VOLATILE ORGANIC COMPOUNDS (VOCs) STANDARDS

Hong Kong Specialty Gases provides full range of accurate low concentration Volatile Organic Compounds (VOCs) calibration standards as low as part per billion level for ambient air studies and indoor air quality (IAQ) studies. Typical component concentrations range from 10 ppm to 100 ppb. Blending of multi-component organic standards at these concentrations requires highly accurate mixing equipment as well as highly skilled production technicians. Our cylinder treatment technology ensures maximum stability for the entire certification period. The certification period for volatile and semi-volatile organic standards is six (6) months or higher depending on components and concentrations. Hong Kong Specialty Gases provides Volatile Organic Chemicals (V.O.C.) Gas Standards from two (2) components to over fifty (50) components, providing requested components do not react with one another and discrete analysis is possible.

Method TO-14A Calibration Standard

US EPA's Compendium Method TO-14A "Gas Chromatography" is used extensively by analysts for both ambient air studies and indoor air quality (IAQ) studies. TO-14A calibration standards provided by Hong Kong Specialty Gases are manufactured using exacting gravimetric techniques with all gravimetric measurements directly traceable to NIST (National Institute of Standards and Technology). The 39 components mixture is also directly traceable analytically to NIST.

Below TO-14A calibration standard consists of 39 components at concentrations of either one (1) ppm or one hundred (100) ppb in a balance of VOC free nitrogen (N_2) with other concentrations available. All TO-14A standards have one year stability. In addition, HSG supplies 41 and 43 component TO-14A standards, as well as, a variety of subsets.

39 Component TO-14A

Benzene [71-43-2]
Bromomethane [74-83-9]
Carbon Tetrachloride [56-23-5]
Chlorobenzene [108-90-7]
Chloroform [67-66-3]
Chloromethane [74-87-3]
1,2-Dibromoethane [106-93-4]
1,3-Dichlorobenzene [95-50-1]
1,4-Dichlorobenzene [541-73-1]
p-Dichlorobenzene [106-46-7]
1,1-Dichloroethane [75-34-3]
1.2-Dichloroethane [107-06-2]
1,1-Dichloroethene [75-35-4]
cis-1,2-Dichloroethene [156-59-2]
1,2-Dichloropropane [78-87-5]
cis-1,3-Dichloropropene [10061-01-05]
trans-1,3-Dichloropropene [10061-02-6]
Chloroethane [75-00-3]
Ethyl Benzene [100-41-4]
Trichlorofluoromethane [75-69-4] (Halocarbon 11)
Dichlorodifluoromethane [75-71-8] (Halocarbon 12)
1,1,2 Trichlorotrifluoroethane [76-13-1] (Halocarbon 113)
Dichlorotetrafluoroethane [76-14-2] (Halocarbon 114)
Hexachloro-1,3 Butadiene [87-68-3]
Methylene Chloride [75-09-2]
Styrene [100-42-5]
1,1,2,2-Tetrachloroethane [79-34-5]
Tetrachloroethylene [127-18-4]
Toluene [108-88-3]
1,2,4-Trichlorobenzene [120-82-1]
1,1,1-Trichloroethane [71-55-6]
1,1,2-Trichloroethane [79-00-5]
Trichloroethene [79-01-6]
1,2,4-Trimethylbenzene [95-63-6]
1,3,5-Trimethylbenzene [108-67-8]
Vinyl Chloride [75-01-4]
o-Xylene [95-47-6]
m-Xylene [108-38-3]
p-Xylene [106-42-3]

NOTE: CAS numbers are in square brackets, i.e. [00-00-0]

41 Component TO-14A

39 components plus 1,3-Butadiene [106-99-0] and Acrylonitrile [107-13-1]

43 Component TO-14A

41 components plus 3-Chloropropene [107-05-1] and 4-Ethyltoluene [622-96-8]

VOLATILE ORGANIC COMPOUNDS (VOCs) STANDARDS

Method TO-14A Calibration Standards Subsets

All are available at standard concentrations of one (1) ppm and one hundred (100) ppb in a balance gas of VOC free nitrogen (N2). Other concentrations are available as custom mixtures.

TO-14A Subset 1	
Benzene [71-43-2]	1,3-Dichlorobenzene [541-73-1]
Benzyl Chloride * [100-44-7]	Toluene [108-88-3]
Chlorobenzene [108-90-7]	o-Xylene [95-47-6]
* stability is not guaranteed	

TO-14A Subset 2	
Acetonitrile [75-05-8]	Chloroform [67-66-3]
1,3-Butadiene [106-99-0]	Methylene Chloride [75-09-2]
Carbon Tetrachloride [56-23-5]	Trichlorofluoromethane [75-69-4]

TO-14A CFC/HFC Standard	
Trichlorofluoromethane (Halocarbon 11) [75-69-4]	1,1,2-Trichloro-1,2,2-Trifluoroethane (Halocarbon 113) [76-13-1]
Dichlorodifluoromethane (Halocarbon 12) [75-71-8]	1,2-Dichlorotetrafluoroethane (Halocarbon 114) [76-14-2]

TO-14A Internal Standard	
Bromochloromethane [74-97-5]	1,4-Difluorobenzene [540-36-3]
Chlorobenzene-d5[3114-55-4]	

TO-14A Internal Standard/Tuning Standard	
Bromochloromethane [74-97-5]	Chlorobenzene-d5 [3114-55-4]
1-Bromo-4-Fluorobenzene (4-Bromofluorbenzene) [460-00-4]	1,4-Difluorobenzene [540-36-3]

VOLATILE ORGANIC COMPOUNDS (VOCs) STANDARDS

Method TO-15 / TO-17 Calibration Standard

The TO-15 / TO-17 Calibration Standard consists of 62 components at standard concentrations of one (1) ppm or one hundred (100) ppb in a balance gas of VOC free nitrogen (N_2). Other concentrations are available as custom mixtures. Stability of 1 ppm TO-15 standard in a size "A030" cylinder is 12 months. All other concentrations or cylinder sizes are 6 months.

Whether you are performing Compendium Method TO-15; **"Determination of Volatile Organic Compounds (VOCs) In Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)"** or Compendium Method TO-17; **"Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling Onto Sorbent Tubes"**, Spectra's Calibration Standard is the standard of choice.

Acetone [67-64-1]
Benzene [71-43-2]
Benzyl Chloride* [100-44-7]
Bromoform [75-25-2]
Bromomethane [74-83-9]
Bromodichloromethane [75-27-4]
1,3-Butadiene [106-99-0]
2-Butanone (MEK) [78-93-3]
Carbon Disulfide* [75-15-0]
Carbon Tetrachloride [56-23-5]
Chlorobenzene [108-90-7]
Chloroethane [75-00-3]
Chloroform [67-66-3]
Cyclohexane [110-82-7]
Chloromethane [74-87-3]
Dibromochloromethane [124-48-1]
1,2-Dichlorobenzene [95-50-1]
1,3-Dichlorobenzene [541-73-1]
1,4-Dichlorobenzene [106-46-7]
1,1-Dichloroethane [75-34-3]
1,2-Dichloroethane [107-06-2]
1,1-Dichloroethene [75-35-4]
cis-1,2-Dichloroethene [156-59-2]
trans-1,2-Dichloroethene [156-60-5]
1,2-Dichloropropane [78-87-5]
cis-1,3-Dichloropropene [10061-01-5]
trans-1,3-Dichloropropene [10061-02-6]
1,4-Dioxane [123-91-1]
Ethanol* [64-17-5]
Ethyl Acetate [141-78-6]
Ethyl Benzene [100-41-4]
1,2 Dibromoethane [106-93-4]
4-Ethyltoluene [622-96-8]
Halocarbon 11 (Trichlorofluoromethane) [75-69-4]
Halocarbon 12 (Dichlorodifluoromethane) [75-71-8]
Halocarbon 113 (1,1,2-Trichlorotrifluoroethane) [76-13-1]
Halocarbon 114 (1,2-Dichlorotetrafluoroethane) [76-14-2]
Heptane [142-82-5]
Hexachloro-1,3-butadiene [87-68-3]
Hexane [110-54-3]
2-Hexanone (MBK) [591-78-6]
4-Methyl-2-Pentanone (MIBK) [108-10-1]
Methylene Chloride [75-09-2]
Methyl-tert-Butylether (MTBE) [1634-04-4]
2-Propanol [67-63-0]
Propylene [115-07-1]
Styrene [100-42-5]
1,1,2,2-Tetrachloroethane [79-34-5]
Tetrachloroethene [127-18-4]
Tetrahydrofuran [109-99-9]
Toluene [108-88-3]
1,1,1-Trichloroethane [71-55-6]
1,1,2-Trichloroethane [79-00-5]
Trichloroethene [79-01-6]
1,2,4-Trichlorobenzene [120-82-1]
1,2,4-Trimethylbenzene [95-63-6]
1,3,5-Trimethylbenzene [108-67-8]
Vinyl Acetate [108-05-4]
Vinyl Chloride [75-01-4]
o-Xylene [95-47-6]
m-Xylene [108-38-3]
p-Xylene [106-42-3]

*No stability guarantee on these compounds.

NOTE: CAS numbers are in square brackets, i.e. [00-00-0]

VOLATILE ORGANIC COMPOUNDS (VOCs) STANDARDS

TO-15 / TO-17 Subset Calibration Standard

The TO-15 / TO-17 Subset Calibration Standard consists of 25 components which are not contained in the TO-14 Calibration Standard. It is available from stock at standard concentrations of one (1) ppm or one hundred (100) ppb in a balance gas of VOC free nitrogen (N2). Other concentrations are available as custom mixtures.
Stability of 1 ppm TO-15 standard in a size A030 cylinder is 12 months. All other concentrations or cylinder sizes are 6 months.

Acetone [67-64-1]
Allyl Chloride [107-05-1]
Benzyl Chloride* [100-44-7]
Bromodichloromethane [75-27-4]
Bromoform [75-25-2]
1,3-Butadiene [106-99-0]
2-Butanone (MEK) [78-93-3]
Carbon Disulfide* [75-15-0]
Cyclohexane [110-82-7]
Dibromochloromethane [124-48-1]
trans-1,2-Dichloroethene [156-60-5]
1,4-Dioxane [123-91-1]
Ethyl Acetate [141-78-6]
4-Ethyltoluene [622-96-8]
n-Heptane [142-82-5]
n-Hexane [110-54-3]
2-Hexanone (MBK) [591-78-6]
4-Methyl-2-Pentanone (MIBK) [108-10-1]
Methyl-tert-Butylether (MTBE) [1634-04-4]
2-Propanol [67-63-0]
Propylene [115-07-1]
Tetrahydrofuran [109-99-9]
Vinyl Acetate [108-05-4]
Vinyl Bromide [593-60-2]
2,2,4-Trimethylpentane [540-84-1]

*No stability guarantee on these compounds.
Shelflife for 1ppm each, A030 size, is 1 year.
All other concentrations, six months.

VOLATILE ORGANIC COMPOUNDS (VOCs) STANDARDS

U.S. EPA PAMS Calibration Standards

U.S. EPA has an ozone precursor monitoring program known as PAMS, Photochemical Assessment Monitoring System, to monitor the ozone and its precursors in areas with persistently high ozone levels, mostly large metropolitan areas.

Hong Kong Specialty Gases provides the EPA specified PAMS standard using exacting micro-gravimetric techniques with all measurements directly traceable to NIST (National Institute of Standards and Technology).

The standard is supplied in a size A030 cylinder with a guaranteed stability of 12 months or a size A001 cylinder with a six month stability guarantee. Concentrations are expressed in ppb C (parts per billion expressed as carbon) as specified by the U.S. EPA. and also at 100 ppb v/v and 1 ppm v/v.

Acetylene 40 [74-86-2]
Benzene 30 [71-43-2]
n-Butane 40 [106-97-8]
1-Butene 30 [106-98-9]
cis-2-Butene 35 [590-18-1]
trans-2-Butene 25 [624-64-6]
Cyclohexane 40 [110-82-7]
Cyclopentane 20 [287-92-3]
n-Decane 30 [124-18-5]
m-Diethylbenzene 40 [141-93-5]
p-Diethylbenzene 25 [105-05-5]
2,2-Dimethylbutane 40 [75-83-2]
2,3-Dimethylbutane 50 [79-29-8]
2,3-Dimethylpentane 50 [565-59-3]
2,4-Dimethylpentane 40 [108-08-7]
n-Dodecane 40 [112-40-3]
Ethane 25 [74-84-0]
Ethyl Benzene 25 [100-41-4]
Ethylene 20 [74-85-1]
o-Ethyltoluene 30 [611-14-3]
m-Ethyltoluene 25 [620-14-4]
p-Ethyltoluene 40 [622-96-8]
n-Heptane 25 [142-82-5]
n-Hexane 30 [110-54-3]
1-Hexene 60 [592-41-6]
Isobutane 25 [75-28-5]
Isopentane 40 [78-78-4]
Isoprene 40 [78-79-5]
Isopropylbenzene 40 [98-82-8]
n-Octane 30 [111-65-9]
n-Pentane 25 [109-66-0]
1-Pentene 25 [109-67-1]
Methylcyclohexane 30 [108-87-2]
Methylcyclopentane 25 [96-37-7]
2-Methylheptane 25 [592-27-8]
3-Methylheptane 25 [589-81-1]
2-Methylhexane 25 [591-76-4]
3-Methylhexane 25 [589-34-4]
2-Methylpentane 20 [107-83-5]
3-Methylpentane 40 [96-14-0]
n-Nonane 25 [111-84-2]
cis-2-Pentene 35 [627-20-3]
trans-2-Pentene 25 [646-04-8]
Propane 40 [74-98-6]
n-Propylbenzene 30 [103-65-1]
Propylene 25 [115-07-1]
Styrene 40 [100-42-5]
Toluene 40 [108-88-3]
1,2,3-Trimethylbenzene 25 [526-73-8]
1,2,4-Trimethylbenzene 40 [95-63-6]
1,3,5-Trimethylbenzene 25 [108-67-8]
2,2,4-Trimethylpentane 30 [540-84-1]
2,3,4-Trimethylpentane 25 [565-75-3]
n-Undecane 30 [1120-21-4]
o-Xylene 25 [95-47-6]
m/p-Xylene (combined) 40 [108-38-3 / 106-42-3]

NOTE: CAS numbers are in square brackets, i.e. [00-00-0]
Number following the compounds is the concentration in ppb.

VOLATILE ORGANIC COMPOUNDS (VOCs) STANDARDS

BTEX Calibration Standards

Environmental regulations require accurate, traceable low concentration organic gas calibration standards to calibrate instruments used in :

- Ambient air monitoring
- Measurement of incinerator emissions
- Measurement of fugitive emissions from chemical processing equipment
- Measurement of industrial stationary sources
- Measurement of landfill gases

Hong Kong Specialty Gases offers a four (4) component, BTEX Standard-1, and a six (6) component, BTEX Standard-2, calibration standards in concentrations from 100 ppb to 10 ppm in a balance gas of VOC zero grade nitrogen (N_2). All concentrations are directly traceable to NIST gravimetrically and analytically by comparison with NIST certified standards.

BTEX standards are available in a variety of cylinders, most common are the size A001, 104 liters at 1800 psig and the A030, 4000 liters at 2000 psig.

BTEX Standard-1	
Benzene [71-43-2]	Toluene [108-88-3]
Ethyl Benzene [100-41-4]	o-Xylene [95-47-6]

BTEX Standard-2	
Benzene [71-43-2]	m-Xylene [108-38-3]
Ethyl Benzene [100-41-4]	o-Xylene [95-47-6]
Toluene [108-88-3]	p-Xylene [106-42-3]

Specifications	
Blend Tolerance	100 ppb to 1 ppm +/- 10%
	> 1 ppm to 10 ppm +/- 5%
Analytical Accuracy	100 ppb to 1 ppm +/- 5%
	> 1 ppm to 10 ppm +/- 2%
Stability	12 months
NOTE: CAS numbers are in square brackets, i.e. [00-00-0]	