Hazardous Chemicals Desk Reference

Sixth Edition

Richard J. Lewis, Sr.

A JOHN WILEY & SONS, INC., PUBLICATION

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Dedicated to Grace Ross Lewis.
Her effort and advice made this edition possible.

Welcome to Ava Grace Herrmann,
the latest addition to the new generation to carry the torch.

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Preface

This sixth edition of the *Hazardous Chemicals Desk Reference* again fills the need for a reference work of moderate size that serves the information needs of those who work with hazardous chemicals.

Over 5,800 entries are included. Over 500 new entries were added. Some entries present in previous editions were removed to make room for more relevant substances and maintain the book at a reasonable size. Two-thirds of the entries have been revised for this edition. Most of the new entries were selected because they are on the EPA TSCA Inventory. These are reported to be used in commerce in the United States. Emphasis was placed on adding and updating physical properties and updating all DOT Classifications.

The information was extracted from *Dangerous Properties of Industrial Materials, Eleventh Edition.* Citation to toxicity data and other less relevant information will be found in the above cited work. When cross-references to entries are not found in this book, they can be found in *Dangerous Properties of Industrial Materials, Eleventh Edition.*

Numerous synonyms have been added to assist in locating the many materials that are known under a variety of systematic and common names. The synonym cross-index contains the entry name as well as each synonym. This index should be consulted first to locate a material by name. Synonyms are given in English and also in other major languages such as French, German, Dutch, Polish, Japanese, and Italian.

Many additional physical and chemical properties have been added. Whenever available, physical descriptions, formulas, molecular weights, melting points, boiling points, explosion limits, flash points, densities, autoignition temperatures, and the like have been supplied.

A court order has vacated the OSHA Air Standards set in 1989 and contained in 29CFR 1910.1000. OSHA has decided to enforce only pre-1989 air standards. We have elected to include both the Transitional Limits that went into effect on December 31, 1992, and the Final Rule limits that went into effect September 1, 1989. These represent the current best judgment as to appropriate workplace air levels. While they may not be enforceable by OSHA, they are better guides than the OSHA Air Standards adopted in 1969.

The following classes of data are new or have been updated for all entries for which they apply.

1. ACGIH TLVs and BEIs reflect the latest recommendations and now include intended changes.
2. German MAK and BAT reflect the latest recommendations.
3. NTP 10th Annual Report On Carcinogens entries are identified.
4. DOT classifications were updated reflecting the HM-181 rule making.
5. CAS Registry numbers are provided for additional entries.

Each entry concludes with a safety profile, a textual summary of the hazards presented by the entry. The discussion of human exposures includes target organs and specific effects reported. Fire and explosion hazards are briefly summarized in terms of conditions of flammable or reactive hazard. Where feasible, fire-fighting materials and methods are discussed. Materials which are known to be incompatible with an entry are listed here.

Also included in the safety profile are comments on disaster hazards which serve to alert users of materials to the dangers that may be encountered on entering storage premises during a fire or other emergency. Although the presence of water, steam, acid fumes, or powerful vibrations can cause the decomposition of many materials into dangerous compounds, of particular concern are high temperatures (such as those resulting from a fire) since these can cause many otherwise mild chemicals to emit highly toxic gases or vapors such as NO_x, SO_x, acids, and so forth, or evolve vapors of antimony, arsenic, mercury, and the like.

Three cross-indices are provided as Appendices to permit rapid location of a material if either a Chemical Abstract Service (CAS) number, a synonym, or DOT Guide Number for the material is the point of entry.

Every effort has been made to include the most current and complete information. The author welcomes comments or corrections to the data presented.

Richard J. Lewis, Sr.

Acknowledgments

I extend thanks to Bob Esposito for his encouragement. My thanks to Melissa Yanuzzi for her expert professional advice and assistance in converting the manuscript to this volume.

Introduction

The list of potentially hazardous materials includes drugs, food additives, preservatives, ores, pesticides, dyes, detergents, lubricants, soaps, plastics, extracts from plant and animal sources, plants and animals that are toxic by contact or consumption, and industrial intermediates and waste products from production processes. Some of the information refers to materials of undefined composition. The chemicals included are assumed to exhibit the reported toxic effect in their pure state unless otherwise noted. However, even in the case of a supposedly "pure" chemical, there is usually some degree of uncertainty as to its exact composition and the impurities that may be present. This possibility must be considered in attempting to interpret the data presented because the toxic effects observed could in some cases be caused by a contaminant. Some radioactive materials are included but the effect reported is the chemically produced effect rather than the radiation effect.

For each entry the following data are provided when available: the DPIM code, hazard rating, entry name, CAS number, DOT number, molecular formula, molecular weight, line structural formula, a description of the material and physical properties, and synonyms. Following this are listed the toxicity data with references for reports of primary skin and eye irritation, mutation, reproductive, carcinogenic, and acute toxic dose data. The Consensus Reports section contains, where available, NTP 8th Annual Report on Carcinogens notation, IARC reviews, NTP Carcinogenesis Testing Program results, EPA Extremely Hazardous Substances List, the EPA Genetic Toxicology Program, and the Community Right-To-Know List. We also indicate the presence of the material in the update of the EPA TSCA inventory of chemicals in use in the United States. The next grouping consists of the U.S. Occupational Safety and Health Administration's (OSHA) permissible exposure levels, the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLVs), German Research Society's (MAK) values, National Institute for Occupational Safety and Health (NIOSH) recommended exposure levels, and U.S. Department of Transportation (DOT) classifications. Each entry concludes with a Safety Profile that discusses the toxic and other hazards of the entry. The Safety Profile concludes with the OSHA and NIOSH occupational analytical method, referenced by method name or number.

1. *DPIM Entry Code* identifies each entry by a unique code consisting of three letters and three numbers, for example, AAA123. The first letter of the entry code indicates the alphabetical position of the entry. Codes beginning with "A" are assigned to entries indexed with the A's. Each listing in the cross-indexes is referenced to its appropriate entry by the DPIM entry code.

2. *Entry Name* is the name of each material, selected, where possible, to be a commonly used designation.

3. *Hazard Rating* (**HR:**) is assigned to each material in the form of a number (1, 2, or 3) that briefly identifies the level of the toxicity or hazard. The letter "D" is used where the data available are insufficient to indicate a relative rating. In most cases a "D" rating is assigned when only in-vitro mutagenic or experimental reproductive data are available. Ratings are assigned on the basis of low (1), medium (2), or high (3) toxic, fire, explosive, or reactivity hazard.

The number "3" indicates an LD50 below 400 mg/kg or an LC50 below 100 ppm; or that the material is explosive, highly flammable, or highly reactive.

The number "2" indicates an LD50 of 400−4,000 mg/kg or an LC50 of 100−500 ppm; or that the material is flammable or reactive.

The number "1" indicates an LD50 of 4000−40,000 mg/kg or an LC50 of 500−5000 ppm; or that the material is combustible or has some reactivity hazard.

4. *Chemical Abstracts Service Registry Number* (*CAS:*) is a numeric designation assigned by the American Chemical Society's Chemical Abstracts Service and uniquely identifies a specific chemical compound. This entry allows one to conclusively identify a material regardless of the name or naming system used.

5. *DOT:* indicates a four-digit hazard code assigned by the U.S. Department of Transportation. This code is recognized internationally and is in agreement with the United Nations coding system. The code is used on transport documents, labels, and placards. It is also used to determine the regulations for shipping the material.

6. *Molecular Formula* (*mf:*) or *atomic formula* (*af:*) designates the elemental composition of the material and is structured according to the Hill System (see *Journal of the American Chemical Society*, 22(8): 478−494, 1900), in which carbon and hydrogen (if present) are listed first, followed by the other elemental symbols in alphabetical order. The formulas for compounds that do not contain carbon are ordered strictly alphabetically by element symbol. Compounds such as salts or those containing waters of hydration have molecular formulas incorporating the CAS dot-disconnect convention. In this convention, the components are listed individually and separated by a period. The individual components of the formula are given in order of decreasing carbon atom count, and the component ratios given. A lowercase "x" indicates that the ratio is unknown. A lower case "n" indicates a repeating, polymer-like structure. The formula is obtained from one of the cited references or a chemical reference text, or derived from the name of the material.

7. *Molecular Weight* (*mw:*) or *atomic weight* (*aw:*) is calculated from the molecular formula, using standard elemental molecular weights (carbon = 12.01).

8. *Structural Formula* is a line formula indicating the structure of a given material.

9. *Properties* (*PROP:*) are selected to be useful in evaluating the hazard of a material and designing its proper storage and use procedures. A definition of the material is included where necessary. The physical description of the material may refer to the form, color, and odor to aid in positive identification. When available, the boiling point, melting point, density, vapor pressure, vapor density, and refractive index are given. The flash point, autoignition temperature, and lower and upper explosive limits are included to aid in fire protection and control. An indication is given of the solubility or miscibility of the material in water and common solvents. Unless otherwise indicated, temperature is given in Celsius, pressure in millimeters of mercury. Levels identified as "IDLH:" indicate concentrations that meet the definition of "immediately dangerous to life or health concentrations" (IDLHs). These are defined according to the NIOSH Respirator Decision Logic (DHHS [NIOSH] Publication No. 87-108, NTIS Publication No. PB-91-151183). It is a situation "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or

immediate or delayed permanent adverse health effects or prevent escape from such an environment."

10. *Synonyms* for the entry name are listed alphabetically. Synonyms include other chemical names, common or generic names, foreign names (with the language in parentheses), or codes. Some synonyms consist in whole or in part of registered trademarks. These trademarks are not identified as such. The reader is cautioned that some synonyms, particularly common names, may be ambiguous and refer to more than one material.

11. *Consensus Reports* lines supply additional information to enable the reader to make knowledgeable evaluations of potential chemical hazards. Two types of reviews are listed: (a) International Agency for Research on Cancer (IARC) monograph reviews, which are published by the United Nations World Health Organization (WHO); and (b) the National Toxicology Program (NTP).

a. Cancer Reviews. In the U.N. International Agency for Research on Cancer (IARC) monographs, information on suspected environmental carcinogens is examined, and summaries of available data with appropriate references are presented. Included in these reviews are synonyms, physical and chemical properties, uses and occurrence, and biological data relevant to the evaluation of carcinogenic risk to humans. The monographs in the series contain an evaluation of over 1200 materials.

The format of the IARC data line is as follows. The entry "IARC Cancer Review:" indicates that the carcinogenicity data pertaining to a compound have been reviewed by the IARC committee. The committee's conclusions are summarized in three words. The first word indicates whether the data pertain to humans or to animals. The next two words indicate the degree of carcinogenic risk as defined by IARC.

For experimental animals the evidence of carcinogenicity is assessed by IARC and judged to fall into one of four groups defined as follows:

(1) Sufficient Evidence of carcinogenicity is provided when there is an increased incidence of malignant tumors: (a) in multiple species or strains; (b) in multiple experiments (preferably with different routes of administration or using different dose levels); or (c) to an unusual degree with regard to the incidence, site, or type of tumor, or age at onset. Additional evidence may be provided by data on dose-response effects.

(2) Limited Evidence of carcinogenicity is available when the data suggest a carcinogenic effect but are limited because: (a) the studies involve a single species, strain, or experiment; (b) the experiments are restricted by inadequate dosage levels, inadequate duration of exposure to the agent, inadequate period of follow-up, poor survival, the use of too few animals, or inadequate reporting; or (c) the neoplasms produced often occur spontaneously and, in the past, have been difficult to classify as malignant by histological criteria alone (for example, lung adenomas and adenocarcinomas, and liver tumors in certain strains of mice).

(3) Inadequate Evidence is available when, because of major qualitative or quantitative limitations, the studies cannot be interpreted as showing either the presence or absence of a carcinogenic effect.

(4) No Evidence applies when several adequate studies are available that show that within the limitations of the tests used, the chemical is not carcinogenic.

It should be noted that the categories *Sufficient Evidence* and *Limited Evidence* refer only to the strength of the experimental evidence that these chemicals are carcinogenic and not to the extent of their carcinogenic activity nor to the mechanism involved. The classification of any chemical may change as new information becomes available.

The evidence for carcinogenicity from studies in humans is assessed by the IARC committees and judged to fall into one of four groups defined as follows:

(1) Sufficient Evidence of carcinogenicity indicates that there is a causal relationship between the exposure and human cancer.

(2) Limited Evidence of carcinogenicity indicates that a causal relationship is credible, but that alternative explanations, such as chance, bias, or confounding, could not adequately be excluded.

(3) Inadequate Evidence, which applies to both positive and negative evidence, indicates that one of two conditions prevailed: (a) there are few pertinent data; or (b) the available studies, while showing evidence of association, do not exclude chance, bias, or confounding.

(4) No Evidence applies when several adequate studies are available that do not show evidence of carcinogenicity.

This cancer review reflects only the conclusion of the IARC committee based on the data available for the committee's evaluation. Hence, for some substances there may be a disparity between the IARC determination and the information on the tumorigenic data lines (see paragraph 15). Also, some substances previously reviewed by IARC may be reexamined as additional data become available. These substances will contain multiple IARC review lines, each of which is referenced to the applicable IARC monograph volume.

An IARC entry indicates that some carcinogenicity data pertaining to a compound have been reviewed by the IARC committee. It indicates whether the data pertain to humans or to animals and whether the results of the determination are positive, suspected, indefinite, or negative, or whether there are no data.

This cancer review reflects only the conclusion of the IARC committee, based on the data available at the time of the committee's evaluation. Hence, for some materials there may be disagreement between the IARC determination and the tumorigenicity information in the toxicity data lines.

b. NTP Status. The notation "NTP 10th Annual Report on Carcinogens" indicated that the entry is listed on the report made to the U.S. Congress by the National Toxicology Program (NTP) as required by law. This listing implies that the entry is assumed to be a human carcinogen.

Another NTP notation indicates that the material has been tested by the NTP under its Carcinogenesis Testing Program. These entries are also identified as National Cancer Institute (NCI), which reported the studies before the NCI Carcinogenesis Testing Program was absorbed by NTP. To obtain additional information about NTP, the Carcinogenesis Testing Program, or the status of a particular material under test, contact the Toxicology Information and Scientific Evaluation Group, NTP/TRTP/NIEHS, Mail Drop 18-01, P.O. Box 12233, Research Triangle Park, NC 27709.

c. EPA Extremely Hazardous Substances List. This list was developed by the U.S. Environmental Protection Agency (EPA) as required by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Title III, Section 304 requires notification by facilities of a release of certain extremely hazardous substances. These 402 substances were listed by the EPA in the *Federal Register* of November 17, 1986.

d. Community Right-To-Know List. This list was developed by the EPA as required by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Title III, Sections 311–312 require manufacturing facilities to prepare Material Safety Data Sheets and notify local authorities of the presence of listed chemicals. Both specific chemicals and classes of chemicals are covered by these sections.

e. EPA Genetic Toxicology Program (GENE-TOX). This status line indicates that the material has had genetic effects reported in the literature during the period 1969–1979. The test protocol in the literature is evaluated by an EPA expert panel on mutations, and the positive or negative genetic effect of the substance is reported. To obtain additional information

about this program, contact GENE-TOX Program, USEPA, 401 M Street, SW, TS796, Washington, DC 20460, telephone (202) 260-1513.

f. EPA TSCA Status Line. This line indicates that the material appears on the chemical inventory prepared by the Environmental Protection Agency in accordance with provisions of the Toxic Substances Control Act (TSCA). Materials reported in the inventory include those that are produced commercially in or are imported into this country. The reader should note, however, that materials already regulated by the EPA under FIFRA and by the Food and Drug Administration under the Food, Drug, and Cosmetic Act, as amended, are not included in the TSCA inventory. Similarly, alcohol, tobacco, and explosive materials are not regulated under TSCA. TSCA regulations should be consulted for an exact definition of reporting requirements. For additional information about TSCA, contact EPA, Office of Toxic Substances, Washington, DC 20402. Specific questions about the inventory can be directed to the EPA Office of Industry Assistance, telephone (800) 424-9065.

18. *Standards and Recommendations* section contains regulations by agencies of the U.S. government or recommendations by expert groups. "OSHA" refers to standards promulgated under Section 6 of the Occupational Safety and Health Act of 1970. "DOT" refers to materials regulated for shipment by the Department of Transportation. Because of frequent changes to and litigation of federal regulations, it is recommended that the reader contact the applicable agency for information about the current standards for a particular material. Omission of a material or regulatory notation from this edition does not imply any relief from regulatory responsibility.

a. OSHA Air Contaminant Standards. The values given are for the revised standards that were published in January 13, 1989 and were scheduled to take effect from September 1, 1989 through December 31, 1992. These are noted with the entry "OSHA PEL:" followed by "TWA" or "CL," meaning either time-weighted average or ceiling value, respectively, to which workers can be exposed for a normal 8-hour day, 40-hour work week without ill effects. For some materials, TWA, CL, and Pk (peak) values are given in the standard. In those cases, all three are listed. Finally, some entries may be followed by the designation "(skin)." This designation indicates that the compound may be absorbed by the skin and that, even though the air concentration may be below the standard, significant additional exposure through the skin may be possible.

b. ACGIH Threshold Limit Values. The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values are noted with the entry "ACGIH TLV:" followed by "TWA" or "CL," meaning either time-weighted average or ceiling value, respectively, to which workers can be exposed for a normal 8-hour day, 40-hour work week without ill effects. The notation "CL" indicates a ceiling limit that must not be exceeded. The notation "skin" indicates that the material penetrates intact skin, and skin contact should be avoided even though the TLV concentration is not exceeded. STEL indicates a short-term exposure limit, usually a 15-minute time-weighted average, which should not be exceeded. Biological Exposure Indices (*BEI:*) are, according to the ACGIH, set to provide a warning level ". . .of biological response to the chemical, or warning levels of that chemical or its metabolic product(s) in tissues, fluids, or exhaled air of exposed workers. . . ."

The latest annual TLV list is contained in the publication *Threshold Limit Values and Biological Exposure Indices.* This publication should be consulted for future trends in recommendations. The ACGIH TLVs are adopted in whole or in part by many countries and local administrative agencies throughout the world. As a result, these recommendations have a major effect on the control of workplace contaminant concentrations. The ACGIH may be contacted for additional information at Kemper Woods Center, 1330 Kemper Meadow Drive, Cincinnati, OH 45240.

c. DFG MAK. These lines contain the German Research Society's Maximum Allowable Concentration values. Those materials that are classified as to workplace hazard potential by the German Research Society are noted on this line. The MAK values are also revised annually and discussions of materials under consideration for MAK assignment are included in the annual publication together with the current values. *BAT:* indicates Biological Tolerance Value for a Working Material which is defined as, ". . .the maximum permissible quantity of a chemical compound, its metabolites, or any deviation from the norm of biological parameters induced by these substances in exposed humans." *TRK:* values are Technical Guiding Concentrations for workplace control of carcinogens. For additional information, write to Deutsche Forschungsgemeinschaft (German Research Society), Kennedyallee 40, D-5300 Bonn 2, Federal Republic of Germany. The publication *Maximum Concentrations at the Workplace and Biological Tolerance Values for Working Materials Report No. 34* can be obtained from VCH Publishers, Inc., 303 N.W. 12th Ave, Deerfield Beach, FL 33442-1788 or Verlag Chemie GmbH, Buchauslieferung, P.O. Box 1260/1280, D-6940 Weinheim, Federal Republic of Germany.

d. NIOSH REL. This line indicates that a NIOSH criteria document recommending a certain occupational exposure has been published for this compound or for a class of compounds to which this material belongs. These documents contain extensive data, analysis, and references. The more recent publications can be obtained from the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, 4676 Columbia Pkwy., Cincinnati, OH 45226.

e. DOT Classification. This is the hazard classification according to the U.S. Department of Transportation (DOT) or the International Maritime Organization (IMO). This classification gives an indication of the hazards expected in transportation, and serves as a guide to the development of proper labels, placards, and shipping instructions. The basic hazard classes include compressed gases, flammables, oxidizers, corrosives, explosives, radioactive materials, and poisons. Although a material may be designated by only one hazard class, additional hazards may be indicated by adding labels or by using other means as directed by DOT. Many materials are regulated under general headings such as "pesticides" or "combustible liquids" as defined in the regulations. These are not noted here, as their specific concentration or properties must be known for proper classification. Special regulations may govern shipment by air. This information should serve *only as a guide*, because the regulation of transported materials is carefully controlled in most countries by federal and local agencies. Because there are frequent changes to regulations, it is recommended that the reader contact the applicable agency for information about the current standards for a particular material. United States transportation regulations are found in 40 CFR, Parts 100 to 189. Contact the U.S. Department of Transportation, Materials Transportation Bureau, Washington, DC 20590.

12. *Safety Profiles* are text summaries of the reported hazards of the entry. The word "experimental" indicates that the reported effects resulted from a controlled exposure of laboratory animals to the substance. Toxic effects reported include carcinogenic, reproductive, acute lethal, and human nonlethal effects, skin and eye irritation, and positive mutation study results.

Human effects are identified either by *human* or more specifically by *man*, *woman*, *child*, or *infant*. Specific symptoms or organ systems effects are reported when available.

Carcinogenicity potential is denoted by the words "confirmed," "suspected," or "questionable." The substance entries are grouped into three classes based on experimental evidence and the opinion of expert review groups. The OSHA, IARC, ACGIH, and DFG MAK decision schedules are not related or synchronized. Thus, an entry may have had a

recent review by only one group. The most stringent classification of any regulation or expert group is taken as governing.

Class I--Confirmed Carcinogens

These substances are capable of causing cancer in exposed humans. An entry was assigned to this class if it had one or more of the following data items present:

a. an OSHA regulated carcinogen
b. an ACGIH assignment as a human or animal carcinogen
c. a DFG MAK assignment as a confirmed human or animal carcinogen
d. an IARC assignment of human or animal sufficient evidence of carcinogenicity, or higher
e. NTP 10th Annual Report on Carcinogens

Class II--Suspected Carcinogens

These substances may be capable of causing cancer in exposed humans. The evidence is suggestive, but not sufficient to convince expert review committees. Some entries have not yet had expert review, but contain experimental reports of carcinogenic activity. In particular, an entry is included if it has positive reports of carcinogenic endpoint in two species. As more studies are published, many Class II carcinogens will have their carcinogenicity confirmed. On the other hand, some will be judged noncarcinogenic in the future. An entry was assigned to this class if it had one or more of the following data items present:

a. an ACGIH assignment of suspected carcinogen
b. a DFG MAK assignment of suspected carcinogen
c. an IARC assignment of human or animal limited evidence
d. two animal studies reporting positive carcinogenic endpoint in different species

Class III--Questionable Carcinogens

For these entries there is minimal published evidence of possible carcinogenic activity. The reported endpoint is often neoplastic growth with no spread or invasion characteristic of carcinogenic pathology. An even weaker endpoint is that of equivocal tumorigenic agent (ETA). Reports are assigned this designation when the study was defective. The study may have lacked control animals, may have used a very small sample size, often may lack complete pathology reporting, or may suffer many other study design defects. Many of these studies were designed for other than carcinogenic evaluation, and the reported carcinogenic effect is a by-product of the study, not the goal. The data are presented because some of the substances studied may be carcinogens. There are insufficient data to affirm or deny the possibility. An entry was assigned to this class if it had one or more of the following data items present:

a. an IARC assignment of inadequate or no evidence
b. a single human report of carcinogenicity
c. a single experimental carcinogenic report, or duplicate reports in the same species
d. one or more experimental neoplastic or equivocal tumorigenic agent reports

Fire and explosion hazards are briefly summarized in terms of conditions of flammable or reactive hazard. Materials that are incompatible with the entry are listed here. Fire and explosion hazards are briefly summarized in terms of conditions of flammable or reactive hazard. Fire-fighting materials and methods are discussed where feasible. A material with a flash point of 100°F or less is considered dangerous; if the flash point is from 100 to 200°F, the flammability is considered moderate; if it is above 200°F, the flammability is considered low (the material is considered combustible).

Also included in the safety profile are disaster hazards comments, which serve to alert users of materials, safety professionals, researchers, supervisors, and firefighters to the

dangers that may be encountered on entering storage premises during a fire or other emergency. Although the presence of water, steam, acid fumes, or powerful vibrations can cause many materials to decompose into dangerous compounds, we are particularly concerned with high temperatures (such as those resulting from a fire) because these can cause many otherwise inert chemicals to emit highly toxic gases or vapors such as NO_x, SO_x, acids, and so forth, or evolve vapors of antimony, arsenic, mercury, and the like.

Key to Abbreviations

abs – absolute
ACGIH – American Conference of Governmental Industrial Hygienists
af – atomic formula
alc – alcohol
alk – alkaline
amorph – amorphous
anhyd – anhydrous
approx – approximately
aq – aqueous
atm – atmosphere
autoign – autoignition
aw – atomic weight
BEI – ACGIH Biological Exposure Indexes
bp – boiling point
b range – boiling range
CAS – Chemical Abstracts Service
cc – cubic centimeter
CC – closed cup
CL – ceiling concentration
COC – Cleveland open cup
compd(s) – compound(s)
conc – concentration, concentrated
contg – containing
cryst – crystal(s), crystalline
d – density
D – day(s)
decomp – decomposition
deliq – deliquescent
dil – dilute
DOT – U.S. Department of Transportation
EPA – U.S. Environmental Protection Agency
eth – ether
(F) – Fahrenheit
FCC – Food Chemical Codex
FDA – U.S. Food and Drug Administration
flam – flammable
flash p – flash point
fp – freezing point
g – gram
glac – glacial
gran – granular, granules
H – hour(s)
HR: – hazard rating
htd – heated
htg – heating
hygr – hygroscopic
IARC – International Agency for Research on Cancer
immisc – immiscible
incomp – incompatible
insol – insoluble
IU – International Unit
kg – kilogram (one thousand grams)
L – liter
lel – lower explosive limit
liq – liquid
M – minute(s)
m^3 – cubic meter
mf – molecular formula
mg – milligram
misc – miscible
mL – milliliter
mm – millimeter
mod – moderately
mp – melting point
mppcf – million particles per cubic foot
mw – molecular weight
m, u – micro
mg – microgram
n – refractive index
ng – nanogram
NIOSH – National Institute for Occupational Safety and Health
nonflam – nonflammable
NTP – National Toxicology Program
OBS – obsolete
OC – open cup
org – organic
ORM – other regulated material (DOT)
OSHA – Occupational Safety and Health Administration
Pa – Pascals
PEL – permissible exposure level
pet – petroleum
pg – picogram (one trillionth of a gram)
Pk – peak concentration
pmole – picomole
powd – powder
ppb – parts per billion (v/v)
pph – parts per hundred (v/v)(percent)
ppm – parts per million (v/v)
ppt – parts per trillion (v/v)
prac – practically
prep – preparation
PROP – properties
refr – refractive

rhomb – rhombic
S, sec – second(s)
sl, slt – slight
sltly – slightly
sol – soluble
soln – solution
solv(s) – solvent(s)
spar – sparingly
spont – spontaneous(ly)
STEL – short-term exposure limit
subl – sublimes
TCC – Tag closed cup
tech – technical
temp – temperature
TLV – Threshold Limit Value
TOC – Tag open cup
TWA – time weighted average
uel – upper explosive limit
unk – unknown, unreported
ULC, ulc – Underwriters Laboratory Classification
USDA – U.S. Department of Agriculture
vac – vacuum
vap – vapor
vap d – vapor density
vap press – vapor pressure
visc – viscosity
vol – volume
W – week(s)
Y – year(s)
% – percent(age)
> – greater than
< – less than
<= – less than or equal to
=> – greater than or equal to

° – degrees of temperature in Celsius (centigrade)
°F – temperature in Fahrenheit

A

AAC250 CAS: 8021-27-0 HR: 1
ABIES ALBA OIL
PROP: Colorless to pale-yellow oil from the steam distillation of the crushed cones of *Abies Alba Mill* (FCTXAV 12,807,74).
SYNS: OIL OF ABIES ALBA ☐ OIL OF FUR ☐ OIL OF SILVER FIR ☐ OIL OF SILVER PINE ☐ SILVER FIR NEEDLE OIL ☐ SILVER FIR OIL ☐ SILVER PINE OIL ☐ TEMPLIN OIL
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
SAFETY PROFILE: Low toxicity by ingestion or skin contact. A skin irritant. When heated to decomposition it emits acrid smoke and irritating fumes.

AAG000 CAS: 105-57-7 HR: 3
ACETAL
DOT: UN 1088
mf: $C_6H_{14}O_2$ mw: 118.20
PROP: Colorless, volatile liquid; agreeable odor, nutty aftertaste. Mp: −100°, bp: 102.7°, flash p: −5°F (CC), lel: 1.65%, uel: 10.4%, d: 0.831, autoign temp: 446°F, vap press: 10 mm @ 8.0°, vap d: 4.08. Sltly sol in water; misc in alc and eth.
SYNS: ACETAAL (DUTCH) ☐ ACETAL DIETHYLIQUE (FRENCH) ☐ ACETALE (ITALIAN) ☐ 1,1-DIAETHOXY-AETHAN (GERMAN) ☐ DIAETHYL-ACETAL (GERMAN) ☐ 1,1-DIETHOXY-ETHAAN (DUTCH) ☐ 1,1-DIETHOXYETHANE ☐ DIETHYL ACETAL ☐ 1,1-DIETOSSIETANO (ITALIAN) ☐ ETHYLIDENE DIETHYL ETHER ☐ USAF DO-45
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
DOT CLASSIFICATION: 3; Label: Flammable Liquid
SAFETY PROFILE: Moderately toxic by ingestion, inhalation, and intraperitoneal routes. A skin and eye irritant. A narcotic. Dangerous fire hazard when exposed to heat or flame; can react vigorously with oxidizing materials. Forms heat-sensitive explosive peroxides on contact with air. When heated to decomposition it emits acrid smoke and fumes. See also ETHERS and ALDEHYDES.

AAG250 CAS: 75-07-0 HR: 3
ACETALDEHYDE
DOT: UN 1089
mf: C_2H_4O mw: 44.06
PROP: Colorless, fuming liquid; pungent, fruity odor. Mp: −123.5°, bp: 20.8°, lel: 4.0%, uel: 57%, flash p: −36°F (CC), d: 0.804 @ 0°/20°, autoign temp: 347°F, vap d: 1.52. Misc in water, alc, and eth. IDLH 2000 ppm.
SYNS: ACETALDEHYD (GERMAN) ☐ ACETIC ALDEHYDE ☐ ALDEHYDE ACETIQUE (FRENCH) ☐ ALDEIDE ACETICA (ITALIAN) ☐ ETHANAL ☐ ETHYL ALDEHYDE ☐ FEMA No. 2003 ☐ NCI-C56326 ☐ OCTOWY ALDEHYD (POLISH) ☐ RCRA WASTE NUMBER U001
CONSENSUS REPORTS: NTP 10th Report on Carcinogens. IARC Cancer Review: Group 2B IMEMDT 7,77,87; Animal Sufficient Evidence IMEMDT 36,101,85; Human Inadequate Evidence IMEMDT 36,101,85. On Community Right-To-Know List. Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.
OSHA PEL: TWA 100 ppm; STEL 150 ppm
ACGIH TLV: CL 25, Confirmed Animal Carcinogen.
DFG MAK: 50 ppm (90 mg/m^3), Suspected Carcinogen
DOT CLASSIFICATION: 3; Label: Flammable Liquid
SAFETY PROFILE: Confirmed carcinogen with experimental carcinogenic and tumorigenic data. Poison by intratracheal and intravenous routes. A human systemic

irritant by inhalation. An experimental routes. A human systemic irritant by inhalation. An experimental teratogen. Other experimental reproductive effects. A skin and severe eye irritant. A narcotic. Human mutation data reported. A common air contaminant. Highly flammable liquid. Mixtures of 30–60% of the vapor in air ignite above 100°. It can react violently with acid anhydrides, alcohols, ketones, phenols, NH_3, HCN, H_2S, halogens, P, isocyanates, strong alkalies, and amines. Reactions with cobalt chloride, mercury(II) chlorate, or mercury(II) perchlorate form violently in the presence of traces of metals or acids. Reaction with oxygen may lead to detonation. When heated to decomposition it emits acrid smoke and fumes.

AAG500 CAS: 75-39-8 HR: 2
ACETALDEHYDE AMMONIA

DOT: UN 1841

mf: $C_2H_4O•H_3N$ mw: 61.10

PROP: White, crystalline solid. Bp: 110°, mp: 97°. Very sol in water, alc; sltly sol in eth.

SYNS: ACETALDEHYDE, AMINE SALT □ ALDEHYDE AMMONIA □ 1-AMINOETHANOL □ α-AMINOETHYL ALCOHOL □ ETHANOL, 1-AMINO-(8CI,9CI)

DOT CLASSIFICATION: 9; Label: CLASS 9

SAFETY PROFILE: It readily decomposes into acetaldehyde and ammonia when heated, causing the hazards of these substances. Moderate fire and explosion hazard when exposed to heat or flame. Can react with oxidizing materials. When heated to decomposition it emits toxic fumes of NH_3 and NO_x.

AAG850 CAS: 105-82-8 HR: 1
ACETALDEHYDE-DI-n-PROPYL ACETAL

mf: $C_8H_{18}O_2$ mw: 146.26

SYNS: ACETALDEHYDE, DIPROPYL ACETAL □ 1,1-DIPROPOXYETHANE □ DIPROPYL ACETAL □ n-PROPYL ACETAL

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: A skin irritant. When heated to decomposition it emits acrid smoke and irritating fumes.

AAH000 CAS: 16568-02-8 HR: 3
ACETALDEHYDE-N-METHYL-N-FORMYLHYDRAZONE

mf: $C_4H_8N_2O$ mw: 100.14

SYNS: ACETALDEHYDE-N-FORMYL-N-METHYL-HYDRAZONE □ ETHYLIDENE GYROMITRIN □ GYROMITRIN □ N-METHYL-N-FORMYL HYDRA-ZONE of ACETALDEHYDE

CONSENSUS REPORTS: IARC Cancer Review: Group 3 IMEMDT 7,56,87; Animal Limited Evidence IMEMDT 7,391,87. EPA Genetic Toxicology Program.

SAFETY PROFILE: Poison via ingestion and possibly other routes. Questionable carcinogen with experimental carcinogenic and tumorigenic data. When heated to decomposition it emits toxic fumes of NO_x.

AAH250 CAS: 107-29-9 HR: 3
ACETALDEHYDE OXIME

DOT: UN 2332

mf: C_2H_5NO mw: 59.08

PROP: A water-sol, crystalline material; sol in alc, eth. Mp: (α) 46.5°, mp: (β) 12°, d: 0.966, bp: 114.5°, flash p: ≤72°F.

SYNS: ACETALDOXIME □ ALDOXIME □ ETHAN-AL OXIME ■ ETHYLIDENEHYDROXYLAMINE ■ USAF AM-5

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

DOT CLASSIFICATION: 3; Label: Flammable Liquid

SAFETY PROFILE: Poison via intraperitoneal route. Mutation data reported. A dangerous fire hazard with a flash point at room temperature. When heated to decomposition it emits toxic fumes of NO_x. See also ALDEHYDES.

AAH750 CAS: 107-89-1 HR: 3
ACETALDOL

DOT: UN 2839

mf: $C_4H_8O_2$ mw: 88.12

PROP: Clear, white-to-yellow syrupy liquid. Bp: 83° @ 20 mm, flash p: 150°F (OC), d: 1.11, autoign temp: 482°F, vap d: 3.04.

SYNS: ALDOL □ 3-BUTANOLAL □ 3-HYDROXY-BUTANAL □ β-HYDROXYBUTYRALDEHYDE □ 3-HYDROXYBUTYRALDEHYDE □ OXYBUTANAL □ OXYBUTYRIC ALDEHYDE

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

DOT CLASSIFICATION: 6.1; Label: Poison

SAFETY PROFILE: Poison via skin contact. Moderately toxic by ingestion. A skin and eye irritant. A flammable liquid and fire hazard when exposed to heat or flame; emits crotonaldehyde and water when heated. See CROTONALDEHYDE. Can react with oxidizing materials.

AAI000 CAS: 60-35-5 HR: 3
ACETAMIDE

mf: C_2H_5NO mw: 59.08

PROP: Colorless crystals; mousy odor. Mp: 81°, bp: 221.2°, d: 1.159 @ 20°/4°, vap press: 1 mm @ 65°. Decomp in hot water.

SYNS: ACETIC ACID AMIDE □ ACETIMIDIC ACID □ AMID KYSELINY OCTOVE (POLISH) □ ETHANAMIDE □ METHANECARBOXAMIDE □ NCI-C02108

CONSENSUS REPORTS: IARC Cancer Review: Group 2B IMEMDT 7,56,87; Animal Sufficient Evidence IMEMDT 7,389,87. On Community Right-To-Know List. Reported in EPA TSCA Inventory.

DFG MAK: Suspected Carcinogen

SAFETY PROFILE: Suspected carcinogen with experimental carcinogenic and neoplastigenic data. Moderately toxic by intraperitoneal and possibly other routes. An experimental teratogen. Other experimental reproductive effects. Mutation data reported. See also AMIDES. When heated to decomposition it emits toxic fumes of NO_x.

AAI250 CAS: 59-66-5 HR: 3
5-ACETAMIDE-1,3,4-THIADIAZOLE-2-SULFONAMIDE

mf: $C_4H_6N_4O_3S_2$ mw: 222.26

SYNS: 2-ACETAMIDO-5-SULFONAMIDO-1,3,4-THIADIAZOLE □ ACETAMIDOTHIADIAZOLESULFONAMIDE □ ACETAMOX □ ACETAZOLAMID □ ACETAZOLAMIDE □ ACETAZOLEAMIDE □ ACETOZALAMIDE □ 2-ACETYLAMINO-1,3,4-THIADIAZOLE-5-SULFONAMIDE □ N-(5-(AMINOSULFONYL)-1,3,4-THIADIAZOL-2-YL)ACETAMIDE □ CARBONIC ANHYDRASE INHIBITOR NO. 6063 □ CIDAMEX □ DEFILTRAN □ DEHYDRATIN □ DIACARB □ DIAKARB □ DIAMOX □ DIDOC □ DILURAN □ DIURAMID □ DIURETICUM-HOLZINGER □ DIUTAZOL □ DONMOX □ EDEMOX □ EUMICTON □ FONURIT □ GLAUPAX □ GLUPAX □ MUIRAMID □ NATRIONEX □ NEPHRAMIDE □ PHONURIT □ N-(5-SULFAMOYL-1,3,4-THIADIAZOL-2-YL)ACET-AMIDE □ VETAMOX

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Poison by subcutaneous and intravenous routes. Moderately toxic by intraperitoneal route. Human systemic effects by ingestion: dyspnea. An experimental teratogen by many routes. Other experimental reproductive effects. When heated to decomposition it emits very toxic fumes of NO_x and SO_x. A carbonic anhydrase inhibitor and diuretic used to treat glaucoma.

AAL750 CAS: 531-82-8 HR: 3
2-ACETAMIDO-4-(5-NITRO-2-FURYL)-THIAZOLE

mf: $C_9H_7N_3O_4S$ mw: 253.25

SYNS: 2-ACETAMINO-4-(5-NITRO-2-FURYL)THIAZOLE □ 2-ACETYLAMINO-4-(5-NITRO-2-FURYL)-THIAZOLE □ N-(4-(5-NITRO-2-FURANYL)-2-THIAZOLYL)ACETAMIDE □ N-(4-(5-NITRO-2-FURYL)-2-THIAZOLYL)ACETAMIDE □ N-(4-(5-NITRO-2-FURYL)THIAZOL-2-YL)ACETAMIDE

CONSENSUS REPORTS: IARC Cancer Review: Group 2B IMEMDT 7,56,87; Animal Sufficient Evidence IMEMDT 1,181,72; IMEMDT 7,185,74.

SAFETY PROFILE: Suspected carcinogen with experimental carcinogenic, tumorigenic, and neoplastigenic data. Mutation data reported. When heated to decomposition it emits very toxic fumes of SO_x and NO_x.

AAQ250 CAS: 2832-40-8 HR: 2
ACETAMINE YELLOW CG

mf: $C_{15}H_{15}N_3O_2$ mw: 269.33

PROP: Brownish-yellow powder. Mp: 268°–270° Solubility in water: <0.1 mg/mL @ 18°, 95% etoh: 1-5 mg/mL @ 22°

SYNS: ACETAMIDE, N-(4-((2-HYDROXY-5-METHYLPHENYL)AZO)PHENYL)- □ 4-ACETAMIDO-2'-HYDROXY-5'-METHYLAZOBENZENE □ ACETATE FAST YELLOW G □ ACETOQUINONE LIGHT YELLOW □ ACETOQUINONE LIGHT YELLOW 4JLZ □ ALTCO SPERSE FAST YELLOW GFN NEW □ AMACEL YELLOW G □ ARTISIL DIRECT YELLOW G □ ARTISIL YELLOW G □ ARTISIL YELLOW 2GN □ CALCOSYN YELLOW GC □ CALCOSYN YELLOW GCN □ CELLITON DISCHARGE YELLOW GL □ CELLITON FAST YELLOW G □ CELLITON FAST YELLOW GA □ CELLITON FAST YELLOW GA-CF □ CELLITON YELLOW G □ CELUTATE YELLOW GH □ C.I. 11855 □ C.I. 3/11855 □ CIBACETE YELLOW GBA □ CIBACET YELLOW GBA □ CIBACET YELLOW 2GC □ C.I. DISPERSE YELLOW 3 □ CILLA FAST YELLOW G □ C.I. SOLVENT YELLOW 92 □ C.I. SOLVENT YELLOW 99 □ DIACELLITON FAST YELLOW G □ DISPERSE FAST YELLOW G □ DISPERSE YELLOW G □ DISPERSE YELLOW 3 □ DISPERSIVE YELLOW 3T □ DISPERSE YELLOW Z □ DISPERSOL FAST YELLOW G □ DISPERSOL PRINTING YELLOW G □ DISPERSOL YELLOW A-G □ DURGACET YELLOW G □ DUROSPERSE YELLOW G □ EASTONE YELLOW GN □ ESTEROQUINONE LIGHT YELLOW 4JL □ ESTONE YELLOW GN □ FENACET FAST YELLOW G □ FENACET YELLOW G □ GENACRON YELLOW G □ HISPACET FAST YELLOW G □ HISPERSE YELLOW G □ N-(4-((2-HYDROXY-5-METHYLPHENYL)AZO)PHENYL)ACETAMIDE □ 4'-((6-HYDROXY-m-TOLYL)AZO)ACETANILIDE □ INTERCHEM ACETATE YELLOW G □ INTERCHEM DISPERSE YELLOW GH □ INTRASPERSE YELLOW GBA □ INTRASPERSE YELLOW GBA EXTRA □ KAYALON FAST YELLOW G □ KAYASET YELLOW G □ KCA ACETATE FAST YELLOW G □ MICROSETILE YELLOW GR □ MIKETON FAST YELLOW G □ NACELAN FAST YELLOW CG □ NCI-C53781 □ NOVALON YELLOW 2GN □ NYLOQUINONE LIGHT YELLOW 4JL □ NYLOQUINONE YELLOW 4J □ OSTACET YELLOW P2G □ PALACET YELLOW GN □ PALANIL YELLOW G □ PAMACEL YELLOW G-3 □ PERLITON YELLOW G □ RELITON YELLOW C □ RESIREN YELLOW TG □ SAFARITONE YELLOW G □ SAMARON YELLOW PA3 □ SERINYL HOSIERY YELLOW GD □ SERIPLAS YELLOW GD □ SERISOL FAST YELLOW GD □ SETACYL YELLOW G □ SETACYL YELLOW 2GN □ SETACYL YELLOW P-2GL □ SILOTRAS YELLOW TSG □ SUPRACET FAST YELLOW G □ SYNTEN YELLOW 2G □ SYNTON YELLOW 2G □ TERASIL YELLOW GBA EXTRA □ TERASIL YELLOW 2GC □ TERTRANESE YELLOW N-2GL □ TULA-DISPERSE FAST YELLOW 2G □ VONTERYL YELLOW G □ VONTERYL YELLOW R □ YELLOW RELITON G □ YELLOW Z □ ZLUT DISPERZNI 3 □ ZLUT ROZPOUSTEDLOVA 77

CONSENSUS REPORTS: Community Right-To-Know List. Reported in EPA TSCA Inventory. IARC Cancer Review: Group 3 IMEMDT 48,149,90; Animal Inadequate Evidence IMEMDT 8,97,75; NTP Carcinogenesis Bioassay (feed); Clear Evidence: mouse, rat NTPTR* NTP-TR-222,82.

SAFETY PROFILE: Suspected carcinogen with experimental tumorigenic and carcinogenic data. Low toxicity by intraperitoneal route. An allergen. Mutation data reported. When heated to decomposition it emits toxic fumes of NO_x.

AAQ500 CAS: 103-84-4 HR: 3
ACETANILIDE

mf: C_8H_9NO mw: 135.18

PROP: White, shining, crystalline scales. Mp: 113.5°, bp: 305°, flash p: 345°F (OC), d: 1.2105 @ 4°/4°, autoign temp: 1004°F, vap press: 1 mm @ 114.0°, vap d: 4.65. Somewhat sol in water, alc, and eth.

SYNS: ACETAMIDE, N-PHENYL- □ ACETAMIDOBENZENE □ ACETANIL □ ACETANILID □ ACETIC ACID ANILIDE □ ACETOANILIDE □ ACETYLAMINOBENZENE □ ACETYLANILINE □ N-ACETYLANILINE □ AN □ ANILINE, N-ACETYL- □ ANTIFEBRIN □ PHENALGENE □ PHENALGIN □ N-PHENYLACETAMIDE □ USAF EK-3

CONSENSUS REPORTS: Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.

SAFETY PROFILE: A human poison by an unspecified route. Poison by ingestion and intravenous routes. Moderately toxic by intraperitoneal route. Human systemic effects by ingestion: hallucinations and distorted perceptions, sleepiness, constipation, cyanosis, respiratory stimulation, kidney damage, methemoglobinemia-carboxyhemoglobinemia, and decreased body temperature. Mutation data reported. When heated to decomposition it emits toxic fumes of NO_x. Combustible when exposed to heat or flame. See also ANILINE.

AAS250 CAS: 5421-48-7 HR: 3
(ACETATO)(DIETHOXYPHOSPHINYL)-MERCURY

mf: $C_6H_{13}HgO_5P$ mw: 396.75

PROP: IDLH 10 mg/m³ (as Hg).

SYN: (DIETHOXY-PHOSPHINYL)MERCURY ACETATE

CONSENSUS REPORTS: Mercury and its compounds are on the Community Right-To-Know List.

OSHA PEL: CL 0.1 mg(Hg)/m³ (skin)

ACGIH TLV: TWA 0.1 mg(Hg)/m³ (skin); BEI: 35 μg/g creatinine total inorganic mercury in urine preshift; 15 μg/g creatinine total inorganic mercury in blood at end of shift at end of workweek.

DFG MAK: Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH REL: (Organomercury) TWA 0.01 mg(Hg)/m³

SAFETY PROFILE: Poison by intraperitoneal route. See also MERCURY COMPOUNDS. When heated to decomposition it emits very toxic fumes of Hg and PO_x.

AAS500 CAS: 21450-81-7 HR: 3
(ACETATO)(2,3,5,6-TETRAMETHYL-PHENYL)MERCURY

mf: $C_{12}H_{16}HgO_2$ mw: 392.87

PROP: IDLH 10 mg/m³ (as Hg).

SYN: (2,3,5,6-TETRAMETHYLPHENYL)MERCURY ACETATE

CONSENSUS REPORTS: Mercury and its compounds are on the Community Right-To-Know List.

OSHA PEL: CL 0.1 mg(Hg)/m³ (skin)

ACGIH TLV: TWA 0.1 mg(Hg)/m³ (skin); BEI: 35 μg/g creatinine total inorganic mercury in urine preshift; 15 μg/g creatinine total inorganic mercury in blood at end of shift at end of workweek.

DFG MAK: Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH REL: (Mercury, Aryl and Inorganic) CL 0.1 mg/m³ (skin)

SAFETY PROFILE: Poison by intravenous route. See also MERCURY COMPOUNDS. When heated to decomposition it emits toxic fumes of Hg.

AAT250 CAS: 64-19-7 HR: 3
ACETIC ACID

DOT: UN 2789/UN 2790

mf: $C_2H_4O_2$ mw: 60.06

PROP: Clear, colorless liquid; pungent odor. Mp: 16.7°, bp: 118.1°, flash p: 109°F (CC), lel: 5.4%, uel: 16.0% @ 212°F, d: 1.049 @ 20°/4°, autoign temp: 869°F, vap press: 11.4 mm @ 20°, vap d: 2.07. Misc in water, alc, and eth. IDLH 50 ppm.

SYNS: ACETIC ACID (aqueous solution) (DOT) □ ACETIC ACID, glacial or acetic acid solution, >80% acid, by weight (UN 2790) (DOT) □ ACETIC ACID, GLACIAL □ ACETIC ACID solution, >10% but not >80% acid, by weight (UN 2790) (DOT) □ ACIDE ACETIQUE (FRENCH) □ ACIDO ACETICO (ITALIAN) □ AZIJNZUUR (DUTCH) □ ESSIGSAEURE (GERMAN) □ ETHANOIC ACID □ ETHYLIC ACID □ FEMA No. 2006 □ GLACIAL ACETIC ACID □ METHANE-CARBOXYLIC ACID □ OCTOWY KWAS (POLISH) □ VINEGAR ACID

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

OSHA PEL: TWA 10 ppm

ACGIH TLV: TWA 10 ppm; STEL 15 ppm

DFG MAK: 10 ppm (25 mg/m³)

DOT CLASSIFICATION: 8; Label: Corrosive

SAFETY PROFILE: A human poison by an unspecified route. Moderately toxic by various routes. A severe eye and skin irritant. Can cause burns, lachrymation, and conjunctivitis. Human systemic effects by ingestion: changes in the esophagus, ulceration, or bleeding from the small and large intestines. Human systemic irritant effects and mucous membrane irritant. Experimental reproductive effects. Mutation data reported. A common air contaminant. A flammable liquid. A fire and explosion hazard when exposed to heat or flame; can react vigorously with oxidizing materials. To fight fire, use CO_2, dry chemical, alcohol foam, foam and mist. When heated to decomposition it emits irritating fumes.

Potentially explosive reaction with 5-azidotetrazole, bromine pentafluoride, chromium trioxide, hydrogen peroxide, potassium permanganate, sodium peroxide, and phosphorus trichloride. Potentially violent reactions with acetaldehyde and acetic anhydride. Ignites on contact with

potassium tert-butoxide. Incompatible with chromic acid, nitric acid, 2-amino-ethanol, NH_4NO_3, ClF_3, chlorosulfonic acid, (O_3 + diallyl methyl carbinol), ethylenediamine, ethylene imine, (HNO_3 + acetone), oleum, $HClO_4$, permanganates, $P(OCN)_3$, KOH, NaOH, xylene.

AAU000 CAS: 150-84-5 HR: 1
ACETIC ACID, CITRONELLYL ESTER

mf: $C_{12}H_{22}O_2$ mw: 198.34

PROP: Found in oils of Citronella Ceylon, geranium, and about 20 other oils (FCTXAV 11,1011,73). Colorless liquid; fruity odor. D: 0.883–0.893, refr index: 1.440–1.450, flash p: 212°F. Sol in alc and fixed oils; insol in glycerin, propylene glycol, and water @ 229°.

SYNS: ACETIC ACID-3,7-DIMETHYL-6-OCTEN-1-YL ESTER □ CITRONELLYL ACETATE (FCC) □ 2,6-DIMETHYL-2-OCTEN-8-OL ACETATE □ 3,7-DIMETHYL-6-OCTEN-1-YL ACETATE □ FEMA No. 2311

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Mildly toxic by ingestion. A human skin irritant. See also ESTERS. Combustible liquid. When heated to decomposition it emits acrid smoke and irritating fumes.

AAU250 CAS: 18461-55-7 HR: 3
ACETIC ACID-4,6-DINITRO-o-CRESYL ESTER

mf: $C_9H_8N_2O_6$ mw: 240.19

SYNS: 4,6-DINITRO-o-KRESYLESTER KYSELINY OCTOVE (CZECH) □ DNOK-ACETAT (CZECH)

NIOSH REL: (Dinitro ortho-Cresyl) TWA 0.2 mg/m^3

SAFETY PROFILE: Poison by ingestion and intraperitoneal routes. A skin and severe eye irritant. When heated to decomposition it emits toxic fumes of NO_x.

AAW000 CAS: 56856-83-8 HR: 3
ACETIC ACID METHYLNITROSAMINO-METHYL ESTER

mf: $C_4H_8N_2O_3$ mw: 132.14

SYNS: α-ACETOXY DIMETHYLNITROSAMINE □ ACETOXYMETHYL-METHYL-NITROSAMIN (GERMAN) □ ACETOXYMETHYL METHYLNITRO-SAMINE □ N-α-ACETOXYMETHYL-N-METHYL-NITROSAMINE □ 1-ACETOXY-N-NITROSODIMETH-YLAMINE □ AMMN □ ANN (GERMAN) □ DMN-OAC □ MAMN □ METHYL-(ACETOXYMETHYL)NITRO-SAMINE □ N-NITROSO-N-(ACETOXY)METHYL-N-METHYLAMINE □ N-NITROSO-N-METHYL-N-ACETOXYMETHYLAMINE

SAFETY PROFILE: Suspected carcinogen with experimental carcinogenic, neoplastigenic, and tumorigenic data. Poison by ingestion, subcutaneous, intravenous, and intraperitoneal routes. Experimental teratogenic data. Human mutation data reported. When heated to decomposition it emits toxic fumes of NO_x. See also NITROSAMINES, N-NITROSO COMPOUNDS, and ESTERS.

AAX175 CAS: 9003-22-9 HR: 1
ACETIC ACID, VINYL ESTER, POLYMER with CHLOROETHYLENE

mf: $(C_4H_6O_2 \bullet C_2H_3Cl)_n$

PROP: White powder with bland odor. D: 1.4

SYNS: A 15 (polymer) □ ACETIC ACID ETHENYL ESTER POLYMER with CHLORETHENE (9CI) □ BAKELITE LP 70 □ BAKELITE VLFV □ BAKELITE VMCC □ BAKELITE VYNS □ BREON 351 □ CHLOROETHYLENEVINYL ACETATE POLYMER □ CORVIC 236581 □ DENKALAC 61 □ DIAMOND SHAMROCK 744 □ EXON 450 □ EXON 454 □ GEON 135 □ HOSTAFLEX VP 150 □ LEUCOVYL PA 1302 □ NORVINYL P 6 □ OPALON 400 □ PLIOVAC AO □ POLYVINYL CHLORIDE–POLYVINYL ACETATE □ PVC CORDO □ RHODOPAS 6000 □ SARPIFAN HP 1 □ SCONATEX □ SOLVIC 523KC □ SUMILIT PCX □ TENNUS 0565 □ TYGON □ VAGD □ VINNOL H 10/60 □ VINYL ACETATE–VINYL CHLORIDE COPOLYMER □ VINYL ACETATE–VINYL CHLO-RIDE POLYMER □ VINYL CHLORIDE–VINYL ACETATE POLYMER □ VINYLITE VYDR 21 □ VLVF □ VMCC □ VYNW

CONSENSUS REPORTS: IARC Cancer Review: Animal Limited Evidence IMEMDT 19,377,79. Reported in EPA TSCA Inventory.

SAFETY PROFILE: Suspected carcinogen with experimental tumorigenic data. When heated to decomposition it emits toxic fumes of HCl.

AAX250 CAS: 9003-20-7 HR: 1
ACETIC ACID VINYL ESTER POLYMERS

mf: $(C_4H_6O_2)_n$

PROP: Clear, water-white solid resin. Sol in benzene, acetone; insol in water.

SYNS: ACETIC ACID ETHENYL ESTER HOMOPOLYMER □ ASAHISOL 1527 □ ASB 516 □ AYAA □ AYAF □ BAKELITE AYAA □ BAKELITE LP 90 □ BASCOREZ □ BOND CH 18 □ BOOKSAVER □ BORDEN 2123 □ CEVIAN A 678 □ D 50 □ DANFIRM □ DARATAK □ DCA 70 □ DUVILAX BD 20 □ ELMER'S GLUE ALL □ EP 1463 □ FORMVAR 1285 □ GELVA CSV 16 □ GOHSENYL E 50 Y □ KURARE OM 100 □ LEMAC 1000 □ MERCKOGEN 6000 □ MOVINYL 114 □ NATIONAL 120-1207 □ POLYVINYL ACETATE (FCC) □ PROTEX (POLYMER) □ RHODOPAS M □ SOVIOL □ SP 60 ESTER □ TOABOND 40H □ UCAR 130 □ VA 0112 □ VINAC B 7 □ VINYL ACETATE HOMOPOLYMER □ VINYL ACETATE POLYMER □ VINYL ACETATE RESIN □ VINYL PRODUCTS R 10688 □ WINACET D

CONSENSUS REPORTS: IARC Cancer Review: Animal Inadequate Evidence IMEMDT 19,341,79. Reported in EPA TSCA Inventory.

SAFETY PROFILE: Very low toxicity by ingestion. Questionable carcinogen. When heated to decomposition it emits acrid smoke and irritating fumes. See also ESTERS.

AAX500 CAS: 108-24-7 HR: 3
ACETIC ANHYDRIDE

DOT: UN 1715

mf: $C_4H_6O_3$ mw: 102.10

PROP: Colorless, very mobile, strongly refractive liquid; very strong, irritating, acetic odor. Mp: −73.1°, bp: 139.55°, flash p: 129°F (CC), d: 1.082 @ 20°/4°, lel: 2.9%, uel: 10.3%, autoign temp: 734°F, vap press: 10 mm @ 36.0°, vap d: 3.52. Sltly sol in water; sol in org solvs. Decomp in hot water and hot alc; misc in alc and eth. IDLH 200 ppm.

SYNS: ACETANHYDRIDE □ ACETIC ACID, ANHYDRIDE (9CI) □ ACETIC OXIDE □ ACETYL ANHYDRIDE □ ACETYL ETHER □ ACETYL OXIDE □ ANHYDRIDE ACETIQUE (FRENCH) □ ANHY-DRID KYSELINY OCTOVE □ ANIDRIDE ACETICA (ITALIAN) □ AZIJNZUURANHYDRIDE (DUTCH) □ ESSIGSAEURE-ANHYDRID (GERMAN) □ ETHANOIC ANHYDRATE □ OCTOWY BEZWODNIK (POLISH)

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

OSHA PEL: CL 5 ppm

ACGIH TLV: TWA 5 ppm.

DFG MAK: 5 ppm (20 mg/m³)

NIOSH REL: Acetic Anhydride: CL 5 ppm

DOT CLASSIFICATION: 8; Label: Corrosive

SAFETY PROFILE: Moderately toxic by inhalation, ingestion, and skin contact. A skin and severe eye irritant. A flammable liquid. A fire and explosion hazard when exposed to heat or flame. Potentially explosive reactions with barium peroxide, boric acid, chromium trioxide, 1,3-diphenyltriazene, hydrochloric acid + water, hypochlorous acid, nitric acid, perchloric acid + water, peroxyacetic acid, potassium permanganate, tetrafluoroboric acid, 4-toluenesulfonic acid + water, and acetic acid + water. Reactions with ethanol + sodium hydrogen sulfate, and hydrogen peroxide form explosive products. Reactions with ammonium nitrate + hexamethylenetetrammonium acetate + nitric acid form as products the military explosives RDX and HMX. Reacts violently with N-tert-butyl-phthalimic acid + tetrafluoroboric acid, chromic acid, glycerol + phosphoryl chloride, and metal nitrates (e.g., copper or sodium nitrates). Incompatible with 2-aminoethanol, aniline, chlorosulfonic acid, (CrO_3 + acetic acid), ethylene-diamine, ethyleneimine, glycerol, oleum, HF, permanganates, NaOH, Na_2O_2, H_2SO_4, water, N_2O_2, (glycerol + phosphoryl chloride). When heated to decomposition it emits toxic fumes; can react vigorously with oxidizing materials, will react violently on contact with water or steam. Used in production of drugs of abuse. To fight fire, use CO_2, dry chemical, water mist, alcohol foam. See also ANHYDRIDES.

AAX750 CAS: 93-29-8 HR: 2
ACETISOEUGENOL

mf: $C_{12}H_{14}O_3$ mw: 206.26

PROP: White crystals; clove odor. Flash p: 153°F. Sol in alc, chloroform, eth; insol in water.
SYNS: 4-ACETOXY-3-METHOXY-1-PROPENYL-BENZENE □ ACETYLISOEUGENOL □ FEMA No. 2470 □ ISOEUGENOL ACETATE □ ISOEUGENYL ACETATE (FCC) □ 2-METHOXY-4-PROPENYL-PHENYL ACETATE
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
SAFETY PROFILE: Moderately toxic by ingestion. Combustible liquid. When heated to decomposition it emits acrid smoke and irritating fumes.

AAY000 CAS: 102-01-2 HR: 2
ACETOACETANILIDE
mf: $C_{10}H_{11}NO_2$ mw: 177.22
PROP: White, crystalline solid. Mp: 86°, bp: decomp, flash p: 365°F (COC), d: 1.260 @ 20°, vap press: 0.01 mm @ 20°.
SYNS: AAN □ ACETANILIDE, 2-ACETYL- □ ACETOACETAMIDOBENZENE □ ACETO-ACETANILID □ ACETOACETIC ACID ANILIDE □ ACETOACETIC ANILIDE □ ((ACETOACETYL)-AMINO)BENZENE □ ACETOACETYLANILINE □ ACETYLACETANILIDE □ α-ACETYLACETANILIDE □ N-(ACETYLACETYL)-ANILINE □ ANILID KYSELINY ACETOCTOVE □ BUTANAMIDE, 3-OXO-N-PHENYL-(9CI) □ β-KETOBUTYRANILIDE □ 3-OXO-N-PHENYLBUT-ANAMIDE □ N-PHENYL-ACETOACETAMIDE □ USAF EK-1239
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
SAFETY PROFILE: Poison by intraperitoneal route. Moderately toxic by ingestion. A weak allergen. See also ACETANILIDE. Combustible when exposed to heat or flame. See ANILINE and CYANIDE for disaster hazard. When heated to decomposition it emits toxic NO_x fumes. To fight fire, use alcohol foam, water mist, CO_2, dry chemical.

ABA000 CAS: 93-68-5 HR: 2
ACETOACET-o-TOLUIDIDE
mf: $C_{11}H_{13}NO_2$ mw: 191.25
PROP: Crystals. Mp: 106°, bp: decomp, d: 1.300 @ 20°, vap press: 0.01 mm @ 20°, flash p: 320°F (COC).
SYNS: 2-ACETOACETYLAMINOTOLUENE □ ACETOACETYL-2-METHYLANILIDE □ 2'-METHYL-ACETOACETANILIDE
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
SAFETY PROFILE: Moderately toxic by ingestion. When heated to decomposition it emits toxic fumes of NO_x.

ABA500 CAS: 92-15-9 HR: 2
ACETOACETYL-o-ANISIDINE
mf: $C_{11}H_{13}NO_3$ mw: 207.25
PROP: Crystals. Mp: 86.6°, flash p: 325°F (OC), d: 1.132 @ 86.6°/20°, vap d: 7.0.
SYNS: o-ACETOACETANISIDE □ ACETOACET-o-ANISIDIN (CZECH) □ ACETOACETIC ACID-o-ANISIDIDE □ 2-ACETOACETYLAMINOANISOLE □ ACETOACETYL-o-ANISIDE □ ACETOACETYL-o-ANISINE □ o-METHOXYACETOACETANILIDE □ 2-METHOXYACETOACETANILIDE □ 2'-METHOXY-ACETOACETANILIDE
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
SAFETY PROFILE: A skin and eye irritant. When heated to decomposition it emits toxic fumes of NO_x. Combustible when exposed to heat or flame or oxidizing materials. To fight fire, use CO_2, mist, dry chemicals.

ABA750 CAS: 1271-55-2 HR: 3
ACETOFERROCENE
mf: $C_{12}H_{12}FeO$ mw: 228.09
PROP: Orange crystals from heptane. Mp: 85–86°.
SYNS: ACETYLFERROCENE □ 1-ACETYLFERROCENE □ FERROCENE, ACETYL- □ MONACETYLFERROCENE
CONSENSUS REPORTS: Reported in EPA TSCA Inventory.
DOT CLASSIFICATION: 3; Label: Flammable Liquid
SAFETY PROFILE: Poison by ocular and intravenous routes. A flammable liquid. When heated to decomposition it emits acrid smoke and irritating fumes.

ABB000 CAS: 968-81-0 HR: 3
ACETOHEXAMIDE
mf: $C_{15}H_{20}N_2O_4S$ mw: 324.43