

What Is Titanium Dioxide?



Titanium dioxide is an odorless, white inert mineral that is naturally found on the earth's surface. (1) Its bright color, high refractive index, ability to filter UV rays, and opaqueness make it a great pigment extensively used in sunscreens and other skin and personal care products like powders, blushes, soaps, lotions, and toothpastes. It is also used in paints, prosthetics, plastics, ceramics, papers, and food additives.

There have been some safety concerns regarding the usage of titanium dioxide in skin care products. How safe is it for the skin? Find out below.

Is Titanium Dioxide Safe For Skin? Are There Any Side Effects?

Most commercial skin care products contain micronized titanium dioxide coated with alumina, dimethicone, silica, and trimethoxy capryl silane. Hence, it does not penetrate deep into the skin.

Several studies have proven that titanium dioxide, even as nanoparticles, does not penetrate the skin or stratum corneum (SC) (2).

A study published in the International Journal Of Environmental Research And Public Health demonstrated that titanium dioxide nanoparticles (TiO₂NPs) could not permeate intact and damaged skin (3). It has been suggested that it can exhibit a potentially toxic effect on the skin only after long-term exposure.

It is thought to have carcinogenic properties when taken orally or inhaled. However, none of the studies found any evidence of carcinogenicity of

titanium dioxide (4). Also, there is no evidence of adverse effects of titanium dioxide after topical application. However, some people can be allergic to it, and upon topical application, titanium dioxide may

- Irritate your eyes and skin
- May cause coughing, phlegm, and shortness of breath (if inhaled).

Related: [How To Soothe Irritated Skin \(Rashes\) Around The Eyes – 12](#)

Home Remedies

It is on the Right To Know Hazardous Substance List cited by (5)

- Occupational Safety and Health Administration (OSHA)
- American Conference of Governmental Industrial Hygienists (ACGIH)
- National Institute for Occupational Safety & Health (NIOSH)

Since studies are inconclusive, and there is no data on the safe level of exposure, it is important to look for the ‘Made Safe’ seal on the skin care products before buying one.

However, if you are using products with titanium dioxide without any issues, do not panic. It is an effective UV filter and can protect your [skin from sun damage](#). Here are the reasons it is widely used in products.

Uses Of Titanium Dioxide In Skin Care



1. In Sunscreens

Titanium dioxide particles can block harmful ultraviolet light rays and protect your skin from cancer, UV damage, photoaging, and oxidative stress. **It can scatter both UVA and UVB rays off your skin and is an active ingredient in mineral-based sunscreen products.** It is gentle on the skin and does not cause a stinging sensation when applied around the eyes.

Another benefit of using titanium dioxide is that it does not leave a white cast on the skin when used in lower concentrations (3).

Related: [What Is Sun Damaged Skin? How To Deal With It?](#)

2. In Makeup Products

Titanium dioxide is used in cosmetic products as a brightening, thickening, and opacifying agent (3). It is commonly found in loose and pressed powders, eyeshadows, and blushes. The brightly pigmented particles of titanium dioxide refract light rays. This property aids the cosmetics in hiding blemishes, **brightens the skin**, and gives you the desired results.

3. In Products For Sensitive Skin

Titanium dioxide is an inert earth mineral and is gentle on inflamed or redness-prone skin. Hence, it is commonly used in skin care products formulated for **sensitive skin**.

Titanium dioxide is not a new name in the skin care industry. It has been used in powder-based makeup and sunscreens. However, there have been a few safety concerns about using titanium dioxide for the skin. Though there are a few speculations about the ingredient's toxicity, there is not enough scientific evidence to prove that titanium dioxide is unsafe for your skin. However, if you are allergic to the topical application of titanium dioxide, it may cause a few reactions. Therefore, if you have been using products with titanium dioxide, you may continue using them; otherwise, do a patch test before using.

Related: [16 Must Know Beauty Tips For Sensitive Skin](#)

Frequently Asked Questions

Is titanium dioxide or zinc oxide better?

Zinc oxide is better as a sunscreen than titanium dioxide. Like zinc oxide, titanium dioxide can effectively block UV-B and short-wave UV-A rays. However, it is not as effective as zinc dioxide in blocking long UV-A rays.

Can titanium dioxide cause pimples?

No. Titanium dioxide is non-comedogenic. However, individuals with sensitive and acne-prone skin should use it with caution as it may irritate sensitive skin and trigger breakouts.

Is titanium dioxide banned in Europe?

Titanium dioxide is set to be banned in Europe as a food additive, with effect from August 2022.

Is titanium dioxide FDA-approved?

Yes, titanium dioxide is FDA-approved as an ingredient in sunscreens.

Key Takeaways

- Titanium dioxide is a white inert mineral with no odor and can naturally be found on the earth's surface.
- Particles of titanium dioxide block harmful ultraviolet rays. Therefore, it protects the skin from photoaging, oxidative stress, UV damage, and cancer.
- Cosmetic products use titanium dioxide as a brightening, thickening, and opacifying agent.

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Sources

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1. Titanium dioxide

<https://pubchem.ncbi.nlm.nih.gov/compound/Titanium-dioxide>

2. Titanium dioxide nanoparticles: a review of current toxicological data

<https://particleandfibretoxicology.biomedcentral.com/articles/10.1186/1743-8977-10-15>

3. Titanium Dioxide Nanoparticle Penetration into the Skin and Effects on HaCaT Cells

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4555280/>

4. Titanium dioxide in our everyday life; is it safe?

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3423755/>

5. Hazardous Substance Fact Sheet: New Jersey Health Department

<https://nj.gov/health/eoh/rtkweb/documents/fs/1861.pdf>

TITANIUM DIOXIDE

TYPE OF INGREDIENT: UVA and UVB filter, anti-aging

MAIN BENEFITS: Prevents sunburn and long-term sun damage

WHO SHOULD USE IT: Anyone who wants to protect themselves from any kind of UV (ultraviolet) damage.

HOW OFTEN CAN YOU USE IT: Sunscreens that contain titanium dioxide are suitable for daily use as creams, lotions, and moisturizers.

WORKS WELL WITH: Zinc oxide

DON'T USE WITH: Generally, titanium dioxide works well with other ingredients, though you can always ask your dermatologist if you aren't sure how it will interact with other products in your routine.

Benefits of Titanium Dioxide for Skin

Any type of SPF has major potential to benefit your skin, both in the short term and over time. Titanium dioxide, in particular, has a few extra perks that may make it an ideal choice over other UV filters, depending on your priorities.

Non-irritating: Some cosmetics and sunscreens that contain titanium dioxide are formulated with sensitive skin in mind, so they have the potential to soothe skin and address any concerns you have at the same time. “Titanium dioxide is a non-irritating mineral as well as a safe natural alternative to synthetically derived sunscreens, which can cause inflammation,” Dr. Riyaz says.

Non-comedogenic: If you have acne-prone skin, using non-comedogenic products may help reduce the occurrence of breakouts, thanks to ingredients that don't block pores. Most brands will specify whether a product is non-comedogenic on the packaging, so it's definitely worth looking out for this. “Titanium dioxide is a water-loving, non-comedogenic ingredient that washes off easily, making it suitable for those who are concerned about clogged pores, breakouts, and skin sensitivity,” Dr. Riyaz explains.

Protects against harmful UV rays: “Titanium dioxide is perfect for anyone who wants to prevent UV damage,” Dr. Riyaz says, adding that titanium dioxide is used as a physical broad-spectrum UVA and UVB blocker.

Prevents premature aging: Ultraviolet radiation causes changes in DNA that can lead to premature aging and in some cases, skin cancer, so wearing a sunscreen that contains titanium dioxide and has an SPF of at least 30 is a great way to protect your skin's health.

Riyaz agrees on titanium dioxide's ability to potentially promote a more youthful and clearer appearance.² “It would be great to see titanium dioxide in every sunscreen, as it can help to keep lines and wrinkles at bay as well as prevent a loss of elasticity and dark spots,” he says.

Invisible after application: For anyone looking for a sunscreen that won't leave a white cast, it may be worth investing in one that contains titanium dioxide. Be aware that results may vary due to product formulations. Also, keep in mind that most sunscreens don't go on clear, so you'll still need to rub it in to ensure maximum protection.

Side Effects of Titanium Dioxide

Generally, titanium dioxide has no side effects when used topically.³ “It is not absorbed through the skin and is unlikely to cause allergic reactions