

Date: 01.11.2011

Certificate of Analysis

File Copy

PETROCHEM CARLESS

Fax: COA ARCHIVE

QUEENS ROAD

BELFAST

NI BT3 9DT

UNITED KINGDOM

Cust P.O.: 210182

Dlvy Note: 26131134 10

Material: PROPYLENE GLYCOL USP/EP

Cust Mtl: 19941

Batch: ZJ221920TS

Mfgd: 22.10.2011

Expires: 21.10.2013

Vehicle: NX07EJN GCAT74506

Ship from: DOW EUROPE GMBH

MIDDLESBROUGH EN UNITED KINGDOM

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.

Production Site: Stade, Germany

Feature	Units	Results		Limits		Method	
		ZJ221920TS		Minimum	Maximum		
Appearance		Passes				Visual	Q
Clear, free of suspended matter							
Color, Pt-Co	-	< 10		----	10	ASTM D5386	Q
Water Content	%	0.019		----	0.200	Current EP	Q
Odor		Passes				Olfactory	Q
practically odorless							
Refractive Index	-	1.433	1.431		1.433	Current EP	Q
Relative Density	-	1.038	1.035		1.040	Current EP	Q
Assay	%	99.9	99.80		----	Current USP	Q
Dimer, Trimer & Higher Polymers	%	0.058		----	0.100	DOWM 100687	Q
Ethylene Glycol	%	< 0.0080		----	0.0080	DOWM 100687	Q
Diethylene Glycol	%	< 0.0080		----	0.0080	DOWM 100687	Q
Acidity	mL	< 0.20		----	0.20	Current USP	M
Chlorides	%	< 0.007		----	0.007	Current USP	M
Heavy Metals	ppm	< 5.0		----	5.0	Current USP	M
Residue on Ignition per 50g	mg	0.20		----	3.50	Current USP	M
Residue on Ignition	ppm	4		----	70	Current USP	M
Specific Gravity	-	1.036	1.035		1.037	Current USP	M
Sulfate	%	< 0.006		----	0.006	Current USP	M
Water Content	%	0.016		----	0.200	Current USP	M
IDENTIFICATION TEST A							
Identification		Passes				Current USP	M
matches IR scan							
IDENTIFICATION TEST B							
Ethylene Glycol		Passes				Current USP	Q

For inquiries please contact Customer Service or local sales

Date: 01.11.2011

## Certificate of Analysis

Cust P.O.: 210182

Dlvy Note: 26131134 10

Material: PROPYLENE GLYCOL USP/EP

Cust Mtl: 19941

Feature	Units	Results		Limits		Method	
		ZJ221920TS		Minimum	Maximum		
Diethylene Glycol		Passes				Current USP	Q
IDENTIFICATION TEST C							
Identification		Passes				Current USP	Q
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		
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 Substance	mL	0.08	----	0.20	Current EP		M
0.05M sodium thiosulfate							
Reducing Substances		Passes	----	----	Current EP		M
Sulfated Ash	%	0.0010	----	0.0100	Current EP		M
Assay	%	99.9	99.80	----	Current FCC		M
Acidity		Passes	----	----	Current FCC		M
Appearance		Passes			Current FCC		M
clear & colorless							
Distillation, IBP	degC	187.0	185.0	----	Current FCC		M
Distillation, DP	degC	188.2	----	189.0	Current FCC		M
Lead (Pb)	ppm	< 1.0	----	1.0	Current FCC		M
Identification		Passes			Current FCC		M
matches IR scan							
Residue on Ignition	%	0.002	----	0.007	Current FCC		M
Specific Gravity	-	1.036	1.035	1.037	Current FCC		M
Water Content	%	0.005	----	0.200	Current FCC		M
Acidity		Passes	----	----	Current JP		M
Arsenic	ppm	< 2.0	----	2.0	Current JP		M
Chlorides	%	< 0.007	----	0.007	Current JP		M
Distillation, IBP	degC	187.0	184.0	----	Current JP		M
Distillation, DP	degC	188.2	----	189.0	Current JP		M
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	%	0.000	----	0.005	Current JP		M
Specific Gravity	-	1.038	1.0350	1.0400	Current JP		M
@ 20/20degC							
Sulfate	%	< 0.002	----	0.002	Current JP		M
Water Content	%	0.016	----	0.500	Current JP		M
Acidity	%	0.0003	----	0.0020	DOWM 101370		M
As Acetic Acid							
Chlorides	ppm	< 0.5	----	1.0	DOWM 101867		M
Iron	ppm	0.02	----	0.30	ASTM E202		M

For inquiries please contact Customer Service or local sales

Certificate 5283362

The Dow Chemical Company

Page 3

Date: 01.11.2011

Certificate of Analysis

Cust P.O.: 210182

Dlvy Note: 26131134 10

Material: PROPYLENE GLYCOL USP/EP

Cust Mtl: 19941

Feature	Units	Results	Limits		Method	
		ZJ221920TS	Minimum	Maximum		
Spec. Grav. @ 20C	-	1.0380	1.0376	1.0389	ASTM D4052	M

SOURCE OF ANALYSIS

Q Based on actual batch specific analysis performed by SGS Redwood Services UK. Results obtained by original or equivalent test methods.

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