

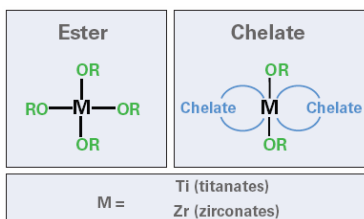
### A Broad Line of Versatile, High-Quality Solutions for Enhancing Your Products' Performance

Dorf Ketal is the industry pioneer and a global leader in producing and supplying organic titanates and zirconates. For more than 50 years, Dorf Ketal has been delivering innovative, high-quality Tyzor® compounds to meet the evolving needs of a wide range of industrial markets. Dorf Ketal offers more than 40 grades of Tyzor®, including several specialty compounds.

#### Broad Product Selection

Dorf Ketal Tyzor® organic titanates and zirconates offer superior properties and versatility in performing a variety of functions in a broad range of industrial markets and applications. They offer dramatic improvements in product performance and processing conditions, with low environmental impact.

The broad range of Tyzor® organic titanate and zirconate products—from highly reactive alkoxides to very stable chelates—facilitates the selection of optimum reactivity and compatibility for each application or reaction condition.



The production of Tyzor® products is integrated back to the titanium-bearing ore via titanium tetrachloride, the same raw material used for Ti-Pure® titanium dioxide produced by Dorf Ketal. This integrated supply chain—from mine, to production, to customer—ensures a dependable supply to Dorf Ketal Tyzor® customers. Combining high production capacity, a large global distribution network and flexible supply chain management, Dorf Ketal customers can have confidence in worldwide product availability and timely delivery.

#### Four Key Functions

Dorf Ketal Tyzor® organic titanates and zirconates perform four important functions that are key to their versatility: catalysis, cross-linking, surface modification and adhesion promotion.

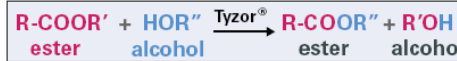
#### Catalyst

Tyzor® organic titanates and zirconates are efficient catalysts for a variety of reactions, including: esterification, transesterification, condensation and addition.

Esterification

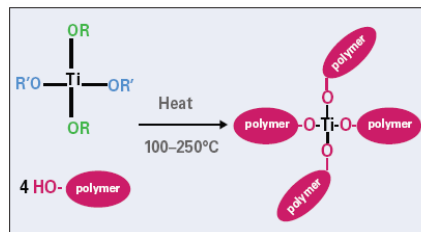


Transesterification



**Cross-linking agent**

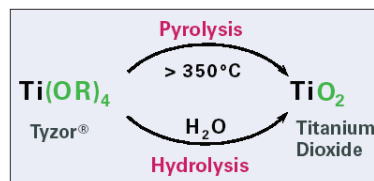
Tyzor® organic titanates and zirconates can be used as cross-linking agents to improve the product properties of paints, inks, sealants, polymers and other coatings. They can also be used to improve processing in fracturing fluids used in down-hole oil and gas production applications.



**Surface modifier**

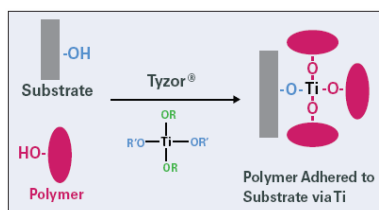
Tyzor® organic titanates and zirconates can be used to modify the surface of both inorganic and organic materials. This occurs when the Tyzor® products are applied alone or in combination with other materials in hydrolytic (sol-gel) or pyrolytic processes to form the corresponding metal oxides as a continuous layer.

Tyzor® organic titanates and zirconates can also be used as the source for TiO<sub>2</sub> or ZrO<sub>2</sub> pigments or nano-sized metal oxides.



**Adhesion promoter**

Tyzor® organic titanates and zirconates can promote the adhesion of paints, coatings, printing inks, sealants, adhesives, etc. to various substrates, including: metals, plastics (pretreated), glass and more. They do this by forming a bridge between two different substances (such as inorganic or organic materials and polymers) at their interface.



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**Diverse Applications**

Dorf Ketal Tyzor® organic titanates and zirconates are available in more than 40 grades, including specialty compounds, to meet a wide variety of customer needs in diverse applications such as:

- Esterification (e.g., plasticizer)
- Transesterification (e.g., acrylates and bio-fuels)
- Polyester
- Olefin polymerization
- Printing inks
- Oil field fracturing
- Corrosion protection
- Silicone sealants
- Industrial paints
- Adhesives
- Glass coating (flat glass, hollow glass, fiberglass)
- Inorganic binders
- Ceramics
- Nano-technology

In many of these applications, Tyzor® organic titanates and zirconates are the preferred products due to their ease of use; high efficiency; versatility; uniqueness of effect; cost effectiveness; low toxicity; and freedom from undesirable side effects.

**Multitude of Benefits**

Depending on the application and end use, there are a multitude of benefits that can be achieved by using Tyzor® organic titanates and zirconates. Overall, Tyzor® provides: controlled reactivity, good compatibility and stability, and low toxicity (replacement of tin, antimony and chromium VI compounds).

As a Lewis acid catalyst, Tyzor® features:

- Mild reaction conditions
- High yield
- Low catalyst concentration
- Limited formation of by-products
- Easy work-up
- High-quality end products

As a **cross-linking agent**, Tyzor® enables:

- Accelerated curing rates for sealants, inks and coatings
- Improved mechanical properties
- Gel formation in solvent and waterborne carbohydrate systems, such as printing inks, oil well fracturing fluids and thixotropic dispersion paints
- Thermal stability
- Water scavenger capabilities

As an **adhesion promoter**, Tyzor® offers:

- Improved adhesion to substrates
- Increased resistance to water and chemicals
- Enhanced mechanical properties
- Adhesion to low-reactive substrates

As a **surface modifier**, Tyzor® delivers:

- Corrosion protection
- Scratch resistance
- Thermal resistance
- Chemical resistance
- Light/heat reflection
- Decorative/optical effects
- Source for nano-scaled TiO<sub>2</sub> and ZrO<sub>2</sub> particles

### Put Tyzor® to Work for You

The broad range of Tyzor® organic titanates and zirconates allows you to select the optimum grade to meet your specific needs, enabling you to produce superior quality products for a wide variety of applications and market segments.

And, with warehouses in every region and an integrated global network of highly trained sales and technical service professionals available to assist you, it is easy and convenient to put Tyzor® to work in your application anywhere in the world.