WILEY GUIDE TO CHEMICAL INCOMPATIBILITIES

THIRD EDITION

RICHARD P. POHANISH
STANLEY A. GREENE

WILEY GUIDE TO CHEMICAL INCOMPATIBILITIES

Richard P. Pohanish
Stanley A. Greene

WILEY

A JOHN WILEY & SONS, INC., PUBLICATION

Published by John Wiley & Sons, Inc., Hoboken, New Jersey. All rights reserved.
Published simultaneously in Canada.

Library of Congress Cataloging-in-Publication Data:

Pohanish, Richard P.
Wiley guide to chemical incompatibilities / Richard P. Pohanish, Stanley A. Greene. — 3rd ed.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-470-38763-4 (cloth)
1. Hazardous substances—Safety measures—Handbooks, manuals, etc. 2. Chemicals—Safety measures—Handbooks, manuals, etc. I. Greene, Stanley A. II. Title.
T55.3.H3P647 2009
660'.2804—dc22 2009009766

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

WILEY GUIDE TO CHEMICAL INCOMPATIBILITIES

To

Nora McNamara Pohanish Calpin 1919 - 2008

NOTICE

This reference work provides data and guidance about chemical incompatibilities and other hazards. It cannot be assumed that all necessary warnings and precautionary measures are contained in this work and that other, or additional, information or assessments may not be required. Extreme care has been taken in the preparation of this work and, to the best knowledge of the publisher and the editors, the information presented is accurate. No warranty, express or implied, is made. Information may not be available for some chemicals; consequently, an absence of data does not necessarily mean that a substance is not hazardous. Neither the publisher nor the editors assume any liability or responsibility for completeness or accuracy of the information presented or any damages of any kind alleged to result in connection with or arising from the use of this book. The publisher and the editors strongly encourage all readers of this work, and users of chemicals to follow the manufacturers' or suppliers' current instructions, technical bulletins, and material safety data sheets (MSDSs) for specific information on the use, handling, and storage of all chemical materials. MSDSs are required by federal law to be supplied to users by chemical manufacturers and distributors. These data sheets are an excellent general source of critical information about known toxicological and health hazards as well as some useful information about transportation, first response, storage, and disposal of chemicals. However, be aware that the quality of available MSDSs varies widely, and the information that they contain may not always be appropriate for some chemical uses.

The chemical profiles presented in this guide book are representative of known and potential incompatible materials and neither purports to be complete, nor is it intended as a primary source of research information. In fact, although there are other fine works that report on chemical accidents, it is nearly impossible to cover all of the potential combinations resulting from the 3,000 high-production volume chemicals used in the United States and elsewhere, let alone the hundreds of thousands of chemicals registered with the Chemical Abstract Service of the ACS.

ACKNOWLEDGMENT

Thanks are due to those individuals who reviewed and constructively commented on the publication of the two previous editions and during the development of the manuscript of this third edition. We also want to thank the many scientists, contract employees, and other individuals who developed the various documents and databases that provided so much of the data that was compiled for this book. Thanks are particularly due to Bob Esposito of John Wiley & Sons for his encouragement and suggestions for this edition.

INTRODUCTION

More than a dozen years ago the first edition of *Rapid Guide to Chemical Incompatibilities* was published in the compact format of the Wiley Rapid Guide series. The second edition outgrew Wiley's compact-sized Rapid Guide series; it was enlarged and renamed *Wiley Guide to Chemical Incompatibilities.*

Designed to fill the need for a portable and easy-to-use reference on reactive substances commonly found in commerce, the objective of this edition is to aid those having all levels of knowledge and especially those who may not be chemists by profession but who are trusted with the protection of human health and the environment. More specifically, this is a guide for personnel in the fields of safety, first response, and transportation as well as workers, supervisors, and plant management responsible for the handling, storage, and conveyance of chemical materials. To this end, the summary information covers flammability, violent and explosive binary reactions, incompatibilities, and reactions that may result from physical change.

This third edition contains nearly 9000 chemical incompatibility profiles and nearly 250 new entries. Rather than simply revise the second edition, the authors chose to rewrite and expand all of the chemical profiles. At the suggestion of reviewers of the proposal for the third edition, some foreign language names have been eliminated to make room for new entries. In addition to more flash points, the following were added: molecular formulas, lower and upper explosive limits, autoignition temperatures, and NFPA®-type (Red) numerical fire codes. Each chemical profile contains suggested fire extinguishing media and dangerous thermal decomposition products that may be released in a fire. In keeping with the previous editions, more information has been added on the effects of chemicals that come in contact with construction materials, including metals, rubbers, plastics, and coatings. To help users with general chemical terms the glossary has been revised.

The glossary has been revised to help users with general chemical terms. Temperatures appear in both Fahrenheit and Celsius using the format (xxx°F/xxx°C). A more detailed description of profile contents appears in the next section. All Chemical Abstract Service Numbers (CAS) have been checked. To save space, many similar and contiguous chemical names and synonyms (with the same CAS number) have been combined into a single entry. Also, foreign language entries, trade names, and common or "trivial" names of chemicals often used in the workplace or laboratory contain a reference to the main entry (e.g., "see methyl ethyl ketone" for the MEK entry).

It is intended that this third edition will provide information that would otherwise be difficult to obtain from multiple and disparate other sources. Any comments, suggestions, or advice from users are both welcomed and appreciated. If users are aware of any entries that are registered trademarks, please notify the publisher with relevant information so that trademarks can be appropriately noted. All correspondence should be submitted in writing to the publisher.

HOW TO USE THIS BOOK

The term "incompatibility" is used to describe a wide range of chemical reactions that might include self-ignition from contact with air, the generation of heat resulting from contact of a chemical with moisture; decomposition; the generation of toxic gases; the heating, overflow, and rupture of containers; polymerization; the formation of new and possibly more dangerous compounds; fire, detonation, and explosion; or any combination of these or other actions. Also "incompatible" generally means that there may be a reaction (possibly violent) with another material that may be other than binary and quite complicated. The reaction with another material may occur when subjected to "outside forces" such as earth tremors, warming, change in vapor pressure, or other physical change. Simply stated, certain chemicals cannot be safely mixed. Certain chemicals must not be stored within proximity of incompatible materials due to possible violent reaction or uncontrolled release of products that might be toxic, flammable, or explosive and that might pose a threat, especially during fire, to workers, staff, fire fighters, police, and other first responders.

A substance's incompatibility profile is based on the following information (as available):

•Incompatibility or reactions with common materials or conditions, including air and moisture.

•Incompatibility or binary reactions with another chemical substances.

•Incompatibility or reactions with structural materials such as metals, glass, concrete, etc.

•Incompatibility or reactions with protective materials such as plastics, rubber, and coatings.

•Information, as known, related to the ability of chemical substances to accumulate dangerous static electrical charges.

•The ability, when known, of a chemical (e.g., ethers) to form unstable and potentially explosive peroxides or to cause polymerization. When polymerization inhibitors are known or recommended, they have been included. According to National Safety Council Data Sheet 1-655/rev. 1982, peroxides can be rendered harmless with iron(II) sulfate (1:1) or by passing the liquid material over a bed of activated aluminum oxide [-alumina (OSHA)].

Using chemical names and CAS numbers, readers can locate concise incompatibility profiles for thousands of commercial chemicals that may be found in the industrial workplace, frequently stored, and transported in bulk. Chemical names, regulatory names, alternate names, commonly used "trivial" names, and in many cases product and trade names can be looked up directly without the readers having to first consult interim indices or charts. To avoid confusion with like-sounding names or multiple names with exact spellings, CAS registry numbers (in the format xxx-xx-x) have been provided. These numbers are assigned to all chemicals registered with the CAS of the American Chemical Society, and should always be used in conjunction with a substance name for positive identification.

Users of this work should note that all chemical entries appear in alphabetical order and that certain notations (such as numbers, Greek letters, *N*-, *N,N'*-, *n*-, *sec*-, *tert*-, *o*-, *m*-, *p*-, *S*-, *O*-, *O,O*-) are ignored in order to make each compound easier to locate within the alphabetical listings. Therefore, *N*-(2-AMINOETHYL) is located in the "A" section (as "aminoethyl") and *O,O*-DIETHYL-2-ETHYLMERCAPTOETHYL THIOPHOSPHATE, DIETHOXY-THIOPHOSPHORIC ACID is located in the "D" section (as "diethylethylmercaptoethyl-

thiophosphate, diethoxythiophosphoric acid").

Flash point: This is defined as "the minimum temperature (at 760 mm Hg/1 atm) at which the liquid or gives off sufficient vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used. Data are apparatus- and procedure-dependent." Depending on the test method used, the values given are either Tag Closed Cup (cc) (ASTM D56) or Cleveland Open Cup (oc) (ASTM D93). However, in practice (e.g., outside the laboratory), ignition may occur at lower temperatures than those provided and it should also be noted that flash points found in the literature may differ for various reasons, including the presence of impurities. When a precise flash point is required, it should be established or verified by testing a technical-grade sample of the chemical substance. The values, along with those in *Flammable Limits in Air* and *Autoignition Temperature* below, give an indication of the relative flammability of the chemical. In general, the open-cup value may be about 10 to 15°F higher than the closed-cup value.

Flammable Limits in Air: The percent concentration in air (by volume) is given for the LEL [lower explosive (flammable) limit in air, % by volume] and UEL [upper explosive (flammable) limit in air, % by volume], at room temperature, unless otherwise specified. The values, along with those in Flash Point and Autoignition Temperature give an indication of the relative flammability of the chemical.

Autoignition Temperature: This is the minimum temperature at which the material will ignite without a spark or flame being present. Values given are only approximate and may change substantially with changes in geometry, gas, or vapor concentrations, presence of catalysts, or other factors. Also called Ignition Temperature. *Fire Rating*: [(based on the National Fire Protection Association (NFPA®-704) Rating System and/or the New Jersey Department of Health and Senior Services (NJHDSS)]: **Code 4** —Materials which will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or that are readily dispersed in air and that will burn readily. **Code 3**—Liquids and solids that can be easily ignited under almost all normal temperature conditions. **Code 2**—Materials that must be moderately heated or exposed to relatively high ambient temperature before ignition can occur. **Code 1**—Materials that must be preheated before ignition can occur. It should be noted that U.S. OSHA and U.S. DOT have differing definitions for the term "flammable" and "combustible." DOT defines a flammable liquid as one that, under specified procedures, has a flash point of 140°F/60°C or less. A combustible liquid is defined as .having a flash point above 140°F/60°C and below 200°F/93°C. This definition is used in this book. Many experts use 100°F/37.8°C as the point to differentiate these terms. Therefore, for reference only, the following (from 29 CFR 1910.106) is used by OSHA to classify flammable or combustible liquids:

- Class IA flammable liquid...Flash point below 73°F and boiling point below 100°F.
- Class IB flammable liquid...Flash point below 73°F and boiling point at or above 100°F.
- Class IC flammable liquid—Flash point at or above 73°F and below 100°F
- Class II combustible liquid—Flash point at or above 100°F and below 140°F
- Class IIIA combustible liquid—Flash point at or above 140°F and below 200°F
- Class IIIB combustible liquid—Flash point at or above 200°F

Extremely flammable liquids should be transported by gravity, pumping, or inert gas propellent. The use of compressed air will cause the spreading of fumes and air-vapor mixtures. In confined spaces combustion can lead to violent explosion.

Some materials are sensitive to heat and can deflagrate without any addition of air. When heated to decomposition, many substances emit toxic, flammable, and explosive vapors; some will ignite or explode.

Although intended to be helpful in preventing, or at least minimizing, the harmful effects of chemical accidents, this guide will not address all possible contingencies that may be associated with storage or chemical mixtures and should not

be considered a substitute for the user's own knowledge or judgment. In compiling this manual the editors used various sources of information and occasionally contradictory data were found in the literature. Consequently, the editors and the publisher strongly urge users to consult chemical manufacturers' and suppliers' technical bulletins, material safety data sheets, labels, and shipping and other documents related to protection from and the safe handling and storage of all chemical substances. Furthermore, users are cautioned that the absence of specific reaction information in no way implies that different materials or combinations of materials, under any set of conditions, may be safely mixed or otherwise used. In like manner, users must weigh comments about the "violence" of particular reactions, which may be affected by factors such as the amount of material, physical properties, temperature, use of closed or restricted systems, and so on. In some cases very small quantities of contamination or the presence of other materials in the working environment may act as a catalyst and produce violent reactions such as polymerization, disassociation, and condensation.

It should be noted that foreign names do not contain distinctive or diacritical marks used to aid in a particular country's pronunciation; therefore, a name such as ACIDO FOSFÓRICO appears as ACIDO FOSFORICO or ACIDE ACÉTIQUE appears as ACIDE ACETIQUE.

KEY TO ABBREVIATIONS, SYMBOLS, AND ACRONYMS

α	Greek letter alpha; used as a prefix to denote the carbon atom in a straight chain compound to which the principal group is attached
AAAF	aqueous film-forming foam
AIHA	American Industrial Health Association
approx	approximately
ASTM	American Society for Testing and Materials
asym- or *as-*	prefix for asymmetric
@	at
atm.	atmosphere
β	Greek letter beta
BP	boiling point
°C	degrees Centigrade
carc.	carcinogen
CAS	Chemical Abstract Service
cc	cubic centimeter
cc	closed cup (flash point)
CFCs	chlorofluorocarbons
CFR	*Code of Federal Regulations*
cis-	Latin: *on this side*; indicating one of two geometrical isomers in which certain atoms or groups are on the same side of a plane
cyclo-	Greek: *circle*; cyclic, ring structure; as cyclohexane
Δ or δ	Greek letter delta
DMF	dimtehylformamide
DOT	U.S. Department of Transportation
ε	Greek letter epsilon
°F	degrees Fahrenheit
FR	*Federal Register*
γ	Greek letter gamma
h	hour(s)
HCFC	hydrochlorofluorocarbons
IDLF	immediately dangerous to life and health
iso-	Greek: *equal, alike*; usually denoting an isomer of a compound
IUPAC	International Union of Pure and Applied Chemistry
kg	kilogram(s)
l	liter(s)
lb	pound(s)
lel	Lower explosive (flammable) limit in air, % by volume at room temperature or other temperature as noted
m-	abbreviation for *meta-*, prefix used to distinguish between isomers or nearly related compounds
m^3	cubic meter
mg	milligram(s)
μ	micro
μg	microgram(s)
min	minute(s)
mmHg	millimeters of mercury (non-SI symbol for pressure); also known as "torr"
MSDS	material safety data sheets
n-	abbreviation for "normal," referring to the arrangement of carbon atoms in a chemical molecule prefix for normal
N-	Symbol used in some chemical names, indicating that the next section of the name refers to a chemical group attached to a nitrogen atom; the bond to the nitrogen atom
NFPA	National Fire Protection Association
NTP	National Toxicology Program
o-	*ortho-*, a prefix used to distinguish between isomers or nearly related compounds
ω	Greek letter omega
oc	open cup
OSHA	Occupational Safety and Health Administration
Oxy	Oxidizer or oxidizing agent

p-	abbreviation for *para-*, prefix used to distinguish between isomers or nearly related compounds
PBB	polybrominated biphenyl
PCB	polychlorinated biphenyl
PE	polyethylene
ppb	parts per billion
ppm	parts per million
prim-	prefix for primary
PVC	polyvinyl chloride
®	symbol for a registered trademark or proprietary product
sec-	prefix for secondary
sym-	abbreviation for "symmetrical," referring to a particular arrangement of elements within a chemical molecule
t-	prefix for tertiary
tert-	abbreviation for "tertiary," referring to a particular arrangement of elements within a chemical molecule
thio-	containing a sulfur atom
trans-	Latin: *across*; indicating that one of two geometrical isomers in which certain atoms or groups are on opposite sides of a plane
uel	upper explosive (flammable) limit in air, % by volume at room temperature or other temperature as noted
unsym-	prefix for asymmetric
>	symbol for "greater than"
<	symbol for "less than"
≤	symbol for "less than or equal to"
≥	symbol for "greater than or equal to"
°	degrees of temperature
%	percent

CONTENTS

A

ABICEL® (9004-34-6) $(C_6H_{10}O_5)_x$ Combustible solid. Fine dust can form explosive mixture with air (flash point 770°F/410°C; Fire Rating: 1). Violent reaction with strong oxidizers including bromine pentafluoride; fluorine, hydrogen peroxide; perchlorates, perchloric acid; peroxides; sodium hypochlorite; sodium nitrate; sodium nitrite; zinc permanganate. On small fires, use H_2O, foam, dry chemical, or CO_2 extinguishers. Nitration with a mixture of nitric and sulfuric acids produces cellulose nitrates (celluloid pyroxylin, soluble pyroxyline, guncotton) which are flammable or explosive.[3]

ABSOLUTE ALCOHOL or ABSOLUTE ETHANOL (64-17-5) see ethanol.

ACEDE CRESYLIQUE (French) (1319-77-3) see cresols.

ACEITE de CITRONELA (Spanish) (8000-29-1) see citronella oil.

ACEITE de PINO (Spanish) (8002-09-3) see pine oil.

ACEITE de RICINO (Spanish) (8001-79-4) see castor oil.

ACETAL (105-57-7) $C_6H_{14}O_2$ Extremely flammable liquid. Low ignition temperature makes it very dangerous. Forms explosive mixture with air [explosion limits in air (vol %) 1.65 to 10.4; flash point –5°F/–20°C cc; autoignition temp 446°F/230°C; Fire Rating: 3]. Reacts violently with oxidizers. Contact with acids may cause decomposition. Forms unstable and explosive peroxides on contact with air, heat, and light. Flow or agitation of substance may generate electrostatic charges due to low conductivity; ground all equipment containing this material. Peroxide hazard on concentration; do not distill or evaporate without first testing for the presence of peroxides. On small fires, use dry chemical, CO_2, or alcohol-resistant foam extinguishers. Date containers when opened and discard or test for peroxides (and re-date) 6 months after opening.[1]

ACETALDEHYDE (75-07-0) C_2H_4O Highly flammable; extremely low ignition temperature makes it very dangerous. Forms explosive mixture with air [explosion limits in air (vol %) 4.1 to 60; flash point –36°F/–38°C cc; autoignition temp 365°F/185°C; Fire Rating: 4]. Oxidizes freely in air, forming unstable peroxides that can explode spontaneously. In the presence of air it will slowly polymerize, forming paraldehyde and corrosive acetic acid. Exposure to heat, dust and other contaminants, corrosives, or oxidizers can cause evolution of heat and, without warning, possible explosive polymerization. Contact with strong acids, strong bases, or traces of metals may cause vigorously exothermic condensation reaction. A strong reducing agent; reacts violently with oxidizers such as dinitrogen pentaoxide, hydrogen peroxide, oxygen, silver nitrate, etc.; acid anhydrides; alcohols (condensation reaction), anhydrous ammonia; aliphatic amines, bromine, caustic materials, chlorine, ketones, halogens, hydrogen cyanide; hydrogen sulfide, isocyanates, oxidizers, phenols, phosphorus. Explodes when mixed with iodine, oxygen. May dissolve rubber. Slightly corrosive to mild (low carbon) steel. Flow or agitation of substance may generate electrostatic charges due to low conductivity; ground all equipment containing this material. Pure product attacks rubber, coatings, and some plastics (PVC, nitrile, polyethylene, polyvinyl alcohol, Teflon®, polyurethane, neoprene, Viton®). For storage, add an inhibitor and store in the dark in airtight containers, under cool, fireproof conditions. Extinguish fires with alcohol-resistant foams, chemical powder, CO_2 or flood with water.

***p*-ACETALDEHYDE** (123-63-7) $C_6H_{12}O_3$ A highly flammable liquid. Forms explosive mixture with air [explosion limits in air (vol %) 1.3 to 17; flash point 75°F/24°C[13,26]; 96°F/36°C[NTP,6]; autoignition temp 460°F/238°C; Fire Rating: 3]. Decomposes on contact with acids or acid fumes, forming acetaldehyde. Reacts with alkalis, strong acids, caustics, amines, amides, organic hydroxides; ammonia, hydrocyanic acid; iodides; oxidizers. This material may decompose in light and air, on prolonged

storage to acetaldehyde and acetic acid. Flow or agitation of substance may generate electrostatic charges due to low conductivity; ground all equipment containing this material. Attacks rubber and plastics; copolymers of polystyrene and styrene-acrylonitrile. On small fires, use dry chemicals, foam, or CO_2 extinguishers.

ACETALDEHYDE DIETHYL-ACETAL (105-57-7) $C_6H_{14}O_2$ Extremely flammable liquid. Low ignition temperature makes it very dangerous. Forms explosive mixture with air [explosion limits in air (vol %) 1.65 to 10.4; flash point –5°F/–20°C cc; autoignition temp 446°F/230°C; Fire Rating: 3]. Reacts violently with oxidizers. Contact with acids may cause decomposition. Forms unstable and explosive peroxides on contact with air, heat, and light. Flow or agitation of substance may generate electrostatic charges due to low conductivity; ground all equipment containing this material. Peroxide hazard on concentration; do not distill or evaporate without first testing for the presence of peroxides. On small fires, use dry chemical, CO_2, or alcohol-resistant foam extinguishers. Date containers when opened and discard or test for peroxides (and re-date) 6 months after opening.[1]

ACETALDEHYDE DIMETHYL ACETAL (534-15-6) $C_4H_{10}O_2$ Highly flammable liquid; extremely low ignition temperature makes it very dangerous. Forms explosive mixture with air (flash point –17°F/1°C; Fire Rating: 3). May be able to form unstable peroxides. Reacts violently with strong oxidizers. Incompatible with aliphatic amines, amides, strong acids like sulfuric acid, nitric acid; caustics, Lewis acids (aluminum chloride, boron trifluoride, ferric chloride, etc.), isocyanates. Flow or agitation of substance may generate electrostatic charges due to low conductivity; ground all equipment containing this material. On small fires, use dry chemicals, CO_2, or alcohol-resistant foam extinguishers. Peroxide hazard on storage with exposure to air. Date and discard after 3 years.

ACETALDEHYDE OXIME or β-ACETALDEHYDE OXIME (107-29-9) C_2H_5NO Flammable liquid. Forms explosive mixture with air [flash point 72 to 96°F/22 to 36°C]. Reacts violently with oxidizers. Capable of reacting as both a weak base and a weak acid. Decomposes on contact with acids, forming hydroxylamine and acetaldehyde. Forms explosive peroxides on contact with air, acids. Attacks various alkali metals (i.e., lithium, sodium, potassium, rubidium, cesium, francium). When exposed to air forms unstable peroxides; may explode or decompose violently during distillation.

ACETALDEHYDE TRIMER (123-63-7) see paraldehyde.

ACETAL DIETHYLIQUE (French) (105-57-7) see acetal.

ACETALDOL (107-89-1) $C_4H_8O_2$ Poisonous, combustible liquid. Forms explosive mixture with air (flash point 150°F/66°C oc; Fire Rating: 2). Violent reaction with strong oxidizers; carboxylic acids may be formed. Contact with acids, isocyanates, or epoxides may cause exothermic polymerization or self-condensation reactions. May form flammable and/or toxic gases or otherwise react violently with bromine, ketones. Incompatible with strong acids, alkali metals; azo dyes, carboxylic acids; caustics, diazo compounds; dithiocarbamates, nitrides, ammonia, amines, boranes, strong reducing agents (alkali metals, hydrides, nitrides, and sulfides), including hydrazines; salts of transition metals (e.g., cobalt, iron, manganese, nickel, vanadium), oxoacids. Consider the addition of a stabilizer to retard autoxidation, which may make it light-sensitive.

ACETALDOXIME or β-ACETALDOXIME (107-29-9) C_2H_5NO Flammable liquid. Forms explosive mixture with air [flash point 72 to 96°F/22 to 36°C]. Reacts violently with oxidizers. Capable of reacting as both a weak base and a weak acid. Decomposes on contact with acids, forming hydroxylamine and acetaldehyde. Forms explosive peroxides on contact with air, acids. Attacks various alkali metals (i.e., lithium, sodium, potassium, rubidium, cesium, francium). When exposed to air forms unstable peroxides; may explode or decompose violently during distillation.

ACETAMIDE, *N,N'*-DIMETHYL (127-19-5) C_4H_9NO Combustible liquid

[explosion limits in air (vol %) 1.8 to 13.8; flash point 158°F/70°C oc; autoignition temp 914°F/490°C; Fire Rating: 2]. Violent reaction with strong oxidizers, halogenated compounds; carbon tetrachloride; hexachlorocyclohexane. Reacts violently in the presence of iron.[NTP] Incompatible with mineral acids, strong acids, ammonia, isocyanates, phenols, cresols. Attacks many plastics, rubber, and coatings. When heated to decomposition, emits carbon oxides, nitrogen oxides, and dimethylamine. On small fires, use alcohol-resistant foam, dry chemical, or CO_2 extinguishers. *Do not use* halogen extinguishers or water.

ACETAMIDOBENZENE (103-84-4) **C_8H_9NO** A combustible solid (flash point 345°F/174°C; autoignition temp 986°F/530°C; 1004°F/540°C[NTP]; Fire Rating: 1). Slowly hydrolyzes in water, releasing ammonia and, forming acetate salts; this process is accelerated with heat in an acid or caustic environment. Contact with strong reducing agents forms flammable gases. Reacts with strong oxidizers and strong bases (forming salts). A weak base. Reacts with strong oxidizers (may cause fire or explosion); caustics, strong bases; strong reducing agents, including metal hydrides, nitrides, sulfides, and alkali metals. UV light can cause chemical alteration (the acetyl group forms a new bond on ring in the *o*- or *p*-position.). When heated to decomposition, produces nitrogen oxides; carbon monoxide; carbon dioxide. On small fires, use dry chemical, carbon dioxide or Halon® extinguishers.

ACETANIL or ACETALNILIDA (Spanish) **or ACETANILIDE** (103-84-4) **C_8H_9NO** A combustible solid (flash point 345°F/174°C; autoignition temp 986°F/530°C; 1004°F/540°C[NTP]; Fire Rating: 1). Slowly hydrolyzes in water, releasing ammonia and, forming acetate salts; this process is accelerated with heat in an acid or caustic environment. Contact with strong reducing agents forms flammable gases. Reacts with strong oxidizers and strong bases (forming salts). A weak base. Reacts with strong oxidizers (may cause fire or explosion); caustics, strong bases; strong reducing agents, including metal hydrides, nitrides, sulfides, and alkali metals. UV light can cause chemical alteration (the acetyl group forms a new bond on ring in the *o*- or *p*-position.). When heated to decomposition, produces nitrogen oxides; carbon monoxide; carbon dioxide. On small fires, use dry chemical, carbon dioxide or Halon® extinguishers.

ACETATE d'ALLYLE (French) (591-87-7) see allyl acetate.

ACETATE d'AMMONIUM (French) (631-61-8) see ammonium acetate.

ACETATE d'AMYLE (French) (628-63-7) see *n*-amyl acetate.

ACETATE de BUTYLE (French) (123-86-4) see butyl acetate.

ACETATE de BUTYLE SECONDAIRE (French) (105-46-4) see *sec*-butyl acetate.

ACETATE de CUIVRE (French) (142-71-2) see copper acetate.

ACETATE d'ISOPROPYLE (French) (108-21-4) see isopropyl acetate.

ACETATE de L'ETHER MONO-METHYLIQUE de L'ETHYLÈNE-GLYCOL (French) (110-49-6) see ethylene glycol monomethyl ether acetate.

ACETATE de METHYLE (French) (79-20-9) see methyl acetate.

ACETATE de METHYLE GLYCOL (French) (110-49-6) see ethylene glycol monomethyl ether acetate.

ACETATE de PLOMB (French) (301-04-2) see lead acetate.

ACETATE de PROPYLE NORMAL (French) (109-60-4) see propyl acetate.

ACETATE SALICYCLIC ACID (50-78-2) **$C_9H_8O_4$** Combustible solid. An organic acid. Powder or dust forms explosive mixture with air (flash point 482°F/250°C). Reacts wit strong oxidizers, strong acids, strong bases. Contact with alkali hydroxides or carbonates may cause decomposition. Incompatible with acetanilide, acetaminophen, some alcohols, aliphatic amines; alkanolamines, alkylene oxides; amidopyrine, amines, ammonia, caustics, epichlorohydrin, hexamine, iron salts; isocyanates, phenozone, phenobarbital sodium; potassium iodide; quinine salts; sodium iodide; stearates. Slowly hydrolyzes in moist air. On small fires, use AFFF,