Report of the Committee on

Hazardous Chemicals

John A. Davenport, *Chair*
West Hartford, CT [I]
Rep. Industrial Risk Insurers

Anthony Andrews, Crompton Corporation, TX [M]
Rep. Society of the Plastics Industry Inc.
James E. Benge, Hercules Inc., DE [U]
William J. Bradford, Brookfield, CT [SE]
Henry L. Febo, Jr., FM Global, MA [I]
Richard Ferguson, PPG Industries, PA [M]
Charles L. Gibson, Gibson Technology & Engineering Associates, GA [SE]
H. Dieter Heinz, Heinz Laboratories International, CA [SE]
John M. Hoffmann, Safety Engineering Labs Inc., MI [SE]
Bart Howard, Davenport Fire Department, IA [E]
Ronald Keefer, Menlo Park Fire Protection District, CA [E]
(Vote Ltd. to NFPA 432, 434, 490)
Chester M. McCloskey, The Norac Company, Inc., CA [M]
Robert A. Michaels, RAM TRAC Corporation, NY [SE]
Ralph J. Mikida, FMC Corporation, PA [M]
Milton Norsworthy, Arch Chemicals, Inc., TN [M]
David P. Nugent, Schirmer Engineering Corporation, IL [SE]
Anthony M. Ordile, Loss Control Associates, Inc., PA [SE]
David F. Purdy, BioLab, Inc., GA [M]
George W. Rambo, GRCS Inc., VA [SE]
Gary F. Trojak, Chlorine Institute Inc., DC [M]
(Vote Ltd. to NFPA 434)
Samuel Vanover, Jefferson Parish Fire Department, LA [E]
(Vote Ltd. to NFPA 432, 434, 490)
Michael A. Viggiani, George Eastman House, NY [U]

Alternates

Paul A. Cera, Industrial Risk Insurers, CT [I]
(Alt. to J. A. Davenport)
Richard Cobb, The Norac Company, Inc., CA [M]
(Alt. to C. M. McCloskey)
Lynne R. Harris, Society of the Plastics Industry, Inc., DC [M]
(Alt. to A. Andrews)
Donald J. Hoffmann, Safety Engineering Laboratories, Inc., MI [SE]
(Alt. to J. M. Hoffmann)
Thomas M. Lachocki, BioLab, Inc., GA [M]
(Alt. to D. F. Purdy)

Nonvoting

Charles H. Ke, U.S. Department of Transportation, DC

Staff Liaison: **Carl H. Rivkin**

Committee Scope: This Committee shall have primary responsibility for documents on, and maintain current codes for, classes of hazardous chemicals and codes for specific chemicals where these are warranted by virtue of widespread distribution or special hazards.

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the front of this book.

The Technical Committee on **Hazardous Chemicals** is presenting four Reports for adoption, as follows:

Report I: The Technical Committee proposes for adoption, a reconfirmation to NFPA 42, **Code for the Storage of Pyroxylin Plastic**, 1997 edition. NFPA 42-1997 is published in Volume 2 of the 2001 National Fire Codes and in separate pamphlet form.

NFPA 42 has been submitted to letter ballot of the **Technical Committee on Hazardous Chemicals**, which consists of 19 voting members; of whom 12 voted affirmatively and 7 ballots were not returned (Benge, Bradford, Ferguson, Gibson, Nugent, Purdy, and Rambo).

Report II: The Technical Committee proposes for adoption, amendments to NFPA 432, **Code for the Storage of Organic Perioxide Formulations**, 1997 edition. NFPA 432-1997 is published in Volume 7 of the 2001 National Fire Codes and in separate pamphlet form.

NFPA 432 has been submitted to letter ballot of the **Technical Committee on Hazardous Chemicals**, which consists of 21 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.

Report III: The Technical Committee proposes for adoption, amendments to NFPA 434, **Code for the Storage of Pesticides**, 1998 edition. NFPA 434-1998 is published in Volume 7 of the 2001 National Fire Codes and in separate pamphlet form.

NFPA 434 has been submitted to letter ballot of the **Technical Committee on Hazardous Chemicals**, which consists of 22 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.

Report IV: The Technical Committee proposes for adoption, amendments to NFPA 490, **Code for the Storage of Ammonium Nitrate**, 1998 edition. NFPA 490-1998 is published in Volume 7 of the 2001 National Fire Codes and in separate pamphlet form.

NFPA 490 has been submitted to letter ballot of the **Technical Committee on Hazardous Chemicals**, which consists of 21 voting members. The results of the balloting, after circulation of any negative votes, can be found in the report.

NFPA 42

(Log #CP2)

42- 1 - (Entire Document): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Restructure entire document to comply with the NFPA Manual of Style as follows:
1. Chapter 1 to contain administrative text only.
2. Chapter 2 to contain only referenced publications cited in the mandatory portions of the document.
3. Chapter 3 to contain only definitions.
4. All mandatory sections of the document must be evaluated for usability, adoptability, and enforceability language. Generate necessary committee proposals.
5. All units of measure in document are converted to SI units with inch/pound units in parentheses.
6. Appendices restructured and renamed as "Annexes."
SUBSTANTIATION: Editorial restructuring, to conform with the 2000 edition of the NFPA Manual of Style.
COMMITTEE ACTION: Accept.

(Log #CP3)

42- 2 - (Entire Document): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: The Technical Committee on Hazardous Chemicals reconfirms the 1997 edition of NFPA 42, Code for the Storage of Pyroxylin Plastic.
SUBSTANTIATION: There were no public proposals submitted on NFPA 42. Also, there have been no changes relating to the document that need to be addressed at this time.
COMMITTEE ACTION: Accept.

NFPA 432

(Log #CP1)

432- 1 - (Entire Document): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Restructure entire document to comply with the NFPA Manual of Style as follows:
1. Chapter 1 to contain administrative text only.
2. Chapter 2 to contain only referenced publications cited in the mandatory portions of the document.
3. Chapter 3 to contain only definitions.
4. All mandatory sections of the document must be evaluated for usability, adoptability, and enforceability language. Generate necessary committee proposals.
5. All units of measure in document are converted to SI units with inch/pound units in parentheses.
6. Appendices restructured and renamed as "Annexes."
SUBSTANTIATION: Editorial restructuring, to conform with the 2000 edition of the NFPA Manual of Style.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent

(Log #1)

432- 2 - (2-2): Reject
SUBMITTER: Western Regional Fire Code Dev. Committee
RECOMMENDATION: Revise to read: 2-2* Employee Instruction.
Personnel involved in operations in organic peroxide storage areas shall be instructed in proper and safe handling of such materials, proper use of personal protective equipment, fire suppression equipment, fixed systems, proper and safe disposal of spilled material, and proper emergency procedures. Records shall be maintained of such training and made available to the authority having jurisdiction upon request. Manufacturers' instructions shall be consulted for each specific formulation.
A 2-2. Manual fire fighting in storage areas should be undertaken only by those having a clear understanding of the storage conditions and the characteristics of fires involving organic peroxides.
Delete this reference in A-2-8.
SUBSTANTIATION: Without documentation the above requirement has no meaning or value and since fire suppression equipment is required, this training should be included in this section. The training requirement is also required by OSHA for employees doing fire suppression operations.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: Existing OSHA regulations address emergency response training and recordkeeping requirements.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 14
NEGATIVE: 2
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent
EXPLANATION OF NEGATIVE:
BENGE: I disagree with the Committee's recommendation for this proposal in that adopting the language in the proposal will help to ensure better safety and fire protection system training for employees working with organic peroxides.
KEEFER: Accept. Current OSHA regulations only require facility personnel to know how to use a fire extinguisher. They are not required to be trained in the use of fixed fire protection systems and equipment. Emergency preparedness training is in-line with Federal guidelines for facilities that store or use hazardous materials.

(Log #CP4)

432- 3 - (2-8.1): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Revise text to read as follows:
2-8.1* Manual fire-fighting equipment shall be provided according to manufacturers recommendations and maintained according to the requirements of NFPA 10, Standard for Portable Fire Extinguishers, and NFPA 14, Standard for the Installation of Standpipe and Hose Systems.
SUBSTANTIATION: Clarifies the type of extinguisher to be used.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent

(Log #CP3)

432- 4 - (5-4.3): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Revise text to read as follows:
5-4.3*Buildings of combustible construction employing sun shields such as those illustrated in Figure A-5-4.3 shall be permi tted to be used for detached storage buildings storing less than 5000 lb (2270kg) of organic peroxide formulations ~~in those areas where the temperature inside the storage building can approach or exceed the maximum recommended storage temperature~~.
SUBSTANTIATION: The user must determine the appropriate storage temperature.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent

(Log #CP6)

432- 5 - (A-2-10.2): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Correct the typo in the Class I part of the example shown in paragraph A-2-10.2:

Class I:

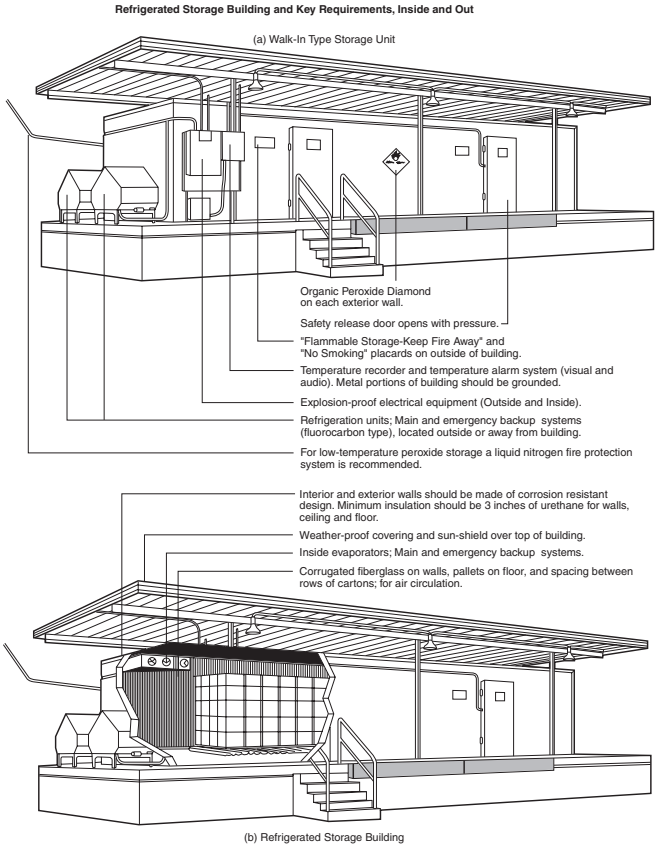
500 lb x 100 = 25%
~~200~~ 2000 lb (max)

SUBSTANTIATION: Correction of typographical error.
COMMITTEE ACTION: Accept.

NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent
COMMENT ON AFFIRMATIVE:
FEBO: Editd equation is not properly displayed to identify correction made.

(Log #CP5)

432- 6 - (A-5-4.1): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Section A.5.4.1 A detached, mechanically refrigerated storage building for storing organic peroxide formulations that require temperature control is illustrated in Figure A.5.4.1.



SUBSTANTIATION: To show an example of a refrigerated building.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent
COMMENT ON AFFIRMATIVE:
FEBO: Older sketch should be replaced with new one not showing specific manufacturer's OPF.

(Log #CP7)

432- 7 - (A-5-4.3): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Revise Figure A.5.4.3:
"is an example of a non-refrigerated building for…".
SUBSTANTIATION: This qualification to the title of Figure A.5.4.3 must be made to allow for the addition of a refrigerated building example to the code.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent

(Log #2)

432- 8 - (Table B-1): Reject
SUBMITTER: Ross Anderson, Kemiva Chemicals Canada, Inc.
RECOMMENDATION: Add new text as follows:
"Peroxyacetic Acid diluent - water container - 5000 gal (20m3) class - IV."
SUBSTANTIATION: Peroxyacetic acid used in North America is typically an equilibrium solution of peroxyacetic acid; containing > 40% acetic acid, > 8% hydrogen peroxide, and water. The flammability hazard is associated with the high content of acetic acid in the presence of an oxidizer. Peroxyacetic acid can be distilled to produce an aqueous solution, containing <2% acetic acid. The submitted report shows that distilled peroxyacetic acid is not flammable. Distilled peroxyacetic acid is currently transported and stored in bulk containers [illegible text] where it is used in the bleaching of wood pulp. The storage tanks are chilled to prevent decomposition to the equilibrium composition.
Note: Supporting material is available for review at NFPA Headquarters.
COMMITTEE ACTION: Reject.
COMMITTEE STATEMENT: The committee has not classified bulk storage and has not developed criteria for this type of storage.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent

(Log #CP8)

432- 9 - (Table B-1, B.2.3, B.3.3, B.4.3, B.5.3, B.6.3): Accept
SUBMITTER: Technical Committee on Hazardous Chemicals
RECOMMENDATION: Update tables B.1, B.2.3, B.3.3, B.4.3, B.5.3, and B.6.3 to make consistent with DOT terminology, correct title of B-1, add hazard identification, make entries consistent among tables, give additional information on temperatures, and add or clarify footnotes. Tables are shown on the following pages
SUBSTANTIATION: These changes would add additional useful information, correct errors in terminology, make terminology consistent with DOT, and increase general ease of use.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 21
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 16
NOT RETURNED: 5 Ferguson, Gibson, Hoffmann, Michaels, Nugent
COMMENT ON AFFIRMATIVE:
FEBO: Corrections to tables as indicated in Tony Andrews 5-7-01 email should be implemented.

Table B-1 Alphabetical listing of typical organic peroxide formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Class	Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity		
t-Amyl hydroperoxide	88	Water			3	3	2	III	55 gal (208 L)
t-Amyl peroxyacetate	60	OMS			2	3	2	III	5 gal (19 L)
t-Amyl peroxybenzoate	96	–			2	3	2	II	5 gal (19 L)
t-Amyl peroxy-2-ethylhexanoate	96	–	20	25	0	3	2	III	55 gal (208 L)
t-Amyl peroxyneodecanoate	75	OMS	0	10	1	3	2	III	5 gal (19 L)
t-Amyl peroxypivalate	75	OMS	10	15	1	3	2	III	5 gal (19 L)
t-Butyl cumyl peroxide	95	–			2	2	2	IV	55 gal (208 L)
n-Butyl-4,4-di-(t-butyl peroxy) valerate	98	–			2	3	2	II	5 gal (19 L)
t-Butyl hydroperoxide	90	Water & t-BuOH			3	3	3	I	5 gal (19 L)
t-Butyl hydroperoxide	70	DTBP & t-BuOH			3	3	3	II	55 gal (208 L)
t-Butyl hydroperoxide[3]	70	Water			3	2	2	IV	55 gal (208 L)
t-Butyl monoperoxymaleate	98	–			2	3	3	I	50 @ 1lb (50 @ 0.5kg)
t-Butyl peroxyacetate	75	OMS			1	3	3	I	5 gal (19 L)
t-Butyl peroxyacetate	60	OMS			1	3	3	I	5 gal (19 L)
t-Butyl peroxybenzoate	98	–			1	3	3	II	5 gal (19 L)
t-Butyl peroxy-2-ethylhexanoate	97	–	20	25	1	3	3	III	5 gal (19 L)
t-Butyl peroxy-2-ethylhexanoate	97	–	20	25	1	3	3	II	55 gal (208 L)
t-Butyl peroxy-2-ethylhexanoate	50	DOP or OMS	30	35	1	2	2	IV	5 gal (19 L)
t-Butyl peroxy-2-ethylhexanoate	50	DOP or OMS	30	35	1	2	2	III	55 gal (208 L)
t-Butyl peroxy-2-ethylhexyl carbonate	95	–			1	3	2	III	5 gal (19 L)
t-Butyl peroxyisobutyrate	75	OMS	15	20	2	3	3	II	5 gal (19 L)
t-Butylperoxy isopropyl carbonate	92	OMS			1	3	3	I	5 gal (19 L)
t-Butylperoxy isopropyl carbonate	75	OMS			1	3	3	II	5 gal (19 L)
t-Butyl peroxyneodecanoate	75	OMS	0	10	2	3	2	III	5 gal (19 L)
t-Butyl peroxypivalate	75	OMS	0	10	2	3	3	II	5 gal (19 L)

Table B-1 Alphabetical listing of typical organic peroxide formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Class	Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity		
t-Butyl peroxypivalate	45	OMS	0	10	2	2	2	IV	5 gal (19 L)
Cumyl hydroperoxide	88	Cumene			3	2	2	III	55 gal (208 L)
Cumyl peroxyneodecanoate	75	OMS	-10	0	1	3	2	III	5 gal (19 L)
Cumyl peroxyneoheptanoate	75	OMS	0	10	2	3	2	III	5 gal (19 L)
Diacetyl peroxide	25	DMP	20	25	2	3	3	II	5 gal (19 L)
1,1-Di-(t-amylperoxy) cyclohexane	80	OMS or BBP			2	3	2	III	5 gal (19 L)
Dibenzoyl peroxide	98	–			1	3	4	I	1 lb (0.5 kg)
Dibenzoyl peroxide	78	Water			1	2	3	II	25 lb (11 kg)
Dibenzoyl peroxide	75	Water			1	2	2	III	25 lb (11 kg)
Dibenzoyl peroxide	70	Water			1	2	2	IV	25 lb (11 kg)
Dibenzoyl peroxide (paste)	55	Plasticizer	T		1	2	2	III	350 lb (160 kg)
Dibenzoyl peroxide (paste)	55	Plasticizer & Water	T		1	2	2	IV	350 lb (160 kg)
Dibenzoyl peroxide (paste)	50	Plasticizer	T		1	2	2	III	380 lb (170 kg)
Dibenzoyl peroxide (paste)	50	Plasticizer & Water	T		1	2	2	IV	380 lb (170 kg)
Dibenzoyl peroxide (slurry)	40	Water & Plasticizer	T		1	2	2	IV	380 lb (170 kg)
Dibenzoyl peroxide (slurry)	40	Water			1	2	2	IV	5 gal (19 L)
Dibenzoyl peroxide (powder)	35	Dicalcium phosphate dihydrate or Calcium sulfate dihydrate			1	0	0	V	100 lb (45 kg)
Dibenzoyl peroxide (powder)	35	Starch			1	2	2	IV	100 lb (45 kg)
Di-(4-t-butylcyclohexyl) peroxydicarbonate	98	–	30	35	1	3	2	III	88 lb (40 kg)
Di-t-butyl peroxide[3]	99	–			1	3	2	III	55 gal (208 L)
2,2-Di-(t-butylperoxy) butane	50	Toluene			1	3	3	I	1 gal (4 L)
1,1-Di-(t-butylperoxy) cyclohexane	80	OMS or BBP			1	3	3	II	5 gal (19 L)
Di-sec-butyl peroxydicarbonate	98	–	-20	-10	1	3	3	II	1 gal (4 L)
Di-sec-butyl peroxydicarbonate	75	OMS	-20	-10	1	3	3	II	5 gal (19 L)
Di-(2-t-butylperoxyisopropyl) benzene	96	–			1	2	2	III	100 lb (45 kg)

Table B-1 Alphabetical listing of typical organic peroxide formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Class	Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity		
Di-(2-t-butylperoxyisopropyl) benzene	40	Clay			1	1	0	V	100 lb (45 kg)
Di-(t-butylperoxy) phthalate	40	DBP			2	2	2	IV	30 gal (110 L)
1,1-Di-(t-butylperoxy)-3,3,5-trimethylcyclohexane	75-95	–			2	3	3	II	5 gal (19 L)
1,1-Di-(t-butylperoxy)-3,3,5-trimethylcyclohexane	40	Calcium carbonate			1	1	1	V	100 lb (45 kg)
Dicetyl peroxydicarbonate	85	–	30	35	1	2	2	IV	44 lb (20 kg)
Dicumyl peroxide	98	–			2	2	2	IV	55 gal (208 L)
Dicumyl peroxide	40	Clay or Calcium carbonate			1	1	1	V	100 lb (45 kg)
Didecanoyl peroxide	98	–	30	35	1	3	2	III	50 lb (23 kg)
Di-2,4-dichlorobenzoyl peroxide	50	DBP & Silicone	T		1	2	2	III	5 gal (19 L)
Di-(2-ethylhexyl) peroxydicarbonate	97	–	-20	-10	1	3	3	II	1 gal (4 L)
Di-(2-ethylhexyl) peroxydicarbonate	40	OMS	-15	-5	1	2	2	IV	5 gal (19 L)
Diisopropyl peroxydicarbonate	99	–	-15	-5	2	3	4	I	10 lb (4.5 kg)
Diisopropyl peroxydicarbonate	30	Toluene	-10	0	2	3	2	III	5 lb (2.3 kg)
Di-n-propyl peroxydicarbonate	98	–	-25	-15	2	3	4	I	1 gal (4 L)
Di-n-propyl peroxydicarbonate	85	OMS	-25	-15	2	3	4	I	1 gal (4 L)
Dilauroyl peroxide	98	–			1	2	2	IV	110 lb (50 kg)
2,5-Dimethyl-2,5-di-(benzoylperoxy) hexane	95	–			2	3	3	II	4 @ 5 lb (4 @ 2.3 kg)
2,5-Dimethyl-2,5-di-(t-butylperoxy) hexane	92	–			2	3	2	III	30 gal (110 L)
2,5-Dimethyl-2,5-di-(t-butylperoxy) hexane	47	Calcium carbonate or Silica			1	1	1	V	100 lb (45 kg)
2,5-Dimethyl-2,5-di-(2-ethyl hexanoylperoxy) hexane	90	–	20	25	0	3	2	III	5 gal (19 L)
2,5-Dimethyl-2,5-dihydroperoxyhexane	70	Water			2	3	3	II	100 lb (45 kg)
Ethyl-3,3-di-(t-amylperoxy) butyrate	75	OMS			1	3	2	III	5 gal (19 L)
Ethyl-3,3-di-(t-butylperoxy) butyrate	75	OMS			2	2	2	III	5 gal (19 L)
Ethyl-3,3-di-(t-butylperoxy) butyrate	40	Clay or Calcium silicate			1	3	2	V	100 lb (45 kg)
p-Menthyl hydroperoxide	54	Alcohols & Ketones	T		3	2	2	IV	55 gal (208 L)

Table B-1 Alphabetical listing of typical organic peroxide formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Class	Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity		
Methyl ethyl ketone peroxide	9% AO	DMP			3	2	2	III	5 gal (19 L)
Methyl ethyl ketone peroxide	5.5% AO	DMP			3	2	2	IV	5 gal (19 L)
Methyl ethyl ketone peroxide	9% AO	Water & Glycols			3	2	2	IV	5 gal (19 L)
Methyl ethyl ketone peroxide & Cyclohexanone peroxide mixture	9% AO	DMP			3	2	2	III	5 gal (19 L)
2,4-Pentanedione peroxide	4% AO	Water & Solvent			2	1	1	IV	5 gal (19 L)
Peroxyacetic acid, Type E, stabilized	43	Water, HOAc, & H2O2			3	2	3	II	30 gal (110 L)

[1] These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49CFR§173.225 for details.

[2] The column refers to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, hazard ratings for health, flammability, and reactivity. See NFPA 704 for details.

T — Temperature control should be considered to reduce fire hazard depending on packaging size and recommendations in manufacturers' literature.

Note: Diluents: BBP — Butyl benzyl phthalate; DBP — Dibutyl phthalate; DMP — Dimethyl phthalate; DOP — Dioctyl phthalate; DTBP — Di-tertiary-butyl peroxide; HOAc — Acetic acid; H_2O_2 — Hydrogen peroxide
OMS — Odorless mineral spirits; t-BuOH — Tertiary butanol

[3] See NFPA 30 for additional storage requirements

Table B-2.3 Typical Class I Formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity	
t-Butyl hydroperoxide	90	Water & t-BuOH			3	3	3	5 gal (19 L)
t-Butyl monoperoxymaleate	98	–			2	3	3	50 @ 1lb (50 @ 0.5kg)
t-Butyl peroxyacetate	75	OMS			1	3	3	5 gal (19 L)
t-Butyl peroxyacetate	60	OMS			1	3	3	5 gal (19 L)
t-Butylperoxy isopropyl carbonate	92	OMS			1	3	3	5 gal (19 L)
Dibenzoyl peroxide	98	–			1	3	4	1 lb (0.5 kg)
2,2-Di-(t-butylperoxy) butane	50	Toluene			1	3	3	1 gal (4 L)
Diisopropyl peroxydicarbonate	99	–	-15	-5	2	3	4	10 lb (4.5 kg)
Di-n-propyl peroxydicarbonate	98	–	-25	-15	2	3	4	1 gal (4 L)
Di-n-propyl peroxydicarbonate	85	OMS	-25	-15	2	3	4	1 gal (4 L)

[1] These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49CFR§173.225 for details.

[2] The column refers to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, hazard ratings for health, flammability, and reactivity. See NFPA 704 for details.

Note: Diluents: OMS — odorless mineral spirits; t-BuOH — Tertiary butanol

Table B-3.3 Typical Class II Formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity	
t-Amyl peroxybenzoate	96	–			2	3	2	5 gal (19 L)
n-Butyl-4,4-di-(t-butyl peroxy) valerate	98	–			2	3	2	5 gal (19 L)
t-Butyl hydroperoxide	70	DTBP & t-BuOH			3	3	3	55 gal (208 L)
t-Butyl peroxybenzoate	98	–			1	3	3	5 gal (19 L)
t-Butyl peroxy-2-ethylhexanoate	97	–	20	25	1	3	3	55 gal (208 L)
t-Butyl peroxyisobutyrate	75	OMS	15	20	2	3	3	5 gal (19 L)
t-Butylperoxy isopropyl carbonate	75	OMS			1	3	3	5 gal (19 L)
t-Butyl peroxypivalate	75	OMS	0	10	2	3	3	5 gal (19 L)
Diacetyl peroxide	25	DMP	20	25	2	3	3	5 gal (19 L)
Dibenzoyl peroxide	78	Water			1	2	3	25 lb (11 kg)
1,1-Di-(t-butylperoxy) cyclohexane	80	OMS or BBP			1	3	3	5 gal (19 L)
Di-sec-butyl peroxydicarbonate	98	–	-20	-10	1	3	3	1 gal (4 L)
Di-sec-butyl peroxydicarbonate	75	OMS	-20	-10	1	3	3	5 gal (19 L)
1,1-Di-(t-butylperoxy)-3,3,5-trimethylcyclohexane	75-95	–			2	3	3	5 gal (19 L)
Di-(2-ethylhexyl) peroxydicarbonate	97	–	-20	-10	1	3	3	1 gal (4 L)
2,5-Dimethyl-2,5-di-(benzoylperoxy) hexane	95	–			2	3	3	4 @ 5 lb (4 @ 2.3 kg)
2,5-Dimethyl-2,5-dihydroperoxyhexane	70	Water			2	3	3	100 lb (45 kg)
Peroxyacetic acid, Type E, stabilized	43	Water, HOAc, & H2O2			3	2	3	30 gal (110 L)

[1] These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49CFR§173.225 for details.

[2] The column refers to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, hazard ratings for health, flammability, and reactivity. See NFPA 704 for details.

[3] Also a flammable liquid; see NFPA 30 for storage requirements

Note: Diluents: BBP — Butyl benzyl phthalate; DMP — Dimethyl phthalate; DTBP — Di-tertiary-butyl peroxide; HOAc — Acetic acid; H_2O_2 — Hydrogen peroxide; OMS — Odorless mineral spirits; t-BuOH — Tertiary butanol

Table B-4.3 Typical Class III Formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity	
t-Amyl hydroperoxide	88	Water			3	3	2	55 gal (208 L)
t-Amyl peroxyacetate	60	OMS			2	3	2	5 gal (19 L)
t-Amyl peroxy-2-ethylhexanoate	96	–	20	25	0	3	2	55 gal (208 L)
t-Amyl peroxyneodecanoate	75	OMS	0	10	1	3	2	5 gal (19 L)
t-Amyl peroxypivalate	75	OMS	10	15	1	3	2	5 gal (19 L)
t-Butyl peroxy-2-ethylhexanoate	97	–	20	25	1	3	3	5 gal (19 L)
t-Butyl peroxy-2-ethylhexanoate	50	DOP or OMS	30	35	1	2	2	55 gal (208 L)
t-Butyl peroxy-2-ethylhexyl carbonate	95	–			1	3	2	5 gal (19 L)
t-Butyl peroxyneodecanoate	75	OMS	0	10	2	3	2	5 gal (19 L)
Cumyl hydroperoxide	88	Cumene			3	2	2	55 gal (208 L)
Cumyl peroxyneodecanoate	75	OMS	-10	0	1	3	2	5 gal (19 L)
Cumyl peroxyneoheptanoate	75	OMS	0	10	2	3	2	5 gal (19 L)
1,1-Di-(t-amylperoxy) cyclohexane	80	OMS or BBP			2	3	2	5 gal (19 L)
Dibenzoyl peroxide	75	Water			1	2	2	25 lb (11 kg)
Dibenzoyl peroxide (paste)	55	Plasticizer	T		1	2	2	350 lb (160 kg)
Dibenzoyl peroxide (paste)	50	Plasticizer	T		1	2	2	380 lb (170 kg)
Di-(4-t-butylcyclohexyl) peroxydicarbonate	98	–	30	35	1	3	2	88 lb (40 kg)
Di-t-butyl peroxide	99	–			1	3	2	55 gal (208 L)
Di-(2-t-butylperoxyisopropyl) benzene	96	–			1	2	2	100 lb (45 kg)
Didecanoyl peroxide	98	–	30	35	1	3	2	50 lb (23 kg)
Di-2,4-dichlorobenzoyl peroxide	50	DBP & Silicone	T		1	2	2	5 gal (19 L)
Diisopropyl peroxydicarbonate	30	Toluene	-10	0	2	3	2	5 lb (2.3 kg)
2,5-Dimethyl-2,5-di-(t-butylperoxy) hexane	92	–			2	3	2	30 gal (110 L)
2,5-Dimethyl-2,5-di-(2-ethyl hexanoylperoxy) hexane	90	–	20	25	0	3	2	5 gal (19 L)

Table B-4.3 Typical Class III Formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity	
Ethyl-3,3-di-(t-amylperoxy) butyrate	75	OMS			1	3	2	5 gal (19 L)
Ethyl-3,3-di-(t-butylperoxy) butyrate	75	OMS			2	2	2	5 gal (19 L)
Methyl ethyl ketone peroxide	9% AO	DMP			3	2	2	5 gal (19 L)
Methyl ethyl ketone peroxide & Cyclohexanone peroxide mixture	9% AO	DMP			3	2	2	5 gal (19 L)

[1] These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49CFR§173.225 for details.

[2] The column refers to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, hazard ratings for health, flammability, and reactivity. See NFPA 704 for details.

[3] See NFPA 30 for additional storage requirements

T — Temperature control should be considered to reduce fire hazard depending on packaging size and recommendations in manufacturers' literature.

Note: Diluents: BBP — Butyl benzyl phthalate; DBP — Dibutyl phthalate; DMP — Dimethyl phthalate; DOP — Dioctyl phthalate; OMS — Odorless mineral spirits

AO — Active Oxygen

Table 5.3 Typical Class IV Formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity	
t-Butyl cumyl peroxide	95	–			2	2	2	55 gal (208 L)
t-Butyl hydroperoxide	70	Water			3	2	2	55 gal (208 L)
t-Butyl peroxy-2-ethylhexanoate	50	DOP or OMS	30	35	1	2	2	5 gal (19 L)
t-Butyl peroxypivalate	45	OMS	0	10	2	2	2	5 gal (19 L)
Dibenzoyl peroxide	70	Water			1	2	2	25 lb (11 kg)
Dibenzoyl peroxide (paste)	55	Plasticizer & Water	T		1	2	2	350 lb (160 kg)
Dibenzoyl peroxide (paste)	50	Plasticizer & Water	T		1	2	2	380 lb (170 kg)
Dibenzoyl peroxide (slurry)	40	Water & Plasticizer	T		1	2	2	380 lb (170 kg)
Dibenzoyl peroxide (slurry)	40	Water			1	2	2	5 gal (19 L)
Dibenzoyl peroxide (powder)	35	Starch			1	2	2	100 lb (45 kg)
Di-(t-butylperoxy) phthalate	40	DBP			2	2	2	30 gal (110 L)
Dicetyl peroxydicarbonate	85	–	30	35	1	2	2	44 lb (20 kg)
Dicumyl peroxide	98	–			2	2	2	55 gal (208 L)
Di-(2-ethylhexyl) peroxydicarbonate	40	OMS	-15	-5	1	2	2	5 gal (19 L)
Dilauroyl peroxide	98	–			1	2	2	110 lb (50 kg)
p-Menthyl hydroperoxide	54	Alcohols & Ketones	T		3	2	2	55 gal (208 L)
Methyl ethyl ketone peroxide	5.5% AO	DMP			3	2	2	5 gal (19 L)
Methyl ethyl ketone peroxide	9% AO	Water & Glycols			3	2	2	5 gal (19 L)
2,4-Pentanedione peroxide	4% AO	Water & Solvent			2	1	1	5 gal (19 L)

[1] These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49CFR§173.225 for details.

[2] The column refers to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, hazard ratings for health, flammability, and reactivity. See NFPA 704 for details.

T — Temperature control should be considered to reduce fire hazard depending on packaging size and recommendations in manufacturers' literature.

Note: Diluents: DBP — Dibutyl phthalate; DMP — Dimethyl phthalate; DOP — Dioctyl phthalate; OMS — Odorless mineral spirits

AO — Active Oxygen

Table B-6.3 Typical Class V Formulations

Organic Peroxide	Concentration	Diluent	Recommended Maximum Temperatures[1]		Hazard Identification[2]			Container
			Control (°C)	Emergency (°C)	Health	Flamm.	Reactivity	
Dibenzoyl peroxide (powder)	35	Dicalcium phosphate dihydrate or Calcium sulfate dihydrate			1	0	0	100 lb (45 kg)
Di-(2-t-butylperoxyisopropyl) benzene	40	Clay			1	1	0	100 lb (45 kg)
1,1-Di-(t-butylperoxy)-3,3,5-trimethylcyclohexane	40	Calcium carbonate			1	1	1	100 lb (45 kg)
Dicumyl peroxide	40	Clay or Calcium carbonate			1	1	1	100 lb (45 kg)
2,5-Dimethyl-2,5-di-(t-butylperoxy) hexane	47	Calcium carbonate or Silica			1	1	1	100 lb (45 kg)
Ethyl-3,3-di-(t-butylperoxy) butyrate	40	Clay or Calcium silicate			1	3	2	100 lb (45 kg)

[1] These columns refer to temperatures in the Department of Transportation (DOT) Organic Peroxides Table. Refer to document 49CFR§173.225 for details.

[2] The column refers to NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, hazard ratings for health, flammability, and reactivity. See NFPA 704 for details.

AO — Active Oxygen