



## DUB SSIC : a new multifunctional ester for foundation and color control formulation

### *Introduction*

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Foundations are used to enhance the color and the appearance of the skin. To do so they contain a relatively high amount of colored pigments that contribute to create a continuous even skin tone and of white pigments to improve skin coverage and hide imperfection. Choosing a good pigment wetting and dispersing agent is thus a key point of the formulation process. To help the formulators meet this challenge, Stéarinerie Dubois evaluated the pigment wetting ability of its cosmetic esters.

### *Pigment wetting process*

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The manufacturing of color cosmetic products generally starts with the preparation of a premix dispersion of pigments in an appropriate vehicle. This vehicle is chosen for its ability to wet and disperse the pigments. The flow properties of the corresponding pigment dispersion are also considered as improved flow makes easier the incorporation of the grind into the final formulation. The preparation of the premix is accomplished in two steps :

1.WETTING	2. DISPERSION
Wetting corresponds to the replacement of the air entrapped on the surface of pigment particles and agglomerates by the dispersant so that the solids are entirely surrounded by the liquid.	<p>In order to reduce the size of solid particles and agglomerates, a mechanical stress is applied using a three-roller mill or a high speed mixer.</p> <p>Dispersion is facilitated if effective wetting occurred during the first step.</p>

### *Material & Methods*

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- *Pigments and esters used*

In this study, we considered 5 inorganic pigments widely used for the formulation of foundations: red iron oxide, yellow iron oxide, titanium dioxide, black iron oxide and ultramarine blue.

Pigment dispersions were prepared using 25 DUB esters. The performances of our esters have been compared to those of castor oil, the most common standard dispersant.

- ***Determination of the maximum pigment load (MPL)***

To compare the wetting ability of the dispersants, we measured the maximum quantity of pigment than can be incorporated into each vehicle. To do so, 50 grams of dispersant were weighted in a beaker. The pigment was then poured gradually in the liquid dispersant and mixed with a spatula. The incorporation has been stopped when the paste become too viscous to flow off from the spatula with clear cut. The MPL has been calculated as follow:

$$MPL (\%) = \frac{\text{pigment weight (grams)}}{\text{pigment weight + dispersant weight (grams)}} \times 100$$

The higher the MPL the better the wetting properties of the dispersant.

- ***Preparation and characterization of pigment dispersions at fixed pigment load***

- ***Preparation of the dispersions***

To compare the properties of pigment dispersions we then worked with dispersions containing the same quantity of a given pigment. A three-roller mill have been used to grind the dispersion (2 passages). Hegman gauge readings were made to ensure the pigment agglomerates have been sufficiently broken.

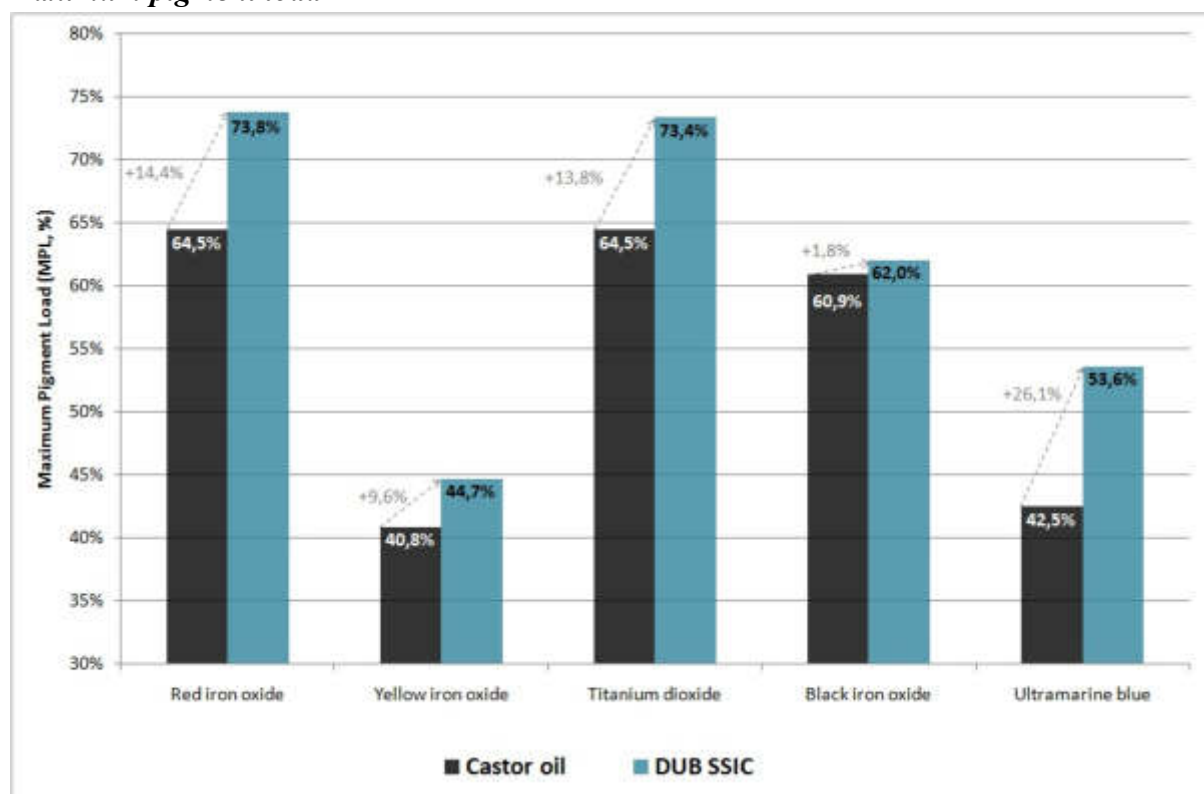
- ***Characterization***

The dispersions obtained have been characterized using visual observation and instrumental methods:

<i>Stability</i>	<i>Viscosity</i>
Stability was assessed by visual observation after 7 days at room temperature. Particular attention was paid to pigment sedimentation and ester release.	The viscosity was measured at 25°C, using a rheometer (AR 2000 Advanced Rheometer, TA instruments).

Our screening study highlighted the performance of DUB SSIC (Isocetyl stearyl stearate) as pigment dispersant. Indeed, this ester offers better wetting properties than the reference castor oil for all pigments considered (see figure 1). DUB SSIC is a high performance universal dispersant which is a very interesting property for the formulation of color cosmetic products containing numerous inorganic pigments like foundations.

### Maximum pigment load

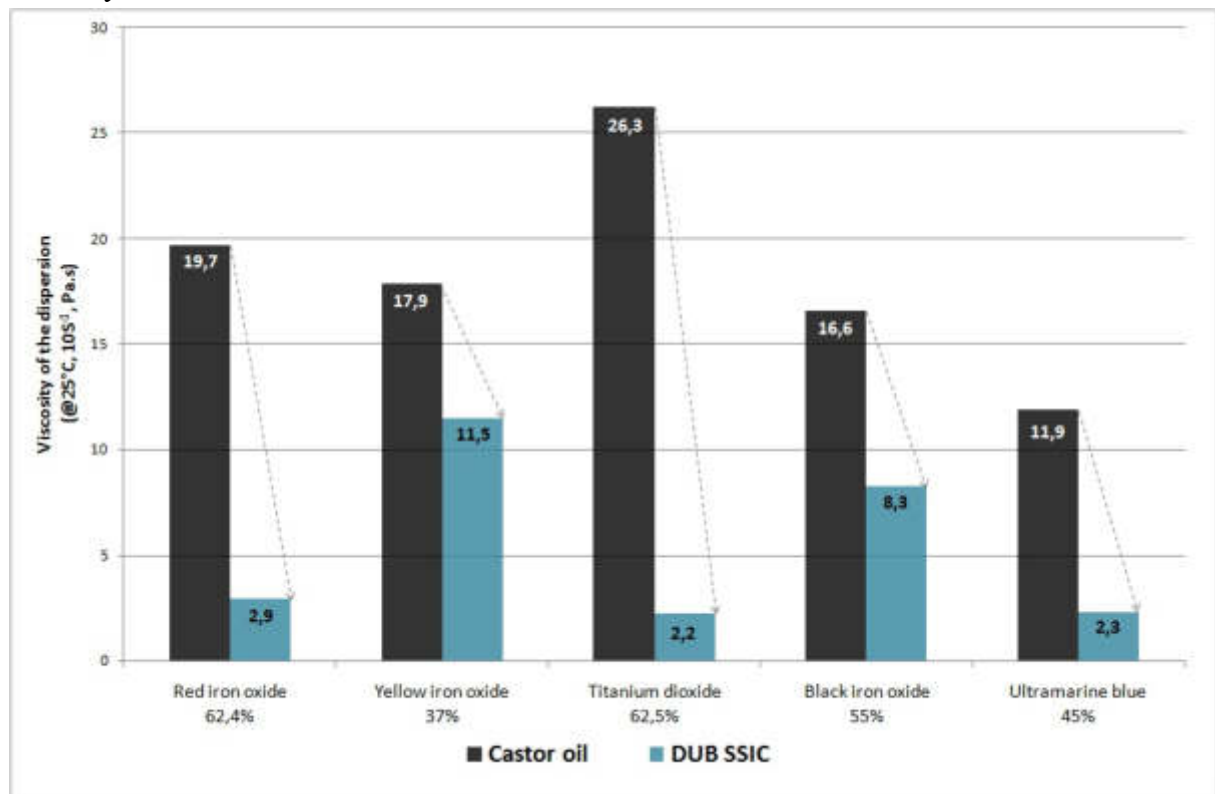


**Figure 1** : Maximum pigment load of DUB SSIC and Castor oil

Viscosity is another way to assess the wetting ability of a vehicle: the lower the viscosity of the suspension, the better the dispersing properties. The results presented on figure 2 confirm that DUB SSIC is a better pigment wetting agent than castor oil.

These results also show that DUB SSIC allow the preparation of dispersions with much lower viscosities compared to castor oil. The improved flow properties of DUB SSIC dispersions will facilitate the manufacturing incorporation of the pigment premix dispersion into cosmetic formulations.

## Viscosity



**Figure 2 :** Viscosity of the dispersions prepared with fixed pigment load

## Application to foundation formulation

Modern foundation formulations provide additional skin care benefits such as anti-ageing, moisturization, pleasant skin feel, long-wearing effect or sun protection. To meet this new trend, DUB SSIC offers multifunctional solutions.

The cushiony effect of DUB SSIC imparts pleasant feel during application and long-lasting coverage. Its very good lubricity and slippery improves the playtime and helps to achieve perfectly uniform application of the product. The high pigment load achieved thanks to the superior dispersing properties of DUB SSIC creates a pleasurable “powdery” texture and maximizes pigment coverage on the skin.

DUB SSIC is of vegetable origin and can be used to formulate organic cosmetic products.

### CC CREAM (Formula n°80133)

TRADE NAME	Supplier	INCI (US) NAME	%	Benefits
DUB BASE EXPERT+	STÉARINERIE DUBOIS FILS	GLYCERYL STEARATE CITRATE (AND) SUCROSE STEARATE (AND) POLYGLYCERYL-4 COCOATE (AND) CETYL ALCOHOL (AND) SODIUM RICINOLEATE	8,00	<b>! NEW PRODUCT !</b>  DUB BASE EXPERT+ is a vegetable origin self- emulsifiable base. It produces ultra-light, silky and smooth emulsions.
DUB SSIC		ISOCETYL STEAROYL STEARATE	11,00	DUB SSIC is a superior pigment dispersant. It also provides cushiony, slippery and long-lasting skin feel.
DUB ININ		ISONONYL ISONONANOATE	11,00	Along with anti-ageing benefits, DUB ININ imparts light and silky skin feel and enhances the spreadability of the formula.
GLYCERINE		GLYCERIN	5,00	DUB DIOL+ DUB MUG = Synergetic association for formula preservation.  DUB DIOL also provides skin hydration.
DUB MUG		GLYCERYL UNDECYLENATE	0,50	
DUB DIOL		METHYLPROPANEDIOL	5,00	
MIRASIL CM5	LCW	CYCLOPENTASILOXANE	1,00	
EAU	-	WATER	48,86	
UNIPURE RED LC381 HLC	LCW	IRON OXIDES (CI 77491)	0,06	
UNIPURE YELLOW LC182 HLC		IRON OXIDES (CI 77492)	0,06	
UNIPURE WHITE LC981 HLC		TITANIUM DIOXYDE (CI 77891)	14,00	
UNIPURE BLACK LC989 HLC		IRON OXIDES (CI 77499)	0,05	
RONAFLAIR M SPHERE	MERCK	MICA (AND) SILICA	0,08	
KELCO CG	KELCO	XANTHAN GUM	0,50	
TALC DE LUZENAC	ARGILETS	TALC	3,00	

### PROCEDURE

Mix at 80°C water and DUB BASE EXPERT+ until gelifying phase.  
Then add DUB SSIC, DUB MUG, MIRASIL CM5 and DUB ININ heating at 80°C.  
Introduce KELCO CG premixed with DUB DIOL and GLYCERIN.  
Between 30°C add color pigments and Talc.  
Then mix with rotor stator during 2 minutes to make a nice emulsion.

### Conclusion

This study revealed the high potential of DUB SSIC for pigment wetting and dispersion and its superiority compared to the market reference castor oil. DUB SSIC is a multifunctional ester answering the demand for additional benefits in color cosmetic products. DUB SSIC is also ideal for skin care formulation (facial and body moisturizing emulsions, night and anti-ageing creams). It helps preparing fluid emulsions with a long-lasting rich and lubricious feel.