

# **OCCUPATIONAL SAFETY AND HEALTH GUIDELINES FOR CHEMICAL HAZARDS**

Supplement IV-OHG

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health  
Cincinnati, Ohio

1995

## **DISCLAIMER**

Mention of the name of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health.

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

Copies of this and other NIOSH documents are available from

Publications Dissemination, EID  
National Institute for Occupational Safety and Health  
4676 Columbia Parkway  
Cincinnati, OH 45226

FAX number: (513) 533 8573

For information about other occupational safety and health problems, call  
1 800 35 NIOSH

**DHHS (NIOSH) Publication No. 95-121, Supplement IV-OHG**

## CONTENTS

### REVISED GUIDELINES

Benzidene  
tert-Butyl chromate  
Calcium oxide  
Camphor, synthetic  
Carbaryl

Chlorobenzene  
o-Chlorobenzylidene malononitrile  
Chloropicrin  
 $\beta$ -Chloroprene  
Decaborane  
Portland Cement

---

### NEW GUIDELINES

Calcium carbonate  
Calcium cyanamide  
Calcium hydroxide  
Calcium silicate  
Calcium sulfate  
Caprolactum dust  
Caprolactum vapor  
Captafol  
Captan  
Carbofuran  
Carbon tetrabromide  
  
Carbonyl fluoride  
Catechol  
Cellulose  
Cesium hydroxide  
Chloroacetyl chloride  
Chlorodifluoromethane  
Chloropentafluoroethane  
Chlorpyrifos  
o-Chlorostyrene  
2-Chloro-6-trichloromethyl pyridine  
o-Chlorotoluene  
Clopidol  
Cobalt carbonyl

Cobalt hydrocarbonyl  
Crufomate  
Cyanogen  
Cyanogen chloride  
Cyclohexylamine  
Cyclonite  
Cyclopentane  
Diazinon  
2-n-Dibutylaminoethanol  
Dichloroacetylene  
1,3-Dichloropropene  
2,2-Dichloropropionic acid  
Dicrotophos  
Dicyclopentadiene  
Dicyclopentadienyl iron  
Diethanolamine  
Diethylenetriamine  
Diethyl phthalate  
Dinitolmide  
Dipropyl ketone  
Disulfiram  
Diuron  
Endosulfan  
Ethion  
Ethylene glycol  
Ethylidene norbornene

## NOTE TO THE READER

**T**his document is the fourth in a series of supplements to the 1981 Publication *NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards* (Washington, DC: U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, DHHS [NIOSH] Publication No. 81-123). The three previous supplements are as follows:

1. *Occupational Safety and Health Guidelines for Chemical Hazards* (DHHS [NIOSH] Publication No. 88-118, Supplement I-OHG). This document contains 35 guidelines.
2. *Occupational Safety and Health Guidelines for Chemical Hazards* (DHHS [NIOSH] Publication No. 89-104, Supplement II-OHG). This document contains 30 guidelines.
3. *Occupational Safety and Health Guidelines for Chemical Hazards* (DHHS [NIOSH] Publication No. 92-110, Supplement III-OHG). This document contains 50 guidelines.

The 62 guidelines presented here in the fourth supplement include 11 revisions of previously issued guidelines and 51 new guidelines. Readers should replace the outdated guidelines in the original 1981 publication with the revised guidelines provided here.

The 62 occupational safety and health guidelines presented here are being published to disseminate technical information about chemical hazards to workers, employers, and occupational safety and health professionals. Each guideline includes (1) data on the chemical name and synonyms, chemical and physical properties, exposure limits, and signs and symptoms of exposure, and (2) recommendations for medical monitoring, personal protective equipment, and control procedures. These recommendations reflect good industrial hygiene and medical monitoring practices, and their implementation should help employers to achieve sound occupational health programs.

The recommendations and information in these guidelines may be superseded as new information becomes available; readers should therefore regard these recommendations as general guidelines and should not rely on them for achieving compliance with occupational safety and health regulations.

The original three-volume set of guidelines and the first three supplements to the original guidelines are available through the National Technical Information Service (NTIS) (5285 Port Royal Road, Springfield, VA 22161 [telephone: 703-487-4650]). The third supplement can also be ordered from the Superintendent of Documents (U.S. Government Printing Office, Washington, DC 20402-9325). The stock numbers for the U.S. Government Printing Office (GPO) and NTIS are as follows:

<i>Publication</i>	<i>GPO No.</i>	<i>NTIS No.</i>
Volumes I, II, III (DHHS [NIOSH] Publication No. 81-123)	—	PB 83-154609
Supplement I-OHG (DHHS [NIOSH] Publication No. 88-118)	—	PB 89-203129
Supplement II-OHG (DHHS [NIOSH] Publication No. 89-104)	—	PB 89-203137
Supplement III-OHG (DHHS [NIOSH] Publication No. 92-110)	017-033-00464-1	PB 93-183903

## BIBLIOGRAPHY

The references listed below were used in preparing the 62 guidelines printed in this supplement, but they were not cited in the text. References cited in the text are listed at the end of each guideline.

- 
- ACGIH [1991]. Documentation of the threshold limit values and biological exposure indices. 6th ed. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.
- ACGIH [1993]. 1993-1994 threshold limit values for chemical substances and physical agents and biological exposure indices. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.
- AIHA [1989]. Odor thresholds for chemicals with established occupational health standards. Akron, OH: American Industrial Hygiene Association.
- AIHA. Hygienic guide series. Fairfax, VA: American Industrial Hygiene Association.
- Amdur MO, Doull J, Klaassen CD, eds. [1991]. Caserett and Doull's toxicology: the basic science of poisoning. 4th ed. New York, NY: Pergamon Press, Inc.
- Amoore JE, Hautala E [1983]. Odor as an aid to chemical safety: odor thresholds compared with threshold limit values and volatilities for 214 industrial chemicals in air and water dilution. *J Appl Toxicol* 3(6): 272-290.
- Armour [1991]. Hazardous laboratory chemicals disposal guide. Boca Raton, FL: CRC Press, Inc.
- ATS [1987]. Standardization of spirometry—1987 update. American Thoracic Society. *Am Rev Respir Dis* 136: 1285-1296.
- Baselt RC [1980]. Biological monitoring methods for industrial chemicals. Davis, CA: Biomedical Publications.
- Braker W, Mossman AL [1980]. Matheson gas data book. 6th ed. Lyndhurst, NJ: Matheson Gas Products, Inc.
- Bretherick L [1985]. Handbook of reactive chemical hazards. Boston, MA: Butterworth.
- Budavari S, ed. [1989]. The Merck Index. 11th ed. Rahway, NJ: Merck & Co., Inc.
- CFR. Code of Federal regulations. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.
- Clayton GD, Clayton FE [1991]. Patty's industrial hygiene and toxicology. New York, NY: John Wiley & Sons, Inc.
- DOT [1993]. 1993 emergency response guidebook. Washington, DC: U.S. Department of Transportation, Office of Hazardous Materials Transportation, Research and Special Programs Administration.
- Forsberg K, Mansdorf SZ [1993]. Quick selection guide to chemical protective clothing. 2nd ed. New York, NY: Van Nostrand Reinhold.
- GPC [1981]. Material safety data sheets collection. Schenectady, NY: Genium Publishing Corporation.
- Gosselin RE, Smith RP, Hodge HC [1984]. Clinical toxicology of commercial products. 5th ed. Baltimore, MD: Williams & Wilkins.
- Government Institutes Staff, ed. [1993]. Book of lists for regulated hazardous substances. Rockville, MD: Government Institutes, Inc.
- Grant WM, Schuman JS [1993]. Toxicology of the eye. 4th ed. Springfield, IL: Charles C. Thomas.
- Grayson M [1985]. Kirk-Othmer concise encyclopedia of chemical technology. Abridged version, 3rd ed. New York, NY: John Wiley & Sons.
- Hathaway GJ, Proctor NH, Hughes JP, Fischman ML [1991]. Proctor and Hughes' chemical hazards of the workplace. 3rd ed. New York, NY: Van Nostrand Reinhold.
- Hayes WJ Jr. [1982]. Pesticides studied in man. Baltimore, MD: Williams & Wilkins.

- Hayes WJ Jr., Laws ER Jr., eds. [1991]. *Handbook of pesticide toxicology*. San Diego, CA: Academic Press, Inc.
- IARC [1972-1994]. *IARC monographs on the evaluation of carcinogenic risks of chemicals to humans (man)*. 61 Vols., 7 Suppl. Lyon, France: World Health Organization, International Agency for Research on Cancer.
- ITII [1986]. *Toxic and hazardous industrial chemicals safety manual; for handling and disposal with toxicity and hazard data*. Tokyo, Japan: The International Technical Information Institute.
- Johnson JS, Schwoppe AD, Goydan R, Herman DS [1991]. *Guidelines for the selection of chemical protective clothing*. 1991 update. Washington, DC: U.S. Department of Energy.
- Lewis RJ [1993]. *Hawley's condensed chemical dictionary*. 12th ed. New York, NY: Van Nostrand Reinhold.
- Lide DR, ed. [1994]. *CRC handbook of chemistry and physics*. 75th ed. Boca Raton, FL: CRC Press, Inc.
- Morgan DP [1989]. *Recognition and management of pesticide poisonings*. 4th ed. Washington, DC: U.S. Environmental Protection Agency, EPA-540/9-88-001.
- NFPA [1994]. *Fire protection guide on hazardous materials*. 11th ed. Quincy, MA: National Fire Protection Association.
- NIOSH [1987]. *NIOSH guide to industrial respiratory protection*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 87-116.
- NIOSH [1987]. *NIOSH respirator decision logic*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 87-108.
- NIOSH [1992]. *NIOSH recommendations for occupational safety and health: compendium of policy documents and statements*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 92-100.
- NIOSH [1994]. *NIOSH manual of analytical methods*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-113.
- NIOSH [1994]. *NIOSH pocket guide to chemical hazards*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-116.
- NIOSH. *Registry of toxic effects of chemical substances*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Standards Development and Technology Transfer, Technical Information Branch.
- NJDH. *Hazardous substances fact sheet*. Trenton, NJ: New Jersey Department of Health.
- NLM. *The hazardous substances data bank*. Bethesda, MD: National Library of Medicine.
- OSHA [1985]. *OSHA analytical methods manual*. Salt Lake City, UT: U.S. Department of Labor, Occupational Safety and Health Administration.
- OSHA [1987]. *Chemical information manual*. Washington, DC: U.S. Department of Labor, Occupational Safety and Health Administration.
- OSHA. *Computerized information system*. Washington, DC: U.S. Department of Labor, Occupational Safety and Health Administration.
- OSHA. *OSHA laboratory in-house methods file*. Salt Lake City, UT: U.S. Department of Labor, Occupational Safety and Health Administration, OSHA Analytical Laboratory.
- Parmeggiani L [1983]. *Encyclopedia of occupational health and safety*. 3rd rev. ed. Geneva, Switzerland: International Labour Organization.
- Patnaik P [1992]. *A comprehensive guide to the hazardous properties of chemical substances*. New York, NY: Van Nostrand Reinhold.
- Rom WN [1992]. *Environmental and occupational medicine*. 2nd ed. Boston, MA: Little, Brown and Company.

Sax NI, Lewis RJ [1989]. *Dangerous properties of industrial materials*. 7th ed. New York, NY: Van Nostrand Reinhold.

Schwoppe AD, Costas PP, Jackson JO, Stull JO, Weitzman DJ [1987]. *Guidelines for the selection of chemical protective clothing*. 3rd ed. U.S. Environmental Protection Agency.

Sheldon L [1986]. *Biological monitoring techniques for human exposure to industrial chemicals: analysis of human fat, skin, nails, hair, blood, urine, and breath*. Park Ridge, NJ: Noyes Publications.

Shepard TH [1992]. *Catalog of teratogenic agents*. 7th ed. Baltimore, MD: Johns Hopkins University Press.

Sittig M [1991]. *Handbook of toxic and hazardous chemicals*. 3rd ed. Park Ridge, NJ: Noyes Publications.

USCG. CHRIS (chemical hazards response information system) hazardous chemical data manual. Washington, DC: U.S. Department of Transportation, U.S. Coast Guard, Commandant Instruction M16456.12A.

