

10 PID Response Factor Table

**WARNING**

VOC Response factors apply in the 0-500 ppm range. The values in this table were obtained using dry bottled gases at room temperature. The response factors may change at higher concentrations, different temperature and humidity conditions, or with cleanliness of lamp. For increased accuracy at different ambient conditions or concentrations, determine a custom response factor and enter it via the Custom Gas page; see Chapter XX, Custom Gas Setup. These response factors are specific to the energy of the lamp designated in the table. They are not valid for devices using PID lamps at any other energy. Using these response factors with a lamp at any other energy may critically compromise the device's ability to detect volatile organic compounds which can result in serious personal injury or death.

**WARNING**

Use of Altair5X PID for detection of extremely toxic gases:

The system resolution limit of the Altair5X PID in normal mode (with a new, clean lamp) is approximately 0.1 ppm isobutylene equivalent. Users must be aware of exposure limit guidelines, such as TLV, for the target compound. Do not use the Altair5X PID Detector if the exposure limit for the target compound is below 0.1 ppm. Failure to follow this warning can cause over-exposure, which can result in serious personal injury or death.

For any compound, its exposure limit guideline can be recalculated in terms of equivalent ppm isobutylene by dividing the exposure limit guideline by the appropriate response factor. Example: For butyl acetate (CAS 123-86-4), the recommended threshold limit value (as TWA) is 150 ppm. Its response factor (10.6 eV lamp) is 2.4. The TLV for butyl acetate, in terms of equivalent ppm isobutylene is: $150 \text{ ppm} \div 2.4 = 62.5 \text{ ppm isobutylene equivalent}$.

**WARNING**

The ALTAIR 5X PID Detector has a reproducibility of $\pm 2 \text{ ppm} (\pm 2000 \text{ ppb})$ or 10%, whichever is greater (see table in chapter 6.2). The user must account for this potential variation between the displayed value and the actual concentration when setting alarms and interpreting readings. Failure to comply with this warning can cause over-exposure and result in serious personal injury or death.

Gases with very high response Factors (RF):

The Altair5X PID is a very versatile solution for monitoring many different gases and vapors. In addition to the pre-programmed list provided in the Altair5X PID device, users can determine response factors for many other compounds (see Section X). The maximum response factor value that will be accepted by the Altair5X PID device is 39.99.

**WARNING**

Use the correct lamp when determining the response factor. Failure to apply the appropriate response factors can result in inaccurate readings, and serious injury or death can occur.

Contact MSA Customer Service at 1-800-MSA-2222 with any question regarding the above information.

COMPOUND NAME	Display Name	Synonym(s)	CAS Number ¹	Chemical Formula	Ionization Potential	RF 10.6eV lamp
acetaldehyde	ETHANAL		75-07-0	C ₂ H ₄ O	10.23	10.8
acetone	ACETONE	2-Propanone	67-64-1	C ₃ H ₆ O	9.71	1.2
acetophenone	ACETPHEN		98-86-2	C ₈ H ₈ O	9.28	0.59

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acrolein	ACROLEIN		107-02-8	C ₃ H ₄ O	10.1	3.9
allyl alcohol	PROPENOL		107-18-6	C ₃ H ₆ O	9.67	2.5
ammonia	AMMONIA		7664-41-7	NH ₃	10.16	9.4
amyl acetate	AMYLACET	mix of n-Pentyl acetate & 2-Methylbutyl acetate	628-63-7	C ₇ H ₁₄ O ₂		3.5
arsine	ARSINE	Arsenic trihydride	7784-42-1	AsH ₃	9.89	2.6
benzene	BENZENE		71-43-2	C ₆ H ₆	9.25	0.53
bromoform	BRFORM	Tribromomethane	75-25-2	CHBr ₃	10.48	2.3
bromomethane	MEBR	Methyl bromide	74-83-9	CH ₃ Br	10.54	1.8
butadiene	BUTADIEN	1,3-Butadiene, Vinyl ethylene	106-99-0	C ₄ H ₆	9.07	0.69
butanol, 1-	BUTANOL	Butyl alcohol, n-Butanol	71-36-3	C ₄ H ₁₀ O	9.99	3.4
butoxyethanol, 2-	BTOXETOH	Butyl Cellosolve, Ethylene glycol monobutyl ether	111-76-2	C ₆ H ₁₄ O ₂	<10	1.3
butyl acetate	BTYLACET		123-86-4	C ₆ H ₁₂ O ₂	10	2.4
butyl alcohol, tert-	TBUOH	tert-Butanol, t-Butyl alcohol, t-butanol	75-65-0	C ₄ H ₁₀ O	9.9	3.4
butyl mercaptan, tert-	TBUMRCAP	1-Butanethiol	109-79-5	C ₄ H ₁₀ S	9.14	0.55
butylamine, tert-	TBUAMINE	Butylamine, t-	75-64-9	C ₄ H ₁₁ N	8.5	0.71
carbon disulfide	CS ₂		75-15-0	CS ₂	10.07	1.2
chlorobenzene	CLBNZ	Monochlorobenzene	108-90-7	C ₆ H ₅ Cl	9.06	0.4
cumene	CUMENE	Isopropylbenzene	98-82-8	C ₉ H ₁₂	8.73	0.54
cyclohexane	CYCHEXAN		110-82-7	C ₆ H ₁₂	9.86	1.5
cyclohexanone	CYCHEXON		108-94-1	C ₆ H ₁₀ O	9.14	0.82
decane	DECANE		124-18-5	C ₁₀ H ₂₂	9.65	1.6
Diacetone alcohol	PYRATON	4-Methyl-4-hydroxy-2-pentanone	123-42-2	C ₆ H ₁₂ O ₂	9.50	0.55
dibromoethane, 1,2-	EDB	EDB, Ethylene dibromide, Ethylene bromide	106-93-4	C ₂ H ₄ Br ₂	10.37	11.7
dichlorobenzene, 1,2-	O-DCLBNZ	dichlorobenzene, o-	95-50-1	C ₆ H ₄ Cl ₂	9.08	0.5

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Dichloroethene, trans-1,2-	DCETHENE	t-1,2-DCE, trans-Dichloroethylene	156-60-5	C ₂ H ₂ Cl ₂	9.65	0.45
diesel fuel #1	DIESEL		68334-30-5	m.w. 226		0.9
diesel fuel #2	DIESEL		68334-30-5	m.w. 216		0.75
diethylamine	DEA		109-89-7	C ₄ H ₁₁ N	8.01	1
dimethoxymethane	METHYLAL	Methylal	109-87-5	C ₃ H ₈ O ₂	10	11.3
dimethyl disulfide	DMDS	DMDS	624-92-0	C ₂ H ₆ S ₂	7.4	0.3
dimethylacetamide, n,n-	DMA	DMA	127-19-5	C ₄ H ₉ NO	8.81	0.73
dimethylformamide, n,n-	DMF	DMF	68-12-2	C ₃ H ₇ NO	9.13	0.8
dioxane, 1,4-	DIOXANE		123-91-1	C ₄ H ₈ O ₂	9.19	1.4
epichlorhydrin	EPCLHYD	ECH Chloromethyloxirane, 1-chloro2,3-epoxypropane	106-89-8	C ₂ H ₅ ClO	10.2	7.6
ethanol	ETHANOL	Ethyl alcohol	64-17-5	C ₂ H ₆ O	10.47	10
ethyl acetate	ETACET	Acetic ether; Ethyl acetic ester; Ethyl ethanoate	141-78-6	C ₄ H ₈ O ₂	10.01	4.2
ethyl acetoacetate	EAA		141-97-9	C ₆ H ₁₀ O ₃		0.9
ethyl acrylate	ETHYLACR		140-88-5		<10.3	2.3
ethyl ether	ETETHER	Diethyl ether	60-29-7	C ₄ H ₁₀ O	9.51	1.2
ethyl mercaptan	ETMERCAP	Ethanethiol	75-08-1	C ₂ H ₆ S	9.31	0.6
ethylbenzene	ETBNZE		100-41-4	C ₈ H ₁₀	8.77	0.51
ethylene	ETHYLENE	ethene	74-85-1	C ₂ H ₄	10.51	10.1
ethylene glycol	ETGLYCOL	1,2-Ethanediol	107-21-1	C ₂ H ₆ O ₂	10.16	15.7
ethylene oxide	ETOXIDE	Oxirane, Epox-yethane	75-21-8	C ₂ H ₄ O	10.57	19.5
gasoline (summary hydrocarbons)	GASOLINE		8006-61-9	m.w. 72		1.1
heptane	HEPTANE		142-82-5	C ₇ H ₁₆	9.92	2.5
hexane, n-	HEXANE		110-54-3	C ₆ H ₁₄	10.13	4.5
hydrazine	HYDRAZINE		302-01-2	H ₄ N ₂	8.1	2.6
hydrogen sulfide	H ₂ S		7783-06-04	H ₂ S	10.45	3.2
isoamyl acetate	IAMYACET	Isopentyl acetate	123-92-2	C ₇ H ₁₄ O ₂	<10	1.8
isobutanol	IBUTANOL	2-Methyl-1-propanol	78-83-1	C ₄ H ₁₀ O	10.02	4.7

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isobutene	ISOBUTYL	Isobutylene, Methyl butene	115-11-7	C ₄ H ₈	9.22	1
isobutyl acetate	IBUACET	2-methylpropyl acetate, β -methylpropyl ethanoate	110-19-0	C ₆ H ₁₂ O ₂	9.97	2.6
isooctane	IOCTANE	2,2,4-Trimethyl-pentane	540-84-1	C ₈ H ₁₈	9.86	1.3
isopentane	ISOPENT	2-Methylbutane	78-78-4	C ₅ H ₁₂	10.32	8
isophorone	IPHORNE		78-59-1	C ₉ H ₁₄ O	9.07	0.74
isoprene	ISOPRENE	2-Methyl-1,3-butadiene	78-79-5	C ₅ H ₈	8.86	0.6
isopropanol	IPA	Isopropyl alcohol, 2-propanol, IPA	67-63-0	C ₃ H ₈ O	10.12	5.6
isopropyl acetate	ISOPRACE		108-21-4		9.99	2.6
isopropyl ether	IPOETHR	Diisopropyl ether	108-20-3	C ₆ H ₁₄ O	9.2	0.8
isopropylamine	2PRAMINE		75-31-0	C ₃ H ₉ N	8.6	0.9
Jet A fuel	JETA(A1)	F-34, Kerosene type aviation fuel	8008-20-6	m.w. 145		0.4
JP-5 fuel	JP5	Jet 5, F-4 4, Kerosene type aviation fuel	8008-20-6	m.w. 167		0.48
JP-8 fuel	JP8	F-34, Kerosene type aviation fuel	8008-20-6	m.w. 165		0.48
mesityl oxide	MSTYLOXD		141-79-7	C ₆ H ₁₀ O	9.1	0.47
methoxyethanol, 2-	MEOXETOH	Methyl cellosolve, Ethylene glycol monomethyl ether	109-86-4	C ₃ H ₈ O ₂	10.1	2.5
methyl acetate	MEACET		79-20-9	C ₃ H ₆ O ₂	10.27	7
methyl acetoacetate	MEACACET		105-45-3	C ₅ H ₈ O ₃	9.82	1.1
methyl acrylate	MEACRYLT	Methyl 2-propenoate, Acrylic acid methyl ester	96-33-3	C ₄ H ₆ O ₂	9.9	3.4
methyl benzoate	MEBNZOTE		93-58-3	C ₈ H ₈ O ₂	9.32	0.93
methyl ethyl ketone	MEK	MEK, 2-Butanone	78-93-3	C ₄ H ₈ O	9.51	0.9
methyl isobutyl ketone	MIBK	MIBK, 4-Methyl-2-pentanone	108-10-1	C ₆ H ₁₂ O	9.3	1.1
methyl mercaptan	METHMERC	Methanethiol	74-93-1	CH ₄ S	9.44	0.6
methyl methacrylate	MEMEACRY		80-62-6	C ₅ H ₈ O ₂	9.7	1.5

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methyl tert-butyl ether	MTBE	MTBE, tert-Butyl methyl ether	1634-04-4	C ₅ H ₁₂ O	9.24	0.86
methylamine	MEAMINE	Aminomethane	74-89-5	CH ₅ N	8.97	1.2
methylbenzyl alcohol, 4-	MEBNZOL		589-18-4	C ₈ H ₁₀ O		0.8
naphthalene	NAPHTH	Mothballs	91-20-3	C ₁₀ H ₈	8.13	0.37
nitric oxide	NO		10102-43-9	NO	9.26	7.2
nitrogen dioxide	NO ₂		10102-44-0	NO ₂	9.59	10
nonane, n-	NONANE		111-84-2	C ₉ H ₂₀	9.71	1.6
octane	OCTANE		111-65-9	C ₈ H ₁₈	9.82	2.2
pentane, n-	PENTANE		109-66-0	C ₅ H ₁₂	10.35	9.7
pentanone, 2-	PENT2ONE	MPK, 2-Pentanone, Methyl propyl ketone	107-87-9	C ₅ H ₁₀ O	9.38	0.78
phenol	PHENOL	Hydroxybenzene	108-95-2	C ₆ H ₆ O	8.51	1
phosphine	PHOSPHIN		7803-51-2	PH ₃	9.87	2.8
picoline, 2-	2PICOLIN		109-06-8	C ₆ H ₇ N	9.23	0.57
picoline, 3-	3PICOLIN	3-Methylpyridine	108-99-6	C ₆ H ₇ N	9.04	0.9
pinene, alpha	PINENEA		80-56-8		8.07	0.4
pinene, beta	PINENEB		127-91-3			0.4
propanol, 1-	PROPANOL		71-23-8	C ₃ H ₈ O	10.22	5.7
propionaldehyde	PROPANAL	Propanal	123-38-6	C ₃ H ₆ O	9.96	14.8
propyl acetate, n-	PRACETAT		109-60-4		9.98	3.1
propylene	PROPENE	Propene	115-07-1	C ₃ H ₆	9.73	1.3
Propylene glycol methyl ether	MEOXPROP	PGME, 1-methoxy-2-propanol	107-98-2	C ₄ H ₁₀ O ₂	9.54	1.4
propylene oxide	PROPLYOX	Methyloxirane	75-56-9	C ₃ H ₆ O	10.22	6.5
pyridine	PYRIDINE		110-86-1	C ₅ H ₅ N	9.25	0.79
quinoline	QUNOLINE		91-22-5		8.63	0.72
styrene	STYRENE		100-42-5	C ₈ H ₈	8.47	0.4
tetrachloroethylene	PERC	PCE, Perchloroethylene, Tetrachloroethylene, Perchloroethene	127-18-4	C ₂ Cl ₄	9.32	0.56
tetrahydrofuran	THF	THF	109-99-9	C ₄ H ₈ O	9.41	1.6
thiophene	THIOLE		110-02-1		8.86	0.47
toluene	TOLUENE	Methylbenzene	108-88-3	C ₇ H ₈	8.82	0.53

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trichloroethylene	TCE		79-01-6		9.47	0.5
trimethylamine	TEN	TEN	121-44-8	C ₆ H ₁₅ N	7.53	0.83
trimethylbenzene, 1,2,3-	123MEBNZ		526-73-8	C ₉ H ₁₂	8.42	0.49
trimethylbenzene, 1,2,4-	124MEBNZ		95-63-6	C ₉ H ₁₂	8.27	0.43
trimethylbenzene, 1,3,5-	135MEBNZ		108-67-8	C ₉ H ₁₂	8.4	0.34
turpentine - crude sulfite	TURPS-CS	Pinenes (85%) + other diisoprenes	8006-64-2	C ₁₀ H ₁₆		1
turpentine - pure gum	TURPS-PG	Pinenes (85%) + other diisoprenes	8006-64-2	C ₁₀ H ₁₆		0.45
vinyl acetate	VNYLACET		108-05-4	C ₄ H ₆ O ₂	9.19	1.3
vinyl bromide	VBRM	Bromoethylene	593-60-2	C ₂ H ₃ Br	9.8	0.4
vinyl chloride	VCM	Chloroethylene, VCM	75-01-4	C ₂ H ₃ Cl	9.99	1.8
vinylcyclohexane	VYLCYHEX	VCH	695-12-5	C ₈ H ₁₄	9.51	0.54
vinylidene chloride	VDC	1,1-DCE, dichloroethene, 1,1-	75-35-4	C ₂ H ₂ Cl ₂	9.81	0.8
xylene, m-	M-XYLENE	1,3-Dimethylbenzene	108-38-3	C ₈ H ₁₀	8.56	0.53
xylene, o-	O-XYLENE	1,2-Dimethylbenzene	95-47-6	C ₈ H ₁₀	8.56	0.54
xylene, p-	P-XYLENE	1,4-Dimethylbenzene	106-42-3	C ₈ H ₁₀	8.44	0.5

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