

BRENTAG MID SOUTH, INC.
 1405 Highway 136 West
 Henderson, Kentucky 42420-0020
 Tel. (270) 830-1200 • Fax (270) 826-1486

CERTIFICATE OF ANALYSIS

Propylene Glycol USP/Kosher

CUSTOMER:	LOT NUMBER: 261129678173151
	DATE ANALYZED: 06/22/2018

PARAMETERS	ANALYSIS	SPECIFICATIONS
Identification by IR	PASS	Pass/Fail
Appearance	PASS	Clear, colorless with no suspended matter
Specific gravity @ 25°C (77°F)	1.036	1.035 to 1.037
Water Content, % by weight	0.10	0.2 Max.
Acidity, ml of 0.10N NaOH*	0.02	< 0.20mL Max.
Residue on Ignition*	0.26	3.5mg/50g Max.
Chlorides, Wt %*	<0.007	≤ 0.007%
Sulfates, Wt %*	<0.006	≤ 0.006%
Heavy Metals*	<5.0	5ppm Max.
Organic Volatile Impurities*	PASS	Meets requirements
Assay as C ₃ H ₈ O ₂ *	99.95	≥ 99.5%

*Analytical results as reported by vendor.

INCOMING PRODUCT INFORMATION (VENDOR AND CARRIER)	
VENDOR: DOW CHEMICAL CO	CARRIER: KIRBY
VENDOR LOT NUMBER: D35715L000	VEHICLE NUMBER: 11525

Analyst: JORDAN AACH	Approved: GENE RIXFORD
-----------------------------	-------------------------------

cc: With Shipment
 Lab File

Direct questions concerning certification of this product to personnel at the location marked below.

- Kennesaw, GA 770-429-1405
- Orlando, FL 407-857-9310
- St. Louis, MO 314-832-5010
- Durham, NC 919-596-0681

Form Approval: James Clements
 Form Approval Date: May 15, 2017

CARD1\WORD\COA\PROP GLYCOL USP KOSH

"All information provided is believed to be accurate and complete. The data provided is representative of the product quality on the date of analysis for the lot number indicated. This certificate of analysis may not include all of the constituents of the product. Persons using this information should make their own determination regarding its suitability for their particular application. This certificate of analysis shall not in any way limit or preclude the operation and effect of the applicable terms and conditions of sale."

IMPORTANT: All information provided is believed to be accurate and complete. The data provided is representative of the product quality on the date of analysis for the lot number indicated. This certificate of analysis may not include all of the constituents of the product. Persons using this information should make their own determination regarding its suitability for their particular application. This certificate of analysis shall not in any way limit or preclude the operation and effect of the applicable terms and conditions of sale.

The Dow Chemical Company
 Certificate of Analysis

Date: 06/08/2018

Mfg date: 05/21/2018
 Expiration date: 05/20/2020
 Customer Material#
 Batch Number: D357I5L000
 Ship from: THE DOW CHEMICAL COMPANY

Delivery note:
 TX UNITED STATES

FREEPORT

Manufacturing Location: This product is manufactured in Freeport, Texas and/or Plaquemine, Louisiana

LOT NUMBER:
261129678173151

It is hereby certified that the material indicated above has been inspected and tested in accordance with the conditions and requirements of the contract or purchase order and, unless agreed otherwise conforms in all respects to the specification relevant thereto and it meets all requirements of the current United States Pharmacopoeia, current Food Chemical Codex, current European Pharmacopoeia and current Pharmacopoeia of Japan.

Feature	Units	Results		Limits		Method	
		D357I5L000		Minimum	Maximum		
Assay	%	99.95		99.80		Current USP	
Acidity	mL	0.02			0.20	Current USP	M
Chlorides	ppm	< 70			70	Current USP	M
Heavy Metals	ppm	< 5.0			5.0	Current USP	M
Residue on Ignition per 50g	mg	0.26			3.50	Current USP	M
Specific Gravity @ 25/25degC	-	1.036		1.035	1.037	Current USP	M
Sulfate	ppm	< 60			60	Current USP	M
Water Content	%	0.013			0.200	Current USP	
IDENTIFICATION TEST A		Passes				Current USP	M
Identification matches IR scan							
IDENTIFICATION TEST B		Passes				Current USP	
Ethylene Glycol		Passes				Current USP	
Diethylene Glycol		Passes				Current USP	
IDENTIFICATION TEST C		Passes				Current USP	
Identification matches GC scan							
Acidity	mL	0.02			0.05	Current EP	M
Boiling Point	degC	185		184	189	Current EP	M
Clarity		Passes				Current EP	M
Color		Passes				Current EP	M
Heavy Metals	ppm	< 5.0			5.0	Current EP	M
Melting Point	degC	126		121	128	Current EP	O
Oxidizing Substances	mL	0.05			0.20	Current EP	M
0.05M sodium thiosulfate							
Reducing Substances		Passes				Current EP	M
Refractive Index @ 20degC	-	1.433		1.431	1.433	Current EP	M
Relative Density @ 20/20degC	-	1.038		1.035	1.040	Current EP	M
Sulfated Ash	%	0.0037			0.0100	Current EP	M

For inquiries please contact Customer Service or local sales.

IMPORTANT: All information provided is believed to be accurate and complete. The data provided is representative of the product quality on the date of analysis for the lot number indicated. This certificate of analysis may not include all of the constituents of the product. Persons using this information should make their own determination regarding its suitability for their particular application. This certificate of analysis shall not in any way limit or preclude the operation and effect of the applicable terms and conditions of sale.

The Dow Chemical Company
Certificate of Analysis

Date 06/08/2018

Cust P.O.

Divy Note:

Material: PROPYLENE GLYCOL USP/EP BULK

Spec: 00111814-5

Cust Mt:

Feature	Units	Results		Limits		Method	
		D357ISL000		Minimum	Maximum		
Water Content	%	0.013		----	0.200	Current	EP
Assay	%	99.95	99.80	----		Current	FCC
Acidity		Passes				Current	FCC
Appearance		Passes				Current	FCC
clear & colorless							
Distillation, IBP	degC	186.8	185.0	----		Current	FCC
Distillation, DP	degC	188.8		----	189.0	Current	FCC
Lead (Pb)	ppm <	1.0		----	1.0	Current	FCC
Identification		Passes				Current	FCC
matches IR scan							
Residue on Ignition	%	0.0040		----	0.0070	Current	FCC
Specific Gravity	-	1.036	1.035		1.037	Current	FCC
@ 25/25degC							
Water Content	%	0.013		----	0.200	Current	FCC
Acidity		Passes				Current	JP
Arsenic	ppm <	2.0		----	2.0	Current	JP
Chlorides	% <	0.007		----	0.007	Current	JP
Distilling Range	% vol	97	95			Current	JP
184 - 189 degC							
Glycerine (Odor)		Passes				Current	JP
Heavy Metals	ppm <	5.0		----	5.0	Current	JP
Melting Point	degC	175	174		178	Current	JP
Odor		Passes				Current	JP
Residue on Ignition	%	0.0019		----	0.0050	Current	JP
Specific Gravity	-	1.038	1.035		1.040	Current	JP
@ 20/20degC							
Sulfate	% <	0.002		----	0.002	Current	JP
Water Content	%	0.013		----	0.500	Current	JP
Acidity	%	0.0003		----	0.0020	DOWM 101370	
As Acetic Acid							
Appearance		Passes				Visual	
Clear, free of suspended matter							
Chlorides	ppm <	1.0		----	1.0	DOWM 101867	
Color, Pt-Co	-	2		----	10	ASTM D5386	
Dimer, Trimer	%	0.051		----	0.100	DOWM 100687	
& Higher Polymers							
Ethylene Glycol	% <	0.0080		----	0.0080	DOWM 100687	
Diethylene Glycol	% <	0.0080		----	0.0080	DOWM 100687	
Iron	ppm	0.06		----	0.30	ASTM E202	
Odor		Passes				Olfactory	M
practically odorless							
Spec. Grav. @ 20C	-	1.0382	1.0376		1.0389	ASTM D4052	M

SOURCE OF ANALYSIS

M Quarterly Sample

O Annual Sample

For inquiries please contact Customer Service or local sales.

IMPORTANT: All information provided is believed to be accurate and complete. The data provided is representative of the product quality on the date of analysis for the lot number indicated. This certificate of analysis may not include all of the constituents of the product. Persons using this information should make their own determination regarding its suitability for their particular application. This certificate of analysis shall not in any way limit or preclude the operation and effect of the applicable terms and conditions of sale.

Certificate 32101239

The Dow Chemical Company

Page 3

Date: 06/08/2018

Certificate of Analysis

Cust P.O.
Material: PROPYLENE GLYCOL USP/EP BULK
Cust Mtl:

Divy Note:
Spec: 00000059518

Note:
Values reported for Assay, Ethylene Glycol and Diethylene Glycol under
USP and for Assay under FCC are obtained using the validated Dow
GC Method DOWM 100687.

Plant Quality Coordinator

For inquiries please contact Customer Service or local sales.

* Trademark of The Dow Chemical Company

IMPORTANT: All information provided is believed to be accurate and complete. The data provided is representative of the product quality on the date of analysis for the lot number indicated. This certificate of analysis may not include all of the constituents of the product. Persons using this information should make their own determination regarding its suitability for their particular application. This certificate of analysis shall not in any way limit or preclude the operation and effect of the applicable terms and conditions of sale.