



INSTITUT FÜR KORROSIONSSCHUTZ DRESDEN GMBH

Privatwirtschaftliche Forschungsstelle



Beratung - Schadensfallaufklärung - Qualitätssicherung - Forschung - Prüfung

- Akkreditiertes Prüflabor für Korrosion, Korrosionsschutz und Korrosionsanalytik
- DAR-Registriernummer: DAP-PL-1131.00
- Institut im Verbund der Technischen Akademie Wuppertal e. V.
- Institut an der TU Bergakademie Freiberg

☎ 0351 871 7100
Fax 0351 871 7150
0351 871 7123

Institut für Korrosionsschutz Dresden GmbH • Gostritzer Str. 61 – 63 • 01217 Dresden

Test Report

UB400/53/07

Orderer: Grofit Plastics
Mr. Doron
M.P. Eilot
88825 Israel

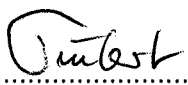
Date of Order: 30.04.2007

Period of testing: 07.05.2007 - 21.05.2007

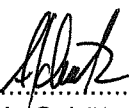
Order: Quantitative analysis of nitrite, primary, secondary and tertiary amines in one sample of plastic film in accordance with guideline for the use of VCI materials, instruction procedure for the analysis of VCI materials of Volkswagen AG Wolfsburg.

Number of pages: 3

Head of Laboratory:


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Dr. J. Triebert

Manager:


.....
Dr. A. Schütz

Dresden, 22.05.2007

The publication of test reports in extracts, the reference to the tests for the purpose of promotion and the application of the content of the test report require a written consent of the IKS in every single case. In the case of no other agreement we reserve to dispose of the samples three month after delivery. The statements refer to the test object exclusively.

1 Conceptual Formulation

The conceptual formulation encloses the quantitative determination of total contents of nitrite, primary, secondary and tertiary amines in one sample of plastic film according VW-guideline:

T 615 #4 VCI-Film (delivery 02.05.2007).

This material is sold under the names VCI2000 and VCI-Multi-Protector.

The individual components, that are important in the area of VCI containing packing materials and are normally applied there, are analyzed in the determination of the primary, secondary and tertiary amines.

2 Methodical Information

The nitrite concentration in the material is determined quantitatively by anion chromatography (according to DIN EN ISO 10304-1: 1995) after a triple ultrasonic extraction of the plastic film with deionized water.

The concentration of primary, secondary and tertiary amines in the material is determined quantitatively by cation chromatography (IKS procedure) after a triple ultrasonic extraction of the film with deionized water.

3 Test results

The following test results were determined for the sample material:

Parameter	Dimension	T 615 #4 VCI-Film (delivery 02.05.2007)
Total content of Nitrite (calculated as NaNO ₂)	wt-% NaNO ₂	< 0,01
<i>Total content of primary Amines:</i>		
Ethanolamine	wt-%	< 0,02
Cyclohexylamine	wt-%	< 0,02
2-Amino-2-methyl-1-propanol	wt-%	< 0,02
<i>Total content of secondary Amines:</i>		
Diethanolamine	wt-%	< 0,02
Morpholine	wt-%	< 0,02
Dicyclohexylamine	wt-%	< 0,05
Piperazine	wt-%	< 0,05
<i>Total content of tertiary Amines:</i>		
Triethanolamine	wt-%	< 0,02
4-Ethylmorpholine	wt-%	< 0,02
2-(Diethylamino)-ethanol	wt-%	< 0,02

The figures < 0,01 / < 0,02 / < 0,05 mean, that the content of the component is smaller than the minimum determination value of the analytical method.

4 Conclusion

The assayed VCI-material shows a nitrite concentration (calculated as NaNO₂) smaller than 0.1 Ma-% and is free from the determined nitrosable secondary amines. Therefore the sample material complies with the requirements of the guideline for the use of VCI materials, instruction procedure to the check of VCI materials of Volkswagen AG Wolfsburg. The analyzed material complies also with the requirements of the German TRGS 615, segments 4.2 and 4.3.



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1 Conceptual Formulation

The conceptual formulation encloses the quantitative determination of total contents of nitrite, primary, secondary and tertiary amines in one sample of plastic film according VW-guideline:

T 615 #7 VCI-Film (delivery 02.05.2007).

This material is sold under the names VCI2000 and VCI-Multi-Protector.

The individual components, that are important in the area of VCI containing packing materials and are normally applied there, are analyzed in the determination of the primary, secondary and tertiary amines.

2 Methodical Information

The nitrite concentration in the material is determined quantitatively by anion chromatography (according to DIN EN ISO 10304-1: 1995) after a triple ultrasonic extraction of the plastic film with deionized water.

The concentration of primary, secondary and tertiary amines in the material is determined quantitatively by cation chromatography (IKS procedure) after a triple ultrasonic extraction of the film with deionized water.

3 Test results

The following test results were determined for the sample material:

Parameter	Dimension	T 615 #7 VCI-Film (delivery 02.05.2007)
Total content of Nitrite (calculated as NaNO ₂)	wt-% NaNO ₂	< 0,01
<i>Total content of primary Amines:</i>		
Ethanolamine	wt-%	< 0,02
Cyclohexylamine	wt-%	< 0,02
2-Amino-2-methyl-1-propanol	wt-%	< 0,02
<i>Total content of secondary Amines:</i>		
Diethanolamine	wt-%	< 0,02
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Dicyclohexylamine	wt-%	< 0,05
Piperazine	wt-%	< 0,05
<i>Total content of tertiary Amines:</i>		
Triethanolamine	wt-%	< 0,02
4-Ethylmorpholine	wt-%	< 0,02
2-(Diethylamino)-ethanol	wt-%	< 0,02

The figures < 0,01 / < 0,02 / < 0,05 mean, that the content of the component is smaller than the minimum determination value of the analytical method.

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The assayed VCI-material shows a nitrite concentration (calculated as NaNO₂) smaller than 0.1 Ma-% and is free from the determined nitrosable secondary amines. Therefore the sample material complies with the requirements of the guideline for the use of VCI materials, instruction procedure to the check of VCI materials of Volkswagen AG Wolfsburg. The analyzed material complies also with the requirements of the German TRGS 615, segments 4.2 and 4.3.