**Table 1. 2015 Update of the 1993 Schaper database of RD50 and their TLV values**

| **# 1** | **# 2** | **Chemicals A,B** | **[CAS Number]**  **(current TLV Documen-tation date)** | **Types of mice and (Reference #) for exposure details C** | **RD50 (ppm)** | **RD50**  **x**  **0.03**  **(ppm)** | **Average**  **RD50**  **x**  **0.03**  **(ppm)** | **1991-1992 TLV-TWA**  **or TLV Ceiling (C)**  **(ppm)**  **from Ref. 1** | **2015 TLV-TWA**  **or TLV Ceiling (C) or STEL(S)**  **(ppm) E** | **2015 TLV Basis D** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **1** | **Acetaldehyde** | **[75-07-0] (2013)** | **SW (1)** | **2845** | **85.35** | **107** | **100** | **C 25** | **Eye & URT irr** |
|  | **2** |  |  | **B6C3F1 (1)** | **2932** | **87.96** |  | **100** | **C 25** |  |
|  | **3** |  |  | **SW (1)** | **4946** | **148.4** |  | **100** | **C 25** |  |
| **2** | **4** | **Acetic acid** | **64-19-7**  **(2003)** | **OF1 (1)** | **163** | **4.89** | **9** | **10** | **10** | **URT & eye irr; pulm func** |
|  | **5** |  |  | **SW (1)** | **577** | **17.31** |  | **10** | **10** |  |
|  | **6** | **New Entry** |  | **OF1 (2)** | **227** | **6.81** |  | **10** | **10** |  |
|  | **7** | **New Entry** |  | **C57B1/6J (2)** | **239** | **7.17** |  | **10** | **10** |  |
|  | **8** | **New Entry** |  | **Ssc:CF-1 (2)** | **308** | **9.24** |  | **10** | **10** |  |
| **3** | **9** | **Acetone** | **[67-64-1]**  **(1996)** | **OF1 (1)** | **23480** | **704** | **1515** | **750** | **250** | **URT & eye irr; CNS impair; hematologic effect** |
|  | **10** | **New Entry** |  | **SW (1)** | **77516** | **2325** |  | **750** | **250** |  |
| **4** | **11** | **Acrolein** | **[107-02-8]**  **(1995)** | **SW (1)** | **1.03** | **0.031** | **0.056** | **0.1** | **C 0.1** | **Eye & URT irr; pulm edema; pulm emph** |
|  | **12** |  |  | **B6C3F1 (1)** | **1.41** | **0.042** |  | **0.1** | **C 0.1** |  |
|  | **13** |  |  | **BALB/C (1)** | **1.66** | **0.050** |  | **0.1** | **C 0.1** |  |
|  | **14** |  |  | **SW (1)** | **1.68** | **0.050** |  | **0.1** | **C 0.1** |  |
|  | **15** |  |  | **SW (1)** | **2.70** | **0.081** |  | **0.1** | **C 0.1** |  |
|  | **16** |  |  | **CF1 (1)** | **2.90** | **0.087** |  | **0.1** | **C 0.1** |  |
|  | **17** | **New Entry** |  | **C57B1/6J (2)** | **1.59** | **0.048** |  | **0.1** | **C 0.1** |  |
| **5** | **18** | **Allyl alcohol** | **[107-18-6]**  **(1996)** | **OF1 (1)** | **1.6** | **0.048** | **0.08** | **2** | **0.5** | **Eye & URT irr** |
|  | **19** |  |  | **ICR (1)** | **2.5** | **0.075** |  | **2** | **0.5** |  |
|  | **20** |  |  | **CF1 (1)** | **3.9** | **0.117** |  | **2** | **0.5** |  |
| **6** | **21** | **Allyl chloride** | **[107-05-1]**  **(2010)** | **CF1 (1)** | **1740** | **52.2** | **52.2** | **1** | **1** | **Eye & URT irr; liver & kidney dam** |
| **7** | **22** | **Allyl glycidyl ether** | **[106-92-3]**  **(1995)** | **OF1 (1)** | **5.7** | **0.171** | **0.171** | **5** | **1** | **URT, eye & skin irr; dermatitis** |
| **8** | **23** | **Ammonia**  **(inorganic)** | **[7664-41-7]**  **(1970)** | **SW (1)** | **303** | **9.09** | **16.4** | **25** | **25** | **Eye dam; URT irr** |
|  | **24** |  |  | **BALB/C (1)** | **789** | **23.67** |  | **25** | **25** |  |
| **9** | **25** | **p-Benzoquinone**  **(Quinone)** | **[106-51-4]**  **(1970)** | **SW (1)** | **5.0** | **0.15** | **0.15** | **0.1** | **0.1** | **Eye irr; skin dam** |
| **10** | **26** | **Benzylchloride** | **[100-44-7]**  **(1990)** | **OF (1)** | **17.0** | **0.51** | **0.66** | **1** | **1** | **Eye, skin, URT irr** |
|  | **27** |  |  | **SW (1)** | **27.0** | **0.81** |  |  |  |  |
| **11** | **28** | **n-Butanol** | **[71-36-3]**  **(1998)** | **OF1 (1)** | **1268** | **38.04** | **160.6** | **C 50** | **20** | **Eye & URT irr** |
|  | **29** |  |  | **SW (1)** | **4784** | **143.5** |  | **C 50** | **20** |  |
|  | **30** |  |  | **SW (1)** | **7075** | **212.3** |  | **C 50** | **20** |  |
|  | **31** |  |  | **CF1 (1)** | **11696 extrapol.** | **350.9** |  | **C 50** | **20** |  |
|  | **32** | **New Entry** |  | **BALB/C (2)** | **3010** | **90.3** |  | **C 50** | **20** |  |
|  | **33** | **New Entry** |  | **BALB/C (2)** | **4300** | **129** |  | **C 50** | **20** |  |
| **12** | **34** | **2-Butoxyethanol** | **[111-76-2]**  **(1996)** | **SW (1)** | **2825** | **85** | **85** | **25** | **20** | **Eye & URT irr** |
| **13** | **35** | **n-Butyl acetate** | **[123-86-4]**  **(1995)** | **OF1 (1)** | **730** | **22** | **32.2** | **150** | **150** | **Eye & URT irr** |
|  | **36** |  |  | **SW (1)** | **735** | **22** |  | **150** | **150** |  |
|  | **37** | **New Entry** |  | **BALB/C (2)** | **1755** | **52.7** |  | **150** | **150** |  |
| **14** | **38** | **tert-Butyl acetate** | **[540-88-5]**  **(1965)** | **OF1 (1)** | **15962** | **479** | **479** | **200** | **200** | **Eye & URT irr** |
| **15** | **39** | **n-Butylamine** | **[109-73-9]**  **(1985)** | **OF1 (1)** | **112** | **3.36** | **4.22** | **C 5** | **C 5** | **Headache;**  **URT & eye irr** |
|  | **40** |  |  | **CF1 (1)** | **121** | **3.63** |  | **C 5** | **C 5** |  |
|  | **41** |  |  | **NMRI (1)** | **246** | **7.38** |  | **C 5** | **C 5** |  |
|  | **42** | **New Entry** |  | **OF1 (2)** | **84** | **2.52** |  | **C 5** | **C 5** |  |
| **16** | **43** | **p-tert-Butyltoluene** | **[98-51-1]**  **(1990)** | **SW (1)** | **360** | **10.8** | **10.8** | **10** | **1** | **Eye & URT irr; nausea** |
| **17** | **44** | **Chlorine**  **(inorganic)** | **[7782-50-5]**  **(1986)** | **SW (1)** | **9.3** | **0.279** | **0.203** | **0.5** | **0.5** | **URT & eye irr** |
|  | **45** |  |  | **BALB/C (1)** | **11.97** | **0.279** |  | **0.5** | **0.5** |  |
|  | **46** | **New Entry** |  | **OF1 (2)** | **3.5** | **0.105** |  | **0.5** | **0.5** |  |
|  | **47** | **New Entry** |  | **C57B1/6J F (2)** | **2.3** | **0.069** |  | **0.5** | **0.5** |  |
| **18** | **48** | **Chloracetophenone** | **[532-27-4]**  **(1990)** | **SW (1)** | **0.96** | **0.023** | **0.023** | **0.05** | **0.05** | **Eye, URT, & skin irr** |
| **19** | **49** | **2-Chlorobenzalmonitrile (aerosol)** | **[2698-41-1]**  **(1990)** | **SW (1)** | **0.42** | **0.013** | **0.024** | **C 0.05** | **C 0.05** | **URT irr; skin sens** |
|  | **50** |  |  | **SW (1)** | **1.19** | **0.036** |  | **C 0.05** | **C 0.05** |  |
| **20** | **51** | **Chlorobenzene**  **(No URT irr in 2015)** | **[108-90-7]**  **(1988)** | **OF1 (1)** | **1054** | **31.6** | **31.6** | **10** | **10** | **Liver Damage** |
| **21** | **52** | **Chloropicrin** | **[76-06-2]**  **(1990)** | **SW (1)** | **7.98** | **0.24** | **0.24** | **0.1** | **0.1** | **Eye irr; pulm edema** |
| **22** | **53** | **o-Chlorotoluene** | **[95-49-8]**  **(1971)** | **OF1 (1)** | **570** | **17** | **17** | **50** | **50** | **URT, eye, & skin irr** |
| **23** | **54** | **Crotonaldehyde** | **[4170-30-3]**  **(1995)** | **SW (1)** | **3.53** | **0.106** | **0.126** | **2** | **C 0.3** | **Eye & URT irr** |
|  | **55** |  |  | **B6C3F1 (1)** | **4.88** | **0.146** |  | **2** | **C 0.3** |  |
| **24** | **56** | **Cyclohexanone** | **[108-94-1]**  **(1990)** | **OF1 (1)** | **756** | **22.6** | **22.6** | **25** | **20** | **Eye & URT irr** |
| **25** | **57** | **Cyclohexylamine** | **[108-91-8]**  **(1990)** | **CF1 (1)** | **27** | **0.81** | **1.24** | **10** | **10** | **URT & eye irr** |
|  | **58** |  |  | **0F1 (2)** | **51** | **1.53** |  | **10** | **10** |  |
| **26** | **59** | **o-Dichlorobenzene** | **[95-50-01]**  **(1990)** | **OF1 (1)** | **181** | **5.43** | **5.44** | **C 50** | **25** | **URT & eye irr** |
|  | **60** |  |  | **OF1 (1)** | **182** | **5.46** |  | **C 50** | **25** |  |
| **27** | **61** | **p-Dichlorobenzene**  **Chemical addition** | **[106-46-7]**  **(1990)** | **SW (8)** | **270** | **8.1** | **8.1** | **75** | **10** | **Eye irr; kidney damage** |
| **28** | **62** | **Diethylamine** | **[109-89-7]**  **(2012)** | **CF1 (1)** | **184** | **5.6** | **5.85** | **10** | **5** | **URT, eye & skin irr** |
|  | **63** |  |  | **OF1 (1)** | **202** | **6.1** |  | **10** | **5** |  |
| **29** | **64** | **Diisobutyl ketone** | **[108-83-8]**  **(1979)** | **OF1 (1)** | **320** | **9.6** | **9.6** | **25** | **25** | **URT & eye irr** |
| **30** | **65** | **Diisopropylamine** | **[108-18-9]**  **(1979** | **OF1 (1)** | **161** | **4.8** | **4.8** | **5** | **5** | **URT irr, eye dam** |
| **31** | **66** | **Dimethylamine** | **[124-40-3]**  **(2013)** | **OF1 (1)** | **70** | **2.1** | **8.7** | **10** | **5** | **URT & GI irr** |
|  | **67** |  |  | **SW (1)** | **511** | **15.3** |  | **10** | **5** |  |
| **32** | **68** | **Divinyl benzene** | **[1321-74-0]**  **(1990)** | **OF1 (1)** | **78** | **2.3** | **2.3** | **10** | **10** | **URT irr** |
| **33** | **69** | **Epichlorohydrin** | **[106-89-8]**  **(1994)** | **SW (1)** | **687** | **20.6** | **20.6** | **2** | **0.5** | **URT irr; male repro** |
| **34** | **70** | **2-Ethoxyethyl acetate**  **(Not URT irr in 2015)** | **[111-15-9]**  **(1981)** | **OF1 (1)** | **720** | **21.6** | **21.6** | **5** | **5** | **Male repro dam (remove??)** |
| **35** | **71** | **Ethyl acetate** | **[141-78-6]**  **(1979)** | **OF1 (1)** | **580** | **17.4** | **17.9** | **400** | **400** | **URT & eye irr** |
|  | **72** |  |  | **SW (1)** | **614** | **18.4** |  | **400** | **400** |  |
| **36** | **73** | **Ethyl acrylate** | **[140-88-5]**  **(1986)** | **OF1 (1)** | **315** | **9.45** | **9.45** | **5** | **5** | **URT, eye & GI irr; CNS impair, skin sens** |
| **37** | **74** | **Ethyl alcohol**  **(Ethanol)** | **[64-17-5]**  **(2008)** | **OF1 (1)** | **13633** | **409** | **614** | **1000** | **C 1000** | **URT irr** |
|  | **75** |  |  | **SW (1)** | **27314** | **819** |  | **1000** | **C 1000** |  |
| **38** | **76** | **Ethylamine** | **[75-04-7]**  **(2012)** | **OF1 (1)** | **151** | **4.5** | **4.5** | **10** | **5** | **URT, eye & GI irr; CNS impair; skin sen** |
| **39** | **77** | **Ethylbenzene** | **[100-41-4]**  **(2010)** | **OF1 (1)** | **1432** | **43** | **82.4** | **100** | **20** | **URT irr; kidney dam (nephrotathy);cochlear impair** |
|  | **78** |  |  | **SW (1)** | **4060** | **122** |  | **100** | **20** |  |
| **40** | **79** | **Ethyl-2-cyanoacrylate**  **Chemical addition** | **[7085-85-0]**  **(1995)** | **OF1 (2)** | **0.7** | **0.021** | **0.021** | **no entry**  **use 0.2** | **0.2** | **URT & skin irr** |
| **41** | **80** | **Ethylidene norbonene** | **[16219-75-3]**  **(2013)** | **SW (1)** | **2500** | **75** | **75** | **C5** | **2** | **URT & eye irr** |
| **42** | **81** | **Formaldehyde** | **[50-00-0]**  **(1987)** | **SW (1)** | **3.2** | **0.09** | **0.13** | **1** | **C 0.3** | **URT & eye irr** |
|  | **82** |  |  | **B6C3F1 (1)** | **4.9** | **0.15** |  | **1** | **C 0.3** |  |
|  | **83** |  |  | **OF1 (1)** | **5.3** | **0.16** |  | **1** | **C 0.3** |  |
|  | **84** |  |  | **BALB/cA (2)** | **4.0** | **0.12** |  | **1** | **C 0.3** |  |
| **43** | **85** | **Formic acid**  **Chemical addition** | **[64-18-06]**  **(1965)** | **Ssc:CF1 (2)** | **438** | **13** |  | **5** | **5** | **URT, eye & skin irr:** |
| **44** | **86** | **Furfural** | **[98-01-1]**  **(1978)** | **B6C3F1 (1)** | **234** | **7.0** | **7.8** | **2** | **2** | **URT & eye irr** |
|  | **87** |  |  | **SW (1)** | **287** | **8.6** |  | **2** | **2** |  |
| **45** | **88** | **Glutaraldehyde**  **Chemical addition** | **[111-30-8]**  **(1998)** | **Swiss OF1 (2)** | **2.6** | **0.078** | **0.25** | **no entry**  **use 0.05** | **C 0.05** | **URT, skin, & eye irr; CNS impair** |
|  | **89** |  |  | **ND4 SW (2)** | **13.9** | **0.417** |  | **0.05** | **C 0.05** |  |
| **46** | **90** | **Heptane** | **142-82-5**  **(1979)** | **CF1 (1)** | **15600** | **468** |  | **400** | **400** | **CNS impair; URT irr** |
| **47** | **91** | **Heptan-2-one**  **(Methyl n-amyl ketone)** | **[110-43-0]**  **(1978** | **OF1 (1)** | **893** | **26.7** |  | **50** | **50** | **Eye & skin irr** |
| **48** | **92** | **Heptan-4-one**  **(Dipropyl ketone)** | **[123-19-3]**  **(1978** | **OF1 (1)** | **1098** | **32.9** |  | **50** | **50** | **URT irr** |
| **49** | **93** | **Hexachlorobutadiene**  **(No URT irr in 2015)** | **[87-68-3]**  **(1979)** | **OF1 (1)** | **211** | **6.33** |  | **0.02** | **0.02** | **Kidney damage is correct.** |
| **50** | **94** | **1,6 Hexametylene diisocyanate** | **[822-06-0]**  **(1985)** | **SW (1)** | **0.17** | **0.005** |  | **0.005** | **0.005** | **URT Irr; resp sens** |
| **51** | **95** | **Hydrogen chloride**  **(inorganic)** | **[7647-01-0]**  **(200)** | **SW (1)** | **309** | **9.27** |  | **C 5** | **C 2** | **URT irr** |
| **52** | **96** | **Hydrogen peroxide**  **(inorganic)** | **[7722-84-1]**  **(1990)** | **OF1 (2)** | **113** | **3.39** |  | **1** | **1** | **Eye, URT, & skin irr** |
| **53** | **97** | **Isoamyl alcohol** | **[123-51-3]**  **(1990)** | **OF1 (1)** | **729** | **21.9** | **78** | **100** | **100** | **Eye & URT irr** |
|  | **98** |  |  | **SW (1)** | **4452** | **133.6** |  |  |  |  |
| **54** | **99** | **Isobutanol** | **[78-83-1]**  **(1973)** | **OF1 (1)** | **1818** | **54.5** |  | **50** | **50** | **Skin & eye irr** |
| **55** | **100** | **Isobutyl acetate** | **[110-19-0]** | **OF1 (1)** | **819** | **24.6** |  | **150** | **150** | **Eye & URT irr** |
| **56** | **101** | **Isopentyl acetate**  **(Pentyl acetate)** | **[123-92-2]**  **(1997)** | **OF1 (1)** | **1056** | **31.7** |  | **100** | **50** | **URT irr** |
| **57** | **102** | **Isophorone** | **[78-59-1]**  **(1992)** | **OF1 (1)** | **27.8** | **0.83** |  | **C 5** | **C 5** | **Eye & URT irr; CNS impair, malaise; fatigue** |
| **58** | **103** | **Isopropyl acetate** | **[108-21-4]**  **(2001)** | **OF1 (1)** | **4259** | **127.8** |  | **250** | **100** | **Eye & URT irr, CNS impair** |
| **59** | **104** | **Isopropyl alcohol**  **(2-propanol)** | **[67-63-0]**  **(2001)** | **OF1 (1)** | **5000** | **150** | **340** | **400** | **200** | **Eye & URT irr, CNS impair** |
|  | **105** |  |  | **SW (1)** | **17693** | **530** |  | **400** | **200** |  |
| **60** | **106** | **Isopropylamine** | **[75-31-0]**  **(1962)** | **OF1 (1)** | **157** | **4.71** |  | **5** | **5** | **URT irr, eye dam** |
| **61** | **107** | **Isopropylbenzene**  **(Cumene)** | **[92-82-8]**  **(1997)** | **CF1 (1)** | **1934** | **58.0** | **66** | **50** | **50** | **Eye, skin, & URT irr; CNS impair** |
|  | **108** |  |  | **SW (1)** | **2490** | **74.7** |  | **50** | **50** |  |
| **62** | **109** | **Mesityl oxide** | **[141-79-7]**  **(1992)** | **OF1 (1)** | **61.1** | **1.83** |  | **15** | **15** | **Eye & URT irr, CNS impair** |
| **63** | **110** | **2-Methoxyethyl acetate**  **(No URT irr in 2015)** | **[110-49-6]**  **(2005)** | **OF1 (1)** | **570** | **17.1** |  | **5** | **0.1** | **Hematolog. & repro eff** |
| **64** | **111** | **Methyl acetate**  **(No URT irr in 2015)** | **[79-20-9]**  **(2012)** | **OF1 (1)** | **829** | **24.8** |  | **200** | **200** | **Headache; dizziness; nausea; eye dam** |
| **65** | **112** | **Methyl alcohol**  **(Methanol)**  **(No URT irr in 2015)** | **[67-56-1]**  **(2008)** | **OF1 (1)** | **25222** | **757** | **1001** | **200** | **200** | **Headache; eye dam; dizziness;nausea** |
|  | **113** |  |  | **SW (1)** | **41514** | **1245** |  | **200** | **200** |  |
| **66** | **114** | **Methylamine** | **[74-89-5]**  **(2012)** | **OF1 (1)** | **141** | **4.23** | **4.23** | **10** | **5** | **Eye, skin, & URT irr** |
| **67** | **115** | **Methyl n-butyl acetone (Methyl n-butyl ketone)**  **(No URT irr in 2015)** | **[591-78-6]**  **(1995)** | **OF1 (1)** | **2555** | **76.7** | **76.7** | **5** | **5** | **Periph. neuropa; testi. dam** |
| **68** | **116** | **Methyl 2-cyanoacrylate**  **Chemical addition** | **[137-05-3]**  **(1995)** | **OF1 (2)** | **1.4** | **0.042** | **0.042** | **2** | **0.2** | **URT & eye irr** |
| **69** | **117** | **Methyl ethyl ketone** | **78-93-3**  **(1992)** | **SW (1)** | **9000** | **270** | **512** | **200** | **200** | **URT irr; CNS & PNS impair** |
|  | **118** |  |  | **OF1 (1)** | **10745** | **322** |  | **200** | **200** |  |
|  | **119** |  |  | **CF (1)** | **31426** | **943** |  | **200** | **200** |  |
| **70** | **120** | **Methyl 5-heptan-3-one**  **(Ethyl amyl ketone)**  **(No URT irr in 2015)** | **[541-85-5]**  **(2006)** | **OF1 (1)** | **759** | **23** | **23** | **25** | **10** | **Neurotoxicity** |
| **71** | **121** | **Methyl-5-hexan-2-one**  **(Methyl isoamyl tone)** | **[110-12-3]**  **(2012)** | **OF1 (1)** | **1232** | **37** | **37** | **50** | **20** | **CNS impair; URT irr** |
| **72** | **122** | **Methyl isobutylketone** | **[108-10-1]**  **(2009)** | **OF1 (1)** | **3195** | **96** | **96** | **50** | **20** | **URT irr; dizziness;**  **headache** |
| **73** | **123** | **Methyl isocyanate** | **624-83-9**  **(2013)** | **SW (1)** | **1.3** | **0.039** | **0.063** | **0.02** | **0.02** | **URT & eye irr** |
|  | **124** |  |  | **ICR (1)** | **2.9** | **0.087** |  |  |  |  |
| **74** | **125** | **1-Methylnaphtalene**  **Chemical addition**  **(No URT irr in 2015)** | **[90-12-0]**  **(2006)** | **BALB/c (2)** | **22** | **0.66** | **0.66** | **no entry**  **use 0.5** | **0.5** | **LTR irr, lung dam** |
| **75** | **126** | **2-Methylnaphtalene**  **Chemical addition**  **(No URT irr in 2015)** | **91-57-6**  **(2006)** | **BALB/c (2)** | **11.5** | **0.35** | **0.35** | **no entry**  **use 0.5** | **0.5** | **LTR irr, lung dam** |
| **76** | **127** | **α-Methyl styrene** | **[98-83-9]**  **(2009)** | **OF1 (1)** | **273** | **8.2** | **8.2** | **50** | **10** | **URT irr; kidney and female repro dam** |
| **77** | **128** | **Nicotine**  **(aerosol)**  **(No URT irr in 2015)** | **[54-11-5]**  **(1992)** | **SW (1)** | **5.28** | **0.158** | **0.205** | **0.075**  **(0.5 mg/m3)** | **0.075**  **(0.5 mg/m3)** | **GI dam; CNS impair; card impair** |
|  | **129** |  |  | **DD (1)** | **5.71** | **0.171** |  | **0.075** | **0.075** |  |
|  | **130** |  |  | **SW (1)** | **9.50**  **(extrap)** | **0.285** |  | **0.075** | **0.075** |  |
| **78** | **131** | **Nitrogen dioxide**  **(inorganic)** | **[10102-44-0]**  **(2011)** | **SW (1)** | **349** | **10.5** | **10.5** | **3** | **0.2** | **LRT irr** |
| **79** | **132** | **Nonane** | **[111-84-2]**  **(2011)** | **CF1 (1)** | **62210**  **(extrap)** | **1866** | **1866** | **200** | **200** | **CNS impair** |
| **80** | **133** | **Octane** | **[111-65-9]**  **(1979)** | **CF1 (1)** | **18150**  **(extrap)** | **545** | **545** | **300** | **300** | **URT irr** |
| **81** | **134** | **Pentan-2-one**  **(Methyl propyl ketone)** | **[107-87-9]**  **(2006)** | **OF1 (1)** | **5933** | **178** | **178** | **200** | **C 150** | **Pulm func; eye irr** |
| **82** | **135** | **n-Pentyl acetate** | **[628-63-7]**  **(1997)** | **SW (1)** | **1438** | **43.2** | **45.1** | **100** | **50** | **URT irr** |
|  | **136** |  |  | **SW (1)** | **1531** | **45.9** |  | **100** | **50** |  |
|  | **137** |  |  | **OF1 (1)** | **1562** | **46.9** |  | **100** | **50** |  |
| **83** | **138** | **Peracetic acid**  **Chemical addition** | **[79-21-0]**  **(2013)** | **OF1 (2)** | **5.4** | **0.16** | **0.16** | **no entry**  **use 0.4** | **C 0.4** | **URT, eye & skin irr** |
| **84** | **139** | **Phenol** | **[108-95-2]**  **(1992)** | **OF1 (1)** | **166** | **4.98** | **4.98** | **5** | **5** | **URT irr; lung dam; CNS impair** |
| **85** | **140** | **Propionic acid** | **[79-09-4]**  **(1977)** | **SW (1)** | **384** | **11.5** | **11.5** | **10** | **10** | **Eye, skin, & URT irr** |
|  | **141** |  |  | **Ssc: CF1 (2)** | **386** | **11.6** |  | **10** |  |  |
| **86** | **142** | **Propyl acetate**  **(n-Propyl acetate)** | **[109-60-4]**  **(1962)** | **OF1 (1)** | **793** | **23.8** | **23.8** | **200** | **200** | **Eye & URT irr** |
| **87** | **143** | **n-Propyl alcohol**  **(n-Propanol)** | **[71-23-8]**  **(2006)** | **OF1 (1)** | **4780** | **143** | **311** | **200** | **100** | **Eye & URT irr** |
|  | **144** |  |  | **SW (1)** | **12704** | **381** |  | **200** | **100** |  |
|  | **145** |  |  | **CF1 (1)** | **13660** | **409** |  | **200** | **100** |  |
| **88** | **146** | **Sodium metabisulfite**  **(as aerosol)** | **[7681-57-4]**  **(1992)** | **SW (1)** | **99.6** | **2.98** | **1.5** | **0.64** | **0.64** | **URT irr** |
| **89** | **147** | **Styrene** | **[100-42-5]**  **(1996)** | **SW (1)** | **156.3** | **4.7** | **17.1** | **50** | **20** | **CNS impair; URT irr, peripheral neuropathy** |
|  | **148** |  |  | **OF1 (1)** | **586** | **17.6** |  | **50** | **20** |  |
|  | **149** |  |  | **SW (1)** | **980** | **29.4** |  | **50** | **20** |  |
| **90** | **150** | **Sulfur dioxide**  **(inorganic)** | **[7446-09-5]**  **(2008)** | **A/HEJ F (9)** | **41** | **1.23** | **4.80** | **2** | **0.25** | **Pulm. func; LRT irr** |
|  | **151** | **(No URT irr in 2015)** |  | **A/HEJ (9)** | **69** | **2.07** |  | **2** | **0.25** |  |
|  | **152** |  |  | **BALB/C F (9)** | **75** | **2.25** |  | **2** | **0.25** |  |
|  | **153** | **Replication in same lab** |  | **BALB/C F (9)** | **78** | **2.34** |  | **2** | **0.25** |  |
|  | **154** |  |  | **C57/BL6 F (9)** | **80** | **2.40** |  | **2** | **0.25** |  |
|  | **155** |  |  | **SJL/J F (9)** | **104** | **3.12** |  | **2** | **0.25** |  |
|  | **156** |  |  | **SJL/J (9)** | **320** | **9.60** |  | **2** | **0.25** |  |
|  | **157** |  |  | **DD (1)** | **120** | **3.60** |  | **2** | **0.25** |  |
|  | **158** |  |  | **C3H/HEJ F (9)** | **125** | **3.75** |  | **2** | **0.25** |  |
|  | **159** |  |  | **C57L/J (9)** | **200** | **6.00** |  | **2** | **0.25** |  |
|  | **160** |  |  | **DBA2/J (9)** | **321** | **9.63** |  | **2** | **0.25** |  |
|  | **161** |  |  | **DBA2/J F (9)** | **445** | **13.35** |  | **2** | **0.25** |  |
|  | **162** |  |  | **SW (1)** | **117** | **3.51** |  | **2** | **0.25** |  |
|  | **163** | **Replication in same lab** |  | **SW (9)** | **117** | **3.51** |  | **2** | **0.25** |  |
|  | **164** |  |  | **SW F (9)** | **133** | **3.99** |  | **2** | **0.25** |  |
| **91** | **165** | **Toluene**  **(No URT irr in 2015)** | **[100-88-3]**  **(2006)** | **OF1 (1)** | **3373** | **101** | **136** | **100** | **20** | **Visual impair; female repro; pregnancy loss** |
|  | **166** |  |  | **SW (1)** | **5300** | **159** |  | **100** | **20** |  |
|  | **167** | **New Entry** |  | **SW (2)** | **4900** | **147** |  | **100** | **20** |  |
| **92** | **168** | **2,4 Toluene diisocyanate**  **(No URT irr in 2015)** | **[584-84-9]**  **(1992)** | **SW (1)** | **0.20** | **0.006** | **0.010** | **0.005** | **0.005** | **Resp sens** |
|  | **169** |  |  | **SW (1)** | **0.20** | **0.006** |  | **0.005** | **0.005** |  |
|  | **170** |  |  | **OF1 (1)** | **0.24** | **0.007** |  | **0.005** | **0.005** |  |
|  | **171** |  |  | **SW (1)** | **0.39** | **0.012** |  | **0.005** | **0.005** |  |
|  | **172** |  |  | **SW (1)** | **0.67** | **0.020** |  | **0.005** | **0.005** |  |
| **93** | **173** | **Triethylamine** | **[121-44-8]**  **(1991)** | **OF1 (1)** | **156** | **4.68** | **5.1** | **10** | **0.5** | **Visual impair, URT irr** |
|  | **174** |  |  | **CF1 (1)** | **186** | **5.58** |  |  | **0.5** |  |
| **94** | **175** | **Trimethylamine** | **[75-50-3]**  **(2012)** | **OF1 (1)** | **61** | **1.83** | **1.83** | **10** | **5** | **URT, eye, & skin irr** |
| **95** | **176** | **1,2,3-Trimethylbenzene**  **Chemical addition**  **(No URT irr in 2015)** | **[562-73-8]**  **(1970)** | **BALB/c (2)** | **541** | **16.2** | **16.2** | **25** | **25** | **CNS impai; asthma hemat. effe** |
| **96** | **177** | **1,2,4-Trimethylbenzene**  **Chemical addition**  **(No URT irr in 2015)** | **[95-63-6]**  **(1970)** | **BALB/c (2)** | **578** | **17.3** | **17.3** | **25** | **25** | **CNS impai; asthma hemat. effe** |
| **97** | **178** | **1,3,5-Trimethylbenzene**  **Chemical addition**  **(No URT irr in 2015)** | **[108-67-8]**  **(1970)** | **BALB/c (2)** | **519** | **15.6** | **15.6** | **25** | **25** | **CNS impai; asthma hemat.effe** |
| **98** | **179** | **Valeraldehyde** | **[110-62-3]**  **(1984)** | **SW (1)** | **1121** | **33.6** | **34.7** | **50** | **50** | **Eye, skin & URT irr** |
|  | **180** |  |  | **B6C3F1 (1)** | **1190** | **35.7** |  | **50** | **50** |  |
| **99** | **181** | **Vinyl toluene** | **[25013-15-4]**  **(1992)** | **OF1 (1)** | **16.4** | **0.46** | **0.46** | **50** | **50** | **URT & eye irr** |
| **100** | **182** | **m-Xylene**  **Chemical addition** | **108-38-3**  **(1992)** | **BALB/C (2)** | **1360** | **40.8** | **40.8** | **100** | **100** | **URT & eye irr; CNS impair** |
| **101** | **183** | **o-Xylene** | **[95-47-6]**  **(1992)** | **OF1 (1)** | **1467** | **44.0** | **44.0** | **100** | **100** | **URT & eye irr; CNS impair** |
| **102** | **184** | **p-Xylene** | **[106-42-3]**  **(1992)** | **OF1 (1)** | **1325** | **39.8** | **39.8** | **100** | **100** | **URT & eye irr; CNS impair** |

**NOTES : Prepared by Yves Alarie, Ph.D. University of Pittsburgh, 2015**

**# 1 : Chemical number**

**# 2 : Entry number**

**A :Chemicals with RD50 values obtained in male mice of various strains (except for acrolein, acetic acid and sulfur dioxide obtained in both male and female mice) and for which a TLV value has been established to primarily prevent sensory irritation in exposed workers. Update includes all chemicals from Schaper, 1993, with additions from Nielsen et al., 2007, Dudek et al., 1992 and Alarie et al., 1980, References 1, 2, 8 and 9 respectively and given for each chemical in the Table above.**

**The 2015 TLV value and basis for each chemical listed were obtained from the American Conference of Governmental Industrial Hygienists (ACGIH) as given in Reference 3.**

**The 1991-992 TLV values listed in the 1993 Schaper database are also listed here for comparison with the 2015 values.**

**RD50 was originally defined from a dose-response from linear regression analysis to be the dose required to elicit a 50% decrease in respiratory rate in mice as given in reference 4. It should have been defined "exposure concentration-response" instead of "dose-response" as given in Reference 10 when it became a standard method with ASTM. RD50 is not applicable to *any other type* of decrease such as a decrease in tidal volume, minute volume, decrease in expiratory airflow, etc. It is only applicable when a definite lengthening of the expiratory phase is observed due to a pause after inspiration and not due to airflow limitation during expiration or pauses between breaths observed during pulmonary irritation, see references 4, 6 , 7 and for details. Also note that in some of the figures in reference 4 the polarity of the signal is not always consistent; one example is the correct polarity (upward deflection during inspiration) for mouse 1 in Figure 23 while it is inverted for mouse 2 in this same Figure.**

**RD50 has been appropriately measured in a variety of mice strains of different sensitivities as shown in Table 1 and References 1 and 9 by different investigators.**

**Nothing is known about quantitative extrapolations to humans when using other animal species were used as discussed at** [**http://rd50.com/**](http://rd50.com/) **or** [**http://www.yvesalarie.com/**](http://www.yvesalarie.com/) **or** [**http://www.pitt.edu/~rd50/**](http://www.pitt.edu/~rd50/)

**Discussions regarding the influence of exposure durations and other factors possibly affecting RD50 values can also be found in references 1, 5, 9 and 11. Reference 5 also presents relationships between lowest observed adverse effect levels (LOAELs) and acute reference exposure levels (RELs) of human responses to sensory irritants and RD50s.**

**The computerized method described in References 7 and 11 has now been widely used to evaluate a variety of single airborne chemicals as well as diverse mixtures of airborne chemicals. It has also been used for mouse and rat asthma models (reference 15) . It provides a better evaluation when complex effects are elicited at different levels of the respiratory tract, particularly when evaluating mixtures, as described in Reference 12. and more recently for nanoparticles (Reference 16) The software for the computerized method is commercially available and runs on Windows.**

**B :Chemical names as listed in Reference 1, name in parenthesis as now listed in Reference 3.**

**Note: A total of 12 new chemicals with RD50 values were added to the 1993 Schaper database**

**Note: A total of 12 new entries of RD50 values were added to chemicals already listed in the 1993 Schaper database**

**Note: For sulfur dioxide the RD50 values are listed for 9 different types of mice, male and female, some measured in the same laboratory for a total of 15 values, see Reference 9, as well as for one other type of mouse from Schaper database which is also included with the other listed values. The entries for sulfur dioxide illustrate the different sensitivities with different types of mice. There is a factor of 10 between the most and least sensitive and the SW type (the type originally used ) is in the middle.**

**Note: Inorganic chemicals are also listed and noted as well as a few evaluated as airborne aerosols.**

**C :For each chemical, the published RD50 value can be found in References 1, 2, 8 or 9 thus details of exposures, exposure durations, how the RD50 value was calculated, etc. can be obtained.**

**D  :Abbreviations as listed by ACGIH in reference 3: Eye & URT irr = Eye and upper respiratory tract irritation; CNS = central nervous system; PNS peripheral nervous system; dam = damage; repro = reproductive; LRT irr = lower respiratory tract irritation; Resp sens = respiratory sensitization; GI = gastrointestinal; irr = irritation**

**E :Although letter C (for Ceiling value) may be added in this table, it is not used in the statistical evaluation database**

**F :Female**

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