

Technical Data Sheet

ZinClear® XP (uncoated zinc oxide powder)

Chemical Composition

INCI Name	CAS No.
Zinc Oxide	1314-13-2

Features and Benefits

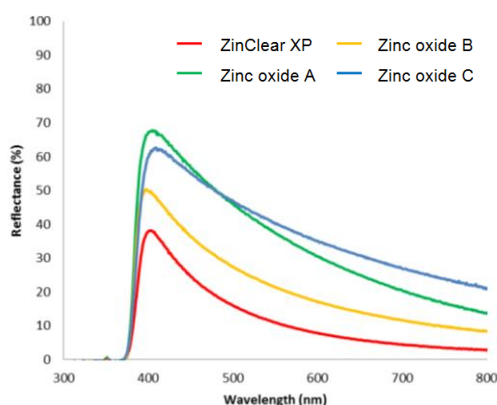
- Transparent / Non-whitening
- Exceeds critical wavelength requirements
- Broad Spectrum UVA/UVB protection
- Suitable for all skin types
- NPA Certified
- COSMOS certified

Typical Applications

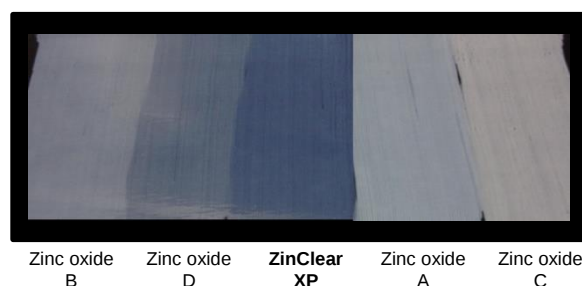
- Mass market suncare in combination with other UV absorbers
- Low irritant or sensitive skin sunscreens
- Everyday moisturisers providing SPF
- 'All natural' and 'mineral only' sunscreens
- Baby and children's suncare products
- Nappy rash creams and balms
- Colour cosmetics
- Lip balms

Physical Characteristics

ZinClear XP is supplied in the form of an uncoated off-white powder. When put in formulation, the product remains highly transparent, even at high loadings. A comparison of ZinClear XP transparency to competitor zinc oxide products is shown in the chart below.



The market leading transparency of ZinClear XP is demonstrated below in dispersion draw-down charts against competitor materials.

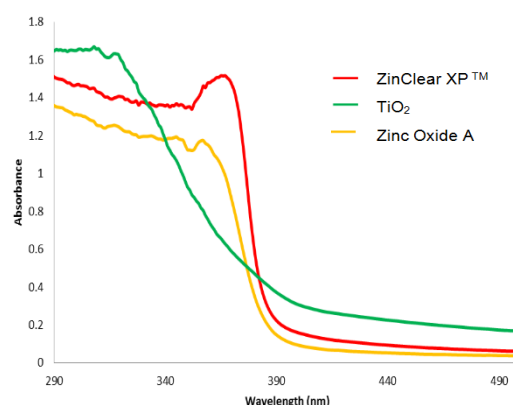


Broad Spectrum Protection

Zinc oxide's absorbance profile intrinsically spans both UVA and UVB. ZinClear XP has been specifically designed to enhance the UVA protection performance of the zinc oxide. This enables ZinClear XP to be used on its own or in combination with other filters to:

- Meet the **UVAPF>1/3 SPF** requirement
- Exceed the **370nm** critical wavelength

An absorbance spectrum with ZinClear XP, TiO₂ and conventional zinc oxide is shown below.



Typical Performance / Required Loadings

ZinClear XP can be formulated at high loadings to achieve high SPF without compromising the clarity of the end product.

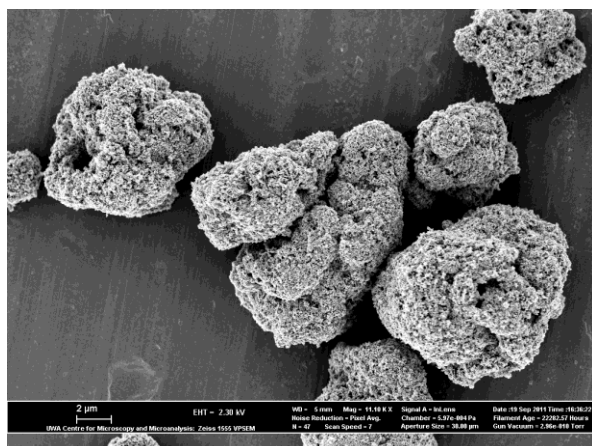
Formulators aiming for mineral only sunscreens are using between 15 – 25% loadings of ZinClear XP to give SPF 50+ (depending on the formulation and mixing equipment).

Antaria recommends that formulators should use *in vivo* SPF testing when possible during product development to ensure reliability of results.

Particle Morphology

The zinc oxide particles in ZinClear XP consist of primary particles, which form aggregates up to a few tens of micrometres in size.

The zinc oxide particles in ZinClear XP have a unique porous structure as shown in the SEM image below. This image illustrates that the zinc oxide is present in the form of porous particles having sizes mostly in the micrometer range.



Natural Certification

ZinClear XP is currently certified as compliant with the Natural Product Association (USA), HALAL, & COSMOS (EU). Certificates available on request.

Regulatory Status

For use as a UV filter, zinc oxide is approved within the limits prescribed in the following table.

Region	Approval Limit
USA	25%
Canada	25%
EU union	25%
Japan	No Limit
Korea	25%
Australia / NZ	No Limit
ASEAN	25%
China	25%
South Africa	25%

Handling

Good ventilation is advised when handling the powder. Store in a tight container after opening.

Consult the SDS for additional handling or safety information.

Use

It is recommended that a high shear or high-speed mixer be used to disperse ZinClear XP. Preferably the powder is dispersed in the oil phase using a dispersant level of 6-10wt% zinc oxide. Adjust the temperature as required to melt waxes and other solids.

Dispersions of up to 60 wt% zinc oxide powder in the oil phase may be achieved. Continue mixing until a free-flowing liquid free of agglomerates is achieved; lower viscosities are obtained with lower ZnO content.

Packaging

Pack Type	Unit Size	Full Pallet
Box	12.5kg	450kg
Bag	48kg, 120kg	480kg
Bulk Bag	400kg, 500kg	800kg, 1000kg

Shelf Life

ZinClear XP has a shelf-life stability of 5 years when stored under standard conditions (above 5°C and below 30°C).

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ZinClear XP: Technical Specification

Appearance	Off-white to light yellow
Form	Free flowing powder (Visual)
Odour	Odourless (Olfactory)
ZnO Assay	98.0 – 102.0 % (Ion chromatography)
Loss on Ignition	< 1.0 % (1 hr at 500°C)
Surface Area	15.0 – 44.0 m ² /g (BET)

Nano-Specific Characterization (per IUCLID 1.4)

Primary Particle Size Range (by TEM)	~200 - 700 nm
Crystal Form	Wurtzite (Zincite)
Surface Coating	None (Uncoated)
Particle Morphology	Porous; Botryoidal Aggregates
Dv50 (Volume-weighted median)	~7.5 - 8.5 μm
Dn50 (Number-weighted median)	~8.5 μm

ZinClear XP meets USP/EP latest version