

# IR Blockers

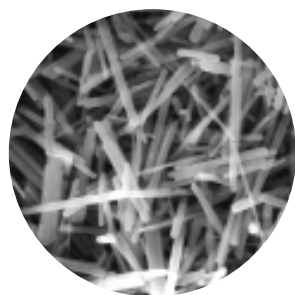
## Improved Sun Protection Beyond UV

Using a broad spectrum sunscreen to protect against both UV-A and UV-B radiation of the sun is now widely accepted as a way to protect skin against the harmful effects of the sun, skin cancers and pre-mature aging.

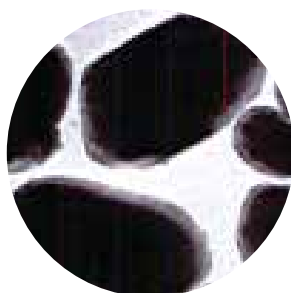
However, more than half of the solar energy that the skin receives is infrared radiations. Contrary to UV, these radiations, in particular the IR-A in Near Infrared region, have the capacity to penetrate deep into the skin, as deep as the hypodermis. Recent studies have shown they are capable of generating free-radicals, diminishing the ability of the skin to fight oxidative-stress as well as creating biological damage such as the destruction of collagen fibers.

Kobo Products has performed extensive studies, testing a large number of ingredients for their capacity to block IR radiations, and has selected two grades of large size (in the micron range) Titanium Dioxide: TiO<sub>2</sub>-IR300 and A1K-TiO<sub>2</sub>. These two pigments have been tested in vitro (transmittance in the IR range) and in vivo (reduction of the IR-induced heat increase on the skin surface). They are now available surface-treated with three hydrophobic / lipophilic treatments for ease of formulation.

*Patent Pending US# 62/521,043  
Cosmetic Composition using  
Titanium Dioxide Particles for IR Protection*



TiO<sub>2</sub>-IR300



A1K-TiO<sub>2</sub>

Product Name	INCI Name	Natural	Shape & Size (µm)
TiO <sub>2</sub> -IR300-11S2	Titanium Dioxide (And) Triethoxycaprylylsilane		
TiO <sub>2</sub> -IR300-ASG3	Titanium Dioxide (And) Stearoyl Glutamic Acid		Acicular (5µm)
TiO <sub>2</sub> -IR300-I2	Titanium Dioxide (And) Isopropyl Titanium Triisostearate		
A1K-TiO <sub>2</sub> -11S2	Titanium Dioxide (And) Aluminum Hydroxide (And) Triethoxycaprylylsilane		
A1K-TiO <sub>2</sub> -ASG3	Titanium Dioxide (And) Aluminum Hydroxide (And) Stearoyl Glutamic Acid		Granular (1µm)
A1K-TiO <sub>2</sub> -I2	Titanium Dioxide (And) Aluminum Hydroxide (And) Isopropyl Titanium Triisostearate		

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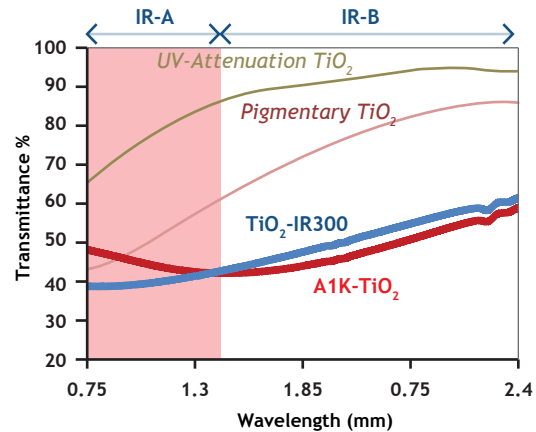
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# IR Blockers

## Transmittance in Infrared

Transmittance in the near infrared (IR-A and IR-B) was measured for the two IR Blockers and compared to a UV-attenuation grade Titanium Dioxide and a Pigmentary grade Titanium Dioxide. Pigments were dispersed in Dimethicone and drawn down on a quartz plate.

The curves on the right show that the two IR Blockers have a lower transmittance, blocking more IR radiations in most of the spectrum than UV-attenuation or Pigmentary  $\text{TiO}_2$ .



Instrument: PE Spectrum NIR Frontier

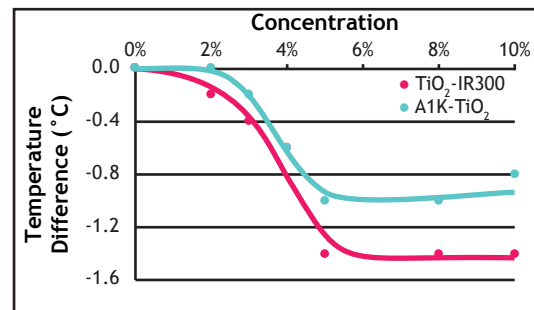
Sample preparation:

1. Samples were dispersed in Dimethicone
2. Draw film on fused quartz plate with a 0.5 mil wire rod

## In vivo Thermoprotection of the Skin

The two IR Blockers were evaluated in an in vivo test: they were formulated in a lotion, then applied on the skin of 5 people of different skin types (ranging from type I to type III). A lotion with no pigment was also tested as control.

Temperature of the skin surface was measured, then the skin was irradiated with an IR lamp and skin temperature was measured again. The difference in skin temperature was then calculated and used as a measure of the capacity of the pigments to block IR radiation at the skin's surface. Both lotions that had IR blockers were found to limit the temperature increase, compared to the control.



Application: 2 mg/cm<sup>2</sup> of each lotion

Irradiation: Infrared Lamp (125 W) - Site is 11 inches from lamp. Irradiated for 5 min.

Measure skin temperature

The graph above shows the temperature differences between the skin surface protected with lotions containing IR blockers at different concentrations vs. a control lotion.

## Opacity on the Skin

A UV-attenuation grade Titanium Dioxide (4), a pigmentary grade Titanium Dioxide (2) and the 2 IR Blockers,  $\text{TiO}_2$ -IR300 (3) and A1K- $\text{TiO}_2$  (1) were dispersed in an O/W emulsion at 5%, then applied on the skin.

The IR blockers do not cause noticeable whitening, similar to that of the UV attenuation grade  $\text{TiO}_2$ , while the pigmentary grade  $\text{TiO}_2$  is more whitening. This shows that IR blockers can easily be added to a formula for additional sun protection without affecting formula aesthetics.



Skin whitening of IR blockers in formulation, compared to other titanium dioxides. At 5% in an emulsion, both IR blockers (1 and 3) are less whitening than Pigmentary  $\text{TiO}_2$  (2) and similar to UV-attenuation grade  $\text{TiO}_2$  (4).

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