NIOSH/OSHA

Occupational Health Guidelines for Chemical Hazards

Editors
Frank W. Mackison
National Institute for Occupational Safety and Health
R. Scott Stricoff
Lawrence J. Partridge, Jr.
A. D. Little, Inc.

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

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

January 1981

DHHS (NIOSH) Publication No. 81-123

Abstract

Occupational Health Guidelines for Chemical Hazards summarizes information on permissible exposure limits, chemical and physical properties, and health hazards. It provides recommendations for medical surveillance, respiratory protection, and personal protection and sanitation practices for specific chemicals that have Federal occupational safety and health regulations. These recommendations reflect good industrial hygiene and medical surveillance practices, and their implementation will assist development and maintenance of an effective occupational health program.

Acknowledgements

These guidelines were prepared by Arthur D. Little, Inc. under NIOSH contract No. 210-76-0161 from data compiled, evaluated, and reviewed under the joint NIOSH/OSHA Standards Completion Program. Frank W. Mackison was the NIOSH Project Officer responsible for management and technical direction. R. Scott Stricoff was responsible for management and technical direction of the project for the contractor. NIOSH gratefully acknowledges the extensive effort performed by the many individuals who worked on the Standards Completion Program in assembling and evaluating the technical data contained in these guidelines. Thanks are also due to those who reviewed and commented on these guidelines during their development. Special recognition is due to David J. Brancato, who reviewed the drafts for NIOSH; to Scott Merkle and Nancy Hughes, who reviewed them for OSHA; to Ana M. Stricoff, editor for Arthur D. Little, Inc.; to Russell Hinton, NIOSH Printing Officer, and Richard Lutz, Printing Specialist, U.S. Public Health Service, for their advice and assistance in producing the document using the U.S. Government Printing Office photocomposition facilities.

TABLE OF CONTENTS

Α

Acetaldehyde

Acetic Acid

Acetic Anhydride

Acetone*

Acetonitrile

2-Acetylaminofluorene*

Acetylene Tetrabromide

Acrolein

Acrylamide

Acrylonitrile*

Aldrin*

Allyl Alcohol

Allyl Chloride

Allyl Glycidyl Ether*

4-Aminobiphenyl*

2-Aminopyridine

Ammonia

Ammonium Sulfamate

n-Amyl Acetate

sec-Amyl Acetate

Aniline

Anisidine, Ortho and Para Isomers

Antimony*

ANTU

Arsenic*, Inorganic

Arsine*

Asbestos*

Azinphos-Methyl

В

Barium, Soluble Compounds

Benzene*

Benzidine

Benzoyl Peroxide

Benzyl Chloride*

Beryillium*

Boron Oxide

Boron Trifluoride

Bromine

Bromoform

Butadiene

2-Butanone*

2-Butoxy Ethanol

Butyl Acetate

sec-Butyl Acetate

tert-Butyl Acetate

Butyl Alcohol

sec-Butyl Alcohol

tert-Butyl Alcohol

^{*}Guidelines for these subjects are not included in this edition.

B (Continued)

Butyl Cellusolve tert-Butyl Chromate as CrO3 n-Butyl Glycidyl Ether* Butyl Mercaptan* Butylamine p-tert-Butyltoluene

C

Cadmium Dust

Cadmium Fume

Calcium Arsenate*

Calcium Oxide

Camphor

Carbaryl (Sevin)®

Carbon Black*

Carbon Dioxide

Carbon Disulfide

Carbon Monoxide

Carbon Tetrachloride

Chlordane

Chlorinated Camphene

Chlorinated Diphenyl Oxide

Chlorine

Chlorine Dioxide

Chlorine Trifluoride

Chloroacetaldehyde

alpha-Chloroacetophenone

Chlorobenzene

o-Chlorobenzylidene Malononitrile

Chlorobromomethane

Chlorodiphenyl, 42% Chlorine

Chlorodiphenyl, 54% Chlorine

Chloroform

bis-Chloromethyl ether*

1-Chloro-I-Nitropropane

Chloropicrin

Chloroprene

Chromic Acid and Chromates

Chromium, Metal and Insoluble Salts

Chromium, Soluble Chromic and Chromous Salts as Cr

Coal Tar Pitch Volatiles

Cobalt, Metal Fume and Dust

Copper Dusts and Mists

Copper Fume

Cotton Dust, Raw*

Crag Herbicide® (Sesone)

Cresol, all Isomers*

C (Continued)

Crotonaldehyde

Cumene

Cyanide as CN

Cyclohexane

Cyclohexanol

Cyclohexanone*

Cyclohexene

Cyclopentadiene

D

2.4-D

DDT*

Decaborane

Demeton® (Systox)

Diacetone Alcohol*

Diazomethane

Diborane

Dibromochloropropane*

Dibutyl Phosphate

Dibutylphthalate

o-Dichlorobenzene

p-Dichlorobenzene

3,3-Dichlorobenzidine*

1,3-Dichloro-5,5-Dimethylhydantoin

1,1-Dichloro-1-Nitroethane

Dichlorodifluoromethane

1,1-Dichloroethane

Dichloroethyl Ether

1,2-Dichloroethylene

Dichloromonofluoromethane

Dichlorotetrafluoroethane

Dichlorvos

Dieldrin*

Diethylamine

Diethylamino Ethanol

Difluorodibromomethane

Diglycidyl Ether*

Diisobutyl Ketone*

Diisopropylamine

Dimethyl Acetamide

4-Dimethylaminoazobenzene*

Dimethyl Formamide

Dimethyl-1,2-Dibromo-2-2-Dichloroethyl Phosphate

Dimethylamine

Dimethylaniline

1,1-Dimethylhydrazine*

Dimethylphthalate

Dimethylsulfate

D (Continued) Dinitrobenzene, all Isomers Dinitro-o-Cresol* Dinitrotoluene Dioxane Diphenyl Dipropylene Glycol Methyl Ether Ε Endrin Epichlorohydrin **EPN** Ethanolamine 2-Ethoxyethanol 2-Ethoxyethylacetate Ethyl Acetate **Ethyl Acrylate** Ethyl Benzene **Ethyl Bromide** Ethyl Butyl Ketone **Ethyl Chloride** Ethyl Ether Ethyl Formate Ethyl Mercaptan* **Ethyl Silicate** Ethylamine Ethylene Chlorohydrin Ethylene Dibromide Ethylene Dichloride* Ethylene Glycol Dinitrate and/or Nitroglycerin* Ethyleneimine* Ethylene Oxide* Ethylenediamine n-Ethylmorpholine F Ferbam Ferrovanadium Dust Fluoride Dust (as F) Fluorine Fluorotrichloromethane Formaldehyde* Formic Acid **Furfural** Furfuryl Alcohol*

G

Glycidol

Graphite, Natural

```
н
     Hafnium
     Heptachlor
     Heptane
     Hexachloroethane
     Hexachloronaphthalene
     Hexane
     2-Hexanone*
     Hexone*
     sec-Hexyl Acetate
     Hydrazine*
     Hydrogen Bromide
     Hydrogen Chloride
     Hydrogen Cyanide
     Hydrogen Fluoride
     Hydrogen Peroxide, 90%
     Hydrogen Selenide
     Hydrogen Sulfide
     Hydroquinone*
ı
     lodine
     Iron Oxide Fume
     Isoamyl Acetate
     Isoamyi Alcohol
     Isobutyl Acetate
     Isobutyl Alcohol
     Isophorone*
     Isopropyl Acetate
     Isopropyl Alcohol
     Isopropyl Glycidyl Ether*
     Isopropylamine
     Isopropylether
J
K
     Ketene
L
     Lead and Inorganic Lead Compounds*
     Lead Arsenate*
     Lindane
     Lithium Hydride
     LPG (Liquefied Petroleum Gas)
```

M

Magnesium Oxide Fume

Malathion

Maleic Anhydride

Manganese

Mercury

Mesityl Oxide*

Methoxychlor

o-Methylcyclohexanone

Methyl (n-Amyl) Ketone*

5-Methyl-3-Heptanone

Methyl Acetate

Methyl Acetylene

Methyl Acetylene-Propadiene Mixture

Methyl Acrylate

Methyl Alcohol

Methyl Bromide

Methyl Cellosolve

Methyl Cellosolve Acetate

Methyl Chloride

Methyl Chloroform

Methylchloromethyl Ether*

Methyl Formate

Methyl lodide

Methyl Isobutyl Carbinol

Methyl Isocyanate

Methyl Mercaptan*

Methyl Methacrylate

alpha-Methyl Styrene

Methylal

Methylamine

Methylcyclohexane

Methylcyclohexanol

Methylene Bisphenyl Isocyanate (MDI)

Methylene Chloride

Mica

Molybdenum: Insoluble Compounds

Molybdenum: Soluble Compounds

Monomethyl Aniline

Monomethyl Hydrazine*

Morpholine

N

Naphthalene

Naphtha, Coal Tar

alpha-Naphthylamine*

beta-Naphthylamine*

Nickel Carbonyl

Nickel, Metal and Soluble Compounds as Ni

N (Continued)

Nicotine

Nitric Acid

Nitric Oxide

p-Nitroaniline

Nitrobenzene

p-Nitrochlorobenzene

Nitroethane

Nitrogen Dioxide

Nitrogen Trifluoride

Nitromethane

1-Nitropropane

2-Nitropropane*

n-Nitrosodimethylamine*

Nitrotoluene

0

Octachloronaphthalene

Octane

di-sec-Octyl Phthalate*

Oil Mist, Mineral

Organo (Alkyl) Mercury

Osmium Tetroxide

Oxalic Acid

Oxygen Difluoride

Ozone

P

Paraquat

Parathion

Pentaborane

Pentachloronaphthalene

Pentachlorophenol

Pentane

2-Pentanone*

Perchloromethyl Mercaptan

Perchloryl Fluoride

Petroleum Distillates

Phenol

Phenyl Ether

Phenyl Ether-Biphenyl Vapor Mixture

Phenyl Glycidyl Ether*

p-Phenylene Diamine

Phenythydrazine*

Phosdrin

Phosgene

Phosphine

Phosphoric Acid

Phosphorus Pentachloride

Phosphorus Pentasulfide

P (Continued)

Phosphorus Trichloride

Phosphorus, Yellow

Phthalic Anhydride

Picric Acid

Pival®

Platinum, Soluble Salts as Pt

Portland Cement

Propane

beta-Propiolacetone*

n-Propyl Acetate

Propyl Alcohol

n-Propyl Nitrate

Propylene Dichloride

Propylene Imine

Propylene Oxide

Pyrethrum

Pyridine

Q

Quinone

R

Rhodium, Metal Fume and Dusts as Rh

Rhodium, Soluble Salts

Ronnel

Rotenone

S

Selenium Compounds as Se

Selenium Hexafluoride

Silica, Amorphous including Natural Diatomaceous Earth

Silica, Crystalline (Quartz)

Silver, Metal and Soluble Compounds

Soapstone

Sodium Fluoroacetate

Sodium Hydroxide

Stibine

Stoddard Solvent

Strychnine

Styrene

Sulfur Dioxide

Sulfur Monochloride

Sulfur Pentafluoride

Sulfuric Acid

Sulfuryl Fluoride

T

2,4,5-T

Talc, Non-asbestos Form

Tantalum

TEDP

Tellurium

Tellurium Hexafluoride

TEPP

Terphenyls

1,1,2,2-Tetrachloro-1,2-Difluoroethane

1,1,1,2-Tetrachloro-2,2-Difluoroethane

1,1,2,2-Tetrachloroethane

Tetrachloroethylene

Tetrachloronaphthalene

Tetraethyl Lead as Pb

Tetrahydrofuran

Tetramethyl Lead as Pb

Tetramethyl Succinonitrile*

Tetranitromethane

Tetrvi

Thallium, Soluble Compounds

Thiram®

Tin, Inorganic Compounds

Tin, Organic Compounds

Titanium Dioxide

Toluene

Toluene-2,4-Diisocyanate*

o-Toluidine

Tributyl Phosphate

1,1,2-Trichloroethane

Trichloroethylene*

Trichloronaphthalene

1,2,3-Trichloropropane

1,1,2-Trichloro-1,2,2-Trifluoroethane

Triethylamine

Trifluoromonobromomethane

Trinitrotoluene

Triorthocresyl Phosphate

Triphenyl Phosphate

Turpentine

U

Uranium, Insoluble Compounds Uranium, Soluble Compounds

ν

Vanadium, Pentoxide Dust Vanadium, Pentoxide Fume Vinyl Chloride* Vinyl Toluene

W

Warfarin

X

Xylene Xylidine

Y

Yttrium

Z

Zinc Chloride Fume Zinc Oxide Fume Zirconium Compounds as Zr

