

# BIO-BASED SUCCINIC ACID FOR EXFOLIATION

## CREATING VALUE WITH NATURAL PERSONAL CARE INGREDIENTS THAT PERFORM

Bio-based succinic acid can be used as an effective exfoliating agent. BioAmber's bio-based succinic acid is naturally derived from non-GMO plant sugar, and does not fall into the alpha-hydroxy acid category. It has been shown to be equally effective in exfoliating dry skin compared to glycolic acid and lactic acid.



### BIO-SA™ NATURAL PERSONAL CARE GRADE INCI NAME: BUTANEDIOIC ACID

ANALYSIS	UNIT	SPECIFICATIONS
<b>Molecular weight</b>	g/mol	118.09
<b>CAS #</b>	---	110-15-6
<b>Appearance</b>	---	White crystalline powder, Odorless, characteristics acid taste
<b>Particle size</b>	---	150µm -800µm
<b>Melting Point</b>	---	186°C - 190°C
<b>Water content</b>	%	≤ 0.5%
<b>Assay</b> (USP Monograph)	%	≥ 99.0%
<b>Residue on ignitions</b> (USP Method 281)	%	< 0.025%
<b>Other organic acids</b>	%	< 0.5%
<b>Lead</b> (EPA Method 60108) * Formaldehyde free	µg/g	< 2

### Potential applications

- Exfoliation products (cell turnover)
- Skin peeling products
- Creams, serums, lotions, cleansers and toners
- Moisturizing skin creams and lotions

### Irritation / Sensitization testing

- The rinse-off succinic acid gel was tested for skin irritation in a 21 day cumulative irritation study with 20 subjects.
- The rinse-off gels were diluted to 20% in water and applied five days weekly for 21 days to the same site.
- No irritation response was observed for any subject with the rinse-off succinic acid gels. (Tests performed by AMA Laboratories)



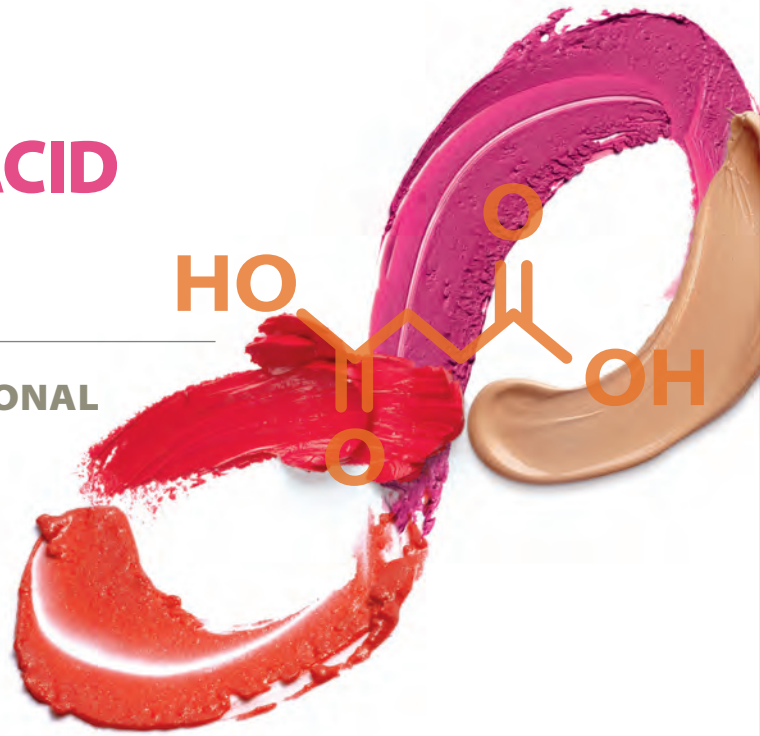
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## EXFOLIATION GEL FORMULATION

(Prepared by Cosmetech Laboratories)

	INGREDIENT (INCI)	WEIGHT PERCENT
<b>PHASE A</b>	Water	58.95
	Guar Gum	0.50
	Xanthan Gum	0.40
<b>PHASE B</b>	Potassium Sorbate	0.10
	Phenoxyethanol	0.70
<b>PHASE C</b>	Water	25.00
	<b>Succinic Acid</b>	<b>7.50</b>
<b>PHASE C1</b>	50% NaOH in water	6.60
<b>PHASE D</b>	Sodium Chloride	0.25

## MANUFACTURING INSTRUCTIONS

**Phase A:** Disperse gums in water one at a time and mix until they are fully hydrated.

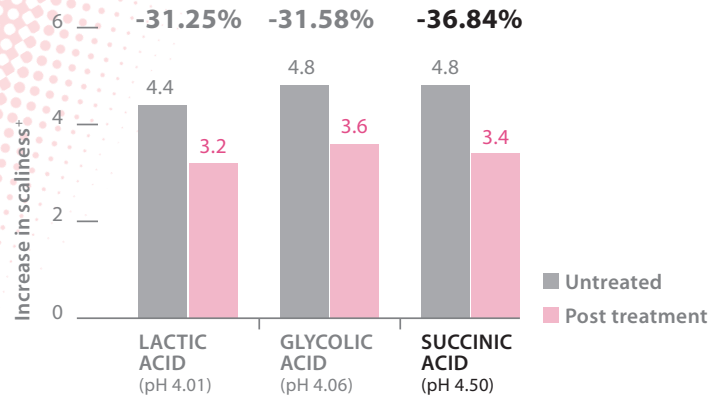
**Phase B:** Add Phase B to Phase A.

**Phase C:** Premix Phase C in a separate vessel. Use Phase C1 to adjust pH of phase C to 4.0-4.50 and mix until the succinic acid dissolves. Warm up to 45-50 °C if necessary. Add phase C/C1 to batch and mix until uniform.

**Phase D:** Add Phase D to batch and mix until uniform.

## Efficacy

- Rinse-off exfoliating gels were prepared containing 7.5% by weight of bio-based succinic acid, 10.77% glycolic acid (70%), and 8.33% lactic acid (90%). The rinse-off exfoliating gels were applied to a wet forearm.
- The area was rubbed gently for 30 seconds. The gel was left on the forearm for 30 minutes, then rinsed and patted dry. D-Squame surface testing was conducted prior to treatment, and 15 minutes after rinse-off.
- Gels containing bio-based succinic acid at higher pH decreased the surface scaliness of skin more effectively than the traditional alpha-hydroxy acids at lower pH.



+ Exfoliating efficiency through skin debris collection via D-Squame surface sampling. Average of five female test subjects ages 41-45. Testing for exfoliation was conducted at AMA Laboratories



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