occupational Safety and Health (NIOSH) recommends that workers be permitted to wear contact lenses when handling hazardous chemicals, provided adequate face and eye protection are worn.

The Council of State Science Supervisors (CSSS) states that contact lenses can be worn, provided “specially marked, non-vented safety goggles are available to contact lens wearers” (see *Science & Safety: Making the Connection*, p. 11: www.csss-science.org/downloads/scisafe.pdf).

Relevant Safety Goggle Information From Various Organizations

1. American National Standards Institute: ANSI Z 87.1 Section 7.3(3) p. 15

The teacher must make a judgment in selection of the appropriate protective equipment so that the protection is greater than the estimated hazards.

2. Goggle Safety, Flinn Scientific Co., 2008

“Just because eyewear meets Z 87.1 standards does not mean it provides adequate protection from the dangers of splashed chemicals. Eyewear that does not provide a complete snug seal around the eyes may be fine for some activities but not when using hazardous chemicals. When vent openings are provided on splash goggles, the vents should be indirect with covers and/or baffles preventing straight line passage of liquids into the goggles.”
(Safety in the Science Classroom, www.flinnsci.com/Sections/Safety/safety.asp)

3. Occupational Safety and Health Administration (OSHA) 1910.1450 (Laboratory Standard) Section D(6)

School laboratories should include “protective apparel compatible with the required degree of protection for substances being handled.”

4. Occupational Safety and Health Administration (OSHA) 1910.133 Eye and Face Protection

The employer shall insure that each affected employee uses appropriate eye and face protection when exposed to eye or face hazards.

5. Texley, J., T. Kwan, and J. Summers. 2004. *Investigating Safely—A Guide for High School Teachers*. Arlington, VA: NSTA Press. p. 147

ANSI Z 87.1—compliant chemical-splash goggles are the type of goggles that we strongly recommend you use exclusively.

6. U.S. Consumer Product Safety Commission, Center for Disease Control and Prevention. 2006. *School Chemistry Laboratory Safety Guide*. Cincinnati, OH: National Institute for Occupational Safety and Health. p. 7.

Always wear appropriate eye protection (e.g., chemical-splash goggles) in the laboratory.

7. National Science Teachers Association (NSTA). 2008. *Science Laboratory Rules and Regulations*. *Safety in the Science Classroom*. Arlington, VA: NSTA Press.

Personal Safety ANSI Z87.1 approved chemical-splash goggles or safety glasses, as appropriate or directed by your instructor, shall be worn at all times in the laboratory, including prelaboratory work cleanup, unless the instructor specifically states that the activity does not require the use of chemical-splash goggles or safety glasses.

8. American Chemical Society (ACS), Council Committee on Chemical Safety. 2001. *Chemical Safety for Teachers and Their Supervisors, Grades 7–12*. Washington, DC: ACS. p. 5.

Eye protection—Always, when hazardous chemicals are used or handled, when glassware is used or handled, when flames are involved, all persons present, whether or not they are doing the handling or using, must wear eye protection.

Only safety goggles known as CHEMICAL SPLASH GOGGLES marked with code “Z87” provide the kind of protection that is needed.

9. Exeter High School. 2008. *Chemical Hygiene Plan*. Exeter, NH: Exeter High School.

Personal protective equipment: All eye protection devices should conform to ANSI Standard Z87.1—2003. Eyeglasses, even with side shields, are not acceptable protection against chemical splashes.

Chemical-splash safety goggles should be used as the standard protective eyewear. Such goggles should fit the face surrounding the eyes snugly to protect the eyes from a variety of hazards.

Any experiment that involves heating or the use of chemicals or glassware shall require the use of chemical-splash safety goggles. The goggles also serve to reduce dust and fumes from reaching the eye.

10. Contact Lenses

Schulte, P. A., H. W. Ahlers, L. L. Jackson, B. D. Malit, and D. M. Votaw. 2005. Contact Lens Use in a Chemical Environment. *Current Intelligence Bulletin* 59, No. 22025-139. Cincinnati, OH: National Institute for Occupational Safety and Health.

American Chemical Society (ACS). 2002. Eye Protection. *Safety in the Academic Chemistry Laboratories*. Washington, DC: ACS. p. 3

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