

The Dow Chemical Company  
Certificate of Analysis

**LOT NUMBER:**  
 144461678057151

PO#  
 Material: PuraGuard(TM) Propylene Glycol USP/EP  
 Cust Mt: P56886  
 Mfg date: 01/16/2018  
 Expiration date: 01/16/2020

Spec: 00111814-S

Delivery Note:

Batch Number: D20711G001  
 Ship from: THE DOW CHEMICAL COMPANY FREEPORT TX UNITED STATES

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

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	
		D20711G001		Minimum	Maximum		
Assay	%	99.95		99.80	----	Current USP	
Acidity	mL	0.01		----	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	0.29		----	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	%	0.004		----	0.200	Current USP	
IDENTIFICATION TEST A Identification matches IR scan		Passes				Current USP	M
IDENTIFICATION TEST B Ethylene Glycol		Passes				Current USP	
Diethylene Glycol		Passes				Current USP	
IDENTIFICATION TEST C Identification matches GC scan		Passes				Current USP	
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	125		121	128	Current EP	O
Oxidizing Substances 0.05M sodium thiosulfate	mL	0.05		----	0.20	Current EP	M
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	%	0.0041		----	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.

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Cust P.O.  
 Dlv Note:  
 Material: PROPYLENE GLYCOL USP/EP BULK Spec: 00111814-S  
 Cust Mt:

Feature	Units	Results		Limits		Method	
		D20711G001		Minimum	Maximum		
Water Content	%	0.004		----	0.200	Current EP	
Assay	%	99.95	99.80		----	Current FCC	
Acidity		Passes				Current FCC	M
Appearance		Passes				Current FCC	
clear & colorless							
Distillation, IBP	degC	186.8	185.0		----	Current FCC	M
Distillation, DP	degC	187.8			189.0	Current FCC	M
Lead (Pb)	ppm <	1.0		----	1.0	Current FCC	O
Identification		Passes				Current FCC	M
matches IR scan							
Residue on Ignition	%	0.0028		----	0.0070	Current FCC	M
Specific Gravity	-	1.036	1.035		1.037	Current FCC	M
@ 25/25degC							
Water Content	%	0.004		----	0.200	Current FCC	
Acidity		Passes				Current JP	M
Arsenic	ppm <	2.0		----	2.0	Current JP	M
Chlorides	% <	0.007		----	0.007	Current JP	M
Distilling Range	% vol	98	95		----	Current JP	M
184 - 189 degC							
Glycerine (Odor)		Passes				Current JP	M
Heavy Metals	ppm <	5.0		----	5.0	Current JP	M
Melting Point	degC	175	174		178	Current JP	O
Odor		Passes				Current JP	M
Residue on Ignition	%	0.0037		----	0.0050	Current JP	M
Specific Gravity	-	1.038	1.035		1.040	Current JP	M
@ 20/20degC							
Sulfate	% <	0.002		----	0.002	Current JP	M
Water Content	%	0.004		----	0.500	Current JP	
Acidity	%	0.0001		----	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	%	0.046		----	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	-	1.0380	1.0376		1.0389	ASTM D4052	M

SOURCE OF ANALYSIS  
 M Quarterly Sample  
 O Annual Sample

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Cust P.O.

Material: PROPYLENE GLYCOL USP/EP BULK

Cust Mtl:

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.

Dlvy Note:

Spec: 00000059518

Plant Quality Coordinator

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