

A number of organic chemicals may form unstable and dangerous peroxide compounds when stored for extended time and left unchecked. Such chemicals pose a significant hazard as they can be explosive if heated or subjected to mechanical shock. Typically, the more concentrated a peroxide forming compound is (i.e. concentrated solutions after undergoing evaporation or distillation) the greater the risk.

Peroxide formation may be accelerated by exposure to:

- a. Atmospheric air (even certain unopened bottles);
- b. Heat;
- c. Light;
- d. Metal exposure.

Peroxide forming is evident when:

- A bottle has whitish crystals around the cap and / or a viscous liquid or precipitate within it, in this case, **DO NOT OPEN THE LID!**
- All potential peroxide-formers should be tested prior to work involving distillation, evaporation or concentration regardless of age.

NOTE: The following lists cover a number of peroxide forming chemicals, but are not exhaustive. Please check the manufacturers SDS for further information .

List A –Severe peroxide hazard

The following chemicals may spontaneously decompose and become explosive with air without being concentrated.	
1. Butadiene (liquid monomer) 2. Isopropyl ether 3. Sodium amide (sodamide) 4. Chloroprene (liquid monomer) 5. Potassium amide 6. Tetrafluoroethylene (liquid monomer) 7. Divinyl acetylene 8. Potassium metal 9. Vinylidene chloride	Testing; A. Every 3 months after opening B. Dispose of 3 months after date received (unless tested and peroxide free) C. Dispose of 1 year after date received Important: Consult manufacturers SDS when using these chemicals

List B – Peroxide Hazard on concentration

The following chemicals form explosive level of peroxides when distilled, evaporated or otherwise concentrated.	
1. Acetal 2. Acetaldehyde	

<ol style="list-style-type: none"> 3. Benzyl alcohol 4. 2-Butanol 5. Cumene 6. Cyclohexanol 7. Cyclohexene 8. 2-cyclohexen-1-ol 9. Decahydronaphthalene 10. Diacetylene 11. Dicyclopentadiene 12. Diethyl ether (ether) 13. Diglyme 14. Dioxane 15. Glyme 16. Furan 17. 4-Heptanol 18. 2-Hexanol 19. Methyl acetylene 20. 3-Methyl-1-butanol 21. Methyl cyclopentane 22. Methyl isobutyl ketone 23. 2-Methyl-2-pentanol 24. 2-Pentanol 25. 4-Penten-1-ol 26. 1-Phenylethanol 27. 2-Phenylethanol 28. 2-Propanol 29. Tetrahydrofuran 30. Tetrahydronaphthalene 31. Vinyl ethers 32. Other secondary alcohols 	<p>Testing:</p> <ol style="list-style-type: none"> A. Every 6 months B. Discard after 1 year <p>Important: Consult manufacturers SDS when using these chemicals</p>
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List C – Hazard due to Peroxide Initiation of Polymerisation (Extremely shock and heat sensitive)

<p>Highly reactive and can auto-polymerize as a result of internal peroxide accumulation. The peroxides formed in these reactions are highly shock and heat sensitive</p>	
<ol style="list-style-type: none"> 1. Acrylic acid 2. Chlorotrifluoroethylene 3. Vinyl acetate 4. Acrylonitrile 5. Methyl methacrylate 6. Vinylacetylene (gas) 7. Butadiene (gas) 8. Chloroprene 9. Styrene Vinylpyridine 10. Tetrafluoroethylene (gas) 11. Vinyladiene chloride 12. Vinyl chloride (gas) 	<p>Testing;</p> <ol style="list-style-type: none"> A. Every 6 months B. Discard after 1 year <p>Important: Consult manufacturers MSDS when using these chemicals</p>

List D – Potential Peroxide formers

The following chemicals may form peroxides but aren't able to be easily categorised into on the above 3 categories.		
1. Acrolein	31. p-Chlorophenetole	61. 4,5-Hexadien-2-yn-1-ol
2. Allyl ether	32. Cyclooctene	62. n-Hexyl ether
3. Allyl ethyl ether	33. Cyclopropyl methyl ether	63. o,p-Iodophenetole
4. Allyl phenyl ether	34. Diallyl ether	64. Isoamyl benzyl ether
5. p-(n-Amyloxy)benzoyl chloride	35. p-Di-n-butoxybenzene	65. Isoamyl ether
6. n-Amyl ether	36. 1,2-Dibenzoyloxyethane	66. Isobutyl vinyl ether
7. Benzyl n-butyl ether	37. p-Dibenzoyloxybenzene	67. Isophorone
8. Benxyl ether	38. 1,2-Dichloroethyl ethyl ether	68. B-Isopropoxy-propionitrile
9. Benzyl ethyl ether	39. 2,4-Dichlorophenetole	69. Isopropyl
10. Benzyl methyl ether	40. Diethoxymethane	70. Limonene
11. Benzyl 1-naphthyl ether	41. 2,2-Diethoxypropane	71. 1,5-p-Methadiene
12. 1,2-Bis(2-chloroethoxy)-ethane	42. Diethyl ethoxymethylene-malonate	72. Methyl p-(n-amyloxy)benzoate
13. Bis(2 ethoxyethyl)ether	43. Diethyl fumarate	73. 4-Methyl-2-pentanone
14. Bis(2(methoxyethoxy)-ethyl) ether	44. Diethyl acetal	74. n-Methylphenetole
15. Bis(2-chloroethyl) ether	45. Diethyketene	75. 2-Methyltetra-hydrofuran
16. Bis(2-ethoxyethyl) adipate	46. m,o,p-Diethoxybenzene	76. 3-Methoxy-1-butyl acetate
17. Bis(2-ethoxyethyl) phthalate	47. 1,2-Diethoxyethane	77. 2-Methoxy-ethanol
18. Bis(2-methoxyethyl) carbonate	48. Dimethoxymethane	78. Methoxy-1,3,5,7-cyclooctatetraene
19. Bis(2-methoxyethyl) ether	49. 1,1-Dimethoxyethane	79. B-Methoxy-propionitrile
20. Bis(2-methoxyethyl) phthalate	50. Dimethylketene	80. m-Nitro-phenetole
21. Bis(2-methoxymethyl) adipate	51. 3,3-Dimethoxypropene	81. 1-Octene
22. Bis(2-n-butoxyethyl) phthalate	52. 2,4-Dinitrophenetole	82. Oxybis(2-ethyl acetate)
23. Bis(2-phenoxyethyl) ether	53. 1,3-Dioxepane	83. Oxybis(2-ethyl benzoate)
24. Bis(4-chlorobutyl) ether	54. Di(1-propynyl)ether	84. B,B-oxydi-propionitrile
25. Bis(chloromethyl) ether	55. Di(2-propynyl)ether	85. 1-Pentene –3 PG I
26. 2-Bromomethyl ethyl ether	56. Di-n-propoxymethane	86. Phenoxyacetyl chloride
27. B-Bromophenetole	57. 1,2-Epoxy-3-isopropoxypropane	87. a-Phenoxy-propionyl chloride
28. o-Bromophenetole	58. 1,2-Epoxy-3-phenoxypropane	88. Phenyl o-propyl ether
29. p-Bromophenetole	59. p-Ethoxyacetho-phenone	89. p-Phenylphenetone
30. 3-Bromopropyl phenyl ether	60. 1-(2-Ethoxyethoxy)-ethyl acetate	90. n-Propyl ether – 3 PG II

Sample Labels that can be used

Below is a label you may print off and attach to your peroxide forming chemical. If you have any further questions, please contact the UNSW HS unit.

Warning: Peroxide-Forming Chemical

Please ensure you do the following;

1. This chemical must be stored in its original container, with the lid tightly closed.
2. Ensure that in storage this chemical has minimal exposure to light, air, and heat.
3. If crystals, discoloration, or layering are visible do not move or open container.
4. Refer to manufacturers SDS or CHEMALERT for further information.
5. For disposal, please contact the UNSW HS unit.

Check for peroxides before distilling or concentrating.

This chemical forms peroxides during storage, limiting its shelf life. Test or dispose _____ months after opened.

Date Received _____ Date Tested _____
Date First Opened _____ Test Results _____
Dispose By (date) _____

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