# Bi-Polar Ionization and Chemical Contaminants

| Chemical Name | Formula | Mol Weight | OSHA TWA (ppm) | Odor Threshold (ppm) | Bi-Polar Ion | Sorbent Filtration |
|---|---|---|---|---|---|---|
| Acetaldehyde | $CH_3CHO$ | 44.1 | 100 | 0.031-2.3 | E | P |
| Acetic Acid | $CH_3COOH$ | 60.1 | 10 | 0.2-2.4 | E | F |
| Acetone | $CH_3COCH_3$ | 58.1 | 750 | 100 | E | P |
| Acetylene | $C_2H_2$ | 26 | - | - | E | P |
| Acrolein | $CH_2=CHCHO$ | 56.1 | 0.1 | 0.2-1.5 | E | F |
| Acrylic Acid | $CH_2CHCO_2H$ | 72.1 | - | - | E | G |
| Allyl Chloride | $CH_2=CHCH_2Cl$ | 76.5 | 1 | - | F | E |
| Ammonia | $NH_3$ | 17 | 35 | 1-46.8 | E | P |
| n-Amyl Acetate | $CH_3COO[CH_2]_4CH_3$ | 130.2 | 100 | - | G | E |
| n-Amyl Ether | $[CH_3(CH_2)_3CH_2]_2O$ | 158.3 | - | - | G | E |
| Aniline | $C_6H_5NH_2$ | 93.1 | 2 | - | G | F |
| Arsine | $AsH_3$ | 78 | 0.05 | - | P | F |
| Benzene | $C_6H_6$ | 78.1 | 1 | 5 | G | E |
| 1,3-Butadiene | $CH_2CHCHCH_2$ | 54.1 | 1000 | 0.16 | G | F |
| Butane | $C_4H_{10}$ | 58.1 | 800 | odorless | P | F |
| 2-Butane | $CH_3CHCHCH_3$ | 56.1 | - | - | F | F |
| n-Nutyl Acetate | $CH_3COO[CH_2]_3CH_3$ | 116.2 | 150 | - | G | E |
| n-Butyl Alcohol | $CH_3CH_2CH_2CH_2OH$ | 74.1 | 50 | - | G | G |
| Butyl amine | $CH_3CH_2CH_2CH_2NH_2$ | 73.2 | 5 | - | G | F |
| Butyl Cellosolve | $C_4H_9OCH_2CH_2OH$ | 118.2 | 25 | - | G | E |
| | | | | | | |

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|---|---|---|---|---|---|---|
| Butyl Chloride | $CH_3CH_2CH_2CH_2Cl$ | 92.6 | - | - | F | E |
| Butylene | $CH_3CH_2CHCH_2$ | 56.1 | - | - | G | F |
| Butyl Ether | $[CH_3CH_2CH_2CH_2]_2O$ | 130.2 | - | - | G | E |
| Butyl Mercaptan | $CH_3CH_2CH_2CH_2SH$ | 90.2 | 0.5 | - | P | F |
| Butyric Acid | $CH_3CH_2CH_2COOH$ | 88.1 | - | 0.001 | E | E |
| Caproic Acid | $CH_3[CH_2]_4COOH$ | 116.2 | 150 | - | G | E |
| Caprylic Acid | $CH_3[CH_2]_6COOH$ | 144.2 | - | - | G | E |
| Carbon Disulfide | $CS_2$ | 76.1 | - | - | P | G |
| Carbon Monoxide | CO | 28 | 50 | odorless | P | |
| Carbon Tetrachloride | $CCl_4$ | 153.8 | 10 | 21.4-100 | P | E |
| Cellosolve | $C_2H_5OCH_2CH_2OH$ | 90.1 | - | - | G | E |
| Cellosolve Acetate | $CH_3COOCH_2CH_2OC_2H_5$ | 132.5 | - | - | F | E |
| Chlorine | $Cl_2$ | 70.9 | 1 | 0.01-0.31 | P | G |
| Chlorine Dioxide | $ClO_2$ | 67.5 | 0.1 | 0.1 | P | F |
| Chloroform | $CHCl_3$ | 119.4 | 50 | 50-300 | P | E |
| Chloropicrin | $CCl_3NO_2$ | 164.4 | 0.1 | 1.1 | P | E |
| beta-Chloroprene | $CH_2=CClCH=CH_2$ | 88.5 | 1 | - | P | F |
| Creosote | - | - | - | - | F | E |
| Cresol | $HOC_6H_4CH_3$ | 108.1 | - | - | F | E |
| Crotonaldehyde | $CH_3CHCHCHO$ | 70.1 | - | - | G | G |
| Cyclohexane | $C_6H_{12}$ | 84.2 | 300 | 0.41 | F | E |
| Cyclohexanol | $C_6H_{12}O$ | 100.2 | 50 | - | G | E |

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|---|---|---|---|---|---|---|
| Cyclohhexanone | $C_6H_{10}O$ | 98.1 | 50 | - | G | E |
| Cyclohexene | $C_6H_{10}$ | 82.1 | 300 | - | G | E |
| Dibromoethane | $BrCH_2CH_2Br$ | 187.9 | - | - | F | E |
| o-Dichlorobenzene | $C_6H_4Cl_2$ | 147 | - | - | P | E |
| 1.1-Dichloroethane | $ClCH_2CH_2Cl$ | 99 | 10 | - | P | E |
| Dichloropropane | $CH_3CH_2CHCl_2$ | 113 | 75 | | P | E |
| Diethyl amine | $[C_2H_5]_2NH$ | 73.1 | 25 | 0.14 | E | F |
| Dimethylamine | $[CH_3]_2NH$ | 45.1 | 10 | 0.021-23 | E | P |
| Diethyl Ketone | $CH_3CH_2COCH_2CH_3$ | 86.1 | - | - | G | G |
| Dimethyl Aniline | $C_6H_5N(CH_3)_2$ | 121.2 | - | - | F | E |
| Dimethyl Sulfate | $[CH_3]_2SO_4$ | 126.1 | - | - | P | E |
| Dioxane | $C_4H_8O_2$ | 88.1 | - | - | F | G |
| Dipropyl Ketone | $CH_3CH_2CH_2COCH_2CH_2CH_3$ | 114.2 | - | - | G | E |
| Ethane | $C_2H_6$ | 30.1 | - | odorless | P | P |
| Ethanol | $C_2H_5OH$ | 46.1 | 1000 | 10 | E | P |
| Ethyl Ether | $C_2H_5OC_2H_5$ | 74.1 | - | - | E | G |
| Ethyl Acetate | $CH_3COOC_2H_5$ | 88.1 | 400 | 0.0056-50 | G | G |
| Ethyl Acrylate | $CH_2=CHCOOC_2H_5$ | 100.1 | 25 | 0.0005-8 | G | E |
| Ethylamine | $CH_3CH_2NH_2$ | 45.1 | 10 | - | E | F |
| Ethyl Benzene | $CH_3CH_2C_6H_5$ | 106.2 | - | - | F | E |
| Ethyl Bromide | $CH_3CH_2Br$ | 109 | - | - | P | E |
| Ethyl Chloride | $CH_3CH_2Cl$ | 64.5 | - | - | P | G |

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|---|---|---|---|---|---|---|
| Ethylene | $CH_2CH_2$ | 28.1 | - | - | E | P |
| Ethylene Oxide | $C_2H_4O$ | 44.1 | 1 | - | F | F |
| Ethyl Formate | $CH_3CH_2OCHO$ | 74.1 | - | - | G | F |
| Ethyl Mercaptan | $CH_3CH_2SH$ | 62.1 | 0.5 | - | P | F |
| Ethyl Silicate | $(C_2H_5)_4SiO_4$ | 208.3 | - | - | P | E |
| Eucalyptol | $C_{10}H_{18}O$ | 154.2 | - | - | G | E |
| Formaldehyde | HCHO | 30 | 3 | 1 | E | P |
| Formic Acid | HCOOH | 46 | 5 | 21 | G | P |
| Freon 22 | $CHClF_2$ | 86.5 | 1000 | - | P | G |
| Freon 114 | $CClF_2CClF_2$ | 170.9 | - | - | P | E |
| Freon 12 | $CCl_2F_2$ | 120.9 | - | - | P | E |
| n-Heptane | $CH_3[CH_2]_5CH_3$ | 100.2 | - | - | P | G |
| Hydrogen | $H_2$ | 2 | - | - | P | |
| Hydrogen Bromide | HBr | 80.9 | 3 | - | E | F |
| Hydrogen Chloride | HCl | 36.5 | 5 | - | P | G |
| Hydrogen Cyanide | HCN | 27 | 4.7 | - | F | P |
| Hydrogen Fluoride | HF | 20 | 3 | - | P | F |
| Hydrogen Iodide | HI | 127.9 | - | - | P | E |
| Hydrogen Selenide | $H_2Se$ | 81 | 0.05 | - | P | F |
| Hydrogen Sulfide | $H_2S$ | 34.1 | 10 | .0005-4.6 | P | F |
| Indole | $C_8H_7N$ | 117.1 | - | - | G | G |
| Iodoform | $CHI_3$ | 393.8 | 0.6 | - | P | E |

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|---|---|---|---|---|---|---|
| Isoprene | $CH_2CCH_3CHCH_2$ | 68.1 | - | - | G | F |
| Isopropanol | $CH_3CHOHCH_3$ | 60.1 | 400 | 45-200 | E | F |
| Isopropyl Acetate | $CH_3COOCHCH[CH_3]_2$ | 102.2 | 250 | - | G | E |
| Isopropyl Ether | $[CH_3]_2CHOCH[CH_3]_2$ | 102.2 | 500 | - | G | E |
| Isovaleric Acid | $[CH_3]_2CHCH_2COOH$ | 102.1 | - | - | E | G |
| Lactic Acid | $C_3H_6O_3$ | 90.1 | - | - | E | E |
| Methane | $CH_4$ | 16 | - | odorless | P | P |
| Methyl Alcohol | $CH_3OH$ | 32.1 | 200 | 100-5900 | E | P |
| Methyl Acetate | $CH_3COOCH_3$ | 74.1 | 200 | - | E | F |
| Methyl Acrylate | $CH_2CHCOOCH_3$ | 86.1 | 10 | 20 | G | G |
| Methyl Bromide | $CH_2Br$ | 95 | 5 | - | P | F |
| Methylbutyl Ketone | $CH_3COC_4H_9$ | 100.2 | - | - | F | G |
| Methyl Cellosilve | $CH_3OCH_2CH_2OH$ | 76.1 | 25 | - | G | G |
| Methyl Cellosolve Acetate | $COOCH_2CH_2OCH_3$ | 118.1 | 25 | - | P | E |
| Methyl Chloroform | $CH_3CCl_3$ | 133.4 | 350 | 200-400 | P | E |
| Methyl Chloride | $CH_3Cl$ | 50.5 | 50 | - | P | G |
| Methylene Chloride | $CH_2Cl_2$ | 84.9 | 500 | - | P | G |
| Methyl Ether | $CH_3OCH_3$ | 46.1 | - | - | G | F |
| Methyl Ethyl Ketone | $CH_3COCH_2CH_3$ | 72.1 | 200 | 10 | E | F |
| Methyl Formate | $HCOOCH_3$ | 60.1 | 100 | - | G | F |
| Methyl Isobutyl | $CH_3COCH_2CH[CH_3]_2$ | 100.2 | - | - | G | E |

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|---|---|---|---|---|---|---|
| Methyl Mercaptan | $CH_3SH$ | 48.1 | 0.5 | 0.0021 | P | F |
| Monochloribenzene | $C_6H_5Cl$ | 112.6 | - | - | P | E |
| Monomethyl Amine | $CH_3NH_2$ | 31.1 | 10 | - | E | F |
| Naphtha | coal tar | 110 | 100 | - | G | E |
| Napthalene | $C_{10}H_8$ | 128.2 | 10 | - | F | E |
| Nicotine | $C_5H_4NC_4H_7NCH_3$ | 162.2 | - | - | E | E |
| Nicotinic Acid | $C_6H_5NH_2$ | 123.1 | - | - | E | G |
| Nitric Acid | $HNO_3$ | 63 | - | - | P | G |
| Nitric Oxide | NO | 30 | 25 | 0.3-1 | P | P |
| Nitrobenzene | $C_6H_5NO_2$ | 123.1 | 1 | 0.0047-1.9 | P | G |
| Nitroethane | $CH_3CH_2NO_2$ | 75.1 | 100 | - | P | F |
| Nitromethane | $CH_3NO_2$ | 61 | 100 | - | P | F |
| Nitrogen Dioxide | $NO_2$ | 46 | 1 | 5 | P | F |
| 1-Nitropropane | $CH_3CH_2CH_2NO_2$ | 89.1 | 25 | - | P | G |
| Nitrotuluene | $NO_2C_6H_4CH_3$ | 137.1 | 2 | - | P | E |
| Nitrous Oxide | $N_2O$ | 44.02 | - | - | P | P |
| Ozone | $O_3$ | 48 | 0.1 | 0.1 | P | E |
| n-Pentane | $CH_3CH_2CH_2CH_2CH_3$ | 72.2 | 600 | - | G | G |
| 2-Pentanone | $COCH_2CH_2CH_3$ | 86.1 | 200 | - | G | G |
| Phenol | $C_6H_5OH$ | 94.1 | 5 | 0.047-5 | E | G |
| Phosgene | $COCl_2$ | 98.9 | 0.1 | 0.125-1 | P | G |
| Propane | $CH_3CH_2CH_3$ | 44.1 | 1000 | odorless | F | F |

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|---|---|---|---|---|---|---|
| Propionaldehyde | $CH_3CH_2CHO$ | 58.1 | - | - | G | F |
| Propionic Acid | $CH_3CH_2COOH$ | 74.1 | 10 | - | P | F |
| n-Propyl Acetate | $CH_3COOCH_2CH_2CH_3$ | 102.2 | 200 | - | G | E |
| Propyl Chloride | $CH_3CH_2CH_2Cl$ | 78.5 | - | - | P | G |
| Propyl Ether | $C_3H_7OC_3H_7$ | 102.2 | - | - | G | E |
| Propylene | $H_2CCHCH_3$ | 42.1 | - | - | G | F |
| Putrescine | $NH_2[CH_2]_4NH_2$ | 88.2 | - | - | G | G |
| Pyridine | $C_5H_5N$ | 79.1 | 5 | 0.012-.23 | G | F |
| Skatole | $C_9H_9N$ | 131.2 | - | - | G | E |
| Styrene | $C_6H_5CHCH_2$ | 104.2 | 50 | 0.047-0.1 | G | E |
| Sulfur Dioxide | $SO_2$ | 64.1 | 2 | 0.47-5 | P | F |
| Sulfuric Acid | $H_2SO_4$ | 98.1 | - | - | P | G |
| Toluene | $C_6H_5CH_3$ | 92.1 | 100 | 2.14-15 | F | E |
| Trichloroethylene | $ClCH=CCL_2$ | 131.4 | 50 | 21.4 | P | E |
| Triethylamine | $[C_2H_5]_3N$ | 101.2 | 10 | - | F | E |
| Trimethylamine | $[CH_3]_3N$ | 59.1 | - | - | F | F |
| Turpentine | $C_{10}H_{16}$ | 136 | 100 | - | F | E |
| Urea | $H_2NCONH_2$ | 60.1 | - | - | F | F |
| Uric Acid | $C_5H_4N_4O_3$ | 168.1 | - | - | P | E |
| Vinyl Chloride | $CH_2=CHCl$ | 62.5 | - | - | P | G |
| Xylene | $C_6H_4[CH_3]_2$ | 106.2 | 100 | 0.47-200 | F | E |

KEY

| Phase: | | Control Method Ratings: | |
|---|---|---|---|
| G | Gas | E | Excellent |
| L | Liquid | G | Good |
| S | Solid | F | Fair |
| | | P | Poor |

OSHA Occupational Safety & Health Administration
TWA Time Weighted Average (for 8 hr. day)
(PPM) Parts Per Million AlSi AluminosilicateSustrate

*The recommendations in this table represent the manufacturer's best estimate of the requirements for the given application. Different facilities for the same general application ma have contaminants or pollutants preset (or in higher concentrations) which were not considered in these recommendations. Careful attention should be given to the actual field conditions and contaminant identification to achieve the best result

Definitions:

**Excellent** – This means that AtmosAir will be very effective as a stand-alone solution in these environments, but for a measured effect filtration should be evaluated.

**Good** – This means AtmosAir will be effective in these environments, but for maximum effectiveness current filtration strategy should be evaluated and enhanced, especially if a measured effect is necessary.

**Fair** – This means AtmosAir can be a part of a strategy which should also include enhanced filtration and media or sorbent filtration.

**Poor** – This means sorbent filtration is absolutely required and AtmosAir can be included to enhance the overall odor reduction effect. These chemicals listed are will not be broken down by bi-polar ionization.