



ISO 17025 Accredited Chemical Testing Lab
Cert. No. 3031.01



ISO 17034 Accredited
Reference Material Producer
Cert. No. 3031.02

Rev 0

Certificate of Analysis

Page 1 of 4

Catalog No.	Lot No.	Storage	Solvent	Date Received	Exp. Date
G34-120023-03	400274	≤ -10 Degrees C	P/T Methanol	_____	30-Dec-2022

Description:

ISO 17034 - Method 8260 VOC Liquids, 54 Compounds, 2,000 mg/L, 1 ml

Container:

1 ml Ampule, Amber Glass

Certified Values:

The certified value is based on gravimetric and volumetric preparation of this Certified Reference Material (CRM). This CRM has been confirmed by GC/MS, GC, HPLC, UPLC/HRAM-MS, UV/VIS, Enzymatic, and/or wet chemistry techniques using internally developed method(s) against independent source(s). The uncertainty value is calculated for a 95% confidence interval with a *k* value of 2. The purity of neat materials not traceable to an ISO 17034:2016 accredited Reference Material Provider is traceable to internal analysis by GC, GC/MS, HPLC, Enzymatic, or wet chemistry techniques and compared to a National Metrological Institute such as NIST where feasible.

Compound	CAS No.	Purity (%)	Neat Material Lot No.	Concentration	
benzene	71-43-2	99.99	146.1.9P	2000 ± 89	mg/L
bromobenzene	108-86-1	99.3	147.1.2P	2002 ± 72	mg/L
bromochloromethane	74-97-5	99.5	148.158.1P	2010 ± 98	mg/L
bromodichloromethane	75-27-4	99.5	149.1.9P	2001 ± 89	mg/L
bromoform	75-25-2	99.3	150.7.2P	2008 ± 89	mg/L
n-butylbenzene	104-51-8	99.2	151.7.3.2P	2002 ± 60	mg/L
sec-butylbenzene	135-98-8	99.5	152.1.2.1P	2010 ± 60	mg/L
tert-butylbenzene	98-06-6	99.9	153.29.1P	2007 ± 60	mg/L
carbon tetrachloride	56-23-5	100	154.9.1P	2009 ± 89	mg/L
chlorobenzene	108-90-7	99.9	155.29.1P	2011 ± 90	mg/L
chloroform	67-66-3	99.8	156.29.2P	2001 ± 89	mg/L
2-chlorotoluene	95-49-8	99.5	157.7.1P	2002 ± 89	mg/L
4-chlorotoluene	106-43-4	99.5	158.1.2P	2006 ± 98	mg/L
cis-1,2-dichloroethylene	156-59-2	99.7	166.286.1P	2004 ± 98	mg/L
dibromochloromethane	124-48-1	97.5	159.29.2P	2011 ± 89	mg/L
1,2-dibromo-3-chloropropane	96-12-8	98.4	160.7.2.1P	2010 ± 60	mg/L
1,2-dibromoethane	106-93-4	99.9	161.9.1P	2000 ± 60	mg/L
dibromomethane	74-95-3	99.8	162.1.2P	2011 ± 98	mg/L
1,2-dichlorobenzene	95-50-1	99.8	43.7.1P	2008 ± 89	mg/L
1,3-dichlorobenzene	541-73-1	99.9	44.7.1P	2008 ± 89	mg/L
1,4-dichlorobenzene	106-46-7	99.9	45.29.2P	2001 ± 89	mg/L
1,1-dichloroethane	75-34-3	99	163.226.1.1P	2003 ± 98	mg/L
1,2-dichloroethane	107-06-2	99.9	164.29.1P	2011 ± 90	mg/L

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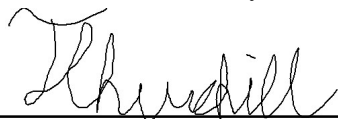
Catalog No. G34-120023-03

Lot No. 400274

Expiration Date 30 -Dec-2022

1,1-dichloroethylene	75-35-4	100	165.1.2.1P	2004 ± 98	mg/L
trans-1,2-dichloroethylene	156-60-5	99.8	167.9.2P	2019 ± 90	mg/L
1,2-dichloropropane	78-87-5	99.7	168.8.1P	1998 ± 97	mg/L
1,3-dichloropropane	142-28-9	99.8	169.7.2P	2010 ± 89	mg/L
2,2-dichloropropane	594-20-7	99.1	170.7.3P	2003 ± 89	mg/L
1,1-dichloropropylene	563-58-6	99.5	171.3.10P	1998 ± 91	mg/L
cis-1,3-dichloropropylene	10061-01-5	99.6	172.7.4.1P	2015 ± 90	mg/L
trans-1,3-dichloropropylene	10061-02-6	99	173.7.4.4P	1984 ± 88	mg/L
ethylbenzene	100-41-4	99.9	174.8.2P	2008 ± 98	mg/L
hexachlorobutadiene	87-68-3	98	47.158.1.1P	2026 ± 73	mg/L
isopropylbenzene	98-82-8	99.9	176.9.3P	2003 ± 60	mg/L
4-isopropyltoluene	99-87-6	99.7	177.9.2P	1999 ± 72	mg/L
methylene chloride	75-09-2	99.9	178.24.3P	2001 ± 89	mg/L
naphthalene	91-20-3	99.6	26.29.2.1P	2000 ± 60	mg/L
n-propylbenzene	103-65-1	99.5	179.7.1P	2007 ± 60	mg/L
styrene	100-42-5	99.5	180.286.1P	2000 ± 72	mg/L
1,1,1,2-tetrachloroethane	630-20-6	99.8	181.7.2.5P	2018 ± 90	mg/L
1,1,2,2-tetrachloroethane	79-34-5	99.4	182.8.2P	2008 ± 98	mg/L
tetrachloroethylene	127-18-4	100	183.1.2P	2010 ± 89	mg/L
toluene	108-88-3	100	184.24.4P	2001 ± 89	mg/L
1,2,3-trichlorobenzene	87-61-6	99	185.1.1.6P	2001 ± 63	mg/L
1,2,4-trichlorobenzene	120-82-1	99.6	54.29.1P	2004 ± 60	mg/L
1,1,1-trichloroethane	71-55-6	99	187.1.1P	2005 ± 98	mg/L
1,1,2-trichloroethane	79-00-5	99.6	195.7.1.6P	2003 ± 89	mg/L
trichloroethylene	79-01-6	98.1	188.29.1P	2017 ± 98	mg/L
1,2,3-trichloropropane	96-18-4	99.2	189.7.2P	2002 ± 89	mg/L
1,2,4-trimethylbenzene	95-63-6	99.2	190.24.1.1P	2002 ± 72	mg/L
1,3,5-trimethylbenzene	108-67-8	99.7	191.9.2.1P	2029 ± 73	mg/L
m-xylene	108-38-3	99.7	193.7.1.2P	2001 ± 89	mg/L
o-xylene	95-47-6	99.2	192.29.2P	2001 ± 60	mg/L
p-xylene	106-42-3	99.9	194.7.1P	2002 ± 60	mg/L

Manufactured By:



Thomas Churchill

26 -Dec-2018

Production Chemist

Certified By:

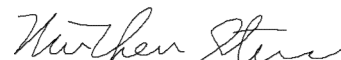


Susan Mathews

28 -Jan-2020

Chemist I

Released By:



HuiChen Stavros, Ph.D.

28 -Jan-2020

Quality Control Manager

Certificate of Analysis

Page 3 of 4

Catalog No. G34-120023-03

Lot No. 400274

Expiration Date 30 -Dec-2022

Intended Uses:

This CRM is intended for use as a calibration standard or a quality control standard for chromatography equipment such as GC, GC/MS, HPLC, and HPLC/MS. It may also be used for various USEPA, NIOSH and ASTM methods.

Recommended storage container for ampuled products after opening is a 12mmx32mm amber vial with screw cap Teflon lined silicon septum. The modeled % change per day can be calculated using the following:

$$\% \text{ Change} = 116192x^{-2.578} + 40.383e^{-0.03y}$$

where x = boiling point of the most volatile analyte in the mix
 y = boiling point of the solvent

This model assumes the container is stored at -10°C and is unopened during storage. The user should determine what the

Method of Preparation:

This standard was prepared gravimetrically using balances calibrated with National Institute of Standards and Technology (NIST) traceable weights (NIST Test Numbers 822/273070-06, 822/275141-07, 822/278993-10). Only calibrated Class A volumetric glassware and/or calibrated syringes were used to prepare this standard. Raw materials may have been checked for stoichiometry and purity prior to use. This standard has been analyzed against an independent source.

Packaging and Storage:

The solution should be stored according to the following storage requirements: ≤ -10 Degrees C

Once the product is opened, it should be transferred to a vial with minimum head space if the product was received in a sealed ampule.

Glassware Calibration:

Only Class A glassware and/or calibrated syringes are used in the manufacture and quality control of standards. All glassware is calibrated using NIST traceable weights.

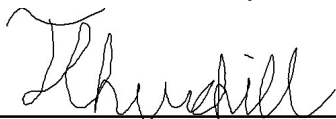
Weights and Balance Calibration:

Weights used to perform daily checks on balances are calibrated annually by the State of South Carolina Department of Agriculture Metrology Laboratory and are traceable to NIST. Balances are checked daily in accordance to procedure O2-LB-004. Balances are calibrated annually by an ISO/IEC 17025:2005 accredited metrology service.

Homogeneity:

Homogeneity has been established in accordance with internal procedure O2-QS-10 and has a maximum uncertainty of 0.1%. This is consistent with the intended use of this CRM. The homogeneity of this product has been confirmed by procedures consistent with ISO/IEC 17025:2005 and ISO 17034:2016. The homogeneity of this CRM is valid for sample

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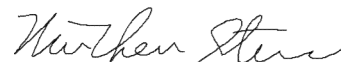


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Certificate of Analysis

Page 4 of 4

Catalog No. G34-120023-03

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sub-sizes that the end user can quantitatively reproduce.

Hazardous Information:

Refer to MSDS.

Calculation of Uncertainty:

The following equations are used to calculate the value of the expanded uncertainty:

$U = k u_c$ U=Expanded Uncertainty, k= the coverage factor at the 95% confidence level, k=2, u_c = the combined uncertainty

$u_c = (u_{char}^2 + u_{tran}^2 + u_{homo}^2 + u_{lts}^2)^{1/2}$ where u_i are the individual uncertainty components for manufacturing, transportation, homogeneity, and shelf life. While no significant uncertainty was detected in the replicates, a minimum contribution to uncertainty was added for homogeneity and long term stability as described in ISO Guide 35:2017.

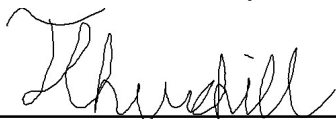
Expiration Information:

The stability of this product is based upon rigorous short term and long term testing of the solution for the certified value. These tests include the effect of temperature and packaging on the product. Studies on the short term instability have determined no contribution to instability as observed on the concentration under controlled transportation conditions. This standard is guaranteed until 30-Dec-2022

Quality Standard Documentation:

- ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 3031.01
- ISO 17034:2016 "General Requirements for the Competence of Reference Material Producers" - Reference Material Production - Accredited A2LA Certificate Number 3031.02

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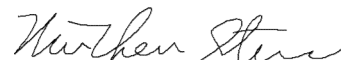


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