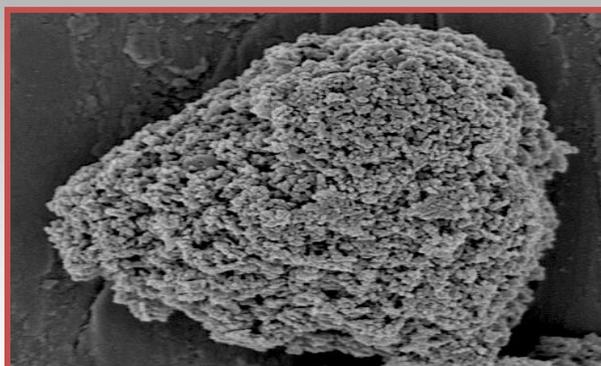


While protection against sunburn due to UVB exposure has long been characterized by the SPF value of a sunscreen, protection from UVA radiation, which is known to cause premature aging and linked to skin cancers, is now also required. The US FDA has recognized the importance of effective protection against both UVA and UVB radiation by adopting the critical wavelength parameter as a measure of broad-spectrum protection.

New labeling requirements are being implemented whereby broad spectrum, UVA-UVB protection, can be claimed only if the critical wavelength parameter exceeds 370 nm. In Australia, the broad-spectrum requirement is not just required to make a broad-spectrum label claim, but is required for products with SPF 30+ or higher to be sold.

Zinc Oxide is an excellent UVA-UVB sunscreen. Besides zinc oxide, the only other mineral UV absorber allowed for use as a sunscreen is titanium dioxide. Titanium dioxide provides only limited UVA protection, due to its higher band gap energy which limits absorption to UVB radiation. As a consequence, titanium dioxide formulations do not meet broad-spectrum requirements without the use of additional UVA actives.

Historically, the use of zinc oxide in cosmetics and skin care products had been limited due the whitening effect imparted by the reflectance of its particles. Transparent formulations containing ~8% zinc oxide nanoparticles (<100 nm) were successfully developed, dramatically improving product aesthetics. However, concerns over the presence of nanoparticles in skincare products have driven the development of a new particle technology that enables transparent formulations using much higher particle sized materials.



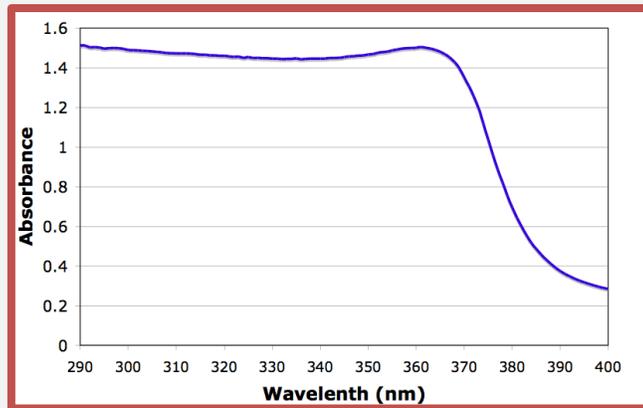
Introducing ARGASUN ZnO, a highly transparent, cosmetically pleasing zinc oxide powder.

ARGASUN ZnO is USP/BP grade zinc oxide. This material imparts minimal whitening due to its unique porous structure and large particle size. When the pores absorb the excipient (oil, silicone, etc. ), the refractive index of the particles is reduced to a value close to that of the excipient, causing a significant increase in transparency.

Description	Fine powder composed of porous Zinc Oxide
Composition	Zinc Oxide (97% Min. USP)
INCI Name:	Zinc Oxide
CAS Number:	1314-13-2
EINECS Number:	215-222-5
Typical Use Levels	2-25%

## EFFICACY

The figure below shows the results of independent *in vitro* testing of a dimethicone formulation containing 20% ARGASUN ZnO CLR-P measured following ISO procedures<sup>1</sup>.



The nearly constant absorbance curve from 290 to 370 nm is characteristic of the broad-spectrum absorbance of ARGASUN ZnO CLR-P

SPF in vitro	31
$\lambda_c$ (nm)	375
SPF/UVAPF	1.7
UVA/UVB	0.79

<sup>1</sup> ISO/DIS 24443, Determination of sunscreen UVA photoprotection in vitro, Draft International Standard, (2010).

## PHYSICAL PROPERTIES

	<b>ARGA-SUN ZnO CLR-P</b>	<b>ARGA-SUN ZnO 700 SiP6</b>	<b>ARGA-SUN ZnO CLR-P-TE</b>
INCI Name	Zinc Oxide	Zinc Oxide (and) Silica	Zinc Oxide (and) Triethoxycaprylylsilane
% ZnO	99 min.	96.5~102.5	>94
Appearance	Free Flowing White to Off-White Powder	Free Flowing White to Off-White Powder	Free Flowing White to Off-White Powder
Particle Size:	<10 microns	<10 microns	<10 microns
Loss on Ignition	1.0% Max.		
Lead (Pb)	10 ppm Max.	10 ppm Max.	10 ppm Max.
Asenic (As)	5 ppm Max.	5 ppm Max.	5 ppm Max.
Iron (Fe)	50 ppm Max.		
pH:	9.0± 0.5		50.0 max

## FORMULATION GUIDELINES

In general, formulations containing 20-25% ARGA-SUN ZnO remain visibly transparent on the skin while providing SPF values exceeding 50 and easily meeting the new requirements for broad spectrum classification.

Numerous products containing 18-20% ZnO are now on the market, particularly in Australia, with in vivo SPF values of 30+. These products, which use only zinc oxide as the UV active, demonstrate the efficacy of zinc oxide as an effective UVB absorber. SPF of 50+ can be achieved with higher concentrations of zinc oxide or with zinc oxide/titanium dioxide mixtures.

### SPF 30 SUN CREAM (W/O ARGASUN Blockers)

	TRADE NAME	INCI NAME	%	SUPPLIER	FUNCTION
A	<b>EWOCREAM</b>	Polyglyceryl-3sorbitan Linum usitatissimum (linseed) oil	3.30	<b>Sinerga/ARGAN Co.</b>	W/O Emulsifier
A	<b>ARMESIL 16C</b>	Isohexedecane	3.00	<b>ARGAN Co.</b>	Nourishing
A		Dicaprylyl ether	3.00	Cognis	Emollient
A		Simmondsia chinensis oil	2.00	Floritech	Emollient
A	<b>WAX OLEA</b>	Olea europea extract	1.30	<b>Sinerga/ARGAN Co.</b>	Emollient
B	<b>ARGA-SUN ZnO CLR-P-TE</b>	Zinc Oxide, Triethoxycaprylylsilane	12.00	<b>ARGAN Co.</b>	Sunscreen filter
B	<b>ARGA-SUN TT 500 1/1</b>	Titanium dioxide, C12-15 Alkyl Benzoate, Dipropylene Glycol Dibenzoate, PPG-15 Stearyl Ether Benzoate, Polyhydroxystearic Acid Triethoxycaprylylsilane	10.00	<b>ARGAN Co.</b>	Sunscreen filter
C	<b>Argan Refined Shea Butter</b>	Butyrospermum Parkii	1.00	<b>ARGAN Co.</b>	Emollient
C		Bentone Gel	1.40	Elementis	Suspending agent
D	Water	Aqua	q.s.100		
D		Magnesium Sulfate	0.50	Orient stars	Bulking agent
D		Glycerin	0.60	Cognis	Humectant
D	<b>ARGAN-O-CIDE</b>	Caprylyl Glycol, Phenoxyethanol, Isopentydiol	1.00	<b>ARGAN Co.</b>	Preservatives
E		Fragrance	0.40		Fragrance
			<u>100.00</u>		

#### Method:

Weight phase A and heat up to 70°C; disperse C under stirring

Then disperse B under stirring

Weight phase D to BC slowly under quick mixing; then stirring for few minutes

Cool down to 30°C and add E, mix until homogenous aspect

The information provided is to our best present knowledge correct and complete and is given in good faith but without warranty. It remains the user's own responsibility to make sure that the information is appropriate and complete for his special use of this product.

February 19, 2019 rev

# ARGAN Co.