The co-processed excipients were prepared for adsorption of the SLN of glyceryl behenate on talc. Five systems with different ratios, Talc: SNL, were prepared, as summarized in Table 1. Briefly, initially, the amount of SNL and water were placed in a glass container, 100 grams of talc was added slowly under mechanical propeller stirring (IKA®, RW 28 basic) at 1200 rpm for 24 h. Finally, the system was separated by decantation, drying the sediment in a stove at 45 C. Subsequently, the mass was granulated using the fraction that passed through a mesh sieve (less than

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Development and characterization of a co-processed cosmetic excipient based on solid lipid nanoparticles and talc for makeup preparations.

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Introduction:

One main consideration to formulate a makeup is the selection and the ratio of raw materials, which provide the desirable characteristics to the product such as good covering capacity, easy spread, and absorption, pleasant texture and odor and do not show shine, do not provoke dryness or skin toxicity or to be occlusive[1,2].In addition, facial makeup must possess properties reasonably durable to avoid the need for frequent applications (adhesion to the skin) also to be resistant to the mixture of the skin secretions[3]. For the formulator, It is very important to know the properties of powders. Co-processing is one of the most widely explored and commercially utilized methods for developing new excipients, products that combine two or more excipients to obtain performance advantages compared to simple physical mixtures. This process involves the following steps: selecting the excipients required, determining their optimal relative proportions, choosing the most suitable co-processing technique, and optimizing various process parameters. The availability of nanotechnology opens opportunities to elaborate new co-processed excipients [4 5].

The present study aimed to formulate and then characterize a novel obtained co-processed using a simple method based on the adsorption of SLN into talc that can optimize manufacturing powders cosmetic form like compact powder by the direct compression process. The idea is to obtain a co-processed capable of showing better stability for color-dependent cosmetic form, avoiding hot-process, reducing the use of equipment, saving time and facilitating ingredient mixing and pigment incorporation.

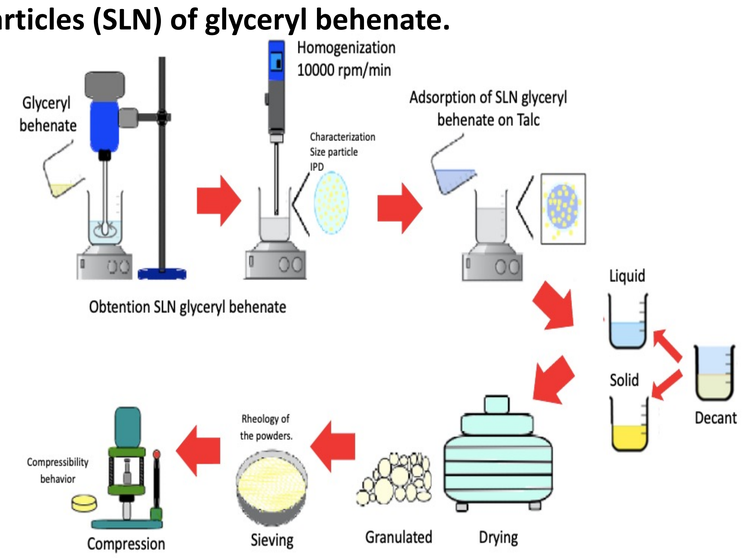
Materials & Methods:

Preparation of Solid Lipid Nanoparticles (SLN) of glyceryl behenate.

The SLN of glyceryl behenate (Compritol® 888 ATO) were obtained using the hot high-energy dispersion method:

1. Lipid internal phase was melted 80 ºC
2. The lipid was then dispersed in 90 mL of an aqueous solution containing 2.5% (w/w) Pluronic® F-68 as a stabilizer at the same temperature used to melt the lipid.
3. The oil/water emulsion obtained was homogenized in a high-efficiency disperser at 10,000 rpm for 5 cycles of 5 min each with a 3-min repose period between cycles.
4. Finally, the system was allowed to cool to room temperature.

Component	% w/w
Glyceril behenete	10
Poloxamer 188	2.5
Distillate water	87.5



Preparation of the co-processed excipients based on SLN glyceryl behenate /Talc.

The co-processed excipients were prepared for adsorption of the SLN of glyceryl behenate on talc.

- The amount of SNL and water were placed in a glass container, 100 grams of talc was added slowly under mechanical propeller stirring at 1200 rpm for 24 h.
- Finally, the system was separated by decantation, drying the sediment in a stove at 45◦C.
- Subsequently, the mass was granulated using the fraction that passed through a mesh sieve (less than 355 µm).
- Each obtained powder was characterized by rheology properties and compressibility behavior.

Batch	Talc	SNL 10 % (w/w) of glyceryl behenate (mL)	Distillate water
1	100	125	875
2	100	250	750
3	100	500	500
4	100	750	250
5	100	1000	0

Sensorial evaluation of conventional cosmetic form vs co-processed cosmetic

The evaluation of the cosmetic forms consisted in the application of both products to 10 panelists, who would determine the value of each parameter, comparing both products with a cosmetic formulation in facial cream based on a numerical scale from 1 to 5 with 1 = Very bad , 2 = Bad, 3 = Fair, 4 = Good and 5 = Excellent

Compact facial makeup formulation.

Component	Formulation	
	F1	F2
Sodium carbonte	4.00	4.00
Titanium dioxide	4.00	4.00
Fumed silica 200	0.30	0.30
Red iron oxide	0.21	0.21
Yellow iron oxide	0.96	0.96
Black iron oxide	0.08	0.08
Glyceryl behenate	-	10.00
Mineral oil	x	x
Talc	-	q.s 100
Co-processed	q.s 100	

The proposed formulation in facial makeup was evaluated for the amount of mineral oil (5, 7.5, 10 and 15%w/w)

Texture
Extensibility
Covering power
Absorption
Glide
Adherence
Brightness
Matte effect

Results & Discussion:

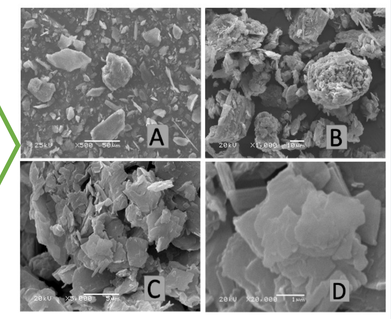
Results of the rheological properties and particle size obtained with the co-processed excipients of NLS glyceryl behenate and talc.

System	Adsorbed SNL (g)	Particle size (µm)	Bulk density	Tap density	True density	Porosity	Carr index	Hausner index	Angle of repose	Flow rate (g/s)
Talc		78.3±4.4	0.47±0.02	0.74±0.09	1.54±0.23	58.94±1.76	36.67±2.67	1.58±0.24	48.64±2.54	-
Batch 1	1.25	149.0±6.8	0.51±0.07	0.67±0.09	2.14±0.18	74.42±2.33	25.33±3.22	1.34±0.25	50.3±3.11	-
Batch 2	2.5	164.0±5.7	0.51±0.06	0.66±0.07	2.32±0.49	78.28±4.11	23.67±4.11	1.31±0.16	54.9±3.85	-
Batch 3	5.0	310.0±7.2	0.50±0.04	0.66±0.04	2.44±0.26	79.17±4.21	23.67±3.67	1.31±0.21	55.6±4.21	-
Batch 4	7.5	326.0±3.3	0.55±0.08	0.68±0.04	2.68±0.65	81.01±3.34	20.05±2.89	1.26±0.11	55.28±3.54	-
Batch 5	10	348.0±3.9	0.63±0.06	0.71±0.06	2.82±0.54	83.32±2.43	11.00±1.11	1.12±0.10	33.89±2.11	0.725±0.112

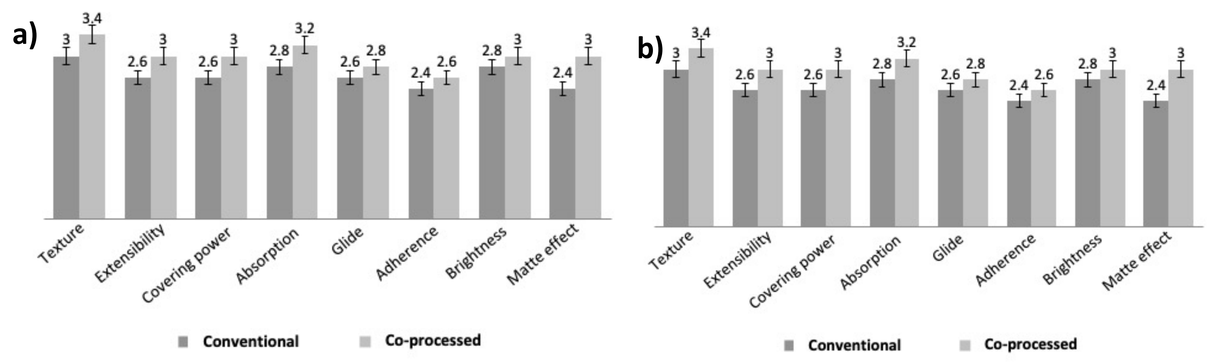
Compressibility behavior of the co-processed excipients

System	Grams of adsorbed SNL	Compaction behavior
Talc		Elastic
Batch 1	1.25	Plastic
Batch 2	2.5	Plastic
Batch 3	5.0	Plastic
Batch 4	7.5	Plastic
Batch 5	10	Plastic

SEM photographs of (A) Talc, (B) batch 5 at magnification of 1000X (C) batch 5 at magnification of 5000X, and (D) batch 5 at magnification of 20000X



Sensory evaluation of compact facial makeup with 5.0%(a) and 7.5%(b) conventional compact facial makeup vs cosmetic co-processing. [Batch 5]



Conclusions:

In this study, a novel co-processed system to prepare makeup formulations was developed by assembling solid lipid nanoparticles onto talc. The assembled system showed several advantages such as a) room-temperature process avoiding lipid fusion; b) easy implementation; c) good color dispersion; d) use of conventional mixing equipment; e) high batch production; f) time-saving process; g) less process waste. The nano-co-processed is one of the first attempts to prepare a system from nanoparticles, and it shows the potentiality of these dispersions to assembly materials for cosmetic use.

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