

Standards PREPARATION



4600A
Dynamic
Diluter



Static Dilution using
4600-02 Option



Surrogate spiking of
field sample



6R Standard
Cylinder

Approx.
Cylinder Vol.
6R - 100L
4A - 600L



4600A
Silonite®
Manifold
Option

Dynamic Dilution

The 4600A Dynamic Diluter prepares PPB level standards from PPM level certified cylinders. Up to 6 mass flow controllers blend cylinder standards with a diluent gas (typically N₂) under equilibrium conditions for unsurpassed reproducibility. With option 4600-01, pressurizing of field samples with nitrogen or surrogate is supported to add unequalled quality assurance to the analysis.

| Unit | Part No. | Description |
|------|----------|--|
| EA | 4601A | 4600A Dynamic Dilution System Bundle (2 Mass Flow Controllers Included) |
| EA | 03-1xxxx | Additional MFCs (xxxx = cc/min) (0010, 0050, 0200, 1000, 5000) |
| EA | 4600-01 | Automated Sample Pressurization Option |
| EA | 4600-02 | Syringe Spiking Option |
| EA | 4600-03 | Silonite® Coated Manifold |
| EA | 4621A | 2-Stage Dynamic Diluter For Preparing Part Per Trillion Standards (4 Mass Flow Controllers Included) |
| EA | 90-84600 | 4600 to 4600A Upgrade Kit, SL1 to SL2 |
| EA | 4600-230 | 230 VAC Option for 4600A |
| EA | 4600-100 | 100 VAC Option for 4600A |
| EA | 40-45010 | 1 PPM TO14 Std., 6R Cyl., 1700 psig |
| EA | 40-45110 | 1 PPM TO15 Subset Std., 6R Cyl., 1700 psig |
| EA | 40-45120 | 1 PPM 77 Cmpd TO15 Std., 4A Cyl, 2000 psig |
| EA | 40-45150 | 1 PPM PAMS HC Std., 6R Cyl., 1700 psig |
| EA | 40-45130 | Carbonyl Std., 2-5 PPM, 4A Cyl., 2000 psig |
| EA | 40-45210 | 1 PPM 4 Component Internal Std., 6R |
| EA | 40-02000 | High Purity Stainless Steel Regulator |

TO14 Standard

| | |
|------------------------|---------------------------|
| Freon 12 | cis-1,3-Dichloropropene |
| Chloromethane | trans-1,3-Dichloropropene |
| Freon-114 | 1,1,2-Trichloroethane |
| Vinyl Chloride | Toluene |
| Bromomethane | 1,2-Dibromoethane |
| Chloroethane | Tetrachloroethylene |
| Freon-11 | Chlorobenzene |
| 1,1-Dichloroethene | Ethylbenzene |
| Methylene chloride | p-Xylene |
| Freon-113 | m-Xylene |
| 1,1-Dichloroethane | Styrene |
| cis-1,2-dichloroethene | o-Xylene |
| Chloroform | 1,1,2,2-Tetrachloroethane |
| 1,2 Dichloroethane | 1,3,5-Trimethylbenzene |
| 1,1,1-Trichloroethane | 1,2,4-Trimethylbenzene |
| Benzene | 1,3-Dichlorobenzene |
| Carbon Tetrachloride | 1,4-Dichlorobenzene |
| 1,2-Dichloropropane | 1,2-Dichlorobenzene |
| Trichloroethylene | 1,2,4-Trichlorobenzene |
| Balance: Nitrogen | Hexachloro-1,3-Butadiene |

Carbonyl Std

Formaldehyde
Acetaldehyde
Acetone
Propionaldehyde
2-Butanone
Balance: Nitrogen

Internal Standard

Bromochloromethane
Chlorobenzene-d5
1,4-Difluorobenzene
1,4-Bromofluorobenzene
Balance: Nitrogen

TO15 - 77 Compound Standard

| | | |
|---------------------------------------|------------------------|-------------------|
| Dichlorodifluoromethane | 1,2-dichloroethane | Methylvinylketone |
| vinyl chloride | tetrachloromethane | methanol |
| chloroethane | trichloroethylene | ethanol |
| 1,1-dichloroethene | CFC-114 | 1-propanol |
| chloroform | HCFC-22 | 2-propanol |
| 1,1,1-trichloroethane | propene | 1-butanol |
| carbon disulfide | isobutene | MTBE |
| 1,2-dichloropropane | pentane | Acetaldehyde |
| cis-1,3-dichloropropene | cyclopentane | propanal |
| trans-1,3-dichloropropene | hexane | butanal |
| 1,1,2-trichloroethane | cyclohexane | pentanal |
| chlorobenzene | isoprene | hexanal |
| benzyl chloride | benzene | vinyl acetate |
| tetrachloroethylene | toluene | 1,4-dioxane |
| 1,1,2,2-tetrachloroethane | ethylbenzene | acetonitrile |
| m-dichlorobenzene | styrene | methacrolein |
| o-dichlorobenzene | m-xylene | |
| p-dichlorobenzene | p-xylene | Balance-Nitrogen |
| 1,2,4-trichlorobenzene | o-xylene | |
| chloromethane | 1,2,3-trimethylbenzene | |
| bromomethane | 1,2,4-trimethylbenzene | |
| bromodichloromethane | 1,3,5-trimethylbenzene | |
| bromoform | acetone | |
| 1,2-dibromoethane | methyl ethyl ketone | |
| trichlorofluoromethane | methyl isobutyl ketone | |
| dichloromethane | 2-pentanone | |
| 1,1,2-trichloro-1,1,2-trifluoroethane | 3-pentanone | |
| cis-1,2-dichloroethene | 2-hexanone | |
| | 3-hexanone | |

TO15 Subset Standard

Propylene
1,3-Butadiene
Vinyl Bromide
Acetone
Isopropyl Alcohol
Carbon Disulfide*
Allyl Chloride
trans-1,2-Dichloroethene
Methyl t-Butyl Ether (MTBE)
Vinyl Acetate
Methyl Ethyl Ketone
n-Hexane
Ethyl Acetate
Tetrahydrofuran
Cyclohexane
Bromodichloromethane
1,4-Dioxane
2,2,4-Trimethylpentane
n-Heptane
Methyl Isobutyl Ketone
Methyl Butyl Ketone
Dibromochloromethane
Bromoform
4-Ethyltoluene
Benzyl Chloride*
Balance - Nitrogen

* - No Stability Guarantee



ESP - Static Dilution



07-41000
Static Dilution Prep Kit



4600-02 Syringe
Spiking Option

Tips to Improve Accuracy of Statically Prepared Standards:

- ◀ Try to select syringes or manipulate calculations using ESP so that transfer volumes are at least 50% of the volume of the selected syringe to reduce measurement error.
- ◀ Include a compound in the statically prepared mixture for which a calibrated cylinder standard exists so the dilution accuracy can be checked.
- ◀ Compare the response from previous preparations of the same standard to verify good precision.
- ◀ When making liquid mixtures in vials, add the heaviest compound first to avoid loss of light compounds during the preparation process. Use large amounts of each standard (100 to 500ul) to reduce relative evaporative loss.

Static Dilution

The Entech ESP Windows[®] Software provides support in preparing standards using Dynamic or Static dilution. Static dilution allows standards to be made from neat compounds using syringe transfer into intermediate gas dilution bottles. The ESP software performs the complex calculation necessary to make multi-component mixtures at ppm or ppb levels.

- ◀ Make PPB level standards using an intermediate glass dilution bottle
- ◀ Make PPM level standards by direct injection of liquids into cylinders or canisters
- ◀ Avoids the use of methanolic standards
- ◀ Eliminates large methanol peak which can attenuate response of MS
- ◀ Allows methanol to be added as a target compound (1990 CAAA HAPS)
- ◀ Make water-soluble polar VOC mixtures in water to prevent gas-phase preparative losses on surface of intermediate dilution vessel

| Qty | Part No. | Description |
|-----|----------|---|
| 1 | 4600-02 | 4600A Syringe Spiking Option <i>Includes:</i> |
| 1 | 30-04500 | Injection Tee |
| 1 | 36-71540 | Syringe Injection Cap |
| 5pk | 36-71710 | Septa |
| 1 | 30-04046 | 1/4" Port Adapter |
| 1 | 07-41000 | Static Dilution Standard Prep Kit <i>Includes:</i> |
| 1 | 01-ESP | ESP Windows Software |
| 1 | 07-40000 | 2 Liter Gas Dilution Bottle |
| 1 | 07-40020 | Replacement Mini-nert Cap |
| 5pk | 07-40031 | Replacement Mini-nert Septa |
| 1 | 07-2010U | 10ul Syringe |
| 1 | 07-2100U | 100ul Syringe |
| 1 | 07-2001M | 1cc Syringe |
| 1 | 07-2010M | 10cc Syringe |
| 1 | 53-40000 | Neat Internal Standard Kit 1 <i>Includes:</i> |
| 1 | 53-40010 | 100 ml Bromochloromethane |
| 1 | 53-40020 | 100 ml 1,4 Difluorobenzene |
| 2pk | 53-41050 | 1 ml Chlorobenzene-d5 |
| 1 | 53-40030 | 100 ml 1,4-Bromo-fluorobenzene (BFB) |