# Method TO-14A Calibration Standards

US EPA's Compendium Method TO-14A, "**Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography"** is used extensively by analysts for both ambient air studies and indoor air quality (IAQ) studies.

Spectra's TO-14A calibration standards are manufactured using exacting gravimetric techniques with all gravimetric measurements directly traceable to NIST (National Institute of Standards and Technology). Furthermore Spectra's 39 component mix is directly traceable analytically to NIST.

Spectra's base 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 as custom mixtures. All TO-14A standards have one year stability. In addition Spectra 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 [10061-01-5]
trans-1,3-Dichloropopropene [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]*

To enhance your QA/QC procedures, Spectra stocks at least two (2) individual batches of each VOC raw material. This allows you to order two (2) independent **TO-14A Calibration Standards** from Spectra.

## 41 Component TO-14A

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

## 43 Component TO-14A

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

***(Continued)***

# 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 ($N_2$). Other concentration are available as custom mixtures.

**TO-14 A Subset 1** (1 year stability)

| | |
|---|---|
| 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-14 A Subset 2** (1 year stability)

| | |
|---|---|
| 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** (1 year stability)

| | |
|---|---|
| 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** (1 year stability)

| | |
|---|---|
| Bromochlormethane[74-97-5] | 1,4-Diflurobenzene[540-36-3] |
| Chlorobenzene-d5[3114-55-4] | |

**TO 14A Internal Standard/Tuning Standard** (1 year stability)

| | |
|---|---|
| Bromochlormethane [74-97-5] | Chlorobenzene-d5 [3114-55-4] |
| 1-Bromo-4-Flurobenzene (4-Bromofluorbenzene) [460-00-4] | 1,4-Diflurobenzene [540-36-3] |

## Regulator Recommendation

Various independent and Agency laboratories have indicated that to ensure repeatability with low level calibration gases it is best to utilize the same regulator for initial assay and for daily usage, thus minimizing the sources for potential variances and possible cross contamination. If a regulator is purchased along with the TO-14A standard, Spectra Gases will perform the initial assay and certification analysis utilizing the regulator and cylinder as a matched set.

Spectra Gases' model 7621 regulator is ideal for use with the TO-14A component standard. Please see the equipment section for information on this and other gas handling equipment.

### Standard Available Cylinders

| CYLINDER SIZE | VOLUME | PRESSURE | CGA |
|---|---|---|---|
| 2A | 4000 liters | 2000 psig | 350 |
| 6A | 104 liters | 1800 psig | 180 |