

Date: 13.09.2012

Certificate of Analysis

Cust P.O.: Order 2067

Dlvy Note: 26578891 20

Material: PROPYLENE GLYCOL USP/EP
Cust Mtl:

Batch: 1I071920D3

Mfgd: 07.09.2012

Expires: 07.09.2014

Vehicle: Z8-22 CE

Ship from: DOW EUROPE GMBH

STADE

03 GERMANY

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	
		1I071920D3	Minimum	Maximum			
Assay	%	99,93	99,80	----	Current USP		
Acidity	mL	0,02	----	0,20	Current UMP		
Chlorides	ppm	< 70	----	70	Current USP		M
Heavy Metals	ppm	< 5,0	----	5,0	Current USP		M
Residue on Ignition per 50g	mg	1,04	----	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	%	0,006	----	0,2	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	0,01	----	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 0.05M sodium thiosulfate	mL	0,04	----	0,20	Current EP		M

For inquiries please contact Customer Service or local sales

Date: 13.09.2012

Certificate of Analysis

Cust P.O.: Order 2067

Dlvy Note: 26578891 20

Material: PROPYLENE GLYCOL USP/EP

Cust Mtl:

Feature	Units	Results		Limits		Method	
		1I071920D3		Minimum	Maximum		
Reducing Substances		Passes				Current EP	M
Refractive Index @ 20degC	-	1,433	1,431	1,433	1,433	Current EP	M
Relative Density @ 20/20degC	-	1,038	1,035	1,040	1,040	Current EP	M
Sulfated Ash	%	0,0016	----	0,0100	0,0100	Current EP	M
Water Content	%	0,006	----	0,2	0,2	Current EP	
Assay	%	99,93	99,80	----	----	Current FCC	
Acidity		Passes				Current FCC	M
Appearance clear & colorless		Passes				Current FCC	
Distillation, IBP	degC	186,6	185,0	----	----	Current FCC	M
Distillation, DP	degC	187,4	----	189,0	189,0	Current FCC	M
Lead (Pb)	ppm	< 1,0	----	1,0	1,0	Current FCC	M
Identification matches IR scan		Passes				Current FCC	M
Residue on Ignition	%	0,0019	----	0,0070	0,0070	Current FCC	M
Specific Gravity @ 25/25degC	-	1,036	1,035	1,037	1,037	Current FCC	M
Water Content	%	0,006	----	0,2	0,2	Current FCC	
Acidity		Passes				Current JP	M
Arsenic	ppm	< 2,0	----	2,0	2,0	Current JP	M
Chlorides	%	< 0,007	----	0,007	0,007	Current JP	M
Distilling Range 184 - 189 degC	% vol	95	95	----	----	Current JP	M
Glycerine (Odor)		Passes				Current JP	M
Heavy Metals	ppm	< 5,0	----	5,0	5,0	Current JP	M
Melting Point	degC	177	174	178	178	Current JP	O
Odor		Passes				Current JP	M
Residue on Ignition	%	0,0021	----	0,0050	0,0050	Current JP	M
Specific Gravity @ 20/20degC	-	1,038	1,035	1,040	1,040	Current JP	M
Sulfate	%	< 0,002	----	0,002	0,002	Current JP	M
Water Content	%	0,006	----	0,500	0,500	Current JP	
Acidity As Acetic Acid	%	0,0002	----	0,0020	0,0020	DOWM 101370	
Appearance Clear, free of suspended matter		Passes				Visual	
Chlorides	ppm	< 0,5	----	1,0	1,0	DOWM 101867	
Color, Pt-Co	-	2	----	10	10	ASTM D5386	
Dimer, Trimer & Higher Polymers	%	0,058	----	0,100	0,100	DOWM 100687	
Ethylene Glycol	%	< 0,0080	----	0,0080	0,0080	DOWM 100687	
Diethylene Glycol	%	< 0,0080	----	0,0080	0,0080	DOWM 100687	

For inquiries please contact Customer Service or local sales

Certificate 5630898

The Dow Chemical Company

Page 3

Date: 13.09.2012

Certificate of Analysis

Cust P.O.: Order 2067

Dlvy Note: 26578891 20

Material: PROPYLENE GLYCOL USP/EP

Cust Mtl:

Feature	Units	Results	Limits		Method	
		1I071920D3	Minimum	Maximum		
Iron	ppm	0,04	----	0,30	ASTM E202	
Odor		Passes			Olfactory	
practically odorless						
Spec. Grav. @ 20C	-	1,0382	1,0376	1,0389	ASTM D4052	M

SOURCE OF ANALYSIS

M Quarterly Sample

O Annual Sample

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