

July 31, 2008

MEMORANDUM

To: ISU Faculty and Staff
From: Pam Crowell, Ph.D., Vice President for Research
Richard Brey, Ph.D., Director, Technical Safety Office
Subject: Disposal of materials declared to be high hazards

There are several chemicals found commonly throughout campus that when allowed to deteriorate require special attention and additional costs for disposal.

We request that you review your chemical inventories to identify and properly handle or dispose of chemicals deemed to be high hazards. A list of "high hazard" chemicals is attached. Should you have questions about this request please contact the ISU Technical Safety Office (TSO) at Extension 2310.

Our current waste broker classifies chemicals as "high hazard" if they have reached their label expiration date, or if they have apparently deteriorated to unstable states. Once classified as "high hazard," such items must be handled by a team specially equipped to deal with highly hazardous materials. Such circumstances impose unnecessary risk to students, staff and faculty as well as a high cost burden for handling and disposal. A series of recent incidents involving the disposal of high hazard chemicals, their potential consequences in terms of health and safety, and the additional cost incurred by the university have prompted this request.

We request that you take two sets of actions:

- (1) Please compare your chemical inventory to the attached list of chemicals deemed as highly hazardous for handling if their expiration dates are exceeded. Should you be in possession of a chemical on the high hazard list which has exceeded its label expiration date or is within 270 days of expiring, please contact the Idaho State University Technical Safety Office (TSO) (extension 2310) for prompt removal of the material at no cost to your academic-unit. If you identify a high-hazard material without an expiration date, we will assume it has expired and deal with it appropriately.

Our next shipment date for the disposal of all hazardous material is August 13, 2008. Please contact the Technical Safety Office as soon as possible before that date to provide time for dealing with the materials in question. A second shipment of hazardous materials for disposal will be in about April of 2009.

- (2) We recommended that you maintain a written inventory of all chemicals in your possession. You are required to hence forth maintain inventory control over all potential high hazard materials and have the TSO remove them from inventory at least 270 days prior to their expiration date. Prior to the expiration date, these chemicals are not

declared as highly hazardous material and can be handled as normal hazardous waste. Should you have a high hazardous material that elicits “high hazard” handling and disposal cost after the April 2009 shipment, your academic-unit will be asked to pay the additional cost of handling and disposal.

Please note that we are not in any way prohibiting the use of these materials prior to their expiration date and default listing as highly hazardous material. Rather, we are working with you to ensure that such material is handled in a timely, legal, and appropriate fashion prior to its expiration date. Thank you in advance for your cooperation.



Reactive Material Services

AZIDE COMPOUNDS

Azide compounds (RN3) are derivatives of hydrogen azide (HN3). There are both inorganic and organic derivatives. They vary widely in their stability and some members of both classes are unstable and potentially explosive. Azide compounds also display significant human toxicity, primarily due to the evolution of hydrogen azide.

Ammonium azide	Diazonium nitrates (dry)
Azido guanidine picrate (dry)	Diazonium perchlorates (dry)
5-Azido-1-hydroxy tetrazole	Diphenyl Phosphoryl Azide
Azido hydroxy tetrazole (mercury & silver salts)	1,3-Diazopropane
3-Azido-1,2-propylene glycol dinitrate	N,N'-Dichlorazodicarbonamidine (salts of) (dry)
Azidodithiocarbonic acid	Hydrazine azide
Azidoethyl nitrate	Hydrazoic acid solutions >10%
Azidotrimethyltin	Hydrogen azide
Azotetrazole (dry)	Iodine azide (dry)
Benzoyl Azide	Lead Azide (dry)
Benzyl Azide	Mercuric azide
Bromine azide	Mercurous azide
Chlorine azide	Nitrobenzoyl Azide
Copper amine azide	Silver azide (dry)
Cupric azide	Sodium Azide
Cuprous azide	Tert-butoxy Carbonyl Azide
p-Diazidobenzene	Tetraazido benzene quinone
1,2-Diazidoethane	Tetrazoyl azide (dry)
1,1'-Diazoaminonaphthalene	Tosyl Azide
Diazoaminotetrazole (dry)	Trimethylsilylazide
Diazodinitrophenol (dry)	Tri-n-butyl ammonium azide
Diazidiphenylmethane	p-Xylyl diazide

The above list is not a complete listing of all unstable azides. In addition, even stable azides can become unstable under certain conditions.

MONO AND DINITRO COMPOUNDS

The main issues associated with mono and dinitro compounds are that some are considered potentially explosive or shock sensitive when dry and/or need to be wetted

- dinitroglycoluril or dingu
- dinitronaphthalene
- dinitrophenol
- dinitrophenolates, alkali metals
- dinitrophenyl hydrazine
- dinitroresorcinol
- dinitroaminophenol or picramic acid
- dinitrosobenzene
- N,N-dinitroso-N,N-dimethylterephthalamide
- N,N-dinitrosopentamethylenetetramine

This list is not all inclusive of all chemicals which could be highly hazardous. The listed chemicals are substances which Clean Harbors as a matter of its own health & safety protocols have analyzed handling in the context of its particular facilities and processes. The List is not intended to be utilized or relied upon by others for any other purpose and is a representation of specific materials Clean Harbors has determined to be materials which require special handling by its personnel only or as a company we will not accept



Reactive Material Services

nitrocellulose
nitroguanidine or picrite
nitrosoguanidine
nitrostarch
nitrourea
sodium dinitro-o-cresolate
sodium picramate
urea nitrate

TRI AND MULTINITRATED COMPOUNDS

The main issue with these compounds is that **all are considered potentially explosive or shock sensitive under various conditions** (e.g., dry, contaminated, etc.)

ammonium picrate
hexanitrodiphenylamine or dipicrylamine or hexyl
hexanitrostilbene
trinitro-m-cresol
trinitroaniline or picramide
trinitroanisole
trinitrobenzene
trinitrobenzenesulfonic acid or picrylsulfonic acid
trinitrobenzoic acid
trinitrofluorenone
trinitronaphthalene
trinitrophenetole
trinitrophenol or picric acid
trinitrophenylmethylnitramine or tetryl
trinitroresorcinol or styphnic acid
trinitrotoluene or TNT
various picrates

PEROXIDE FORMING MATERIALS

GROUP I MATERIALS

These materials form peroxides that may explode even without being concentrated.

CHEMICAL	SYNONYMS	DESCRIPTION
Isopropyl ether	Diisopropyl Ether, Diisopropyl Oxide	Colorless Liquid
Diethyl Ketene	2 ethyl 1 butene 1 one	Liquid
Divinyl Ether	Vinyl Ether, Divinyl Oxide	Liquid
Potassium Metal	Potassium	Silver White Metal
Potassium Amide		Solid
Sodium Amide	Sodamide	White crystalline powder
Sodium Ethoxyacetylde		
Vinylidene Chloride	1,1,-dichloroethylene 1,1-dichloroethane	Colorless Liquid

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GROUP II MATERIAL

Peroxide hazard on concentration. Distillation or most likely evaporation.

CHEMICAL	SYNONYMS	DESCRIPTION
p- dioxane	1,4 dioxane, diethylene dioxide	Colorless liquid
Ethyl ether	Ether, diethyl ether, ethoxyethane	
Tetrahydrofuran	Butylenes oxide, diethylene oxide	
Acetal	1,1 diethoxyethane, diethyl acetal	
Cumene	Isopropyl benzene	
Cyclohexene	1,2,3,4 tetrahydrobenzene	
Cyclopentene		
Diacetylene	Beacetylene	Gas
Ethylene glycol dimethyl ether	1,2, dimethoxy ethane, glyme, monoglyme	Liquid
Furan	Divinylene oxide	Water white liquid
Methyl actylene	Allylene, propyne	Colorless gas or liquid
Methyl cyclopentane		
Tetrahydronaphthalene	Tetraline	
Vinyl ethers	Ethyl vinyl ether, methyl vinyl ether	
Other unlisted ethers	Call in for evaluation	
Diethylene glycol dimethyl ether	Diglyne	
Acetaldehyde	Ethanal, ethyl aldehyde	

GROUP III MATERIALS

Peroxide hazard due to peroxide initiation of polymerization. All materials in Group III with the exception of material stored as a liquid (the peroxide forming potential increase and certain of these monomers, especially butadiene, chloroprene, and tetrafluoroethylene). These materials should be considered a Group I material.

CHEMICAL	SYNONYMS	DESCRIPTION
1,3 butadiene	Vinylethylene, divinyl	Colorless gas
Chlorobutadiene	Chloroprene	Colorless liquid
Chlorotrifluoroethylene	Trifluorochloroethylene, genetone 1113	Gas
Tetrafluoroethylene	Perfluoroethylene	Colorless gas
Vinyl acetate		Colorless liquid
Vinyl acetylene	Buten-3-yne	Colorless gas or liquid
Vinyl chloride	Chloroethylene, ethylene monochloride	Colorless gas or liquid
Vinyl pyridine		Colorless liquid

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Reactive Material Services

NFPA CLASS 4 OXIDIZER

Oxidizers that fall under the Class 4 NFPA (National Fire Prevention Association) oxidizer category require special evaluation consideration due to their potential for reactivity and shock sensitivity when contaminated or exposed to thermal or physical shock.

- Tetranitromethane
- Ammonium Perchlorate
- Guanidine Nitrate
- Hydrogen Peroxide >90%
- Ammonium Permanganate

ORGANIC PEROXIDES

Organic peroxides can be highly reactive and dangerous compounds if mistreated or mishandled. The main hazard associated with organic peroxides is decomposition. The main causes of peroxide decomposition are Heat, Fire, Friction, Shock and Contamination. Many organic peroxides require temperature controls (e.g., refrigerated vehicle) per DOT regulations when being transported or have been classified as subsidiary explosive compounds per DOT.

2,5-Dimethyl-2,5-Di(2-ethylhexanoylperoxy) Hexane
2,5-Bis(tert-butylperoxy)_2,5-dimethyl-3-hexyne
tert-butyl peroctoate w/ 1,1-di-(tert-butyl-peroxy)-3,3,5-trimethylcyclohexane
Tert Amyl-Peroxy-2-ethylhexanoate
Benzoyl peroxide
tert-butyl peroxy-2-ethylhexanoate (50%)
D-(4-tert-butylcyclohexyl) peroxydicarbonate
Dicumyl Peroxide
MEK Peroxide (45%)
MEK Peroxide
Di-tert-Butyl Peroxide
tert-Butyl peroxybenzoate
1,1 Di(tert-butylperoxy)-3,3,5 trimethylcyclohexane in Dibutyl Phthalate
Di-tert-butyl peroxide
Di-Butylcyclohexyl peroxydicarbonate
t-butyl peroxybutane
Di-t-Amyl peroxy-cyclohexane
t-Amyl peroxyethylhexanoate
t-Amyl peroxyneoheptanoate
t-Amyl peroxy-pivalate
t-Amyl peroxyneodecanoate
t-Butyl Cumyl Peroxide
t-Butyl peracetate
Methyl Ethyl Ketone Peroxide
t-Butyl peroctoate

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Reactive Material Services

Amyl Peroxyacetate
t-Butyl hydroperoxide
Dimethyl dibenzoylperoxyhexane
Ethyl amyloperoxybutyrate
t-Butyl peroxyethylhexanoate
t-Butyl peroxyisopropylcarbonate
t-Butylperoxytrimethylcyclohexane
Dimethylhexane diperoxyethylhexanoate
Dimethyl butylperoxyhexane
Butyl peroxydiisopropylbenzene
Cyclohexanone Peroxide
Butyl hydroxyethylperoxide

PERCHLORIC ACID

Perchloric acid (HClO₄) is a highly corrosive and oxidizing material. It is also a highly reactive material if in contact with incompatibles. Perchloric acid can explode on contact with many organics and can form potentially explosive metal perchlorates if mixed with metals. It is also forbidden to transport in concentrations >72%.

Perchloric Acid >72%

Contaminated Perchloric Acid

Decontamination Perchloric Acid fume hoods and spill type releases

AZO COMPOUNDS

Azo compounds have a wide variety of hazards. These hazards include:

- temperature sensitive
- flammable solids
- shock and friction sensitive
- poisonous solids.

The only way to determine the hazard associated with each type of compound is to review each on a case by case basis using MSDS's and/or chemical references.

Azobisisobutyronitrile (VAZO 64)

2,2-azobis(2,4-dimethyl-4-methoxyvaleronitrile)

2,2-azobis(2-methylbutyronitrile)

2,2-azobis(2,4-dimethylvaleronitrile)

ADDITIONAL DOT FORBIDDEN MATERIAL

Azotetrazole (dry)

Benzene diazonium chloride (dry)

Benzene diazonium nitrate (dry)

Benzoxidiazoles (dry)

p-Diazidobenzene

1,2-Diazidoethane

1,1'-Diazoaminonaphthalene

Diazoaminotetrazole (dry)

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Reactive Material Services

Diazodinitrophenol (dry)
Diazidiphenylmethane
Diazonium nitrates (dry)
Diazonium perchlorates (dry)
1,3-Diazopropane
N,N'-Dichlorazodicarbonamidine (salts of) (dry)
Hexanitroazoxy benzene
Hexanitrodiphenylamine
Mercuric Oxycyanide
Methazoic acid
Naphthalene diazonide
Nitrates of diazonium compounds
6-Nitro-4-diazotoluene-3-sulfonic acid (dry)
m-Nitrobenzene diazonium perchlorate
2,4,6-Trinitro-1,3-diazobenzene
p-Xylyl diazide

OTHER DOT EXPLOSIVES

Acetylides of heavy metals
Ammonium Nitrate explosive mixtures
Ammonium Perchlorate
Black Powder
Cyclonite
Cyclotetramethylenetetranitamine (HMX)
Cyclotrimethylenetrinitamine (RDX)
Dipicrylamine
Erythritol Tetranitrate
Fulminates of heavy metals
Lead Styphnate
Mannitol Hexanitrate
Nitroglycerine
Organic Nitramines
Perchlorate explosive mixtures
Pentaerythritol tetranitrate
Picrate explosives
Picryl chloride
Tetranitrocarbazole
Tetrazole explosives
Trinitrobenzoic acid
Unknown Explosives

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