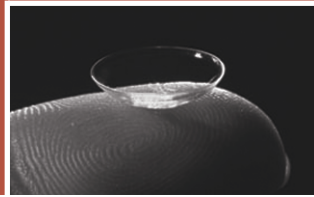




Current Intelligence Bulletin 59

Contact Lens Use in a Chemical Environment



Current Intelligence Bulletin 59

Contact Lens Use in a Chemical Environment

by

Paul A. Schulte, Ph.D.
Heinz W. Ahlers, J.D.
Larry L. Jackson, Ph.D.
Bonita D. Malit, M.D.
David M. Votaw

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

**This document is in the public domain and may be freely copied or
reprinted.**

Disclaimer

Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to Web sites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these Web sites.

Ordering Information

To receive documents or other information about occupational safety and health topics, contact NIOSH at

NIOSH—Publications Dissemination
4676 Columbia Parkway
Cincinnati, OH 45226-1998

Telephone: **1-800-35-NIOSH** (1-800-356-4674)
Fax: 513-533-8573
E-mail: pubstaft@cdc.gov

or visit the NIOSH Web site at www.cdc.gov/niosh

DHHS (NIOSH) Publication Number 2005-139

June 2005

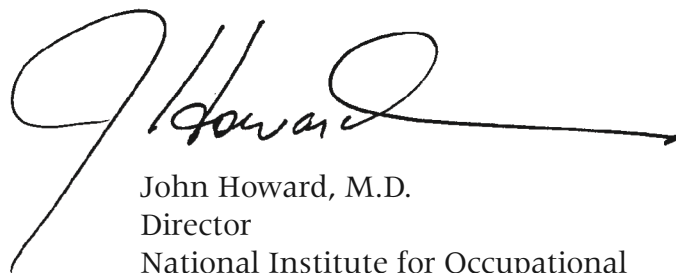
SAFER • HEALTHIER • PEOPLE™

Foreword

The purpose of the Occupational Safety and Health Act of 1970 (Public Law 91–596) is to assure safe and healthful working conditions for every working person and to preserve our human resources. In this Act, the National Institute for Occupational Safety and Health (NIOSH) is charged with recommending occupational safety and health standards and describing exposures that are safe for various periods of employment, including (but not limited to) the exposures at which no worker will suffer diminished health, functional capacity, or life expectancy as a result of his or her work experience.

Current Intelligence Bulletins (CIBs) are issued by NIOSH to disseminate new scientific information about occupational hazards. A CIB may draw attention to a formerly unrecognized hazard, report new data on a known hazard, or disseminate information about hazard control. CIBs are distributed to representatives of academia, industry, organized labor, public health agencies, and public interest groups as well as to Federal agencies responsible for ensuring the safety and health of workers.

This CIB reviews what is known about contact lens wear while working with chemicals and provides guidelines for their use in a chemical environment to help employers safely implement a contact lens use policy.

A handwritten signature in black ink, appearing to read "J. Howard", with a long horizontal stroke extending to the right.

John Howard, M.D.
Director
National Institute for Occupational
Safety and Health
Centers for Disease Control
and Prevention

Abstract

Since the 1978 Standards Completion Program, the National Institute for Occupational Safety and Health (NIOSH) has recommended that workers not wear contact lenses during work with chemicals that present an eye irritation or injury hazard. Recently, several professional groups have issued guidelines removing restrictions in the industrial environment. NIOSH has reviewed these guidelines, company policies on contact lens use and injury incidents, and the limited literature on contact lens use in a chemical environment. Injury data are lacking to indicate that contact lens wear should be restricted during work with hazardous chemicals, and thus NIOSH recommends that contact lens wear be permitted provided that the safety guidelines presented in this Current Intelligence Bulletin (CIB) are followed.

Contents

Foreword	iii
Abstract	iv
Acknowledgments	vi
Background	1
Current Practice	1
Experimental Studies	1
Recommendations	2
References	4

Acknowledgments

The authors would like to thank the following individuals for their assistance in reviewing this document:

Dr. Bernard Blais
American College of Occupational and Environmental Medicine

Dr. Anthony Cullen
American Optometric Association

Dr. Diane Schmidt
American Chemical Society

Ms. Eileen Segal
American Chemical Society

Mr. John Shoemaker
Prevent Blindness America

Mr. Bill Kojola
AFL-CIO

Ms. Ann Brockhaus
Organization Resource Counselors

Dr. Robert Ford
Eastman Kodak Company

Ms. Michelle Castleberry
American Association of Occupational Health Nurses

Dr. Caroline Freeman
Occupational Safety and Health Administration

Editorial review and production assistance were provided by Anne C. Hamilton and Vanessa L. Becks.

Contact Lens Use in a Chemical Environment

Background

Since 1978, the National Institute for Occupational Safety and Health (NIOSH) has recommended that workers not wear contact lenses during work with chemicals that present an eye irritation or injury hazard [NIOSH 2004]. This policy was recommended by the 1978 Standards Completion Program and is based on the “best professional opinion of the committee membership based on literature data” [NIOSH 1978]. The policy was also consistent at that time with general industry practice, Occupational Safety and Health Administration (OSHA) regulations, and recommendations of professional groups such as the American Chemical Society.

Current Practice

Recently, a number of groups have issued new guidelines that remove most previous restrictions for wearing contact lenses in the industrial environment. These groups include the American Optometric Association, the American College of Occupational and Environmental Medicine, the American Academy of Ophthalmology, the American Chemical Society, and Prevent Blindness America. NIOSH has reviewed these new guidelines as well as the limited literature

on the use of contact lenses in a chemical environment and the potential absorption and adsorption of chemicals by contact lenses. In addition, NIOSH has reviewed company policies on contact lens use and injuries involving contact lenses among a small number of chemical manufacturing firms. Some of these companies continue to restrict contact lens wear in their work settings, but others have relaxed their restrictions.

Experimental Studies

In general, injury data are lacking to clearly indicate that contact lens wear should be restricted during work with hazardous chemicals; however, appropriate eye protection is always necessary. Only limited research has been conducted on the hazards of wearing contact lenses when working with specific chemicals. Several laboratory studies have focused on absorption and adsorption of acids, bases, and other solvents by contact lenses [LaMotte et al. 1995; Hejkal et al. 1992; Nilsson and Andersson 1982]. In these experimental studies, various lens materials were exposed to chemicals for extended periods using either vials or animals. The results suggest that contact lens uptake and release of chemicals to eye tissue is not likely to be a significant issue

for workers wearing contact lenses. However, one similar laboratory in vitro study indicates that isopropyl and ethyl alcohol may pose risks to exposed workers wearing contact lenses [Cerulli et al. 1985].

In all of these studies, researchers examined the resistance of contact lenses to chemical exposures under test conditions. They did not examine actual chemical exposures in workers and did not examine the use of appropriate eye protection simultaneously with contact lens use.

Wearing contact lenses under some circumstances provides workers with a greater choice of eye and face protection (such as goggles or full-facepiece respirators without prescription inserts) as well as better visual acuity. However, the risk is unknown for contact lens wearers compared with nonwearers working with chemicals listed in the *NIOSH Pocket Guide to Chemical Hazards* [NIOSH 2004]. Currently, OSHA recommends against contact lens use when working with acrylonitrile, methylene chloride, 1,2 dibromo-3-chloropropane, ethylene oxide, and methylene dianiline. These recommendations are presumably based on best professional judgment, as no specific bases are provided in the preambles to these standards.

Recommendations

NIOSH recommends that workers be permitted to wear contact lenses when handling hazardous chemicals provided that the safety guidelines listed here are followed and that contact lenses are not banned by regulation or contraindicated by medical or industrial hygiene recommendations. However, contact lenses are not eye protective devices, and wearing them does not reduce the re-

quirement for eye and face protection. The following guidelines for contact lens use in a chemical environment will help occupational safety and health professionals and employers safely implement the contact lens use policy:

1. **Conduct an eye injury hazard evaluation in the workplace that includes an assessment of the following:**

- Chemical exposures (as required by OSHA's personal protective equipment standard [29 CFR* 1910.132])
- Contact lens wear
- Appropriate eye and face protection for contact lens wearers

The eye injury hazard evaluation should be conducted by a competent, qualified person such as a certified industrial hygienist, a certified safety professional, or a toxicologist.

Information from the hazard evaluation should be provided to the examining occupational health nurse or occupational medicine physician.

The chemical exposure assessment for all workers should include, at a minimum, an evaluation of the properties of the chemicals in use—including concentration, permissible exposure limits, known eye irritant/injury properties, form of chemical (powder, liquid, or vapor), and possible routes of exposure. The assessment for contact lens wearers should include a review of the available information about lens absorption and adsorption for the class of chemicals in use and an account of the injury experience for the employer or industry, if known.

*Code of Federal Regulations. See CFR in references

2. **Provide suitable eye and face protection for all workers exposed to eye injury hazards, regardless of contact lens wear.** Wearing contact lenses does not appear to require enhanced eye and face protection. For chemical vapor, liquid, or caustic dust hazards, the minimum protection consists of well-fitting nonvented or indirectly vented goggles or full-facepiece respirators. Close-fitting safety glasses with side protection provide limited chemical protection but do not prevent chemicals from bypassing the protection. Workers should wear face shields over other eye protection when needed for additional face protection; but they should not wear face shields instead of goggles or safety glasses—regardless of contact lens wear.
3. **Establish a written policy documenting general safety requirements for wearing contact lenses, including the eye and face protection required and any contact lens wear restrictions by work location or task.** In addition to providing the general training required by the OSHA personal protective equipment standard [29 CFR 1910.132], provide training in employer policies on contact lens use, chemical exposures that may affect contact lens wearers, and first aid for contact lens wearers with a chemical exposure.
4. **Comply with current OSHA regulations on contact lens wear and eye and face protection.**
5. **Notify workers and visitors about any defined areas where contact lenses are restricted.**
6. **Identify to supervisors all contact lens wearers working in chemical**

environments to ensure that the proper hazard assessment is completed and the proper eye protection and first aid equipment are available.

7. **Train medical and first aid personnel in the removal of contact lenses and have the appropriate equipment available.**
8. **In the event of a chemical exposure, begin eye irrigation immediately and remove contact lenses as soon as practical.** Do not delay irrigation while waiting for contact lens removal.
9. **Instruct workers who wear contact lenses to remove the lenses at the first signs of eye redness or irritation.** Contact lenses should be removed only in a clean environment after the workers have thoroughly washed their hands. Evaluate continued lens wear with the worker and the prescribing ophthalmologist or optometrist. Encourage workers to routinely inspect their contact lenses for damage and/or replace them regularly.
10. **Evaluate restrictions on contact lens wear on a case-by-case basis.** Take into account the visual requirements of individual workers wearing contact lenses as recommended by a qualified ophthalmologist or optometrist.

These recommendations are for work with chemical hazards. They do not address hazards from heat, radiation, or high-dust or high-particulate environments.

References

Cerulli L, Tria M, Bacaloni A, Palmieri N [1985]. Hydrophilic contact lenses and contamination in the work environment. *Bollettino di Oculistica* 64(1–2):299–305.

CFR. Code of Federal regulations. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

Hejkal TW, Records RE, Kubitschek C, Humphrey C [1992]. Diffusion of volatile organics through contact lenses. *CLAO J* 18(1):41–45.

LaMotte J, Smith G, Chang-Smith A [1995]. Absorption of ammonia by high water content hydrogel lenses: an inexpensive method of analysis. *Optometry Vis Sci* 72:605–607.

Nilsson EEG, Andersson L [1982]. The use of contact lenses in environments with organic solvents, acids, or alkalies. *Acta Ophthalmologica* 60:599–608.

NIOSH [1978]. The standards completion program draft technical standards analysis and decision logics. Cincinnati, OH: U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, NTIS No. PB–282 989.

NIOSH [2004]. NIOSH pocket guide to chemical hazards. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 97–140.



Notes



Notes



Notes

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226-1998



Delivering on the Nation's promise:
Safety and health at work for all people
through research and prevention

To receive NIOSH documents or more information
about occupational safety and health topics, contact
NIOSH at

1-800-35-NIOSH (1-800-356-4674)

Fax: (513) 533-8573

E-mail: pubstaff@cdc.gov

or visit the NIOSH Web site at www.cdc.gov/niosh

DHHS (NIOSH) Publication No. 2005-139

SAFER • HEALTHIER • PEOPLE™