TOROWHITE
ENGINEERED FUNCTIONAL ADDITIVES

PRODUCT DATA SHEET

Ti-ExR 04

POLYMER & BIOPOLYMER

TIO_2 EXTENDER

CALCIUM SULFATE **ANHYDRITE**

HIGHLIGHTS

- High purity > 99% $CaSO_4$
- Excellent whiteness and brightness
- Cost efficient alternative as white pigment extender
- Unique raw material quality
- 100% natural product
- Resistance to weak acids
- Improved UV resistance
- Good impact properties
- Resistance to high temperatures
- Easy to process due to low Mohs hardness
- Good adhesion with polymer
- Narrow particle size distribution
- Can be applied in thermoplastics

TOROWHITE Ti-ExR 04 is a Calcium Sulfate Anhydrite (AII) extender with very high purity & excellent whiteness. Ti-ExR 04 is produced from natural calcium sulfate that is unique and selected especially for use in industries such polymers/biopolymers and painting. Narrow particle size distribution enables high performances in terms of color, opacity, brightness, processability and mechanical impact resistance.

Partial substitution of TiO2 by Ti-ExR 04 – L, a, b Test results*

Masterbatches (60 wt% pigment, 40 wt% LDPE) and white LDPE compounds were produced by melt-mixing using a laboratory Banbury mixer. TiO_2 was substituted with up to 66% Ti-ExR 04. The compounds of white color were prepared by adding 2,5% masterbatch into the neat LDPE matrix. Plates produced by compression molding were used for CIELAB color managements. Color parameters for the compounds including those containing $CaSO_4$ are given below:

*Carried out by IPF Leibniz-Institut für Polymerforschung Dresden

Pigment / Extender in Masterbach	L	a	b
100% TiO_2 (reference)	95.90	-0.96	2.24
5% Ti-ExR 04*	95.95	-0.97	1.94
20% Ti-ExR 04	95.74	-0.97	2.23
33% Ti-ExR 04	94.15	-0.65	1.90
66% Ti-ExR 04	93.23	-0.65	3.74

*Ti-ExR 04 extends TiO_2 based on 2,5% masterbach concentration in the LDPE compound (60% TiO_2 40% LDPE)

VALUE ADDITION

- Ti-ExR 04 extends very efficiently 10% to 40% TiO_2 depending on the application, with minimal sacrifice in whiteness and opacity.
- Ti-ExR 04 provides greater, superior whiteness with high L values and brightness.

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TECHNICAL DATA

Physical properties

Tap Density (g/cm^3) (1)	0.9
Pycnometer Density (g/cm^3) (2)	2.8 - 3.0
Mohs hardness (3)	2.0 - 3.0
Refractive index (3)	1.55 - 1.60
Whiteness (CIE L value) (4)	L* > 95
Medium particle size D50 (microns) (5)	3.80 - 4.70
Maximum particle size D98 (microns)	16 - 20
Oil Absorption-DOP (g/100g) (6)	26.76
BET Surface Area (m2/g) (7)	8.76
pH (10% slurry)	10.0 – 11.0
Purity	> 99% $CaSO_4$
Crystal shape	orthorhombic
Water content	max. 1.0% (TGA method)

(1) According to the standard ASTM B527
(2) Quantachrome Ultrapyc-1200e
(3) Literature data (R. Rothon, Fillers for Polymer Applications, Springer 2017)
(4) Datacolor ELREPHO
(5) Malvern Mastersizer 3000
(6) ASTM D1483
(7) Quantachrome NOVAtouch

Typical Chemical Analysis

Chemical name	Calcium Sulfate (Anhydrite)
Molecular formula	$CaSO_4$
CAS number	7778-18-9

Food & Pharma Grade raw material with following results for Ti-ExR 04

Assay	>99%
Flame Test	Red Flame Calcium present
Sulphate Test	Present
Solubility in Water	Slightly Soluble
Solubility in Ethanol	Insoluble
Fluoride (Anion IC)	<30.0 mg/kg
Selenium (F5202)	<10.0 mg/kg
Arsenic (F5202)	< 1.0 mg/kg
Lead (F5202)	< 1.0 mg/kg
Mercury (F5202)	< 0.5 mg/kg

This information is given to the best of our knowledge. Although all statements and results shown in this document are believed to be accurate and reliable, they are presented for guidance and as information only. Because of the multitude of formulations and processing conditions, the above-mentioned statements must be adapted by user to the requirements of application.