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ISO 17034 Accredited
Reference Material Producer
Cert. No. 3031.02

Date manufactured: 25 -Oct-2017
Original issue date: 25 -Oct-2017

Certificate of Analysis

Date Received:

Rev 0

Catalog No.:	Lot No.:	Storage:	Solvent:	Expiration Date:	Description:
DRE-GS09000398 MW	326267	≤ -10 ºC	P/T MeOH:Water 9:1	22-Jun-2018	ISO 17034 - Custom Volatile Mix, 74-1714, 200 mg/L, 10 x 1 mL

Certified Values:

The certified value is based on gravimetric and volumetric preparation of this CRM. This CRM has been confirmed by gas chromatography (GC), gas chromatography/mass spectrometry (GC/MS), or High Performance Liquid Chromatography (HPLC) using an internally developed method against an independent source. The uncertainty value is calculated for a 95% confidence interval with a *k* value of 2.

Compound	CAS No.	Purity (%)	Neat Material Lot No.	Concentration, mg/L
acetone	67-64-1	99.9	196.29.1.1P	200 +/-10
allyl chloride	107-05-1	98	227.8.1.1P	199.6 +/-10
benzene	71-43-2	100	146.1.7P	200.4 +/-11
bromobenzene	108-86-1	99.3	147.1.2P	200.4 +/-11
bromochloromethane	74-97-5	99.7	148.1.3P	200.9 +/-11
bromodichloromethane	75-27-4	99	149.1.8P	200.8 +/-11
bromoform	75-25-2	99.4	150.7.1.1P	200.4 +/-11
2-butanone (MEK)	78-93-3	99.9	197.18.1P	199.9 +/-10
n-butylbenzene	104-51-8	99	151.7.1.1P	200.1 +/-11
sec-butylbenzene	135-98-8	99.9	152.7.1.2P	201.6 +/-11
tert-butylbenzene	98-06-6	99.9	153.29.1P	200.2 +/-11
carbon disulfide	75-15-0	99.9	200.18.1P	200.2 +/-10
carbon tetrachloride	56-23-5	99.9	154.1.2P	201.9 +/-11
chlorobenzene	108-90-7	99.9	155.29.1P	200.3 +/-11
chloroform	67-66-3	99.9	156.1.5P	200.7 +/-11
1-chlorohexane	544-10-5	99.3	303.1.1P	199.3 +/-10
2-chlorotoluene	95-49-8	99.5	157.7.1P	200.3 +/-11
4-chlorotoluene	106-43-4	99.5	158.1.2P	200.2 +/-11
cis-1,2-dichloroethylene	156-59-2	99.7	166.286.1P	199.4 +/-10
cyclohexane	110-82-7	99.9	308.1.4P	199.6 +/-10
dibromochloromethane	124-48-1	99.9	159.29.1P	201.2 +/-11
1,2-dibromo-3-chloropropane	96-12-8	98	160.7.2P	200 +/-11
1,2-dibromoethane	106-93-4	99.8	161.1.2P	200.4 +/-11
dibromomethane	74-95-3	99.8	162.1.2P	201.6 +/-11

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1,2-dichlorobenzene	95-50-1	99.5	43.1.2P	200.1 +/-11
1,3-dichlorobenzene	541-73-1	99.9	44.9.2P	200.3 +/-11
1,4-dichlorobenzene	106-46-7	99.9	45.29.2P	200.5 +/-11
trans-1,4-dichloro-2-butene	110-57-6	95.8	201.1.15P	200.3 +/-10
1,1-dichloroethane	75-34-3	99.1	163.8.3P	200.4 +/-11
1,2-dichloroethane	107-06-2	99.9	164.29.1P	200.2 +/-11
1,1-dichloroethylene	75-35-4	100	165.1.2.1P	200 +/-11
trans-1,2-dichloroethylene	156-60-5	99.3	167.7.1.1P	198.6 +/-10
dichlorofluoromethane (Freon 21)	75-43-4	99	986.158.2.2P	200.9 +/-10
1,2-dichloropropane	78-87-5	99.7	168.8.1P	200.3 +/-11
1,3-dichloropropane	142-28-9	99.2	169.7.1P	200.4 +/-11
2,2-dichloropropane	594-20-7	99	170.7.1P	199.4 +/-10
1,1-dichloropropylene	563-58-6	98.4	171.3.9P	201.2 +/-11
cis-1,3-dichloropropylene	10061-01-5	99.5	172.7.4P	200.7 +/-11
trans-1,3-dichloropropylene	10061-02-6	99	173.7.4.3P	199.7 +/-11
ethyl ether	60-29-7	99.9	226.1.3P	200.4 +/-10
ethyl methacrylate	97-63-2	99	216.8.1.1P	199.7 +/-10
ethyl acetate	141-78-6	99	269.29.2P	200 +/-10
ethylbenzene	100-41-4	99.9	174.8.2P	200.4 +/-11
hexachlorobutadiene	87-68-3	98	47.158.1P	200.3 +/-11
2-hexanone	591-78-6	99	199.7.2P	199.9 +/-10
iodomethane	74-88-4	100	203.1.2P	200.2 +/-10
isopropylbenzene	98-82-8	99.8	176.9.2.1P	199.8 +/-11
4-isopropyltoluene	99-87-6	99.7	177.9.2P	200.6 +/-11
methyl acetate	79-20-9	99.5	439.8.1.1P	200.4 +/-10
methyl cyclohexane	108-87-2	99.6	390.1.1P	199.9 +/-10
methylene chloride	75-09-2	99.9	178.24.2P	202.2 +/-11
4-methyl-2-pentanone (MIBK)	108-10-1	99.6	198.1.3P	200.7 +/-10
methyl t-butyl ether	1634-04-4	99.96	208.24.2P	200.2 +/-10
naphthalene	91-20-3	99.9	26.29.3P	199.8 +/-11
pentachloroethane	76-01-7	98.8	52.3.4P	200 +/-10
n-propylbenzene	103-65-1	100	179.1.5P	201.1 +/-11
styrene	100-42-5	99.9	180.1.7P	200.7 +/-11

Manufactured By:

Madeline Luby
Chemist I

Certified By:

Lukas Earhart
Chemist I

Released By:

Adrienne Ormand
Technician II

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1,1,1,2-tetrachloroethane	630-20-6	99.8	181.7.2.5P	200.3 +/-11
1,1,2,2-tetrachloroethane	79-34-5	99.4	182.8.2P	199.5 +/-11
tetrachloroethylene	127-18-4	99.9	183.1.1P	200.2 +/-11
tetrahydrofuran (THF)	109-99-9	99.9	299.18.1P	200 +/-10
toluene	108-88-3	99.9	184.9.1P	199.7 +/-11
1,2,3-trichlorobenzene	87-61-6	99	185.1.1.5P	201.1 +/-11
1,2,4-trichlorobenzene	120-82-1	99.6	54.29.1P	199.8 +/-11
1,1,1-trichloroethane	71-55-6	99	187.1.1P	199.9 +/-11
1,1,2-trichloroethane	79-00-5	99.2	195.7.1.4P	200.2 +/-11
trichloroethylene	79-01-6	98.1	188.29.1P	199.4 +/-11
1,2,3-trichloropropane	96-18-4	99.2	189.7.2P	200.2 +/-11
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	99.9	270.158.1P	202.5 +/-11
1,2,4-trimethylbenzene	95-63-6	99.2	190.24.1.1P	200.5 +/-11
1,3,5-trimethylbenzene	108-67-8	99.7	191.9.2.1P	199.7 +/-11
m-xylene	108-38-3	99.7	193.7.1P	199.9 +/-11
o-xylene	95-47-6	99.5	192.1.3P	200.6 +/-11
p-xylene	106-42-3	99	194.24.1.1P	200.4 +/-11

Intended Uses:

This Certified Reference material (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 EN, ISO, EPA, and ASTM methods.
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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:

$$\% \text{ Change} = (-0.018\ln(x+31) + 0.1157) + 636.54y^{-3.202}$$

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

Manufactured By:	**Certified By:**	**Released By:**
Madeline Luby	Lukas Earhart	Adrienne Ormand
Chemist I	**Chemist I**	**Technician II**

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y = boiling point of the solvent

This model assumes the container is stored at -10 ºC and is unopened during storage. The user should determine what the acceptable error for their process is and calculate the maximum number of days the opened ample should be stored.

Method of Preparation:

All weights are traceable through N. I. S. T. Test No. 822/264157-00. Concentration (correct for purity) and uncertainty (95% confidence) values listed are determined gravimetriclly.

Packaging and Storage:

The solution should be stored according to the following storage requirements: ≤ -10 ºC
Once the product is opened, it should be transferred to a vial with minimum head space if the product was in a sealed ampoule. Once opened, the expiration is determined by user specifications.

Glassware Calibration:

Only Class A glassware is 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 within a calibration laboratory recognized by NIST as Echelon I. Balances are checked daily in accordance to in house procedures. Balances are calibrated annually by an ISO/IEC 17025:2005 and ISO Guide 34:2009 accredited metrology service.

Homogeneity:

Random replicate samples of the final packaged CRM have been analyzed to prove homogeneity in accordance with internal procedures. This is consistent with the intended use of this CRM. The homogeneity of this product has been confirmed by procedures consistent with ISO/IEC guide 17025:2005 and ISO guide 34:2009.

Hazardous Information:

Refer to MSDS

Calculation of Uncertainty:

The following equations are used to calculate the value of the expanded uncertainty: $U=ku_c$: U=Expanded Uncertainty, k= the coverage factor at the 95% confidence level, k=2, u_c = the combined uncertainty $u_c = \sqrt{\sum u_i^2}$ where u_i are the individual uncertainty components for characterization, transportation, homogeneity, and shelf life.

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. This standard is guaranteed until 22-Jun-2018

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Accreditation:

This standard was manufactured by an ISO 17025 Chemical Testing Lab (Certificate number 3031.01) and ISO Guide 34 Reference Material Producer (RMP) Certificate number 3031.02 accredited by The American Association of Laboratory Accreditation (A2LA). Manufacturer's Quality System audited and registered by NSF-ISR to ISO 9001:2008 (Certificate number IZ391-IS4).

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