

## Test report

**Test report relating to a glass product according to European standard EN 1279-4; Desiccants in bulk concerning the product marked as: Nanomol-C 0.5-0.9 mm, manufactured by: Nedex Kimya Sanayi A.S. Turkey**

Report number	89215498-01
Date	26 July 2019
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Client	Nedex Chemie Deutschland GmbH Korrad Zuse Strasse 33 D-47445 Moers Germany
Project number	89215498 PP
Project name	19.A196 - EN1279-4
Number of pages	18



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# 1 Introduction

## 1.1 Purpose

The tests have been performed in order to determine the properties of a desiccant in bulk according to European standard EN 1279-4 [1].

## 1.2 Description of the test specimen

### General

Name of the manufacturer	Nedex Kimya Sanayi A.S. Turkey
Address of the manufacturer	
Production plant of the samples	Turkey
Production date	-/-

### Specific

Trade name	Nanomol-C
Type	3Å molecular sieve
Function	desiccant in bulk
Bead size	0.5 - 0.9 mm
Batch number(s)	1905111307

## 1.3 Sampling procedure

TÜV Rheinland B.V., (TRN) acting as Notified Test Laboratory, has had no influence on the selection of the sample. All test specimen within the sample were test-worthy and were received on 25 June 2019.

## 1.4 Application

The request for testing was submitted by the assignor on 25 June 2019, order or reference number or name: -/- . TRN Quotation / Assignment Form number: 19.A196 Rev1.

## 1.5 Method of testing

All applicable tests have been performed according to the European standard EN 1279-4 [1].

## 1.6 Period of testing

The tests took place in the period week till 18-25 July, 2019.

## 1.7 Put out to contract

The XRD and XRF determination were performed by an external ISO 17025 accredited lab at the request of the client. The test report and methods are given in annex A. The report was supplied by the descant manufacturer.

## 1.8 Privacy statement

Due to privacy reasons, the names of involved personnel that executed the tests are not disclosed in the report. However, this information is available on internal work sheets, test forms etc. in the project file.

### **1.9 Notifications, accreditations, designations**

TÜV Rheinland Nederland B.V. has been notified by the Dutch Minister for Housing and the Central Government Sector as Notified Laboratory (number 1750) and Notified (Factory Production Control) Certification Body (number 0336) for the European Construction Products Regulation 305/2011 (EU).

TÜV Rheinland Nederland B.V. has been accredited by the Dutch Accreditation Council (RvA) as ISO 17025 Test Laboratory (nr. L 484) and ISO 17065 Certification Body (nr. C078).

TÜV Rheinland Nederland B.V. has been designated as Technical Service (Laboratory) by the Approval Authorities for Germany (KBA – E1) and the Netherlands (RDW – E4) for automotive safety glass (ECE R43, 92/22/EC, 2009/144/EC).

TÜV Rheinland Nederland B.V. has been recognised by the German Institute for building technics (DIBt) under number NL005 as test, control and certification body.

### **Remark**

The reported tests were performed under ISO 17025 accreditation.

## 2 Test method

At the request of the client the following properties were determined according to EN1279-4 § 6

- 6.2.1 X-ray Fluorescence Spectroscopy (XRF)
- 6.2.2 X-ray Diffraction (XRD)
- 6.2.3 Bulk density
- 6.2.4 Available water adsorption capacity (AWAC)
- 6.3.1 Loss of ignition (LOI)
- 6.3.2 Standard moisture capacity ( $T_c = AWAC + LOI$ )
- 6.3.3 Gas desorption
- Water induced temperature increase ( $\Delta T$ )

Four packages with the same batch number were received for the tests. Each sample was packed in a vacuum sealed aluminium laminate bag. The AWAC, LOI, gas desorption and bulk density were determined direct after opening the bag.

### 2.1 Methods

The characterization of the desiccant by XRF and XRD was performed by an external lab contracted by the desiccant manufacturer. The used methods and result are described the report given in annex A.

The LOI is determined according to Annex E.1 of EN1279-4 in triple.

Approximately 25-35 g of desiccant was poured in a 130 ml porcelain crucible and dried at  $(540 \pm 10)^\circ\text{C}$  for 2.5 to 3 hours.

The AWAC is determined according to Annex E.2 of EN1279-4 in triple.

Approximately 1 g of desiccant was placed in a desiccator with saturated KOH solution,  $(9 \pm 2)\%$  RH, for 72-73 hr at  $(23 \pm 3)^\circ\text{C}$ .

#### *Note*

Placing the samples for longer time in the desiccator or outside the desiccator still gave increasing weight of the samples. This is an indication the samples were not saturated. The AWAC is therefore only for this particular method and saturation of the desiccant depends on the environmental conditions.

The gas desorption is determined according to Annex E.4 of EN1279-4 in singular.

Water bad temperature  $(70 \pm 3)^\circ\text{C}$ . Approx. 208 g in a 250 ml volumetric flask.

The bulk density is determined according to Annex E.5 of EN1279-4 in singular.

The water induced temperature increase ( $\Delta T$ ) is determent according to EN1279-6 annex H [2].

For the test 50 g of desiccant is added to 50 cm<sup>3</sup> of water and the temperature peak (max) is recorded.

By introducing the desiccant in the water the water starts to boil vigorously, with the contents being blown out of the test tube (dangerous situation). The maximal temperature therefore determent as of boiling water.

### 3 Results

Test results after performing all applicable tests according to European standard EN 1279-4 [1].

Desiccant in bulk	Batch number 1905111307
Trade name	Nanomol-C
Bead size	0.5 -0.9 mm
Bulk density	(950 ±5) g/litre
Water induced temperature increase (ΔT)	>80 °C
Available water adsorption capacity, (AWAC)	individual results: 17.5 / 17.8 / 16.9 % average: (17.4 ±0.5) % by weight
<b>Performance requirements (EN1279-4:2018-07, 6.3)</b>	
Los on ignition, (LOI)	individual results: 0.62 / 0.74 / 0.60 % average: 0.7 % by weight (= Pass < 1.7%)
Standard moisture adsorption capacity (T <sub>c</sub> )	(18.1 ±0.5) % by weight
Gas desorption	0.1 ml/g (= Pass, < 0.3 ml/g)

## Physicochemical characterization (EN1279-4:2018-07, 6.2)

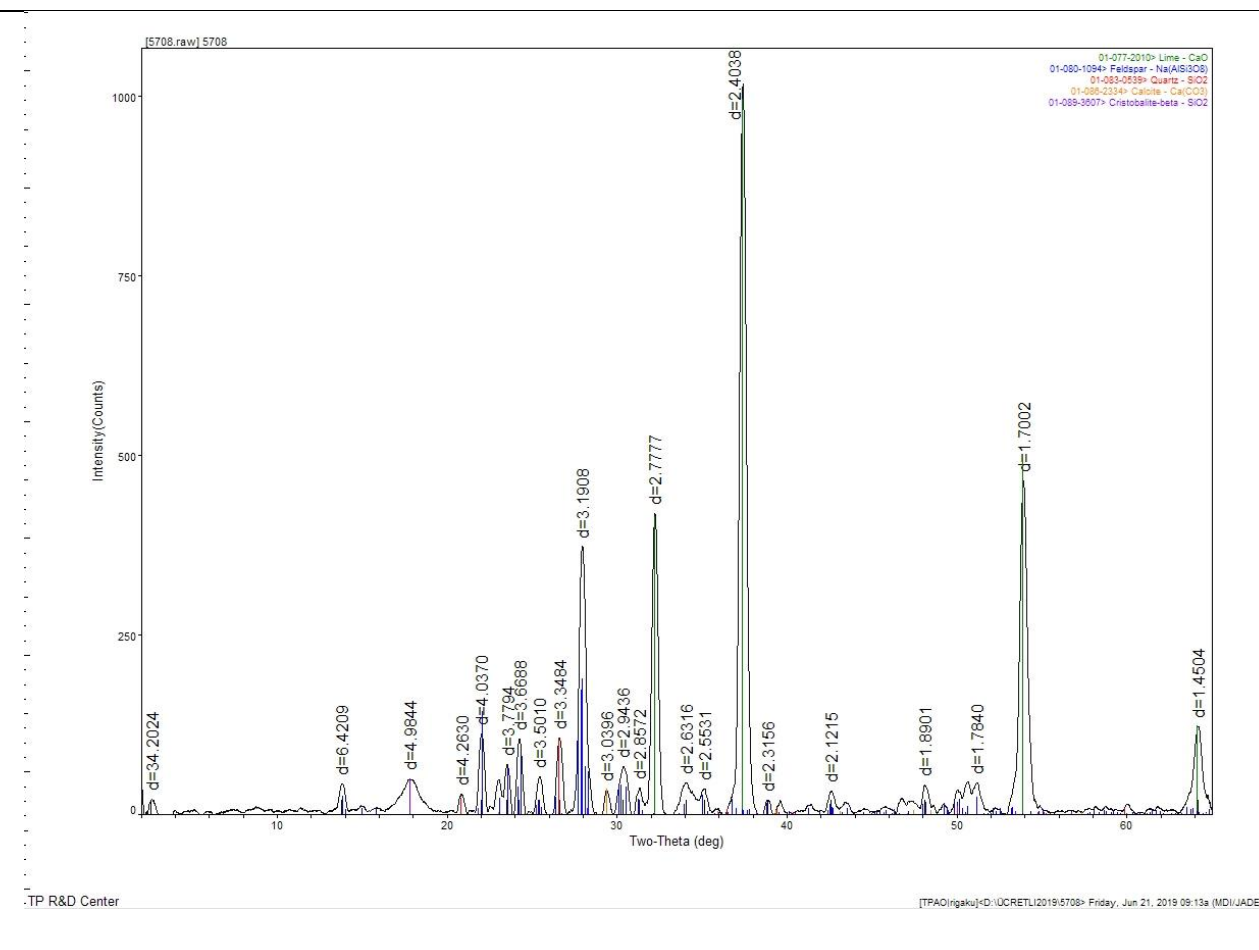
### X-ray fluorescence spectroscopy (XRF)

test report supplied by manufacturer, see appendix A for test report

Silicium (Si)	53.605%
Calcium (Ca)	45.763%
Sulphur (S)	0.451%
Iron (Fe)	0.085%
Titanium (Ti)	0.055%
Strontium (Sr)	0.024%
Copper (Cu)	0.009%
Zirconium (Zr)	0.005%
Nickel (Ni)	0.004%

### X-ray diffraction (XRD)

test report supplied by manufacturer, see appendix A for test report



## 4 Conclusion

The desiccant, marked by the client or manufacturer as: Nanomol-C 0.5-0.9 mm, manufactured by: Nedex Kimya Sanayi A.S. Turkey, meets the performance requirements as stated in the European standard EN 1279-4 [1] concerning the LOI and gas desorption.

The test results exclusively relate to the tested objects.

### Remark 1

When and if changes are made in production method and/or equipment, assessment according to this standard shall be reconsidered and re-tests shall be performed when the changes can lead to different specifications of the desiccant. The decision and responsibility lies at the manufacturer.



## 5 References

- 1 European standard EN 1279-4:2018 (E),  
Glass in building – Insulating glass units – Part 4: Methods of test for the physical attributes of edge seals components and inserts,  
European Committee for Standardization, July 2018.
- 2 European standard EN 1279-6:2018 (E),  
Glass in building – Insulating glass units – Part 6: Factory production control and periodic test  
European Committee for Standardization, July 2018.

## 6 Signatures


<b>Author</b> Mr. M.A.A.M. Schets, B.Sc.	Signature 
Specialist	
<b>Peer review</b> Mr. R. Brandhorst	Signature 
Specialist	
<b>Approved by</b> Mr. H. van Ginkel	Signature 
LSM	

## Appendix A, XRF XRD reports

		<b>TURKISH PETROLEUM CORPORATION RESEARCH&amp;DEVELOPMENT CENTER (TPAO ARGEM)</b>			
		<b>SEDIMENTOLOGY AND RESERVOIR GEOLOGY DEPARTMENT</b>		<b>Test TS EN ISO/IEC 17025 AB-0072-T</b>	
		<b>Söğütözü Mah. 2180. Cadde No:10 06530 Çankaya/ANKARA</b>		<b>AB-0072-T</b>	
				<b>5708</b>	
				<b>06-19</b>	
<b>TEST REPORT REPORT NO:5708</b>					
<b>Customer Name&amp;Address :</b>	NEDEX KİMYA SANAYİ VE TİCARET A.Ş. Tatlısu Mahallesi Aracı Sokak No. 8 Kat 1-2-3-4 Ümraniye / İSTANBUL				
<b>Order Date&amp;No :</b>	June 10th, 2019 / 13769				
<b>Name&amp;Identity of Test Item :</b>	5708 / The Samples Were Received as Small Spherical Particles				
<b>Date of Receive of Test Item :</b>	June 11th, 2019				
<b>Remarks :</b>	*Semi-Quantitative XRD Bulk Powder and Clay Mineral Analysis Were Performed on the Sample.				
<b>Date of Test :</b>	June 17th, 2019				
<b>Number of Pages of Report :</b>	3				
<input checked="" type="checkbox"/> Sample was taken by the Customer and delivered to TPAO ARGEM. <input type="checkbox"/> Sample was taken by TPAO ARGEM personnel, related to sampling standards or instruction which referred in "Remarks" Section. <input checked="" type="checkbox"/> The test and/or measurement results, uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report. -TPAO ARGEM accredited by Turkish Accreditation Agency (TÜRKAK) under registration number AB-0072-T for TS EN ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories-2012 as test laboratory. -TÜRKAK is a signatory to the European co-operation for Accreditation (EA) Multilateral Agreement (MLA) and to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the recognition of test reports.					
		 <b>Macide Zeynep YÜCEL</b> HEAD OF UNIT Person in Charge of Test(s)		 <b>Hüseyin YAKAR</b> DEPUTY HEAD OF DEPT. Laboratory Manager	
				 <b>Zühtü BATI</b> HEAD OF DEPARTMENT V.	

“ \* ” The test method is accredited. “ \* \* ” The test is outsourced.

Test results belong only to the tested sample. These results may be appealed within a month.  
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	<b>TURKISH PETROLEUM CORPORATION</b>	AB-0072-T
	<b>RESEARCH &amp; DEVELOPMENT CENTER</b>	5708
	<b>SEDIMENTOLOGY AND RESERVOIR GEOLOGY</b> <b>DEPARTMENT</b> <b>TEST REPORT</b>	06-19

<b>Test Item Code</b>	: 5708
<b>Date of Arrival of the Test Item to the Department</b>	: 11 <sup>th</sup> June 2019
<b>Test Made</b>	: Semi-Quantitative XRD Bulk Powder Mineral Analysis
<b>Date of Test</b>	: 17 <sup>th</sup> January 2019

#### SEMI-QUANTITATIVE XRD BULK POWDER MINERAL ANALYSIS TEST REPORT

##### METHODS OF ANALYSIS:

The sample ground with Retsch RS-200 grinding equipment to have a bulk powder and then representatively selected and plated for the XRD bulk powder analysis. The semi-quantitative XRD bulk powder mineral analysis was performed under the conditions given below:

- Generator	: Rigaku D/Max-2200 Ultima <sup>+</sup> /PC
- X-Ray Tube	: Cu
- Voltage	: 40 kV
- Current	: 20 mA
- Wavelength	: (CuK $\alpha_1$ ) 1.54059 Å
- Scan Speed	: 1°/min.

The X-ray diffractogram of the sample was interpreted with Inorganic Crystal Structure Database (ICSD) of International Center for Diffraction Data (ICDD) by using MDI's Jade-7.0 software. The output of the XRD analysis was evaluated according to profile-based matching of the software and reference intensity ratios (RIR) by using "Easy Quant" patch of the software. The bulk minerals in the sample, in range of detection limits of the device (1% by weight), were determined as type and relative abundances. The mineral species, chemical constituents and relative abundances of the minerals (as weight percent) are shown in Table-01.



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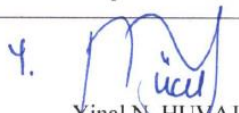
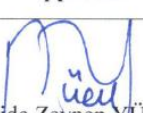
	<b>TURKISH PETROLEUM CORPORATION RESEARCH &amp; DEVELOPMENT CENTER SEDIMENTOLOGY AND RESERVOIR GEOLOGY DEPARTMENT TEST REPORT</b>	AB-0072-T
		5708
		06-19

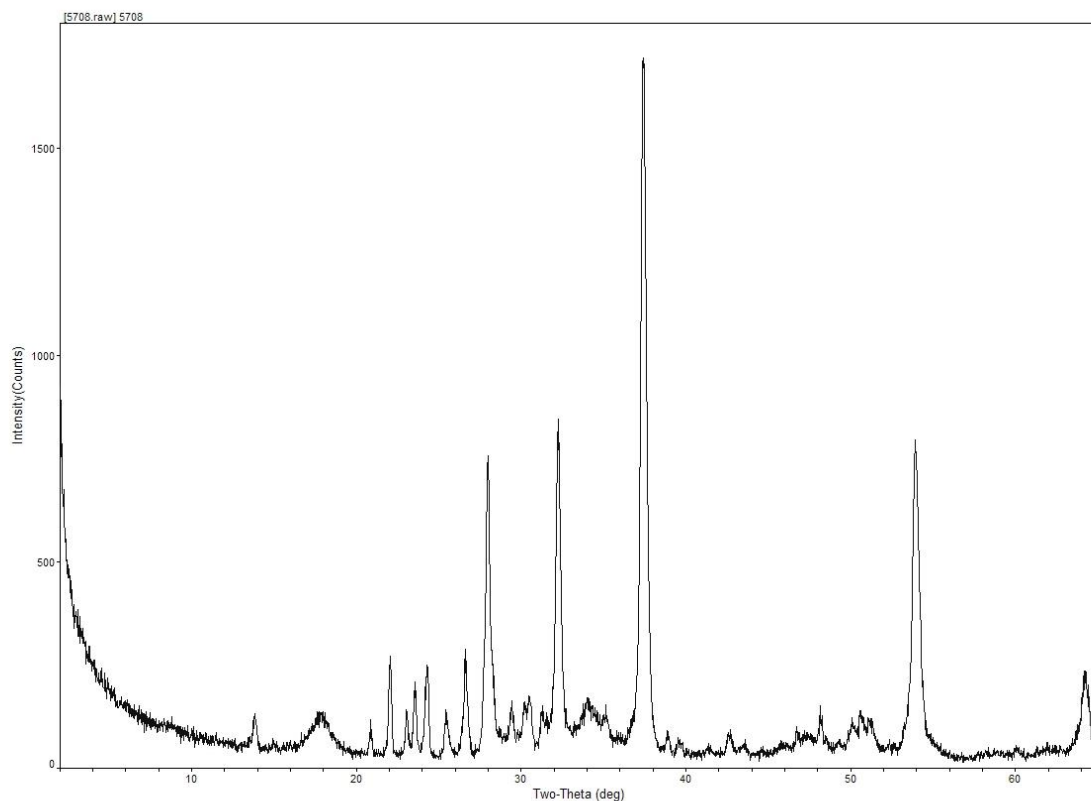
Table 01. Test result of the semi-quantitative XRD bulk powder mineral analysis of the sample "5708"

SAMPLE ID	MINERAL NAME	CHEMICAL FORMULA OF THE MINERAL	RELATIVE ABUNDANCE OF THE MINERAL (wt%)
5708	Lime	CaO	46
	Feldspar	Na(AlSi <sub>3</sub> O <sub>8</sub> )	39
	Cristobalite-beta	SiO <sub>2</sub>	7
	Quartz	SiO <sub>2</sub>	6
	Calcite	Ca(CO) <sub>3</sub>	2

Department of Test	Report Writer	Approval
Sedimentology and Reservoir Geology	 Yinal N. HUYAJ Senior Engineer	 Macide Zeynep YÜCEL Department Manager

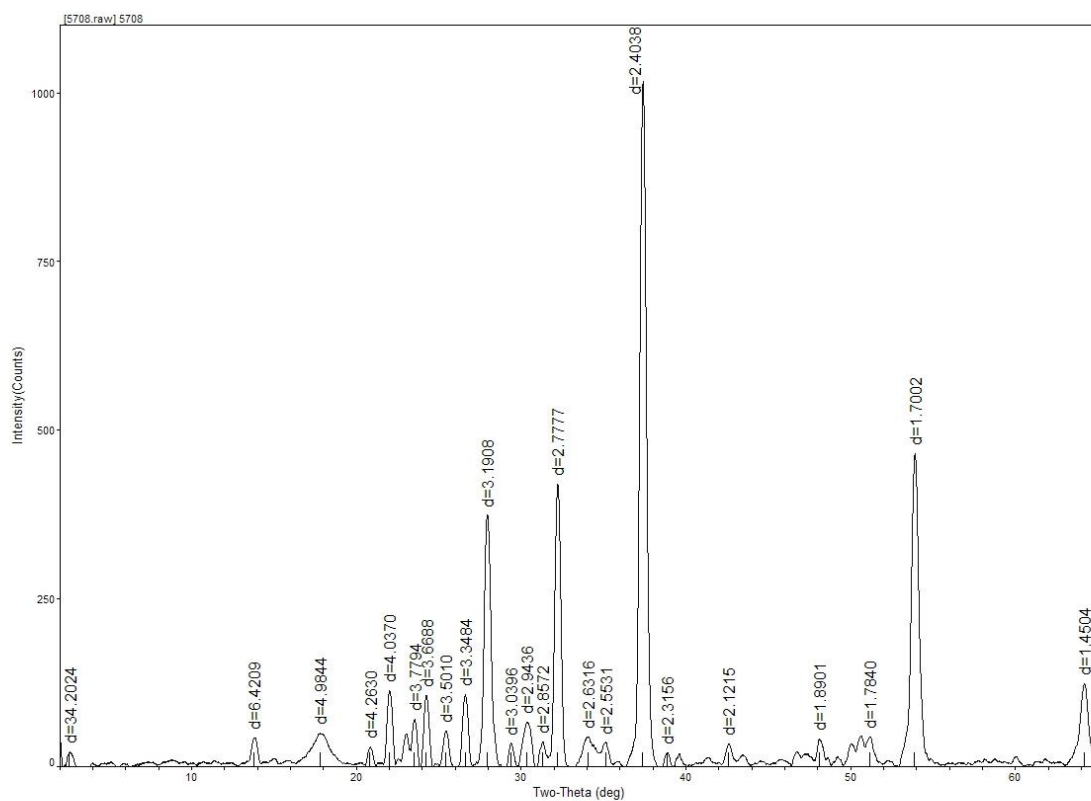
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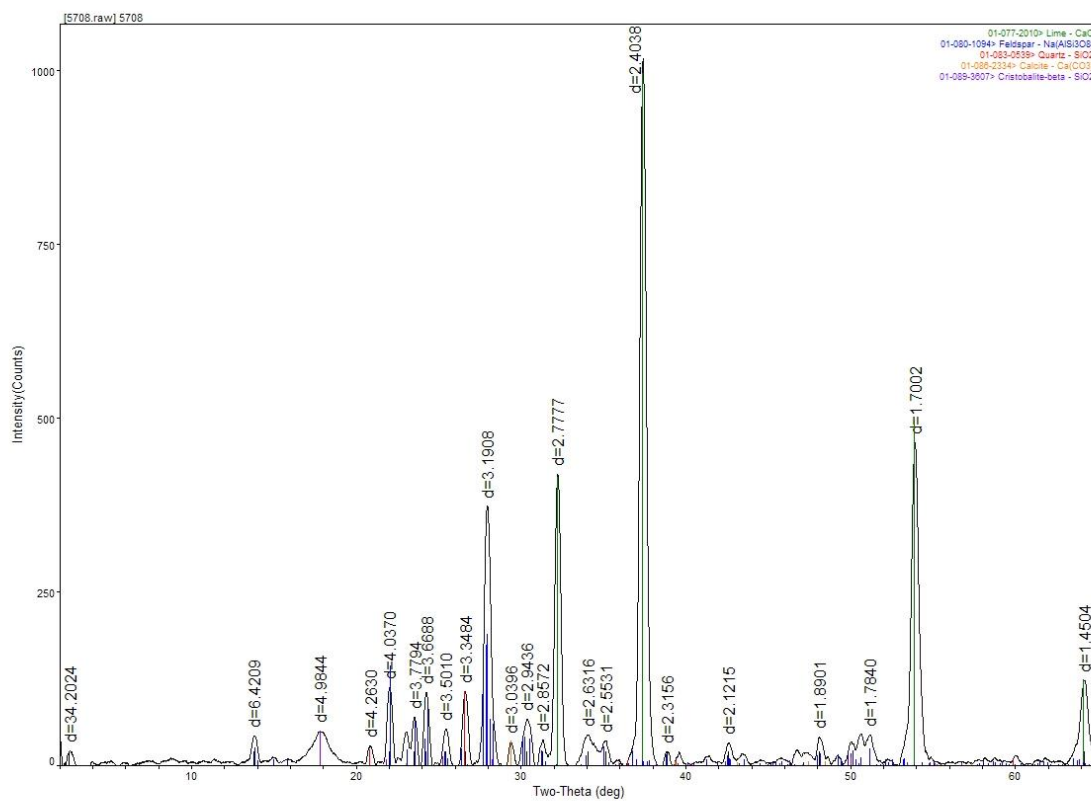
TP R&D Center

[TPAC/rigaku]-D:\ÜCRETU\2019\5708> Friday, Jun 21, 2019 08:58a (MDI/JADE7)



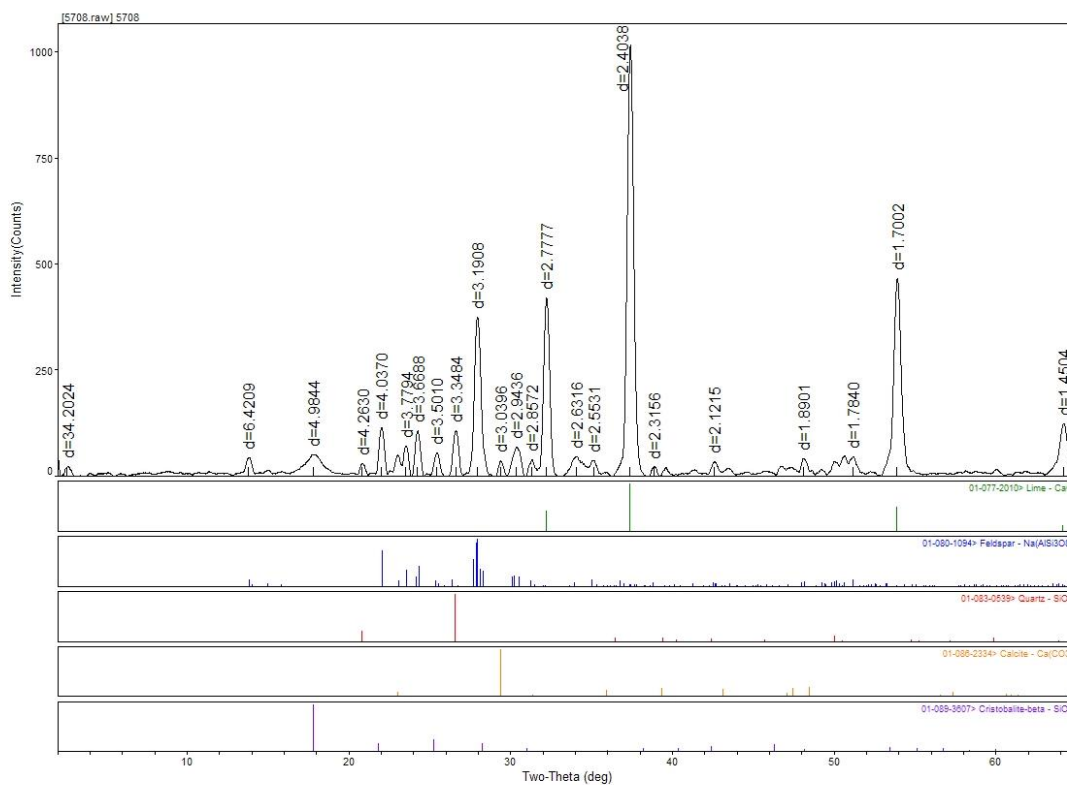
TP R&D Center

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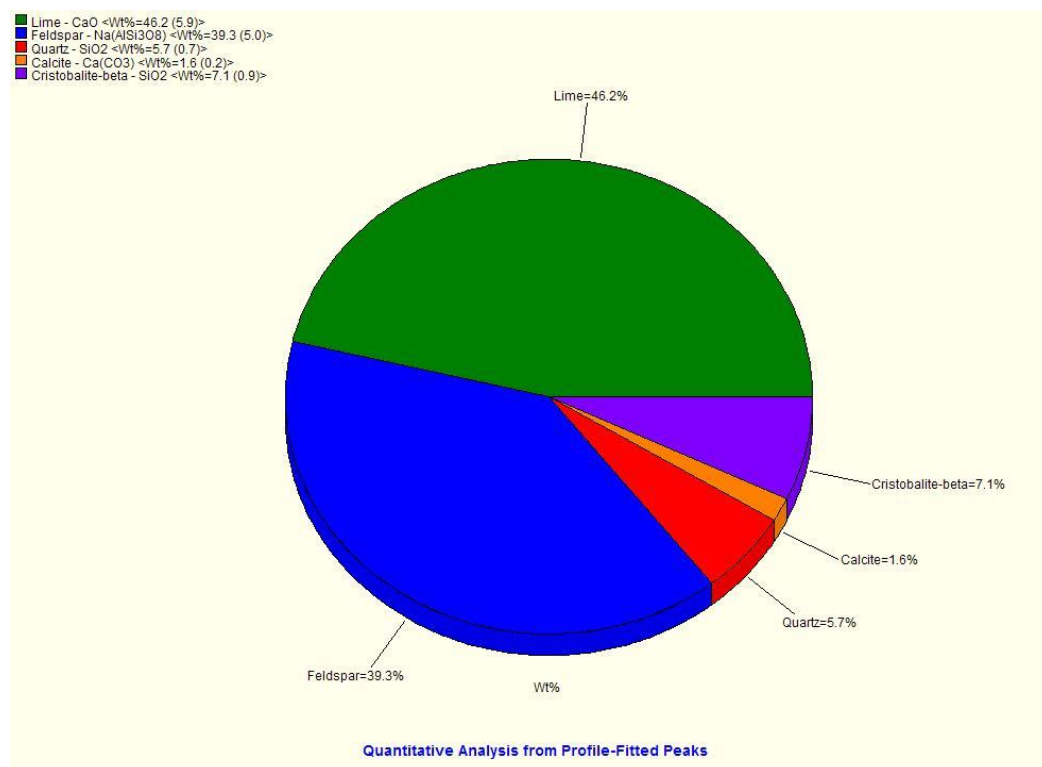
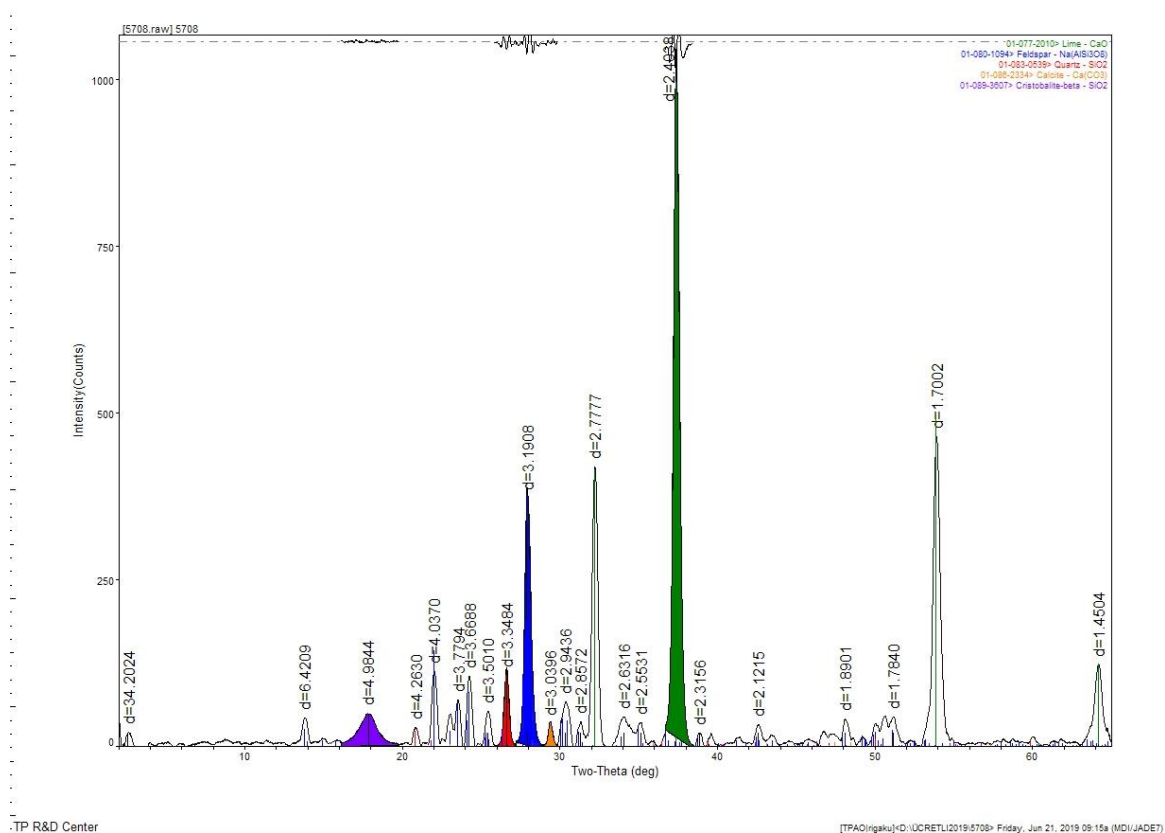
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Form LG.044/Rev.0

## TEST REPORT

Page 1 of 2

**REPORT NUMBER :** TURT190135244  
**APPLICANT NAME :** Nedex Kimya San. Tic. A.Ş.  
**ADDRESS :** Dilovası OSB, 5. Kısım Fırat Cad. No:22 Kocaeli / TURKEY  
TEL:0262 754 87 76 FAX:0262 754 87 78  
**Attention :** Aslıhan Aydın ( aslıhan.aydin@nedexgroup.com )  
**SAMPLE DESCRIPTION :** One sample of NANOMOL-C-White plastic granule  
**DATE IN :** 24 July ,2019 ( 13:59:00)  
**DATE OUT :** 25 July ,2019

TEST	SAMPLE
MATERIAL ANALYSIS with XRF	NR

P = MEETS BUYER' S REQUIREMENT / F = DOES NOT MEET BUYER' S REQUIREMENT / NR = NO REQUIREMENT / SC=STILL CONTINUES / X=NOT PERFORMED / NA = NOT APPLICABLE / LS = LACK OF SAMPLE / NC = NO COMMENT / I = INCONCLUSIVE / # = SEE RESULT / NF = NEEDS FURTHER TESTING / A = ABSENT / M = MARGINAL ACCEPT / SD = SEE DETAILS ENCLOSED / FS: FURTHER STEPS

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Customer Care Executive



Zeynep AKIN  
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190135244



RESULTS  
REPORT :TURT190135244

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25 July ,2019

Test Method	Results	Requirements
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**MATERIAL ANALYSIS with XRF**  
INTERTEK IHTM AL.2.011

Silicium (Si)	53.605%	No Requirement
Calcium (Ca)	45.763%	
Sulphur (S)	0.451%	
Iron (Fe)	0.085%	
Titanium (Ti)	0.055%	
Strontium (Sr)	0.024%	
Copper (Cu)	0.009%	
Zirconium (Zr)	0.005%	
Nickel (Ni)	0.004%	

## END OF TEST REPORT ##

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(This is the end of this report).