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PROMOTOR EKOLOGII

PRODUCT SPECIFICATION

Product name: Halloysite Dunino CSW – component of plastics and paints

CAS Number: 1332-58-7

Chemical formula: $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4 \cdot 2\text{H}_2\text{O}$

Formula weight: 294,19 g/mol

Appearance (Color): beige

Appearance (Form) : powder

BHT Surface Area : 65 m²/g

Bulk density : 650-750 kg/m³

pH : 6,5-7,5

Composition: mixture of nanotubes and nanoplatelets (s. Fig. 1)

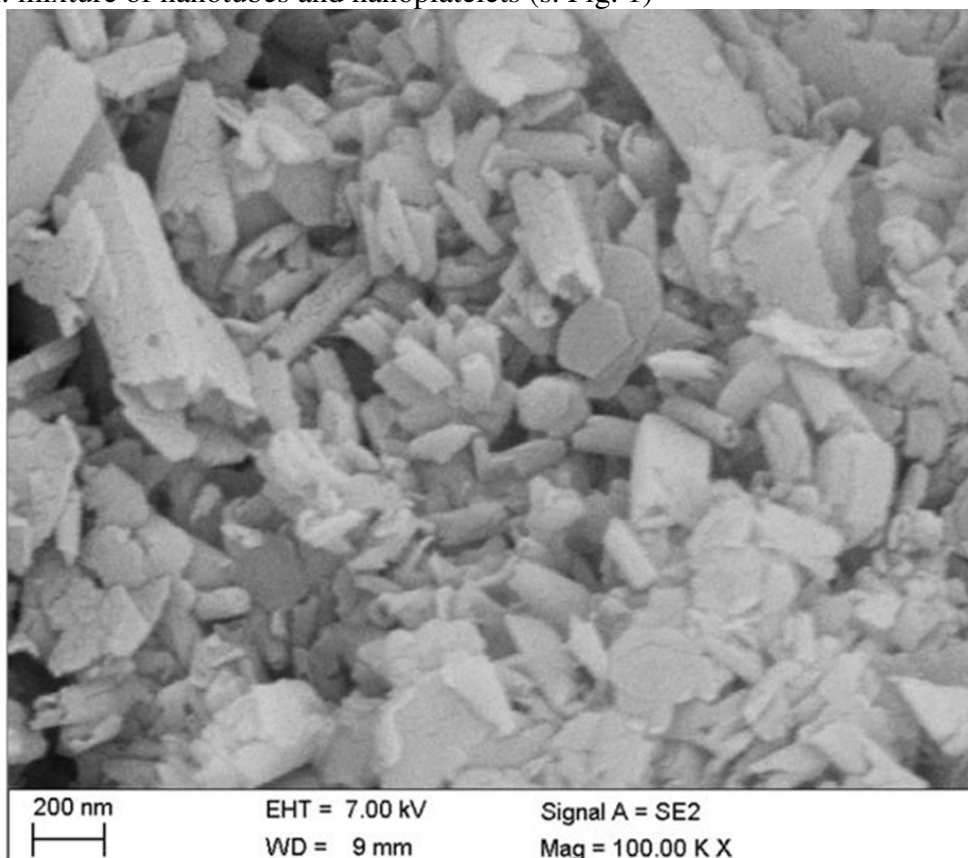


Fig.1 Microscopic SEM view of Halloysite Dunino CSW

Dimensions of nanoparticles:

nanotubes:

diameter: 30-100 nanometers ; length : 0,5 -2 mikrometers

nanoplatelets:

length/ width : 100-300 nanometers; thickness : 1-5 nanometers

Supplier : PTH Intermark , Poland

Chemical composition:

Al₂O₃- 34 +/- 1%;

SiO₂- 37 +/- 1%,

Fe₂O₃- 21 +/- 1%,

TiO₂- 2,5 +/- 1%,

CaO- 0,5% +/-0,1%

K₂O – 0,07+/- 0,01%

Na₂O -0,02%+/- 0,01%

SO₃ – 0,05+/-0,02%

Cl <0,01%

LOI – 14,2%

PTH Intermark warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. For further inquiries, please contact PTH Intermark. Purchaser must determine the suitability of the product for its particular use.

Applications:

Halloysite CSW can be applied as a component of plastics and paints.

It was tested as the component of various polymer composites (polar and non-polar). The purpose of its applications were different in various cases: fire retardancy, flame resistance, improvement of mechanical properties, reduction of oxygen permeability. Because halloysite is polar- it needs the functionalization to a specific case by means of various surface activators for non-polar matrices. The amount of additive, type of surface activator, production parameters depend of the kind of polymer and demanded features of the composite.

Nanotubes and nanoplates form grain agglomerates connected mainly by weak van der Waals forces. A grain size of a few micrometers consists of hundreds of nanoplatelets and nanotubes and they should be disintegrated and good dispersed in the matrix. The experience shows that this is very difficult to achieve in conventional extruders. Very good results were obtained in the extrusion process by means of Entex planetary extruder. Fig. 2 shows a microscopic SEM view of a composite with good disaggregation and dispersion of halloysite nanoplatelets and nanotubes in such extruder.

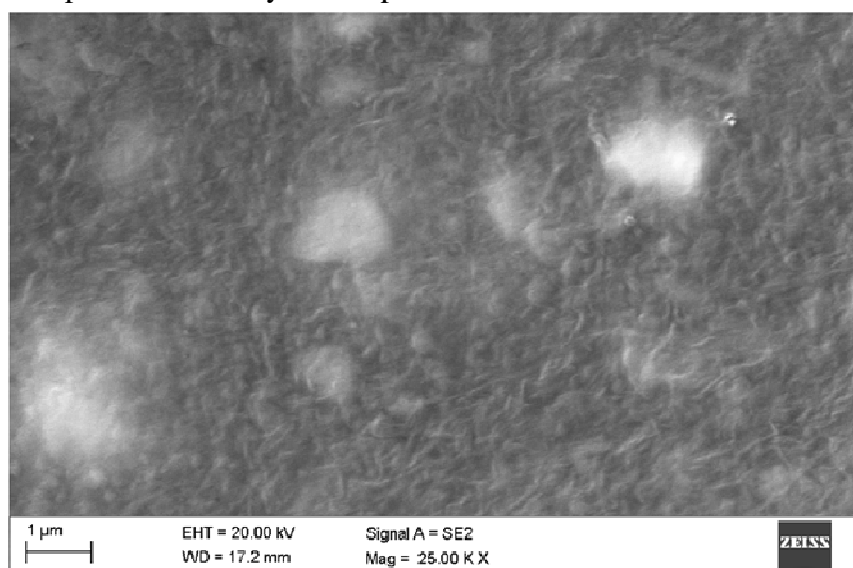


Fig. 2 Microscopic SEM view of the composite with CSW halloysite filler (Entex planetary extruder) The nanoplatelets and nanotubes are disaggregated, correctly dispersed and strongly connected with matrix.

The Young's modulus of halloysite nanotubes and nanoplatlets is approx. 300 GPa, i.e. it is approx. 100 times greater than the modulus of typical pristine plastics.

Full use of halloysite properties results in significant improvement of composite parameters with additive doses of 2-5%.

Following effects are achieved when halloysite is used in paints:

- 1/ very good coverage and adhesion
- 2/ high mechanical properties
- 3/ resistance to discoloration, weather resistance and color fade.
- 4/ flexibility
- 5/ tolerant of surface expansion and contraction without cracking.
- 6/ excellent UV

Halloysite can be successfully used for:

- water and solvent based paints,
- exterior and interior paints
- anticorrosive paints,
- special paints (eg. biocide paints).

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