

## PID Response Factors for VOCs

Application Note TSI-148

TSI Volatile Organic Compound (VOC) probes are calibrated using isobutylene, but the sensor's Photo Ionization Detectors (PID) are broadband VOC detectors with a sensitivity that differs for each VOC compound. If you know what VOC you are measuring, then the table below will allow you to calculate the concentration for your specific VOC. These are approximate values, so for best accuracy, you should calibrate with the relevant VOC.

The table includes eight columns:

1. **Gas/ VOC** The most common name for the VOC.
2. **CAS No.** You can find the VOC using the CAS No.: ask your supplier.
3. **Formula** To assist in identifying the VOC and to determine the VOC's molecular weight.
4. **Response Factor (RF).** Multiply the displayed concentration by the Relative Response to calculate the actual concentration of the VOC.
5. **Relative response (%)** This is the inverse of the correction factor, specifying the percent response of the VOC, relative to isobutylene. If less than 100%, then the VOC is less responsive than isobutylene; if the relative sensitivity is greater than 100%, then the VOC is more responsive than isobutylene. Relative sensitivity (%) is specified the same way as cross-sensitivity for toxic gas sensors.
6. **Minimum Detection Level (MDL) PPM** Also called **Minimum Detectable Quantity (MDQ).** Typical lowest concentration that can be detected. The MDL in this column is for use with the PPB sensor. Since the PPB sensor has greater sensitivity than the PPM sensor, the MDL for the PPB sensor will be much less than the MDL for the PPM sensor.
7. **Minimum Detection Level (MDL) PPB** Also called **Minimum Detectable Quantity (MDQ).** Typical lowest concentration that can be detected. The MDL in this column is for use with the PPM sensor. Since the PPM sensor has less sensitivity than the PPM sensor, the MDL for the PPM sensor will be much more than the MDL for the PPB sensor.
8. **Molecular Weight.** The molecular weight of the VOC is used to convert its number concentration (PPM or PPB) to mass concentration ( $\text{mg}/\text{m}^3$ ).

The Relative Response/ CF/ RF is measured in dry air; high humidity will reduce this factor by 30% to 50%, so the CF/ RF should be increased in high humidity conditions.

## VOC Response

PID sensors cannot measure all VOCs or gases. Two types of VOCs are not measured:

- ZR** No response. The 10.6 eV lamp does not ionize the VOC and the VOC cannot be measured.
- NV** The vapor pressure of the VOC at 20°C is less than a few ppm. This Semi-Volatile Organic Compound (SVOC) cannot be measured.

Occasionally you will be measuring a mixture of VOCs. If the total concentration is within the linear range of your PID, then it is reasonable to assume that the concentrations are additive without interference between the different VOCs. If you are measuring a combination of VOCs, then accurate measurement of one of these VOCs will be difficult. Without careful data analysis, you will get only a CF averaged measurement. Be cautious when reporting actual VOC concentration if you know that there may be several VOC's present.

## Balance Gas

The relative response is measured in laboratory air, with 20.9% oxygen, balance nitrogen. Some gases absorb UV light without causing any PID response (*e.g.*, methane, ethane). In ambient atmospheres where these gases are present, the measured concentration of target gas will be less than is actually present. Methane absorbs UV strongly, so for accurate measurements in methane containing atmospheres, calibrate with a calibration gas containing the expected methane concentration. 50% LEL methane reduces the reading by up to 50%. Gases such as nitrogen and helium do not absorb UV and do not affect the relative response.

The correction factor for a gas mix containing PID detectable gases A, B, C... with response factors RF (A), RF (B), RF(C), in relative proportions a: b: c... is given by:

$$RF_{\text{Mix}} = \frac{1}{\frac{a}{RF_a} + \frac{b}{RF_b} + \frac{c}{RF_c} + \dots}$$

## Conversion to Mass Concentration

TSI's Model 9565 VELOCICALC<sup>®</sup> meter and Model 7575 Q-TRAK<sup>™</sup> monitor can convert their ppm or ppb readings to mass concentration units of mg/m<sup>3</sup>. Refer to the user instructions on how to change units of measurement and to calculate mass concentration.

## Accuracy of the Table

This table is for indication only. Table accuracy is 1 to 2 digits only, so when calculating concentration for a specific VOC, specify to 1 or 2 digits only. For best accuracy, calibrate using the specific VOC.

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Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Acetaldehyde	75-07-0	C <sub>2</sub> H <sub>4</sub> O	4.9	21	25	480	44.05
Acetic Acid	64-17-7	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	36.2	3	180	3615	60.05
Acetic Anhydride	108-24-7	C <sub>4</sub> H <sub>6</sub> O <sub>3</sub>	4.0	25	20	400	102.1
Acetone	67-64-1	C <sub>3</sub> H <sub>6</sub> O	0.7	140	5	70	58.08
Acetonitrile	75-05-8	CH <sub>3</sub> CN	ZR	ZR	ZR	ZR	41.05
Acetylene	74-86-2	C <sub>2</sub> H <sub>2</sub>	ZR	ZR	ZR	ZR	26.04
Acrolein	107-02-8	C <sub>3</sub> H <sub>4</sub> O	4.0	25	20	400	56.06
Acrylic Acid	79-10-7	C <sub>3</sub> H <sub>4</sub> O <sub>2</sub>	2.7	36	15	275	72.06
Acrylonitrile	107-13-1	C <sub>3</sub> H <sub>3</sub> N	ZR	ZR	ZR	ZR	53.06
Allyl alcohol	107-18-6	C <sub>3</sub> H <sub>6</sub> O	2.1	48	10	200	58.08
Allyl chloride	107-05-1	C <sub>3</sub> H <sub>5</sub> Cl	4.5	22	20	450	76.53
Ammonia	7664-41-7	H <sub>3</sub> N	8.5	12	40	850	17.03
Amyl acetate, n-	628-63-7	C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>	1.8	56	10	180	130.2
Amyl alcohol	71-41-0	C <sub>5</sub> H <sub>12</sub> O	3.2	31	15	320	88.15
Aniline	62-53-3	C <sub>6</sub> H <sub>7</sub> N	0.5	200	3	50	93.13
Anisole	100-66-3	C <sub>7</sub> H <sub>8</sub> O	0.5	211	2	50	108.1
Arsine	7784-42-1	AsH <sub>3</sub>	2.5	40	15	250	77.95
Asphalt, petroleum fumes	8052-42-4		1.0	100	5	100	
Benzaldehyde	100-52-7	C <sub>7</sub> H <sub>6</sub> O	0.9	117	5	85	106.1
Benzene	71-43-2	C <sub>6</sub> H <sub>6</sub>	0.5	200	3	50	78.11
Benzenethiol	108-98-5	C <sub>6</sub> H <sub>5</sub> SH	0.7	143	4	70	110.2
Benzonitrile	100-47-0	C <sub>7</sub> H <sub>5</sub> N	0.7	141	4	70	103.1
Benzyl alcohol	100-51-6	C <sub>7</sub> H <sub>8</sub> O	1.3	80	6	125	108.1
Benzyl chloride	100-44-7	C <sub>7</sub> H <sub>7</sub> Cl	0.6	182	3	55	126.6
Benzyl formate	104-57-4	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub>	0.8	130	5	77	136.1
Biphenyl	92-52-4	C <sub>12</sub> H <sub>10</sub>	0.4	250	2	40	154.2
Bis(2,3-epoxypropyl) ether	2238-07-5	C <sub>6</sub> H <sub>10</sub> O <sub>3</sub>	3.0	33	15	300	130.1
Boron trifluoride	7637-07-2	BF <sub>3</sub>	ZR	ZR	ZR	ZR	67.81
Bromine	7726-95-6	Br <sub>2</sub>	20.0	5	100	2000	159.8
Bromine pentafluoride	7789-30-2	BrF <sub>5</sub>	ZR	ZR	ZR	ZR	174.9
Bromobenzene	108-86-1	C <sub>6</sub> H <sub>5</sub> Br	0.7	143	4	70	157.0
Bromochloromethane	74-97-5	CH <sub>2</sub> ClBr	ZR	ZR	ZR	ZR	129.4
Bromoethane	74-96-4	C <sub>2</sub> H <sub>5</sub> Br	5.0	20	25	500	109.0
Bromoethyl methyl ether, 2-	6482-24-2	C <sub>3</sub> H <sub>7</sub> OBr	2.5	40	15	250	139.0
Bromoform	75-25-2	CHBr <sub>3</sub>	2.8	36	15	280	252.7
Bromopropane, 1-	106-94-5	C <sub>3</sub> H <sub>7</sub> Br	1.3	77	7	130	123.0
Bromotrifluoromethane	75-63-8	CF <sub>3</sub> Br	ZR	ZR	ZR	ZR	148.9
Butadiene	106-99-0	C <sub>4</sub> H <sub>6</sub>	0.8	120	4	80	54.09
Butadiene diepoxide,1,3-	1464-53-5	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	4.0	25	20	400	86.09
Butane, n-	106-97-8	C <sub>4</sub> H <sub>10</sub>	46.3	2	230	4600	58.12
Butanol, 1-	71-36-3	C <sub>4</sub> H <sub>10</sub> O	4.0	25	20	400	74.12
Buten-3-ol, 1-	598-32-3	C <sub>4</sub> H <sub>8</sub> O	1.2	87	6	115	72.11
Butene, 1-	106-98-9	C <sub>4</sub> H <sub>8</sub>	1.3	77	7	130	56.11
Butoxyethanol, 2-	111-76-2	C <sub>6</sub> H <sub>14</sub> O <sub>2</sub>	1.1	91	6	110	118.2
Butyl acetate, n-	123-86-4	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	2.4	41	10	240	116.2
Butyl acrylate, n-	141-32-2	C <sub>7</sub> H <sub>12</sub> O <sub>2</sub>	1.5	67	8	150	128.2

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Butyl lactate	138-22-7	C <sub>7</sub> H <sub>14</sub> O <sub>3</sub>	2.5	40	15	250	146.2
Butyl mercaptan	109-79-5	C <sub>4</sub> H <sub>10</sub> S	0.5	185	3	50	90.19
Butylamine, 2-	513-49-5	C <sub>4</sub> H <sub>11</sub> N	0.9	111	5	90	73.14
Butylamine, n-	109-73-9	C <sub>4</sub> H <sub>11</sub> N	1.0	100	5	100	73.14
Camphene	565-00-4	C <sub>10</sub> H <sub>16</sub>	0.5	222	2	45	136.2
Carbon disulfide	75-15-0	CS <sub>2</sub>	1.4	71	7	140	76.14
Carbon monoxide	630-08-0	CO	ZR	ZR	ZR	ZR	28.01
Carbon tetrabromide	558-13-4	CBr <sub>4</sub>	3.0	33	15	300	331.6
Carbon tetrachloride	56-23-5	CCl <sub>4</sub>	ZR	ZR	ZR	ZR	153.8
Carbonyl sulphide	463-58-1	COS	ZR	ZR	ZR	ZR	60.08
Carvone, R-	6485-40-1	C <sub>10</sub> H <sub>14</sub> O	1.0	100	5	100	150.2
Chlorine	7782-50-5	Cl <sub>2</sub>	ZR	ZR	ZR	ZR	70.91
Chlorine dioxide	10049-04-4	ClO <sub>2</sub>	1.0	100	5	100	67.45
Chlorine trifluoride	7790-91-2	ClF <sub>3</sub>	ZR	ZR	ZR	ZR	92.45
Chloro-1,1,1,2-tetrafluoroethane	2837-89-0	C <sub>2</sub> HClF <sub>4</sub>	ZR	ZR	ZR	ZR	136.5
Chloro-1,1,1-trifluoroethane, 2-	75-88-7	C <sub>2</sub> H <sub>2</sub> ClF <sub>3</sub>	ZR	ZR	ZR	ZR	118.5
Chloro-1,1,2,2-tetrafluoroethane	354-25-6	C <sub>2</sub> HClF <sub>4</sub>	ZR	ZR	ZR	ZR	136.5
Chloro-1,1,2-trifluoroethane, 1-	421-04-5	C <sub>2</sub> H <sub>2</sub> ClF <sub>3</sub>	ZR	ZR	ZR	ZR	118.5
Chloro-1,1-difluoroethane, 1-	75-68-3	C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub>	ZR	ZR	ZR	ZR	100.5
Chloro-1,1-difluoroethane, 1-	75-68-3	C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub>	ZR	ZR	ZR	ZR	100.5
Chloro-1,1-difluoroethane, 2-	338-65-8	C <sub>2</sub> H <sub>3</sub> ClF <sub>2</sub>	ZR	ZR	ZR	ZR	100.5
Chloro-1,2,2-trifluoroethane	431-07-2	C <sub>2</sub> H <sub>2</sub> ClF <sub>3</sub>	ZR	ZR	ZR	ZR	118.5
Chloro-1,3-butadiene, 2-	126-99-8	C <sub>4</sub> H <sub>5</sub> Cl	3.2	30	16	320	88.54
Chloro-1-fluoroethane, 1-	1615-75-4	C <sub>2</sub> H <sub>4</sub> ClF	ZR	ZR	ZR	ZR	82.50
Chloro-2-fluoroethane, 1-	762-50-5	C <sub>2</sub> H <sub>4</sub> ClF	ZR	ZR	ZR	ZR	82.50
Chloroacetaldehyde	107-20-0	C <sub>2</sub> H <sub>3</sub> OCl	ZR	ZR	ZR	ZR	78.50
Chlorobenzene	108-90-7	C <sub>6</sub> H <sub>5</sub> Cl	0.5	220	2	50	112.6
Chlorodifluoromethane	75-45-6	CHClF <sub>2</sub>	ZR	ZR	ZR	ZR	86.47
Chloroethane	75-00-3	C <sub>2</sub> H <sub>5</sub> Cl	ZR	ZR	ZR	ZR	64.51
Chloroethanol, 2-	107-07-3	C <sub>2</sub> H <sub>5</sub> ClO	10.0	10	50	1000	80.51
Chloroethyl methyl ether, 2-	627-42-9	C <sub>3</sub> H <sub>7</sub> ClO	2.6	40	13	250	94.54
Chlorofluoromethane	593-70-4	CH <sub>2</sub> ClF	ZR	ZR	ZR	ZR	68.48
Chloroform	67-66-3	CHCl <sub>3</sub>	ZR	ZR	ZR	ZR	119.4
Chloromethane	74-87-3	CH <sub>3</sub> Cl	ZR	ZR	ZR	ZR	50.49
Chloropentafluoroethane	76-15-3	C <sub>2</sub> ClF <sub>5</sub>	ZR	ZR	ZR	ZR	154.5
Chlorotoluene, o-	95-49-8	C <sub>7</sub> H <sub>7</sub> Cl	0.5	220	2	50	126.6
Chlorotoluene, p-	108-41-8	C <sub>7</sub> H <sub>7</sub> Cl	0.5	200	3	50	126.6
Chlorotrifluoroethylene	79-38-9	C <sub>2</sub> ClF <sub>3</sub>	1.0	100	5	100	116.5
Chlorotrifluoromethane	75-72-9	CClF <sub>3</sub>	ZR	ZR	ZR	ZR	104.5
Citral	5392-40-5	C <sub>10</sub> H <sub>16</sub> O	1.0	100	5	100	152.2

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Citronellol	26489-01-0	C <sub>10</sub> H <sub>20</sub> O	1.0	100	5	100	156.3
Cresol, m-	108-39-4	C <sub>7</sub> H <sub>8</sub> O	1.1	95	5	105	108.1
Cresol, o-	95-48-7	C <sub>7</sub> H <sub>8</sub> O	1.1	95	5	105	108.1
Cresol, p-	106-44-5	C <sub>7</sub> H <sub>8</sub> O	1.1	95	5	105	108.1
Crotonaldehyde	4170-30-3	C <sub>4</sub> H <sub>6</sub> O	1.0	100	5	100	70.09
Cumene	98-82-8	C <sub>9</sub> H <sub>12</sub>	0.6	170	3	60	120.2
Cyanamide	420-04-2	CH <sub>2</sub> N <sub>2</sub>	ZR	ZR	ZR	ZR	42.04
Cyanogen bromide	506-68-3	CNBr	ZR	ZR	ZR	ZR	105.9
Cyanogen chloride	506-77-4	CNCl	ZR	ZR	ZR	ZR	61.47
Cyclohexane	110-82-7	C <sub>6</sub> H <sub>12</sub>	1.3	77	7	130	84.16
Cyclohexanol	108-93-0	C <sub>6</sub> H <sub>12</sub> O	2.9	34	15	300	100.2
Cyclohexanone	108-94-1	C <sub>6</sub> H <sub>10</sub> O	1.1	91	6	110	98.14
Cyclohexene	110-83-8	C <sub>6</sub> H <sub>10</sub>	0.8	133	5	75	82.15
Cyclohexylamine	108-91-8	C <sub>6</sub> H <sub>13</sub> N	1.0	102	5	100	99.18
Cyclopentane	287-92-3	C <sub>5</sub> H <sub>10</sub>	4.0	25	20	400	70.13
Decane, n-	124-18-5	C <sub>10</sub> H <sub>22</sub>	1.0	96	5	100	142.3
Diacetone alcohol	123-42-2	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	0.8	125	5	80	116.2
Dibenzoyl peroxide	94-36-0	C <sub>14</sub> H <sub>10</sub> O <sub>4</sub>	0.8	125	5	80	242.2
Diborane	19287-45-7	B <sub>2</sub> H <sub>6</sub>	ZR	ZR	ZR	ZR	27.67
Dibromochloromethane	124-48-1	CHBr <sub>2</sub> Cl	10.0	10	50	1000	208.3
Dibromodifluoromethane	75-61-6	CF <sub>2</sub> Br <sub>2</sub>	ZR	ZR	ZR	ZR	209.8
Dibromoethane 1,2-	106-93-4	C <sub>2</sub> H <sub>4</sub> Br <sub>2</sub>	2.0	50	10	200	187.9
Dibromotetrafluoroethane, 1,2-	124-73-2	C <sub>2</sub> F <sub>4</sub> Br <sub>2</sub>	ZR	ZR	ZR	ZR	259.8
Dibutyl hydrogen phosphate	107-66-4	HC <sub>8</sub> H <sub>18</sub> P O <sub>4</sub>	4.0	25	20	400	210.2
Dichloro-1,1,1-trifluoroethane, 2,2-	306-83-2	C <sub>2</sub> HCl <sub>2</sub> F <sub>3</sub>	ZR	ZR	ZR	ZR	152.9
Dichloro-1,1-difluoroethane, 1,2-	1649-08-7	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	134.9
Dichloro-1,2,2-trifluoroethane, 1,2-	354-23-4	C <sub>2</sub> HCl <sub>2</sub> F <sub>3</sub>	ZR	ZR	ZR	ZR	152.9
Dichloro-1,2-difluoroethane, 1,2-	631-06-1	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	134.9
Dichloro-1-fluoroethane, 1,1-	1717-00-6	C <sub>2</sub> H <sub>3</sub> Cl <sub>2</sub> F	ZR	ZR	ZR	ZR	116.9
Dichloro-1-fluoroethane, 1,1-	1717-00-6	C <sub>2</sub> H <sub>3</sub> Cl <sub>2</sub> F	ZR	ZR	ZR	ZR	116.9
Dichloro-1-fluoroethane, 1,2-	430-57-9	C <sub>2</sub> H <sub>3</sub> Cl <sub>2</sub> F	ZR	ZR	ZR	ZR	116.9
Dichloro-1-propene, 2,3-	78-88-6	C <sub>3</sub> H <sub>4</sub> Cl <sub>2</sub>	1.4	70	7	140	111.0
Dichloro-2,2-difluoroethane, 1,1-	79-35-6	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	134.9
Dichloroacetylene	7572-29-4	C <sub>2</sub> Cl <sub>2</sub>	5.0	20	25	500	94.93
Dichlorobenzene o-	95-50-1	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	0.5	200	3	50	147.0
Dichlorodifluoromethane	75-71-8	CCl <sub>2</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	120.9
Dichloroethane 1,2-	107-06-2	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	ZR	ZR	ZR	ZR	98.96
Dichloroethane, 1,1-	75-34-3	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	ZR	ZR	ZR	ZR	98.96
Dichloroethene, 1,1-	75-35-4	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	1.0	105	5	100	96.94

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Dichloroethene, cis-1,2-	156-59-2	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	0.8	125	4	80	96.94
Dichloroethene, trans-1,2-	540-59-0	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	0.7	143	4	70	96.94
Dichloroethylene 1,2-	540-59-0	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	0.8	133	4	75	96.94
Dichlorofluoromethane	75-43-4	CHFC1 <sub>2</sub>	ZR	ZR	ZR	ZR	102.9
Dichloromethane	75-09-2	CH <sub>2</sub> Cl <sub>2</sub>	39.0	3	200	3900	84.93
Dichloropropane, 1,2-	78-87-5	C <sub>3</sub> H <sub>6</sub> Cl <sub>2</sub>	ZR	ZR	ZR	ZR	113.0
Dichlorotetrafluoroethane, 1,1-	374-07-2	C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	ZR	ZR	ZR	ZR	170.9
Dichlorotetrafluoroethane, 1,2-	76-14-2	C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub>	ZR	ZR	ZR	ZR	170.9
Dicyclopentadiene	77-73-6	C <sub>10</sub> H <sub>12</sub>	0.9	110	5	90	132.2
Diesel Fuel	68334-30-5		0.8	130	4	75	
Diethyl ether	60-29-7	C <sub>4</sub> H <sub>10</sub> O	0.9	110	4	90	74.12
Diethyl maleate	141-05-9	C <sub>8</sub> H <sub>12</sub> O <sub>4</sub>	2.0	50	10	200	172.2
Diethyl phthalate	84-66-2	C <sub>12</sub> H <sub>14</sub> O <sub>4</sub>	1.0	100	5	100	222.2
Diethyl sulphate	64-67-5	C <sub>4</sub> H <sub>10</sub> SO <sub>4</sub>	3.0	33	15	300	154.2
Diethyl sulphide	352-93-2	C <sub>4</sub> H <sub>10</sub> S	0.6	180	3	50	90.19
Diethylamine	109-89-7	C <sub>4</sub> H <sub>11</sub> N	1.0	100	5	100	73.14
Diethylaminoethanol, 2-	100-37-8	C <sub>6</sub> H <sub>15</sub> ON	2.7	40	15	270	117.2
Diethylaminopropylamine, 3-	104-78-9	C <sub>7</sub> H <sub>18</sub> N <sub>2</sub>	1.0	100	5	100	130.2
Difluoroethane, 1,1-	75-37-6	C <sub>2</sub> H <sub>4</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	66.05
Difluoroethane, 1,2-	624-72-6	C <sub>2</sub> H <sub>4</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	66.05
Difluoromethane	75-10-5	CH <sub>2</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	52.02
Dihydrogen selenide	7783-07-5	H <sub>2</sub> Se	1.0	100	5	100	2.016
Dihydroxybenzene, 1,2	120-80-9	C <sub>6</sub> H <sub>6</sub> O <sub>2</sub>	1.0	100	5	100	110.1
Dihydroxybenzene, 1,3	108-46-3	C <sub>6</sub> H <sub>6</sub> O <sub>2</sub>	1.0	100	5	100	110.1
Diisobutylene	107-39-1	C <sub>8</sub> H <sub>16</sub>	0.6	156	3	60	112.2
Diisopropyl ether	108-20-3	C <sub>6</sub> H <sub>14</sub> O	0.7	150	3	70	102.2
Diisopropylamine	108-18-9	C <sub>6</sub> H <sub>15</sub> N	0.7	140	4	70	101.2
Diketene	674-82-8	C <sub>4</sub> H <sub>4</sub> O <sub>2</sub>	2.2	45	11	220	84.07
Dimethoxymethane	109-87-5	C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>	1.4	71	7	140	76.09
Dimethyl cyclohexane, 1,2-	583-57-3	C <sub>8</sub> H <sub>16</sub>	1.1	95	5	105	112.2
Dimethyl disulphide	624-92-0	C <sub>2</sub> H <sub>6</sub> S <sub>2</sub>	0.2	435	1	23	94.20
Dimethyl ether	115-10-6	C <sub>2</sub> H <sub>6</sub> O	1.3	80	7	130	46.07
Dimethyl phthalate	131-11-3	C <sub>10</sub> H <sub>10</sub> O <sub>4</sub>	1.0	100	5	100	194.2
Dimethyl sulphate	77-78-1	C <sub>2</sub> H <sub>6</sub> O <sub>4</sub> S	ZR	ZR	ZR	ZR	126.1
Dimethyl sulphide	75-18-3	C <sub>2</sub> H <sub>6</sub> S	0.5	200	3	50	62.13
Dimethylacetamide N,N-	127-19-5	C <sub>4</sub> H <sub>9</sub> NO	1.3	75	7	130	87.12
Dimethylamine	124-40-3	C <sub>2</sub> H <sub>7</sub> N	1.4	70	7	140	45.08
Dimethylaminoethanol	108-01-0	C <sub>4</sub> H <sub>11</sub> NO	1.5	70	8	150	89.14
Dimethylaniline, NN-	121-69-7	C <sub>8</sub> H <sub>11</sub> N	0.6	167	3	60	121.2
Dimethylbutyl acetate	108-84-9	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	1.6	60	8	160	144.2
Dimethylethylamine, NN-	598-56-1	C <sub>4</sub> H <sub>11</sub> N	0.8	125	4	80	73.14
Dimethylformamide	68-12-2	C <sub>3</sub> H <sub>7</sub> NO	0.9	110	5	90	73.09
Dimethylheptan-4-one, 2,6-	108-83-8	C <sub>9</sub> H <sub>18</sub> O	0.8	125	4	80	142.2

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Dimethylhydrazine, 1,1-	57-14-7	C <sub>2</sub> H <sub>8</sub> N <sub>2</sub>	1.0	100	5	100	60.10
Dinitrobenzene, m-	99-65-0	C <sub>6</sub> H <sub>4</sub> N <sub>2</sub> O <sub>4</sub>	3.0	33	15	300	168.1
Dinitrobenzene, o-	528-29-0	C <sub>6</sub> H <sub>4</sub> N <sub>2</sub> O <sub>4</sub>	ZR	ZR	ZR	ZR	168.1
Dinitrobenzene, p-	100-25-4	C <sub>6</sub> H <sub>4</sub> N <sub>2</sub> O <sub>4</sub>	5.0	20	25	500	168.1
Dinonyl phthalate	84-76-4	C <sub>26</sub> H <sub>42</sub> O <sub>4</sub>	1.0	100	5	100	418.6
Dioxane 1,2-		C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	1.5	67	8	150	88.11
Dioxane 1,4-	123-91-1	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	1.5	67	8	150	88.11
Dipentene	138-86-3	C <sub>10</sub> H <sub>16</sub>	0.9	110	5	90	136.2
Diphenyl ether	101-84-8	C <sub>12</sub> H <sub>10</sub> O	0.8	125	4	80	170.2
Disulphur decafluoride	5714-22-7	S <sub>2</sub> F <sub>10</sub>	ZR	ZR	ZR	ZR	254.1
Disulphur dichloride	10025-67-9	S <sub>2</sub> Cl <sub>2</sub>	3.0	33	15	300	135.0
Di-tert-butyl-p-cresol	2409-55-4	C <sub>11</sub> H <sub>16</sub> O	1.0	100	5	100	164.2
Divinylbenzene	1321-74-0	C <sub>10</sub> H <sub>10</sub>	0.4	250	2	40	130.2
Dodecanol	112-53-8	C <sub>12</sub> H <sub>26</sub> O	0.9	110	5	90	186.3
Enflurane	13838-16-9	C <sub>4</sub> H <sub>2</sub> F <sub>5</sub> Cl O	ZR	ZR	ZR	ZR	196.5
Epichlorohydrin	106-89-8	C <sub>3</sub> H <sub>5</sub> ClO	8.0	15	40	800	92.52
Epoxypropyl isopropyl ether, 2,3-	4016-14-2	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	1.1	90	5	110	116.2
Ethane	74-84-0	C <sub>2</sub> H <sub>6</sub>	ZR	ZR	ZR	ZR	30.07
Ethanol	64-17-5	C <sub>2</sub> H <sub>6</sub> O	8.7	10	45	870	46.07
Ethanolamine	141-43-5	C <sub>2</sub> H <sub>7</sub> NO	3.0	33	15	300	61.08
Ethoxy-2-propanol, 1-	1569-02-4	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	2.0	50	10	200	102.1
Ethoxyethanol, 2-	110-80-5	C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>	29.8	3	150	3000	90.12
Ethoxyethyl acetate, 2-	111-15-9	C <sub>6</sub> H <sub>12</sub> O <sub>3</sub>	3.0	33	15	300	132.2
Ethyl(S)-(-)-lactate	97-64-3	C <sub>5</sub> H <sub>10</sub> O <sub>3</sub>	3.0	33	15	300	118.1
Ethyl acetate	141-78-6	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	3.6	28	20	360	88.11
Ethyl acrylate	140-88-5	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	2.0	50	10	200	100.1
Ethyl amine	75-04-7	C <sub>2</sub> H <sub>7</sub> N	1.0	100	5	100	45.08
Ethyl benzene	100-41-4	C <sub>8</sub> H <sub>10</sub>	0.5	185	3	50	106.2
Ethyl butyrate	105-54-4	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	1.0	105	5	100	116.2
Ethyl chloroformate	541-41-3	C <sub>3</sub> H <sub>5</sub> O <sub>2</sub> Cl	80.0	1	400	8300	108.5
Ethyl cyanoacrylate	7085-85-0	C <sub>6</sub> H <sub>7</sub> O <sub>2</sub> N	1.5	67	8	150	125.1
Ethyl decanoate	110-38-3	C <sub>12</sub> H <sub>24</sub> O <sub>2</sub>	1.8	56	10	180	200.3
Ethyl formate	109-94-4	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	30.0	3	150	3000	74.08
Ethyl hexanoate	123-66-0	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	2.6	38	15	260	144.2
Ethyl hexanol, 2-	105-76-7	C <sub>8</sub> H <sub>18</sub> O	1.5	67	8	150	130.2
Ethyl hexyl acrylate, 2-	103-11-7	C <sub>11</sub> H <sub>20</sub> O <sub>2</sub>	1.0	100	5	100	184.3
Ethyl mercaptan	75-08-1	C <sub>2</sub> H <sub>6</sub> S	0.7	145	3	70	62.13
Ethyl octanoate	106-32-1	C <sub>10</sub> H <sub>20</sub> O <sub>2</sub>	2.3	40	12	230	172.3
Ethylene	74-85-1	C <sub>2</sub> H <sub>4</sub>	8.0	13	40	800	28.05
Ethylene dinitrate	628-96-6	C <sub>2</sub> H <sub>4</sub> O <sub>6</sub> N <sub>2</sub>	ZR	ZR	ZR	ZR	152.1
Ethylene glycol	107-21-1	C <sub>2</sub> H <sub>6</sub> O <sub>2</sub>	20.0	5	100	2000	62.07
Ethylene oxide	75-21-8	C <sub>2</sub> H <sub>4</sub> O	15.0	7	75	1500	44.05
Ferrocene	102-54-5	C <sub>10</sub> H <sub>10</sub> Fe	0.8	125	4	80	186.0
Fluorine	7782-41-4	F <sub>2</sub>	ZR	ZR	ZR	ZR	38.00
Fluoroethane	353-33-6	C <sub>2</sub> H <sub>5</sub> F	ZR	ZR	ZR	ZR	48.06

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Fluoromethane	593-53-3	CH <sub>3</sub> F	ZR	ZR	ZR	ZR	34.03
Formaldehyde	50-00-0	CH <sub>2</sub> O	ZR	ZR	ZR	ZR	30.03
Formamide	75-12-7	CH <sub>3</sub> ON	2.0	50	10	200	45.04
Formic acid	64-18-6	CH <sub>2</sub> O <sub>2</sub>	ZR	ZR	ZR	ZR	46.02
Furfural	98-01-1	C <sub>5</sub> H <sub>4</sub> O <sub>2</sub>	1.4	70	7	140	96.08
Furfuryl alcohol	98-00-0	C <sub>5</sub> H <sub>6</sub> O <sub>2</sub>	2.0	50	10	200	98.10
Gasoline vapors	8006-61-9		1.1	95	5	105	
Gasoline vapors	8006-61-9		0.8	125	4	80	
Gasoline vapors92 octane	8006-61-9		0.8	125	4	80	
Germane	7782-65-2	GeH <sub>4</sub>	10.0	10	50	1000	76.64
Glutaraldehyde	111-30-8	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	0.9	111	5	90	100.1
Halothane	151-67-7	CF <sub>3</sub> CHBr Cl	ZR	ZR	ZR	ZR	197.4
Helium		He	ZR	ZR	ZR	ZR	
Heptan-2-one	110-43-0	C <sub>7</sub> H <sub>14</sub> O	0.7	140	4	70	114.2
Heptan-3-one	106-35-4	C <sub>7</sub> H <sub>14</sub> O	0.8	133	4	75	114.2
Heptane n-	142-82-5	C <sub>7</sub> H <sub>16</sub>	2.1	50	10	200	100.2
Hexachloroethane	67-72-1	C <sub>2</sub> Cl <sub>6</sub>	ZR	ZR	ZR	ZR	236.7
Hexafluoroethane	76-16-4	C <sub>2</sub> F <sub>6</sub>	ZR	ZR	ZR	ZR	138.0
Hexamethyldisilazane, 1,1,1,3,3,3-	999-97-3	C <sub>6</sub> H <sub>19</sub> NSi <sub>2</sub>	1.0	100	5	100	161.4
Hexamethyldisiloxane	107-46-0	C <sub>6</sub> H <sub>18</sub> OSi <sub>2</sub>	0.3	350	1	30	162.4
Hexan-2-one	591-78-6	C <sub>6</sub> H <sub>12</sub> O	0.8	125	4	80	100.2
Hexane n-	110-54-3	C <sub>6</sub> H <sub>14</sub>	4.2	25	20	420	86.18
Hexene, 1-	592-41-6	C <sub>6</sub> H <sub>12</sub>	0.9	110	5	90	84.16
Hydrazine	302-01-2	H <sub>4</sub> N <sub>2</sub>	3.0	33	15	300	32.05
Hydrazoic acid	7782-79-8	HN <sub>3</sub>	ZR	ZR	ZR	ZR	43.03
Hydrogen	1333-74-0	H <sub>2</sub>	ZR	ZR	ZR	ZR	2.016
Hydrogen bromide	10035-10-6	HBr	ZR	ZR	ZR	ZR	80.91
Hydrogen chloride	7647-01-0	HCl	ZR	ZR	ZR	ZR	36.46
Hydrogen cyanide	74-90-8	HCN	ZR	ZR	ZR	ZR	27.03
Hydrogen fluoride	7664-39-3	HF	ZR	ZR	ZR	ZR	20.01
Hydrogen peroxide	7722-84-1	H <sub>2</sub> O <sub>2</sub>	4.0	25	20	400	34.01
Hydrogen sulfide	7783-06-4	H <sub>2</sub> S	4.0	25	20	400	34.08
Hydroquinone	123-31-9	C <sub>6</sub> H <sub>6</sub> O <sub>2</sub>	0.8	125	4	80	110.1
Hydroxypropyl acrylate 2-	999-61-1	C <sub>6</sub> H <sub>10</sub> O <sub>3</sub>	1.5	67	8	150	130.1
Iminodi(ethylamine) 2,2-	111-40-0	C <sub>4</sub> H <sub>13</sub> N <sub>3</sub>	0.9	110	5	90	103.2
Iminodiethanol 2,2'-	111-42-2	C <sub>4</sub> H <sub>11</sub> NO <sub>2</sub>	1.6	60	8	160	105.1
Indene	95-13-6	C <sub>9</sub> H <sub>8</sub>	0.5	220	2	50	116.2
Iodine	7553-56-2	I <sub>2</sub>	0.2	667	1	15	253.8
Iodoform	75-47-8	CHI <sub>3</sub>	1.5	67	8	150	393.7
Iodomethane	74-88-4	CH <sub>3</sub> I	0.4	250	2	40	141.9
Isoamyl acetate	123-92-2	C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>	1.6	60	8	160	130.2
Isobutane	75-28-5	C <sub>4</sub> H <sub>10</sub>	8.0	15	40	800	58.12
Isobutanol	78-83-1	C <sub>4</sub> H <sub>10</sub> O	3.5	30	20	350	74.12
Isobutyl acetate	110-19-0	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	2.3	45	10	230	116.2
Isobutyl acrylate	106-63-8	C <sub>7</sub> H <sub>12</sub> O <sub>2</sub>	1.3	80	7	130	128.2

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Isobutylene	115-11-7	C <sub>4</sub> H <sub>8</sub>	1.0	100	5	100	56.11
Isobutyraldehyde	78-84-2	C <sub>4</sub> H <sub>8</sub> O	1.2	80	6	120	72.11
Isocyanates, all			NV	NV	NV	NV	
Isodecanol	25339-17-7	C <sub>10</sub> H <sub>22</sub> O	0.9	110	5	90	158.3
Isoflurane	26675-46-7	C <sub>3</sub> H <sub>2</sub> ClF <sub>5</sub> O	ZR	ZR	ZR	ZR	184.5
Isononanol	2452-97-9	C <sub>9</sub> H <sub>20</sub> O	1.5	67	8	150	144.3
Isooctane	565-75-3	C <sub>8</sub> H <sub>18</sub>	1.1	90	5	100	114.2
Isooctanol	26952-21-6	C <sub>8</sub> H <sub>18</sub> O	1.7	60	9	170	130.2
Isopentane	78-78-4	C <sub>5</sub> H <sub>12</sub>	6.0	20	30	600	72.15
Isophorone	78-59-1	C <sub>9</sub> H <sub>14</sub> O	0.8	133	4	75	138.2
Isoprene	78-79-5	C <sub>5</sub> H <sub>8</sub>	0.7	140	3	70	68.12
Isopropanol	67-63-0	C <sub>3</sub> H <sub>8</sub> O	4.4	20	22	440	60.10
Isopropyl acetate	108-21-4	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	2.2	50	10	220	102.1
Isopropyl chloroformate	108-23-6	C <sub>4</sub> H <sub>7</sub> O <sub>2</sub> Cl	1.6	60	8	160	122.6
Jet Fuel JP-4			0.8	133	4	75	
Jet Fuel JP-5			0.7	150	3	60	
Jet Fuel JP-8			0.7	150	3	60	
Kerosene	8008-20-6			0.8	120	4 90	
Ketene	463-51-4	C <sub>2</sub> H <sub>2</sub> O	3.0	33	15	300	42.04
Liquefied petroleum gas	68476-85-7		ZR	ZR	ZR	ZR	
Maleic anhydride	108-31-6	C <sub>4</sub> H <sub>2</sub> O <sub>3</sub>	2.0	50	10	200	98.06
Mercaptoacetic acid	68-11-1	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub> S	1.0	100	5	100	92.12
Mercury	7439-97-6	Hg	NV	NV	NV	NV	200.6
Mercury alkyls			NV	NV	NV	NV	
Mesitylene	108-67-8	C <sub>9</sub> H <sub>12</sub>	0.3	300	2	30	120.2
Methacrylic acid	79-41-4	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	2.3	40	12	230	86.09
Methacrylonitrile	126-98-7	C <sub>4</sub> H <sub>5</sub> N	5.0	20	25	500	67.09
Methane	74-82-8	CH <sub>4</sub>	ZR	ZR	ZR	ZR	16.04
Methanol	67-56-1	CH <sub>4</sub> O	200.0	1	1000	20000	32.04
Methoxyethanol, 2-	109-86-4	C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>	2.7	40	15	270	76.09
Methoxyethoxyethanol, 2-	111-77-3	C <sub>5</sub> H <sub>12</sub> O <sub>3</sub>	1.4	70	7	140	120.1
Methoxymethylethoxy-2-propanol	34590-94-8	C <sub>7</sub> H <sub>16</sub> O <sub>3</sub>	1.3	80	7	130	148.2
Methoxypropan-2-ol	107-98-2	C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>	3.0	33	15	300	90.12
Methoxypropyl acetate	108-65-6	C <sub>6</sub> H <sub>12</sub> O <sub>3</sub>	1.2	80	6	120	132.2
Methyl acetate	79-20-9	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	5.2	20	25	500	74.08
Methyl acrylate	96-33-3	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	3.4	30	17	340	86.09
Methyl bromide	74-83-9	CH <sub>3</sub> Br	1.9	50	10	190	94.94
Methyl cyanoacrylate	137-05-3	C <sub>5</sub> H <sub>5</sub> O <sub>2</sub> N	5.0	20	25	500	111.1
Methyl ethyl ketone	78-93-3	C <sub>4</sub> H <sub>8</sub> O	0.8	130	4	80	72.11
Methyl ethyl ketone peroxides	1338-23-4	C <sub>8</sub> H <sub>18</sub> O <sub>2</sub>	0.8	125	4	80	146.2
Methyl formate	107-31-3	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	ZR	ZR	ZR	ZR	60.05
Methyl isobutyl ketone	108-10-1	C <sub>6</sub> H <sub>12</sub> O	0.8	125	4	80	100.2
Methyl isocyanate	624-83-9	C <sub>2</sub> H <sub>3</sub> NO	ZR	ZR	ZR	ZR	57.05
Methyl isothiocyanate	556-61-6	C <sub>2</sub> H <sub>3</sub> NS	0.6	167	3	60	73.12

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Methyl mercaptan	74-93-1	CH <sub>4</sub> S	0.7	140	4	70	48.11
Methyl methacrylate	80-62-6	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	1.6	60	8	160	100.1
Methyl propyl ketone	107-87-9	C <sub>5</sub> H <sub>10</sub> O	0.8	130	4	80	86.13
Methyl salicylate	119-36-8	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	1.2	80	6	120	152.1
Methyl sulphide	75-18-3	C <sub>2</sub> H <sub>6</sub> S	0.5	200	3	50	62.13
Methyl t-butyl ether	1634-04-4	C <sub>5</sub> H <sub>12</sub> O	0.8	125	4	80	88.15
Methyl-2-propen-1-ol, 2-	51-42-8	C <sub>4</sub> H <sub>8</sub> O	1.1	90	5	100	72.11
Methyl-2-pyrrolidinone, N-	872-50-4	C <sub>5</sub> H <sub>9</sub> NO	0.9	110	5	90	99.13
Methyl-4,6-dinitrophenol, 2-	534-52-1	C <sub>7</sub> H <sub>6</sub> N <sub>2</sub> O <sub>5</sub>	3.0	33	15	300	198.1
Methyl-5-hepten-2-one, 6-	110-93-0	C <sub>8</sub> H <sub>14</sub> O	0.8	125	4	80	126.2
Methylamine	74-89-5	CH <sub>5</sub> N	1.4	70	7	140	31.06
Methylbutan-1-ol, 3-	123-51-3	C <sub>5</sub> H <sub>12</sub> O	3.4	30	17	340	88.15
Methylcyclohexane	108-87-2	C <sub>7</sub> H <sub>14</sub>	1.1	90	6	110	98.19
Methylcyclohexanol, 4-	589-91-3	C <sub>7</sub> H <sub>14</sub> O	2.4	40	12	240	114.2
Methylcyclohexanone 2-	583-60-8	C <sub>7</sub> H <sub>12</sub> O	1.0	100	5	100	112.2
Methylheptan-3-one, 5-	541-85-5	C <sub>8</sub> H <sub>16</sub> O	0.8	133	4	75	128.2
Methylhexan-2-one, 5-	110-12-3	C <sub>7</sub> H <sub>14</sub> O	0.8	133	4	75	114.2
Methylhydrazine	60-34-4	CH <sub>6</sub> N <sub>2</sub>	1.3	80	7	130	46.07
Methyl-N-2,4,6-tetranitroaniline, N-	479-45-8	C <sub>7</sub> H <sub>5</sub> N <sub>5</sub> O <sub>8</sub>	3.0	33	15	300	287.1
Methylpent-3-en-2-one, 4-	141-79-7	C <sub>6</sub> H <sub>10</sub> O	0.7	140	4	70	98.14
Methylpentan-2-ol, 4-	108-11-2	C <sub>6</sub> H <sub>14</sub> O	2.8	40	14	280	102.2
Methylpentane-2,4-diol, 2-	107-41-5	C <sub>6</sub> H <sub>14</sub> O <sub>2</sub>	4.0	25	20	400	118.2
Methylpropan-2-ol, 2-	75-65-0	C <sub>4</sub> H <sub>10</sub> O	3.5	30	18	350	74.12
Methylstyrene	25013-15-4	C <sub>9</sub> H <sub>10</sub>	0.5	200	3	50	118.2
Mineral oil	8042-47-5		0.8	125	4	80	
Mineral spirits	64475-85-0		0.8	125	4	80	
Naphthalene	91-20-3	C <sub>10</sub> H <sub>8</sub>	0.4	230	2	45	128.2
Nitric oxide	10102-43-9	NO	8.0	15	40	800	30.01
Nitroaniline 4-	100-01-6	C <sub>6</sub> H <sub>6</sub> N <sub>2</sub> O <sub>2</sub>	0.8	125	4	80	138.1
Nitrobenzene	98-95-3	C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub>	1.7	60	10	170	123.1
Nitroethane	79-24-3	C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub>	ZR	ZR	ZR	ZR	75.07
Nitrogen dioxide	10102-44-0	NO <sub>2</sub>	10.0	10	50	1000	46.01
Nitrogen trichloride	10025-85-1	NCl <sub>3</sub>	1.0	100	5	100	120.4
Nitrogen trifluoride	7783-54-2	NF <sub>3</sub>	ZR	ZR	ZR	ZR	71.00
Nitromethane	75-52-5	CH <sub>3</sub> NO <sub>2</sub>	ZR	ZR	ZR	ZR	61.04
Nitropropane, 1-	108-03-2	C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub>	ZR	ZR	ZR	ZR	89.09
Nitropropane, 2-	79-46-9	C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub>	ZR	ZR	ZR	ZR	89.09
Nitrous oxide	10024-97-2	N <sub>2</sub> O	ZR	ZR	ZR	ZR	44.01
Nonane, n-	111-84-2	C <sub>9</sub> H <sub>20</sub>	1.3	80	6	130	128.3
Norbornadiene, 2,5-	121-46-0	C <sub>7</sub> H <sub>8</sub>	0.6	167	3	60	92.14
Octachloronaphthalene	2234-13-1	C <sub>10</sub> Cl <sub>8</sub>	1.0	100	5	100	403.7
Octane, n-	111-65-9	C <sub>8</sub> H <sub>18</sub>	1.6	60	8	160	114.2
Octene, 1-	111-66-0	C <sub>8</sub> H <sub>16</sub>	0.7	140	3	70	112.2
Oxalic acid	144-62-7	C <sub>2</sub> H <sub>2</sub> O <sub>4</sub>	ZR	ZR	ZR	ZR	90.03
Oxalonnitrile	460-19-5	C <sub>2</sub> N <sub>2</sub>	ZR	ZR	ZR	ZR	52.04

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Oxydiethanol 2,2,-	111-46-6	C <sub>4</sub> H <sub>10</sub> O <sub>3</sub>	4.0	25	20	400	106.1
Oxygen		O <sub>2</sub>	ZR	ZR	ZR	ZR	32.00
Ozone	10028-15-6	O <sub>3</sub>	ZR	ZR	ZR	ZR	48.00
Paraffin wax, fume	8002-74-2		1.0	100	5	100	
Paraffins, normal	64771-72-8		1.0	105	5	100	
Pentacarbonyl iron	13463-40-6	FeC <sub>5</sub> O <sub>5</sub>	1.0	100	5	100	195.9
Pentachloroethane	76-01-7	C <sub>2</sub> HCl <sub>5</sub>	ZR	ZR	ZR	ZR	202.3
Pentachlorofluoroethane	354-56-3	C <sub>2</sub> Cl <sub>5</sub> F	ZR	ZR	ZR	ZR	220.3
Pentafluoroethane	354-33-6	C <sub>2</sub> HF <sub>5</sub>	ZR	ZR	ZR	ZR	120.0
Pentan-2-one	107-87-9	C <sub>5</sub> H <sub>10</sub> O	0.8	125	4	80	86.13
Pentan-3-one	96-22-0	C <sub>5</sub> H <sub>10</sub> O	0.8	125	4	80	86.13
Pentandione, 2,4-	123-54-6	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	0.8	133	4	75	100.1
Pentane, n-	109-66-0	C <sub>5</sub> H <sub>12</sub>	7.9	15	40	800	72.15
Peracetic acid	79-21-0	C <sub>2</sub> H <sub>4</sub> O <sub>3</sub>	2.0	50	10	200	76.05
Perchloryl fluoride	7616-94-6	ClO <sub>3</sub> F	ZR	ZR	ZR	ZR	125.4
Perfluoropropane	76-19-7	C <sub>3</sub> F <sub>8</sub>	ZR	ZR	ZR	ZR	188.0
Petroleum ether			0.9	110	5	90	
Phenol	108-95-2	C <sub>6</sub> H <sub>6</sub> O	1.2	85	6	120	94.11
Phenyl propene, 2-	98-83-9	C <sub>9</sub> H <sub>10</sub>	0.4	230	2	45	118.2
Phenyl-2,3-epoxypropyl ether	122-60-1	C <sub>9</sub> H <sub>10</sub> O <sub>2</sub>	0.8	125	4	80	150.2
Phenylenediamine, p-	106-50-3	C <sub>6</sub> H <sub>8</sub> N <sub>2</sub>	0.6	167	3	60	108.1
Phosgene	75-44-5	COCl <sub>2</sub>	ZR	ZR	ZR	ZR	98.92
Phosphine	7803-51-2	PH <sub>3</sub>	2.0	50	10	200	34.00
Picoline, 3-	108-99-6	C <sub>6</sub> H <sub>7</sub> N	0.9	110	5	90	93.13
Pinene, alpha	80-56-8	C <sub>10</sub> H <sub>16</sub>	0.3	315	2	30	136.2
Pinene, beta	127-91-3	C <sub>10</sub> H <sub>16</sub>	0.3	315	2	30	136.2
Piperidine	110-89-4	C <sub>5</sub> H <sub>11</sub> N	0.9	110	5	90	85.15
Piperylene	504-60-9	C <sub>5</sub> H <sub>8</sub>	0.7	150	3	67	68.12
Prop-2-yn-1-ol	107-19-7	C <sub>3</sub> H <sub>4</sub> O	1.3	80	7	130	56.06
Propan-1-ol	71-23-8	C <sub>3</sub> H <sub>8</sub> O	4.8	20	25	480	60.10
Propane	74-98-6	C <sub>3</sub> H <sub>8</sub>	ZR	ZR	ZR	ZR	44.10
Propane-1,2-diol, total	57-55-6	C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>	10.0	10	50	1000	76.09
Propene	115-07-1	C <sub>3</sub> H <sub>6</sub>	1.4	70	7	140	42.08
Propionaldehyde	123-38-6	C <sub>3</sub> H <sub>6</sub> O	1.7	60	8	169	58.08
Propionic acid	79-09-4	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	8.0	15	40	800	74.08
Propyl acetate, n-	109-60-4	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	2.5	40	13	250	102.1
Propylene dinitrate	6423-43-4	C <sub>3</sub> H <sub>6</sub> N <sub>2</sub> O <sub>6</sub>	ZR	ZR	ZR	ZR	166.1
Propylene oxide	75-56-9	C <sub>3</sub> H <sub>6</sub> O	7.0	15	35	700	58.08
Propyleneimine	75-55-8	C <sub>3</sub> H <sub>7</sub> N	1.3	80	7	130	57.10
Pyridine	110-86-1	C <sub>5</sub> H <sub>5</sub> N	0.8	133	4	75	79.10
Pyridylamine 2-	504-29-0	C <sub>5</sub> H <sub>6</sub> N <sub>2</sub>	0.8	125	4	80	94.12
Silane	7803-62-5	SiH <sub>4</sub>	ZR	ZR	ZR	ZR	32.12
Sodium fluoroacetate	62-74-8	C <sub>2</sub> H <sub>2</sub> O <sub>2</sub> F Na	ZR	ZR	ZR	ZR	100.0
Styrene	100-42-5	C <sub>8</sub> H <sub>8</sub>	0.4	230	2	50	104.2
Sulphur dioxide	7446-09-5	SO <sub>2</sub>	ZR	ZR	ZR	ZR	64.06

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Sulphur hexafluoride	2551-62-4	SF <sub>6</sub>	ZR	ZR	ZR	ZR	146.1
Sulphur tetrafluoride	7783-60-0	SF <sub>4</sub>	ZR	ZR	ZR	ZR	108.1
Sulphuric acid	7664-93-9	H <sub>2</sub> SO <sub>4</sub>	ZR	ZR	ZR	ZR	98.08
Sulphuryl fluoride	2699-79-8	SO <sub>2</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	102.1
Terphenyls		C <sub>18</sub> H <sub>14</sub>	0.6	167	3	60	230.3
Terpinolene	586-62-9	C <sub>10</sub> H <sub>16</sub>	0.5	210	2	50	136.2
Tert-butanol	75-65-0	C <sub>4</sub> H <sub>10</sub> O	2.6	40	15	260	74.12
Tetrabromoethane, 1,1,2,2-	79-27-6	C <sub>2</sub> H <sub>2</sub> Br <sub>4</sub>	2.0	50	10	200	345.7
Tetracarbonylnickel	13463-39-3	NiC <sub>4</sub> O <sub>4</sub>	1.0	100	5	100	170.7
Tetrachloro-1,2-difluoroethane, 1,1,2,2-	76-12-0	C <sub>2</sub> Cl <sub>4</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	203.8
Tetrachloro-1-fluoroethane, 1,1,2,2-	354-14-3	C <sub>2</sub> HCl <sub>4</sub> F	ZR	ZR	ZR	ZR	185.8
Tetrachloro-2,2-difluoroethane, 1,1,1,2-	76-11-9	C <sub>2</sub> Cl <sub>4</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	203.8
Tetrachloro-2-fluoroethane, 1,1,1,2-	354-11-0	C <sub>2</sub> HCl <sub>4</sub> F	ZR	ZR	ZR	ZR	185.8
Tetrachloroethane, 1,1,1,2-	630-20-6	C <sub>2</sub> H <sub>2</sub> Cl <sub>4</sub>	ZR	ZR	ZR	ZR	167.8
Tetrachloroethane, 1,1,2,2-	79-34-5	C <sub>2</sub> H <sub>2</sub> Cl <sub>4</sub>	ZR	ZR	ZR	ZR	167.8
Tetrachloroethylene	127-18-4	C <sub>2</sub> Cl <sub>4</sub>	0.7	140	4	70	165.8
Tetrachloronaphthalenes, all isomers	20020-02-4	C <sub>10</sub> H <sub>4</sub> Cl <sub>4</sub>	1.0	100	5	100	266.0
Tetraethyl orthosilicate	78-10-4	C <sub>8</sub> H <sub>20</sub> O <sub>4</sub> Si	2.0	50	10	200	208.3
Tetraethyllead	78-00-2	C <sub>8</sub> H <sub>20</sub> Pb	ZR	ZR	ZR	ZR	323.4
Tetrafluoroethane, 1,1,1,2-	811-97-2	C <sub>2</sub> H <sub>2</sub> F <sub>4</sub>	ZR	ZR	ZR	ZR	102.0
Tetrafluoroethane, 1,1,2,2-	359-35-3	C <sub>2</sub> H <sub>2</sub> F <sub>4</sub>	ZR	ZR	ZR	ZR	102.0
Tetrafluoroethylene	116-14-3	C <sub>2</sub> F <sub>4</sub>	1.0	100	5	100	100.0
Tetrafluoromethane	75-73-0	CF <sub>4</sub>	ZR	ZR	ZR	ZR	88.00
Tetrahydrofuran	109-99-9	C <sub>4</sub> H <sub>8</sub> O	1.6	65	8	150	72.11
Tetramethyl orthosilicate	681-84-5	C <sub>4</sub> H <sub>12</sub> O <sub>4</sub> Si	ZR	ZR	ZR	ZR	152.2
Tetramethyl succinonitrile	3333-52-6	C <sub>8</sub> H <sub>12</sub> N <sub>2</sub>	1.0	100	5	100	136.2
Therminol			1.0	100	5	100	
Thionyl chloride	7719-09-7	SOCl <sub>2</sub>	ZR	ZR	ZR	ZR	119.0
Toluene	108-88-3	C <sub>7</sub> H <sub>8</sub>	0.5	200	3	50	92.14
Toluene-2,4-diisocyanate	584-84-9	C <sub>9</sub> H <sub>6</sub> N <sub>2</sub> O <sub>2</sub>	1.6	60	8	160	174.2
Toluenesulphonylchloride, p-	98-59-9	C <sub>7</sub> H <sub>7</sub> SO <sub>2</sub> Cl	3.0	33	15	300	190.6
Toluidine, o-	95-53-4	C <sub>7</sub> H <sub>9</sub> N	0.5	200	3	50	107.2
Tributyl phosphate	126-73-8	C <sub>12</sub> H <sub>27</sub> O <sub>4</sub> P	5.0	20	25	500	266.3
Tributylamine	102-82-9	C <sub>12</sub> H <sub>27</sub> N	1.0	100	5	100	185.4
Trichloro-1,1-difluoroethane, 1,2,2-	354-21-2	C <sub>2</sub> HCl <sub>3</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	169.4
Trichloro-1,2-difluoroethane, 1,1,2	354-15-4	C <sub>2</sub> HCl <sub>3</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	169.4

Gas/VOC	CAS No.	Formula	Response Factor	Relative Response	MDL (ppb)	MDL (ppm)	Molecular Weight (g/mol)
Trichloro-2,2-difluoroethane, 1,1,1-	354-12-1	C <sub>2</sub> HCl <sub>3</sub> F <sub>2</sub>	ZR	ZR	ZR	ZR	169.4
Trichloro-2-fluoroethane, 1,1,2-	359-28-4	C <sub>2</sub> H <sub>2</sub> Cl <sub>3</sub> F	ZR	ZR	ZR	ZR	151.4
Trichlorobenzene 1,2,4-	120-82-1	C <sub>6</sub> H <sub>3</sub> Cl <sub>3</sub>	0.6	180	3	50	181.4
Trichloroethane, 1,1,1-	71-55-6	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	ZR	ZR	ZR	ZR	133.4
Trichloroethane, 1,1,2-	79-00-5	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	ZR	ZR	ZR	ZR	133.4
Trichloroethylene	79-01-6	C <sub>2</sub> HCl <sub>3</sub>	0.7	150	3	65	131.4
Trichlorofluoromethane	75-69-4	CCl <sub>3</sub> F	ZR	ZR	ZR	ZR	137.4
Trichloronitromethane	76-06-2	CCl <sub>3</sub> NO <sub>2</sub>	ZR	ZR	ZR	ZR	164.4
Trichlorophenoxyacetic acid, 2,4,5-	93-76-5	C <sub>8</sub> H <sub>5</sub> O <sub>3</sub> Cl <sub>3</sub>	1.0	100	5	100	255.5
Trichloropropane 1,2,3-	96-18-4	C <sub>3</sub> H <sub>5</sub> Cl <sub>3</sub>	ZR	ZR	ZR	ZR	147.4
Trichlorotrifluoroethane, 1,1,1-	354-58-5	C <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub>	ZR	ZR	ZR	ZR	187.4
Trichlorotrifluoroethane, 1,1,2-	76-13-1	C <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub>	ZR	ZR	ZR	ZR	187.4
Triethylamine	121-44-8	C <sub>6</sub> H <sub>15</sub> N	0.9	110	5	90	101.2
Trifluoroethane, 1,1,1-	420-46-2	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub>	ZR	ZR	ZR	ZR	84.04
Trifluoroethane, 1,1,2-	430-66-0	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub>	ZR	ZR	ZR	ZR	84.04
Trifluoroethanol, 2,2,2-	75-89-8	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub> O	ZR	ZR	ZR	ZR	100.0
Trifluoromethane	75-46-7	CHF <sub>3</sub>	ZR	ZR	ZR	ZR	70.01
Trimethylamine	53-50-3	C <sub>3</sub> H <sub>9</sub> N	0.5	200	3	50	59.11
Trimethylbenzene, 1,3,5-	108-67-8	C <sub>9</sub> H <sub>12</sub>	0.3	300	2	35	120.2
Trinitrotoluene 2,4,6-	118-96-7	C <sub>7</sub> H <sub>5</sub> N <sub>3</sub> O <sub>6</sub>	ZR	ZR	ZR	ZR	227.1
Turpentine	8006-64-2	C <sub>10</sub> H <sub>16</sub>	0.6	167	3	60	136.2
TVOC			1.0	100	5	100	
Undecane, n-	1120-21-4	C <sub>11</sub> H <sub>24</sub>	0.9	110	5	100	156.3
Vinyl acetate	108-05-2	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	1.1	90	6	110	86.09
Vinyl bromide	593-60-2	C <sub>2</sub> H <sub>3</sub> Br	1.0	100	5	100	106.9
Vinyl chloride	75-01-4	C <sub>2</sub> H <sub>3</sub> Cl	2.1	50	10	200	62.50
Vinyl-2-pyrrolidinone, 1-	88-12-0	C <sub>6</sub> H <sub>9</sub> NO	0.9	110	5	90	111.1
Xylene mixed isomers	1330-20-7	C <sub>8</sub> H <sub>10</sub>	0.4	230	2	40	106.2
Xylene, m-	108-38-3	C <sub>8</sub> H <sub>10</sub>	0.4	230	2	50	106.2
Xylene, o-	95-47-6	C <sub>8</sub> H <sub>10</sub>	0.6	167	3	60	106.2
Xylene, p-	106-42-3	C <sub>8</sub> H <sub>10</sub>	0.6	180	3	50	106.2
Xylidine, all	1300-73-8	C <sub>8</sub> H <sub>11</sub> N	0.7	140	4	70	121.2

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