CAPAUTE CHEMICAL
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Technical Data Sheet

TiLink™ TCA-K12 (TCA-102)

Isopropyl, tri (dioctyl)phosphato titanate

Description

TCA-K12 (TCA-102) is a liquid monoalkoxy fatty acid titanate that is compatible to semi-polar and nonpolar material.

Synonyms

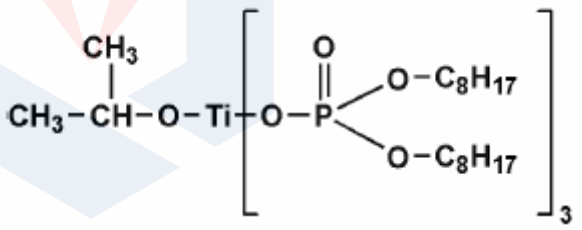
Titanium IV, 2-propanolato, tris (dioctyl) phosphato-O

CAS Number

68585-79-5

Molecular Formula and Molecular Structure

$C_{51}H_{109}O_{13}P_3Ti$



Equivalent Product

Ken-React® KR 12 from Kenrich Petrochemicals, Inc

Typical Properties

Index	Value
Appearance	Viscous liquid with claret color
Specific Gravity (ρ20), g/cm3	1.03
Viscosity (25℃), cps	1500
Refractive Index (n_D^{25})	1.465
Fish Point, ℃	150
Decomposition Temperature, ℃	260
Solubility	Soluble in alcohol, aromatic and mineral oil. Insoluble in water and will be hydrolyzed.

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Mechanism

Coupling Agents are molecular bridges at the interface between two substrates, usually but not limited to an inorganic filler/fiber and an organic polymer matrix. Titanium-derived coupling agents react with free protons at the inorganic interface resulting in the formation of organic-titanium monomolecular layers on the inorganic surface. Additionally, the coupling agent may have up to Six Functions in the matrix-which include polymer catalysis and other heteroatom effects-independent of inorganic content.

When used in polymers, titanates can increase adhesion ;improve impact strength and mechanical properties; reduce embrittlement; allow higher filler loadings; optimize particulate dispersion; increase flow of filled and unfilled polymers at lower process temperatures; prevent phase separation; and may have other effects.

Reactive Substrates

Proton reactivity allows coupling to almost all inorganic and organic substrates such as CaCO3, carbonates, carbon black, graphite, minerals, nano-particulates, silicas, silicates, metals, metal oxides, peroxides, hydrates, acetates, borates, sulfates, nitrates, nitramines, aramid, organic pigments, cellulosics, sulfur, azodicarbonamide, polymers, etc.

Amounts and How to Use

Titanate use level can vary from ppm when used as a catalyst in synthesis to 0.2 to 0.6% by weight of polymer(s) when used as a polymer regeneration catalyst or copolymerization catalyst in the macromolecular melt. A general rule of thumb is to use 0.2 wt. % of polymer (1% CAPS KR 12/L) or 0.2 to 0.7 wt. % of filler, whichever is the greater.

Typically, a 2.7 S.G., 2.5μ mineral filler such as CaCO3 will require 0.2 to 0.4 wt. % titanate.

0.1 to 0.6 wt. % of total polymer matrix is a good range for ladder studies. Amounts to as much as 3% are often used. Use like a color concentrate and lower process temperatures ~10%.

Suggested Functions

Coupling agent, adhesion promoter, catalyst, repolymerization catalyst, copolymerization catalyst, regrind regenerator, polymer strain and mechanical property improver, dispersion aid, deagglomerator, wetting agent, surfactant, grinding aid, plasticizer or solvent reducer, superplasticizer, low temperature flexibilizer, process aid, peptizer, flow control agent, lubricant, viscosity depressant, thixotrope, suspension aid, impact modifier, comonomer, Lewis Acid reducing agent, hydrophobic agent, cure rate modifier, blowing agent activator, intumescent activator, flame retardant, conductivity enhancer, corrosion inhibitor, anti-aging inhibitor, etc. Function depends on dosage, solubility parameters, dilution, sequencing,

process conditions, substrate, polymer, other ingredients, curatives, etc. and their interaction with the neoalkoxy, octyl, phosphato and titanium functionalities of TCA-K12 (TCA-102).

Some Commercial Applications

This product can be used in composite materials to improve thermal stability, surface smoothness and loading level of fillers to reduce the dosage of resin and reduce the cost.

It can be applied to polymers including PP, PE and rubber. It is a surface treatment agent for inorganic fillers such as calcium carbonate, kaoline, talcum etc, to improve hydrophobic property and dispersion of the filler. As a result, the products treated by this product will obtain improved mechanical strength, reduced moisture absorption.

When rubber is filled by the filler of kaolin treated by it, the rubber can obtain improved tearing strength and tensile strength. So silica can be partly replaced.

There are numerous references in the literature citing the use of it. It may be used in high temperature processing thermoplastics when applied as a masterbatch pellet. Applications include: faster cycles @ lower temperatures for thermoplastic and elastomer polymer processing; copolymerization of dissimilar polymers in the melt; regeneration of regrind; improved mechanical properties of CaCO3, mineral and metal oxide filled polymers; control of burn rate and burn rate exponent in energetics and FR compositions; viscosity reduction; adhesion promotion; catalyst; dispersant, etc.

Packing

This product is available in 25 L pail, 200L drums and 1000L immediate bulk container.

Storage and Shelf Life

Should be stored in dry, cool, ventilated room; keep away from water, moisture, high temperature and fire. This product has a shelf life of at least 18 months if stored in tightly closed original container at room temperature.

If this product is kept beyond the shelf life recommend on the product label, it is not necessarily unusable, but a quality control should be performed on the properties relevant to the application.