Ultrafine TiO₂
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Cinkarna Celje is one of the largest Slovene chemical processing companies, successfully tackling the challenges of demanding international markets. Our strengths are the result of decades of work, acquiring know-how and experience. Harmonizing our business conduct with the strict acquis of the European Union in the field of environmental protection is a major part of our success, just as the establishment of a multidisciplinary, targeted leadership and staffing structure.

Our sales approach aims to create genuine long-term relations with our buyers by guaranteeing them reliability and the constant optimization of the relationship between our prices, quality and speed of delivery.

The numbers

- **1953**: Merger with the chemical plant
- **Today**: Focus on manufacturing and marketing TiO₂ pigments
- **150 M**: Total annual sales in EUR
- **1873**: Establishment of Cinkarna Celje
- **1970**: Transformation from a predominately metallurgical company into a chemical processing company
- **1,000**: Employees demanding
- **80 %**: of sales originating from international markets
Safety, health and environment

We place a lot of emphasis on reducing and managing the impact of our activities on people and the environment by making sure that our production processes comply with international quality standards. To achieve this, we use the best technologies and solutions available.
Titanium dioxide pigment is one of the most widely used inorganic materials in the world. Due to its ability to protect materials from sunlight and weather conditions and its extraordinary lightening and covering properties, this material has entered every area of our lives.

Titanium Dioxide is thermally stable, non-flammable and not very soluble. According to the UN Globally Harmonized System of Classification and Labelling of Chemicals it is not considered harmful.

What is the difference between pigment and ultrafine TiO₂?

**TiO₂ pigment**
- Micrometre-size particles
- Unique white pigment
- Excellent covering properties
- Non-toxic and inert
- UV light-absorbent
- Ensures colour-fastness and a better surface protection
- Indoor application for brighter and more pleasant rooms
- Outdoor application ensures great weather-resistance for materials

**Ultrafine TiO₂**
- Ultrafine products are smaller than 100 nm
- Products in the form of water suspensions
- Energy-efficient manufacture
- The technological process doesn’t include the powdery phase
- Pronounced ultrafine material properties due to a larger surface
- Efficient absorbency of UV energy
- Decomposition of environmental pollutants with the help of photocatalysis
- Catalyst in the process of the denitrification of the exhaust systems of cars, lorries and power plants
The most important difference between pigment and ultrafine TiO$_2$ is in the size of their particles and, among others, in their way of diffusing light:

- **TiO$_2$ pigment** diffuses light very efficiently, making the colour of the suspension white.
- The ultrafine TiO$_2$ particles, on the other hand, diffuse light selectively, contributing to a bluish undertone of the suspension.

Due to its small particles ultrafine TiO$_2$ is widely applicable in:

- UV-absorbent transparent wood coatings
- Plastics additives
- UV protection in cosmetics
- Various electronic components
- Self-cleaning surfaces and flexible solar cells
- Decomposition of harmful nitrogen oxides, organic pollutants and micro-organisms
- Water and air purification
Positive effects by reducing:

- Air pollution
- Smog formation
- Acidification
- Harmful UV light

Ultrafine TiO$_2$ particles in construction materials

Can be used as active layers or active coatings. Construction materials like these have the ability to efficiently remove various air pollutants and therefore reduce economic and social costs arising from pollution.

A fountain made of photoactive concrete in Maribor, Slovenia
Did you know?
In nature, Titanium dioxide (TiO₂) exists as part of stone or mineral grits. Titanium is the ninth most common element in the Earth’s crust.

Sustainable approach
One of the ways Cinkarna Celje guarantees sustainability is by reducing the impact of the ultrafine materials during their whole lifecycle. We devote special attention to their manufacturing process. This is why we keep the material in the form of a suspension at all times, eliminating the impact on people and the environment.
Approach

A different approach to manufacturing

Numerous advantages of the manufacturing process enable us to efficiently adapt to our customers’ specific needs and provide them with high-quality products.

The most important advantage and the difference in the manufacturing process is that we produce materials in the form of stable water suspensions. All the process phases take place in an aqueous medium which guarantees better stability and dispersibility for our products.

An ordinary manufacturing process

Numerous manufacturers of ultrafine TiO₂ materials produce it by making a powder and then grinding it into ultrafine particles. They then sell it as powder or in the form of a suspension.
Better materials are the result of our numerous advantages

- **High quality**
  Ultrafine TiO$_2$ is intended to be used with advanced technology applications. That’s why it is of vital importance to manage manufacturing processes, to ensure flexibility and higher quality.

- **Extensive experience**
  Decades of experience in the field of chemical processes, our own research, and technological and engineering know-how, have enabled us to optimize production processes and products.

- **Professional partnership**
  We’ve upgraded our know-how by collaborating with research institutions, universities and institutes.

- **Unique procedures**
  Based on our experience in the field of production and development and our extensive knowledge of the challenges encountered in nanotechnology, we have developed our own procedures, which include the best available technologies for ultrafine TiO$_2$ synthesis.

- **Flexibility**
  Our production is very flexible which enables us to adapt quickly to market needs.

- **Know-how**
  Our specific know-how helps us to manage the reaction mechanisms and the crucial properties of ultrafine particles.

- **Our own laboratory**
  Our laboratory and our experienced staff help us to exercise constant control and a high level of quality.
Ultrafine materials in our homes and environment

- **Roofing tiles**
  - Air and surface cleaning

- **Façade**
  - Air and surface cleaning

- **Glass**
  - Air and surface cleaning

- **Wood protection**
  - Protection from UV radiation

- **Water**
  - Water cleaning and disinfection

- **Exhaust**
  - Exhaust gas cleaning

- **Garage doors**
  - UV protection of plastics

- **Paving units**
  - Air and surface cleaning

- **Car bumper**
  - UV protection of plastics

- **Cosmetics**
  - Protection from UV radiation

- **Anatase**

- **Rutile**
Ultrafine TiO$_2$ products from Cinkarna Celje

*Cinkarna Celje* has developed a wide variety of products based on ultrafine TiO$_2$. Because of their properties, these products are suitable for different applications.

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*Suggested use ✔ Possible use ✫*
Ultrafine titanium dioxide is renowned for its diverse application possibilities due to the small size of its particles and semiconductor properties:

- UV protection
- Photocatalysis
- Decomposition of VOC
- Protection from algae and fungi
- Transparency
- Self-cleaning effect
- Decomposition of NOx
- Antimicrobial effect
- Decomposition of organic pollutants
- Elimination of odours
- Air cleaning
- Water cleaning

*The advantages of a single application vary according to the specific use*
The future

Fuel cells

Catalysts for exhaust gases

Medical prostheses
Nanocomposite implants

Textiles
Multifunctional conductive fibres

Electronics
Multilayer capacitors

_Ultrafine TiO₂_ has enormous potential for the future and represents a great advantage for people and the environment. Its scope of application extends into the fields of medicine, the textile industry, energetics, the automotive industry and electronics.