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CELLULOSCRUB™

The ultimate PE alternative for cosmetics

100% Renewable and Biodegradable Scrub to replace polyethylene beads

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Introduction

Celluloscrub™ is an exfoliating ingredient manufactured from modified cellulose which is extracted from wood pulp. It is 100% renewable and biodegradable material that is safely used cosmetic projects.

Celluloscrub™ is designed to give an ultimate answer to the demand of natural scrubs to replace the Polyethylene beads. PE beads are widely used by the cosmetic and personal care industry for exfoliation purposes and is very popular because of its low cost and good characteristics. But due to environmental campaigns and due to some new regulation (New York and California banishment) (*) there are no doubts that PE beads have to be replaced by biodegradable ingredients to stop ocean pollution. (**)

Celluloscrub™ has the same high performances as the PE beads and is **worldwide approved** (including China).

- White colour
- Colour is stable even in surfactant gel
- Same Abrasiveness as PE
- Abrasiveness is stabile even in surfactant gel
- Very good suspension capacity due to its low density
- Available in large amount

(*) Banishment already registered.
- State of California: Feb. 13, 2014 - An act to add Chapter 5.9 (commencing with Section 42360) to Part 3 of Division 30 of the Public Resources Code, relating to waste management.
- State of New York: Feb. 11, 2014 – 8744 I N A S S E M B L Y

(**)The plastic particles flow down the shower drain to water treatment plants via the sewer. As they are so small, they pass through the treatment plants and end up in the sea.

Celluloscrub™ description

Celluloscrub™ is presented as a white and calibrated powder.

Celluloscrub™ is available in 3 grades

- Celluloscrub™ 1000
- Celluloscrub™ 500
- Celluloscrub™ 300

Celluloscrub™ can be used in any kind of personal care products for exfoliation purposes at the rate of 3 to 10%. It is compatible and stable in water based products, emulsion, oily gel, bar soaps, hand soaps.

Celluloscrub™ is worldwide approved including China.

Celluloscrub™ a renewable ingredients

Celluloscrub™ can be considered as one of the best renewable ingredients as it is manufactured from the pulp of the tree (cellulose). It has therefore a very low foot imprint and a low CO_2 impact on our environment.

Celluloscrub™ has no impact on the agricultural surfaces dedicated to food, the main purpose of the agriculture to nourish the human population. Other natural ingredients are directly derivate from food (rice,…) or from processed food. For instance some materials are manufactured by biosynthesis from corn starch (Ex. polylactic acid) which may impact the availability of food for the human population.

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Celluloscrub™ Stability

Stability studies with Celluloscrub™ have been made to verify if Celluloscrub interferes with the stability of cosmetic products. The cosmetic formulations that have been tested are aqueous gel, shower gels, emulsions and oily gels.

Three samples of each formulation are prepared and placed in 3 different conditions : ageing oven, away from light and under the light.

The criteria of evaluation are: abrasiveness, odour, colour, density, viscosity, microbiology and pH.

The results as below concern the aqueous gel:

	Time	Abrasiveness	Odour	Product colour	Scrubs particles colour	Volumic mass	Viscosity (mPa.s) Br7 - 20 trs/min	Total aerobic plate count	pH
Samples	**J0**		none	transparent with wite particles	white	1 050 g/l	44 000	<10 CFU/g	5,4
Sample A	**1 month**	unchanged	none	unchanged	unchanged	1 050 g/l	36 000	<10 CFU/g	5,1
	2 months	unchanged	none	unchanged	unchanged	1 050 g/l	37 000	<10 CFU/g	5,2
	3 months	unchanged	none	unchanged	unchanged	1 050 g/l	35 000	<10 CFU/g	5,1
Sample B	**1 month**	unchanged	none	unchanged	unchanged	1 050 g/l	38 000	<10 CFU/g	5,1
	2 months	unchanged	none	unchanged	unchanged	1 050 g/l	39 000	<10 CFU/g	5,1
	3 months	unchanged	none	unchanged	unchanged	1 050 g/l	36 000	<10 CFU/g	5,0
Sample C	**1 month**	unchanged	none	unchanged	unchanged	1 050 g/l	37 000	<10 CFU/g	5,1
	2 months	unchanged	none	unchanged	unchanged	1 050 g/l	35 000	<10 CFU/g	5,1
	3 months	unchanged	none	unchanged	unchanged	1 050 g/l	38 000	<10 CFU/g	5,2

The results of this study show that Celluloscrub™ is very stable in aqueous based cosmetic products and does not interfere with its stability.

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Celluloscrub™ Biodegradability

The polymer used to make Celluloscrub[tm] is recognized as biodegradable within the scientific community. Its degradation by microorganism has been extensively studied. The key findings are that biodegradation requires two steps to achieve polymer decomposition. The first step consists in removing the acetyl group by microbial enzymes available in bacteria. During the second step the cellulose is broken down by other enzymes that are widely sprayed in natural environments to degrade organic matter. Biodegradation of Celluloscrub[tm] is very easy in a wide variety of environments including soils, composts, and waste water treatment facilities.

Biodegradability in Europe : Regulation EN 13432

The European norm EN 13432 defines the characteristics a material must own in order to be claimed as compostable. This norm provides presumption of conformity with the European Directive 94/62 EC on packaging and packaging waste. According to the EN 13432, the characteristics a compostable material must show are biodegradable (90% must be reached in less than 6 months) and also shouln't cause negative effects on the composting process (environment impact).

The polymer used to make Celluloscrub[tm] meets the requirements of the EN 13432 standards.

Biodegradation in waste water treatment :

The biodegradation of the polymer used to make Celluloscrub in waste water treatment facilities has been measured by standard method: the ASTM D5210-92 and the ISO11734. These methods evaluate the anaerobic biodegradability of organic compounds in municipal sewage sludge. The determination of anaerobic degradability is based on the liberation of biogas using diluted digested sludge as the inoculums. The study demonstrated that after 3 weeks 60–70% of the initial polymer is degraded.

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Celluloscrub™ Safety

Skin tolerance: the polymer used to make Celluloscrub™ polymer is widely used in textile since many years ago to manufacture clothes. These textiles are well know to be hypoallergenic.

Acute toxicity: there were no target organ effects noted following ingestion in animal studies. In case of ingestion, LD50/oral/rat > 5000 mg/kg.

GRAS status: the polymer used to make Celluloscrub™ is mentioned in the GRAS (Generally Recognised As Safe) list of the FDA as permitted component of food packaging materials. FDA conclusion: "*No evidence that demonstrates, or suggests reasonable grounds to suspect a hazard to the public*".

The polymer used to make Celluloscrub™ is conform to Regulation (EC) N^{0}1223/2009 of the European Parliament for cosmetic products and is not listed in any appendix.

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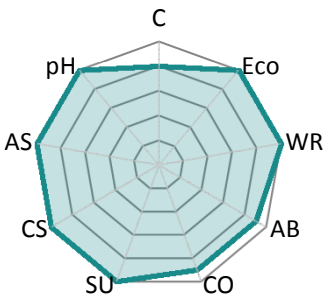
Celluloscrub™ Comparison with PE

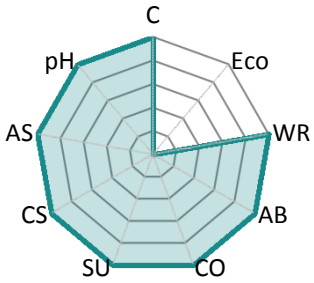
To replace the synthetic polyethylene (PE) beads with natural scrubs the cosmetic formulators have to evaluate several characteristics : colour, stability, abrasiveness, density and suspension capacity, regulation, availability and price.

The charts hereafter show that Celluloscrub™ and Polyethylene have very similar high performance characteristics.

Celluloscrub™



Polyethylene

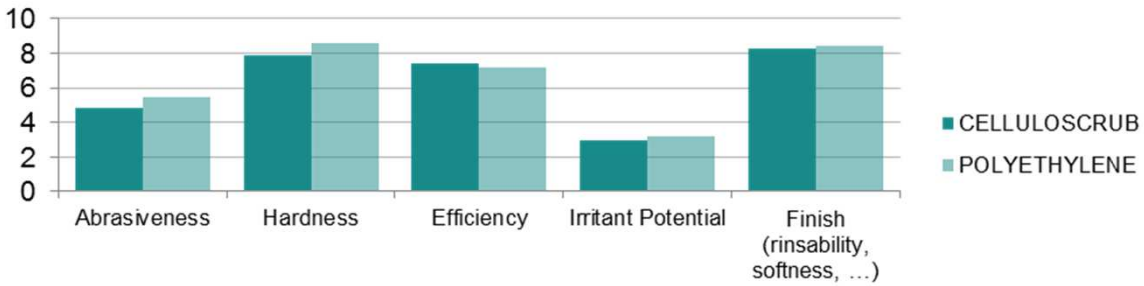


C : Cost effective / ECO : Ecofriendly / WR : World wide Regulation / AB : Abrasiveness / CO : Colour / SU : Suspension capacity / CS : Colour stability / AS : Abrasivity stability / pH : pH stability

Sensory test

Due to its high performances, Celluloscrub™ can easily replace Polyethylene as the products manufactured with have almost the same sensory characteristics.

The following test had been made with 12 consumers using an exfoliating cream made with PE beads or Celluloscrub™. The consumers found that differences between the two creams were very narrow.



Celluloscrub™ the ultimate ingredient to replace Polyethylene beads

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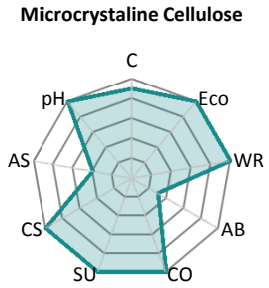
Celluloscrub™ Comparison with other natural scrubs

To replace the synthetic polyethylene (PE) beads with natural scrubs the cosmetic formulators have a wide pallet of scrubbing candidates, but Celluloscrub™ is the only one which is able to replace PE easily as it has very similar performances.

To compare scrubs together it's necessary to evaluate several characteristics : colour, stability, abrasiveness, density, suspension capacity, cosmetic regulation, availability and price.

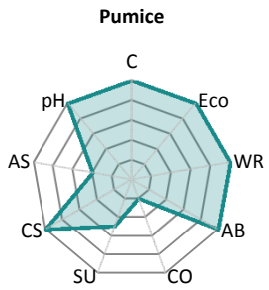
Microcrystalline Cellulose

This scrub has good sustainable properties but cannot be used successfully to replace PE due to its poor stability in water and leak of abrasiveness (spherical)



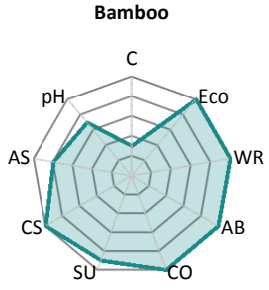
Stones (pumice, sand, other minerals)

These scrubs have good sustainable properties and can have good prices, but due to their too strong abrasiveness and their high density (difficult to keep in suspension), they cannot replace PE beads.



Bamboo silica

Bamboo silica is used with success to make natural scrubs thanks to its white colour. Its availability and price are a handicap to replace widely the PE beads.



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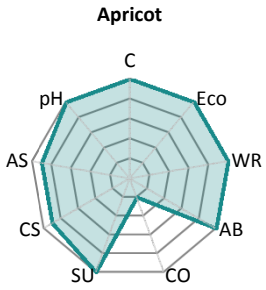
Celluloscrub™ the ultimate ingredient to replace Polyethylene beads

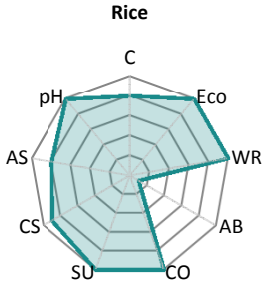
Shell fruits (Apricot, Almond, Walnut, Sherry, Olive,….)

Shell fruits are widely used as scrubs for cosmetic projects as they give a very natural image to the cosmetic products. Most of the time they are cost-effective. All these products have a dark colour (brown) so that they cannot replace PE beads without changing dramatically the cosmetic product colour.



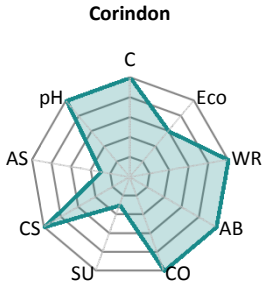
Rice

Rice scrubs are not enough stable in water based product or an emulsion. Their potential to replace PE beads is not good enough.



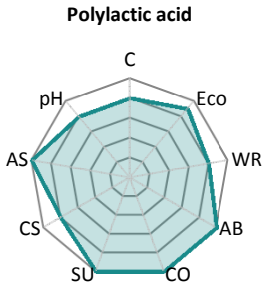
Corindon

Due to its very high density and its strong abrasiveness, Corindon is not a good product to replace PE beads.



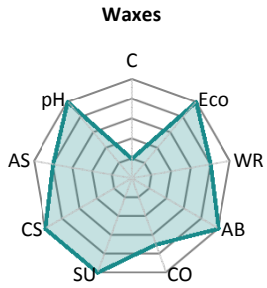
Polylactic acid

Polylactic acid seemed to be one of the good candidates to replace PE beads, but formulators are facing with strong problems. Colour stability is not guaranteed as products become yellowish. Lactic acid is released so that the pH value of the cosmetic products decreases dramatically. It is not registered in China.



Waxes

Granulated waxes can be used to make scrubs. Their availability in large volume and prices are the main handicap to replace PE beads.



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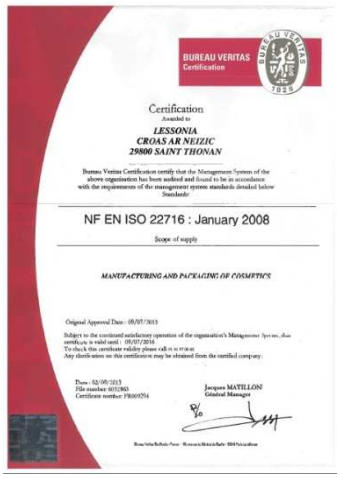
Celluloscrub™ is manufactured by LESSONIA in its own factory in France which is certified for the cosmetic market according to the ISO 22716.



BUREAU VERITAS
Certification

Certification

LESSONIA
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NF EN ISO 22716 : January 2008

MANUFACTURING AND PACKAGING OF COSMETICS