PLASMA AIR INTERNATIONAL

VOCs

Volatile Organic Compounds (VOC's) are gases emitted from certain solids or liquids. VOC's include a variety of chemicals, some of which have short and long-term health effects. Concentrations of many VOC's are consistently higher indoors (up to ten times higher) than outdoors.

Symptoms associated with exposure to VOC's include conjunctive irritation, nose and throat discomfort, headache, allergic skin reaction, dyspnea, nausea, emesis, epistaxis, fatigue, dizziness.

VOC's are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building material and furnishings, office equipment such as copiers and printers, glues and adhesives, permanent markers.

VOC's Controlled with Plasma Air Ionization Equipment and Chemical Adsorption/Oxidation

Name	Formula	Ionization	Chemical Filter
Acetaldehyde	CH_3CHO	Good	Good
Acetic Acid	CH_3COOH	Good	Good
Acetone	CH_3COCH_3	1	Good
Acetylena	C_3H_3	1	Good
Acrolein	C_3H_4O	Good	Good
Allylchloride	C_3H_5CL	2	Good
Ammonia	NH_3	Good	Good
Amyl Acetate	$C_7H_{14}O_2$	1	Good
Arsine Chlorodiphenyl	$(C_6H_5)_2AsCL$	2	Slowly
Benzene	C_6H_6	Slowly(1)	Slowly
Butadiene	C_4H_6	Slowly(1)	Slowly
Butane	C_4H_{10}	N.A.	No
Butylamine	$C_4H_9NH_2$	1	Good
Butylmercaptan	C_4H_9SH	Slowly(2)	Slowly
Butanoic Acid	C_3H_7COOH	Good	Good
Caproic Acid	$C_5H_{11}COOH$	N.A.	Slowly
Caprylic Acid	$C_7H_{15}COOH$	N.A.	Slowly
Carbon Disulfide	CS_2	(1)	Good
Carbon Monoxide	CO	N.A.	Slowly
Carbon Tetrachloride	CCL_4	No	Slowly
Chlorine	CL_3	No	Slowly
Chloroform	$CHCL_3$	(2)	Good
Chloropicrin	$CCLNO_2$	No	Good
3 Chioroprane	C_4H_5CL	(2)	Good
Creosol	$HOC_6H_4CH_3$	(1)	Good
Cyclohexane	C_6H_{12}	N.A.	Good
Cyclohexanone	$C_6H_{10}O$	N.A.	Good
1,2 Dichloroethane	$C_2H_4CL_2$	(2)	Good
Diethylamine	$(C_3H_5)_2NH$	Good	Slowly
Dimethylmine	$(CH_3)_3NH$	Good	Good
Ethanol	C_2H_6O	Good	Good
Ethylacetate	$CH_3COOC_2H_5$	N.A.	Good
Ethyl Acrylate	$C_5H_8O_3$	(1)	Slowly
Ethylene	C_2H_4	Slowly	Slowly

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Name	Formula	Ionization	Chemical Filter
Formic Acid	HCOOH	N.A.	Good
Formaldehyde	HCHO	Good	Good
Hydrogen	H_2	N.A.	Slowly
Hydrazine	N_2H_4	(1)	Good
Hydrogen Sulfide	H_2S	Slowly	Good
Hydrogen Cyanide	HCN	N.A.	Good
Indole	C_8H_7N	Good	Slowly
Idoform	CHI_3	(2)	Good
Isopropanol	C_3H_8O	Good	Good
Isovaleric Acid	C_4H_9COOH	Good	Slowly
Methane	CH_4	(1)	No
Methanol	CH_3OH	Good	Good
Methyl Acrylate	$C_4C_6O_2$	Slowly(1)	Good
Methyl Amine	CH_3NH_3	Good	Good
Methyl Chloride	CH_3CL	(2)	Good
Methyl Chloroform	CH_3CCL_3	(2)	Good
Methyl Ethylketone	C_4H_8O	(1)	Good
Methyl Mercaptan	CH_3SH	(2)	Good
N-Methyl Pyrrolidine	$C_5H_{11}N$	N.A.	Slowly
Methyl Sulfide	$(CH_3)_3S$	(1)	Good
Nicotine	$C_{10}H_{14}N_2$	Slowly	Slowly
Nicotinic Acid	C_5H_4NCOOH	Slowly(1)	Slowly
Nitric Oxide	NO	(1)	Good
Nitrobenzene	$C_6H_5NO_2$	N.A.	Slowly
Nitrogen Dioxide	NO_2	(1)	Good
Nitrous Oxide	N_2O	(1)	Slowly
Phenol	C_6H_5OH	Slowly	Good
Phosgene	$COCL_3$	N.A.(2)	Slowly
Propane	C_3H_8	(1)	Slowly
Pyridene	C_5H_5N	Good	Good
Skatole	C_9H_9N	Good	Good
Stibine	SbH_3	N.A.	Good
Styrene	C_8H_8	Good	Good
Sulfur Dioxide	SO_2	(2)	Good
Sulfur Trioxide	SO_3	(2)	Good
Toluene	C_7H_8	Slowly	Slowly
Trichloroethylene	C_3HCL_3	No	Good
Triethylamine	$(C_3H_5)_3N$	Slowly	Slowly
Trimethylamine	$(CH_3)_3N$	Good	Good
Vinyl Chloride	CH_3CHCL	(2)	Good
Xylene	C_8H_{10}	Good	Slowly

N.A.	Data not available.
Slowly	May not be controllable at high rates of emission
(1)	Conclusion of effectiveness derived from experience with chemicals in same family.
(2)	Ionization should only be used in combination with chemical filter.

Chemical filters either remove and/or oxidize chemical contaminants. N_2, O_2, H_2O, CO_2 are released into the air stream. Ionization creates the same by-products as chemical filters except where elements other than C, H, O, N are present. When other chemicals are present such as halogens, S, A, I, etc., chemical adsorption must be used to remove substances.

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