



BERACLAY 20161
Black Clay



BeraMinerals



BERACA presents a wide portfolio composed of fixed oils, butters, scrubs, clays and actives sustainably sourced from the Brazilian biodiversity. The ingredients come from extractive communities throughout Brazil and are manufactured to connect our biodiversity with thousands of consumers around the world. Through a relationship marked by transparency, traceability and innovation, Beraca contributes directly to regional development and environmental preservation.



GENERAL INFORMATION

Product Code: AB20161B

Related codes: AB20161BA00, AB20161BX05, AB20161BX15

Previous code: BRC-B10

Clay is a natural mineral composed of extremely fine particles of silicates and several trace elements. The clays may exhibit different types and concentrations of metals such as titanium, magnesium, copper, zinc, aluminum, calcium, potassium, nickel, manganese, lithium, sodium and iron.

Clays are derived from sedimentary rocks (feldspar) that have undergone the process of erosion and exposure to climate processes for thousands of years. During this process, these fragments of rock break off and absorb characteristic metals and components of the land. The fragments can also be weathered by water from nearby rivers and organic compounds in each micro-region, thus forming the mineral product that is known as clay.

Thus it is possible to understand that each clay is unique, the result of a specific composition of soil, water and climate processes that occurred in a particular place and time.

Clays have been used for aesthetic purposes for centuries, and their expressive properties make it a raw material ideal for cosmetic products for skin care, hair and scalp. Many properties of clay have been highlighted by the cosmetic market in recent years, such as their water and oil absorption properties and firming effects.

The BERAMINERALS line is comprised of different Brazilian clays and quartz crystals having various granulometric profiles. Beraminerals can be used for many different cosmetic applications, such as creams/lotions, exfoliating products and cleansers, hair care products and color cosmetics, and can be used pure or in formulations.

PROPERTIES

- Natural and highly stable colors
- Natural color promotion for cosmetic products
- Improvement in sensory properties in emulsions
- Help to promote of cell ionic exchange
- Remove waste (impurities, oiliness and dead skin cells)
- Improve combing
- Thermal protection
- Anti-flaking and anti-itching properties

COSMETIC USE

Because of its many properties, especially cosmetic, the Black Clay is suitable for pure application or as an active in formulations, such as:

- Shampoos, conditioners and masks for all hair types
- Scalp Treatment
- Setting sprays and setting powders
- Men's products
- Natural and organic formulations
- Products in general for all kinds of skin

EFFICACY EVALUATION

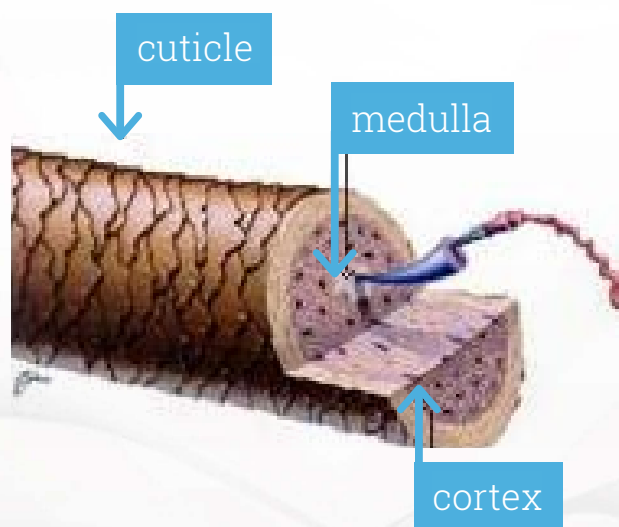
INTRODUCTION

Hair is a natural fiber formed by keratin. According to its geometry and physical structure, the hair has various properties, such as elasticity, softness, volume, combability and shine.

Based on its morphology, the hair has three layers:

- Cuticle: outermost layer, contains a high level of cysteine. Acts as protector of the innermost layer, the cortex.
- Cortex: Part of the hair with the greatest mass. Formed by very fine fibers, it has melanin granules which determine the color and photoprotection of hair according to the quantity. Straightening / permanent wave and color processes occur in this hair region.
- Medulla: central fiber, it may be discontinuous or absent in certain types of hair.

Figure 1 below shows a scheme of the hair fiber.



(SOURCE: Fitocosmetic)

Figure 1. Schematic representation of the hair fiber.

Chemical treatments in general, as well as excessive use of dryers and flat irons can damage the hair structure from the cuticle to the core. The high temperatures achieved by those devices, can damage the fibers, breaking them, and, in many cases, even burning the cuticle.

In addition to concern about the damage to the hair fiber, it is also important to consider the health of the scalp, since any scalp abnormality ends up reflecting directly on the hair, causing it to become dry and undisciplined, with damage to its fiber, increasing the potential for hair loss. In more severe cases, scalp issues can compromise the hair growth.

Products such as hair dyes, bleaches, straighteners and relaxers can irritate the scalp due to certain aggressive substances, included in these products. This irritation can cause problems ranging from flaking of the scalp, erythema, itching or blisters. The use of cosmetic ingredients that promote control of oiliness of the scalp, can help reduce this inflammation and flaking.

Scalp care products have specific characteristics that can be evaluated by means of sensory analysis, a method to evaluate the acceptance of the products in the market by indicating tastes and preferences of consumers. Based on the results, you can measure, evaluate and interpret the sensory perception of the product under review.

From the foregoing, Beraca presents Beraclay 20161 (Black Clay) for treatment with proven efficacy for the fiber of the hair and scalp.

OBJECTIVE

The studies are designed to evaluate the effects of thermal protection and flaking reduction after treatment with hair cosmetic formulations containing Black Clay.

METHODS

1. Laboratory

The studies were conducted by independent laboratories.

1.1 Effect of thermal protection

Allergisa Pesquisa Dermato-Cosmética Ltda. Study Reference: All-E-ES-052530-01/02-09-15

1.2 Reducing effect of flaking

Laboratórios Ecolyzer Ltda. Study Reference: 019206.R.

2. Experimental groups and treatments

For evaluations of "Thermal protection effect" and "Reduction of flaking", experimental groups and their treatment are listed in Table 1 below.

Table 1. Products used in the studies.

| Experimental group | Treatment |
|--------------------|----------------------------|
| PLACEBO | Shampoo without Black Clay |
| BLACK CLAY | Shampoo at 4% Black Clay |

The products were stored at ambient temperature throughout the duration of the study.

3. Procedure

3.1 Effect of thermal protection

A total of 14 tresses were prepared from Caucasian hair, each weighing 3.0 g and measuring 20 cm in length, with 7 tresses selected for each product.

A 0.5 ml sample of product was applied on each tress being massaged for 30 seconds and then rinsed with running water for 1 min. This procedure was repeated for each tress. Then they were submitted to the drying process with dryer and flat iron. This process was repeated 10 times.

3.1.1 Sensory evaluation of hydration / softness

The attributes to be evaluated to have been carried out by a trained technician, using terms considered significant for the product test. A scale was constructed for each word to represent the intensity of each attribute evaluated. The scale used is shown in Table 2.

Table 2. Evaluation scale for test product.

| Key point | Hydration / softness |
|-----------|----------------------|
| 7 | Extreme |
| 6 | - |
| 5 | Much |
| 4 | - |
| 3 | Moderate |
| 2 | - |
| 1 | Little |

3.1.2 Breakage Rating

After the thermal damage, the tresses were placed individually in an automated machine, which combed each tress 10,000 times. At the end of this procedure, the broken hairs were manually counted by a qualified technician.

3.1.3 Combing evaluation

For the combing evaluation, the tresses were fixed individually in an Instron Universal Testing System - 5565, combed at a speed of 100 mm / min with a temperature ($20 \pm 2^\circ\text{C}$) and controlled relative humidity ($50 \pm 5\%$).

For the hydration / softness and breakage results, the Mann-Whitney test was used, unpaired, and for comparison between treatments, the t-Student test for comparison with a 95% confidence interval.

3.2 Reduction of flaking

For the flaking evaluation, 31 volunteers between 18 and 63 years, 28 women and 3 men, with skin type I to V and the presence of seborrheic dermatitis (proven by dermatological examination), received random samples of the treatment groups. They were instructed to use the shampoo daily for 30 days, apply it as they would their normal shampoo, gently massaging the scalp, and then rinsing.

A questionnaire was given to them to evaluate the cosmetic product performance. Table 3 shows the parameters evaluated and possible classifications.

Table 3. Parameters to be evaluated and possible classifications of the test products.

| Parameter | Classification |
|---|---|
| With respect to flaking | Classified according to: 1-improved greatly; 2-improved; 3 without change; 4- worsened; 5- worsened greatly |
| Feeling of clean hair | |
| Feeling of clean hair in relation to the absence of flaking | |

RESULTS

1. Effect of thermal protection

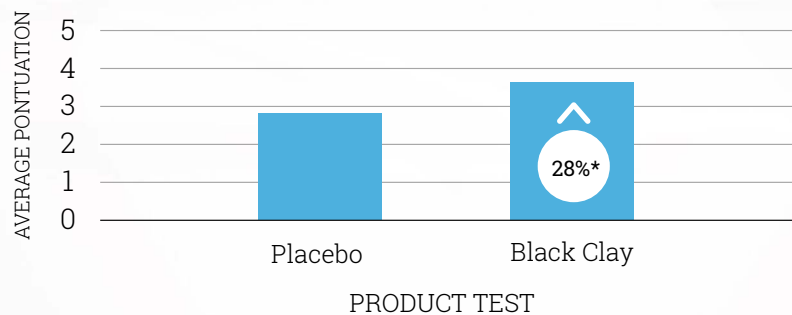
1.1 Sensory evaluation of hydration / softness

Table 4 shows evaluations of hydration / softness for each tress in both treatment groups.

Table 4. Statistical description and results of the evaluation of hydration / softness

| Black Clay | | Placebo | |
|----------------|------------|----------------|------------|
| Tress | Evaluation | Tress | Evaluation |
| 1 | 3 | 1 | 3 |
| 2 | 4 | 2 | 3 |
| 3 | 4 | 3 | 3 |
| 4 | 4 | 4 | 3 |
| 5 | 4 | 5 | 3 |
| 6 | 4 | 6 | 3 |
| 7 | 2 | 7 | 2 |
| Average | 3.7 | Average | 2.9 |
| SD | 0.5 | SD | 0.4 |

From the statistical results, there was a significant difference between treatment with Black Clay and Placebo. Hydration / softness promoted by Black Clay was superior compared to Placebo according to graph 1 below.



Graph 1. Comparison of average hydration/softness attribute score between Black Clay and Placebo.

*Statistical significance $p < 0.05$ compared to Placebo.

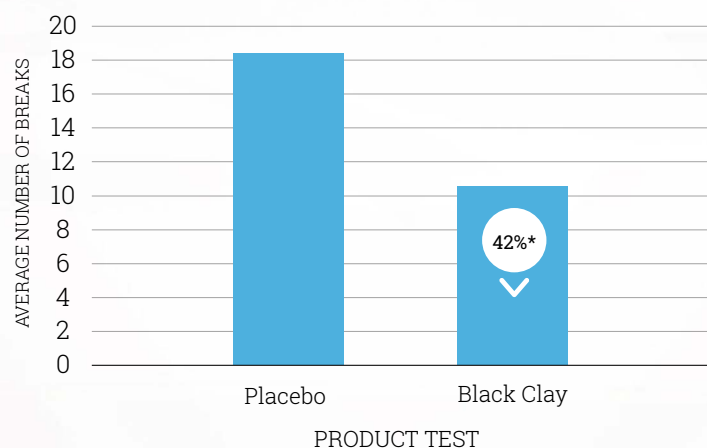
1.2 Breakage rating

Table 5 shows the breakdown of assessments for each tress in both treatment groups.

Table 5. Statistical description and break evaluation results.

| Black Clay | | Placebo | |
|----------------|--------------|----------------|--------------|
| Tress | N° of breaks | Tress | N° of breaks |
| 1 | 16 | 1 | 12 |
| 2 | 19 | 2 | 22 |
| 3 | 7 | 3 | 13 |
| 4 | 7 | 4 | 19 |
| 5 | 10 | 5 | 13 |
| 6 | 6 | 6 | 36 |
| 7 | 9 | 7 | 14 |
| Average | 10.6 | Average | 18.4 |
| SD | 5.0 | SD | 8.6 |

A statistically significant difference was observed when comparing the number of breaks in the tresses after treatments. The number of breaks in the treatment with Black Clay was much smaller compared to Placebo according to graph 2 below.



Graph 2. Comparison of average number of breaks between Black Clay and Placebo. *Statistical significance $p < 0.05$ compared to Placebo.

1.3 Evaluation of combing

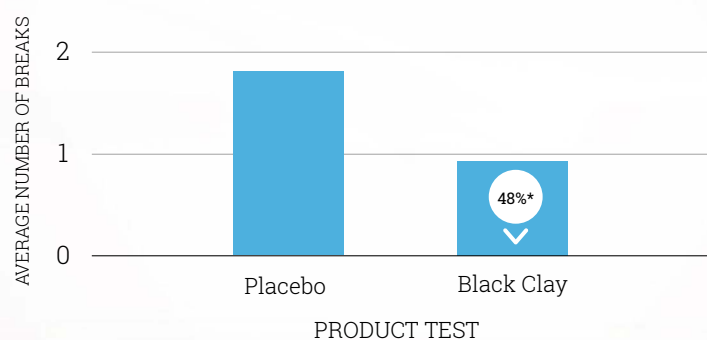
- Medium force:

Table 6 below shows the combing assessment results with the Instron machine programmed in medium force.

Table 6. Statistical description and combing evaluation results in medium force.

| Black Clay | | Placebo | |
|----------------|---------------|----------------|---------------|
| Tress | Medium force | Tress | Medium force |
| 1 | 0.7164 | 1 | 0.9732 |
| 2 | 0.9747 | 2 | 1.1625 |
| 3 | 0.5330 | 3 | 1.4225 |
| 4 | 0.7671 | 4 | 2.0460 |
| 5 | 1.9866 | 5 | 2.2026 |
| 6 | 0.4693 | 6 | 2.6080 |
| 7 | 1.2348 | 7 | 2.3281 |
| Average | 0.9546 | Average | 1.8204 |
| SD | 0.5243 | SD | 0.6303 |

A statistically significant difference was observed when comparing the number of breaks in the tresses after treatments. The number of breaks in the treatment with Black Clay was much smaller compared to Placebo according to graph 2 below.



Graph 3. Comparison of average number of breaks by combing (medium force) between Black Clay and Placebo.

*Statistical significance $p < 0.05$ compared to Placebo.

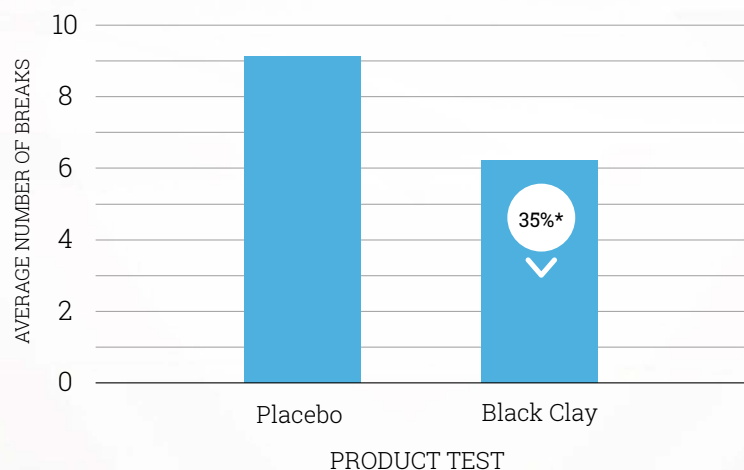
- Maximum force:

Table 7 below shows the combing assessment results with the Instron machine programmed in maximum force.

Table 7. Statistical description and results of combing evaluation at maximum force.

| Black Clay | | Placebo | |
|----------------|---------------|----------------|---------------|
| Tress | Maximum force | Tress | Maximum force |
| 1 | 6.2286 | 1 | 10.5018 |
| 2 | 5.1271 | 2 | 5.2095 |
| 3 | 3.4642 | 3 | 10.5020 |
| 4 | 5.7470 | 4 | 10.0020 |
| 5 | 9.5945 | 5 | 10.5011 |
| 6 | 2.0086 | 6 | 9.1368 |
| 7 | 10.3117 | 7 | 9.0637 |
| Average | 6.0688 | Average | 9.2738 |
| SD | 3.0199 | SD | 1.8989 |

A statistically significant difference between treatment groups was observed. The Black Clay had fewer breaks by combing at maximum force than Placebo according to graph 4 below.



Graph 4. Comparison of average number of breaks by combing (maximum force) between Black Clay and Placebo.

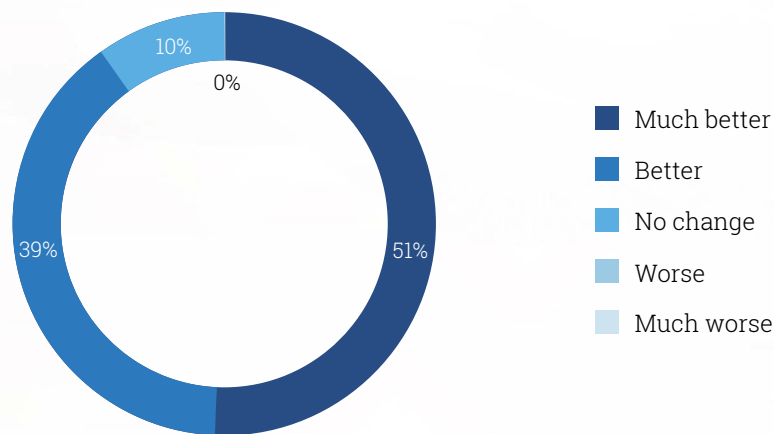
*Statistical significance $p < 0.05$ compared to Placebo.

2. Reduction of flaking

The results obtained with the questionnaire after treatment with **Black Clay** can be observed in figures 1 to 3 below.

As the graph 5, after 30 days of treatment, 16 volunteers (51%) reported much improvement, 12 volunteers (39%) reported improvement and 3 volunteers (10%) did not perceive change.

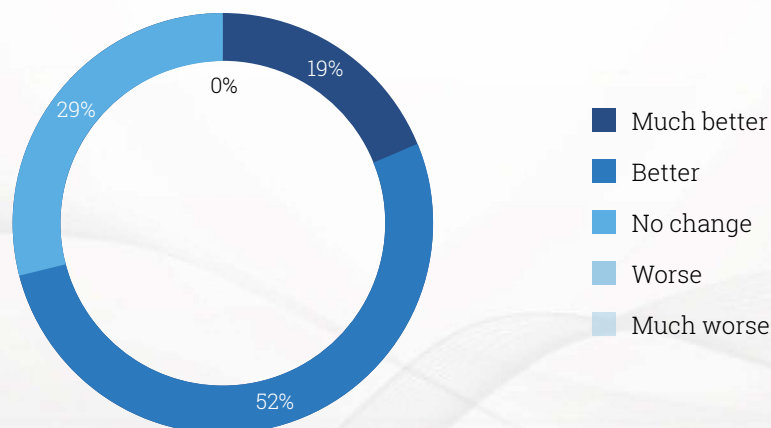
Regarding the flaking



Graph 5. Questioning the opinion of volunteers regarding the flaking.

Graph 6 shows the results after 30 days of treatment use, in which six volunteers (19%) reported much improvement in scaling, 16 volunteers (52%) reported improvement and 9 volunteers (29%) did not perceive change.

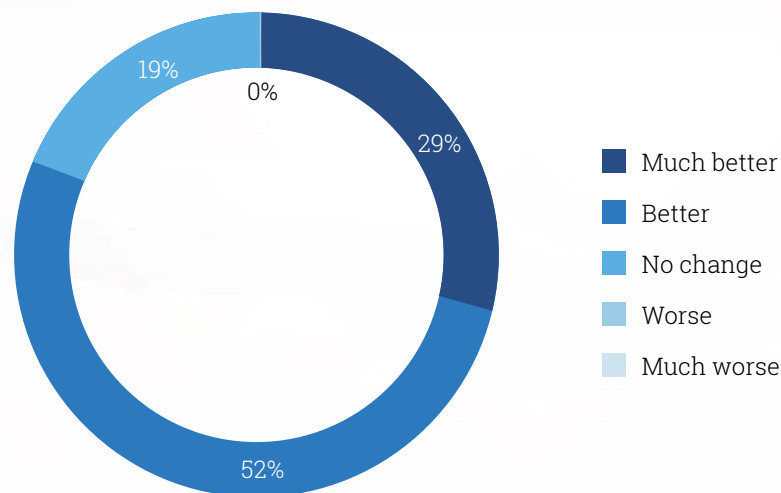
Feeling of clean hair



Graph 6. Questioning the opinion of volunteers in relation to the feeling of clean hair.

As the graph 7, after 30 days of treatment, 9 volunteers (29%) reported much improvement, 16 volunteers (52%) reported improvement and 6 volunteers (19%) did not perceive change in relation to feeling of clean hair.

Feeling of clean hair in relation to the absence of flaking



Graph 7. Questioning the opinion of the volunteers to the feeling of clean hair in relation to the absence of flaking.

It can be observed that among the three questions, the treatment with the shampoo containing Black Clay showed positive results regarding the reduction in flaking.

CONCLUSION

According to the results, the Black Clay proved effective in preventing and reversing damage caused by chemical treatment and thermal stresses to the hair fibers and scalp.

Results showed a thermal protection effect promoted by treatment with Black Clay (4%) compared with placebo treatment after statistical evaluation of the results for hydration / softness, combability and breakage.

In addition, in the opinion of the volunteers, 90% reported improvement in relation to flaking. As for the feeling of clean hair, 71% reported improvement, and 81% reported improvement compared to the feeling of clean hair for no flaking after treatment with shampoo containing Black Clay.

FORMULATIONS USED IN TESTS

1. Effect of thermal protection

| BLACK CLAY GROUP | |
|---|------------|
| INGREDIENTS | % w/w |
| <i>Aqua</i> | Up to 100% |
| <i>Disodium EDTA</i> | 0.10 |
| <i>Magnesium Aluminium Silicate</i> | 1.35 |
| <i>AB20161B Beraclay 20161 (Black Clay)</i> | 4.00 |
| <i>Sodium Laureth-2 Sulfate</i> | 23.00 |
| <i>Cocomidopropyl Betaine</i> | 4.00 |
| <i>Cocamide DEA</i> | 3.00 |
| <i>Fragrance</i> | 0.50 |
| <i>Sodium Chloride</i> | q.s. |

| PLACEBO GROUP | |
|-------------------------------------|------------|
| INGREDIENTS | % w/w |
| <i>Aqua</i> | Up to 100% |
| <i>Disodium EDTA</i> | 0.10 |
| <i>Magnesium Aluminium Silicate</i> | 1.35 |
| <i>Sodium Laureth-2 Sulfate</i> | 23.00 |
| <i>Cocomidopropyl Betaine</i> | 4.00 |
| <i>Cocamide DEA</i> | 3.00 |
| <i>Fragrance</i> | 0.50 |
| <i>Sodium Chloride</i> | q.s. |

2. Reduction of flaking

| BLACK CLAY GROUP | |
|--------------------------------------|------------|
| INGREDIENTS | % w/w |
| Aqua | Up to 100% |
| Magnesium Aluminium Silicate | 1.90 |
| AB20161B Beraclay 20161 (Black Clay) | 6.00 |
| Xanthan Gum | 0.20 |
| Glycerin | 4.00 |
| Dehydroxanthan Gum | 0.20 |
| Sodium Laureth-2 Sulfate | 23.00 |
| Cocomidopropyl Betaine | 4.00 |
| Sodium Cocoyl Sarcosinate | 4.00 |
| Cocamide DEA | 2.00 |
| Glyceryl Caprylate | 0.25 |
| Fragrance | 0.50 |
| Sodium Chloride | max. 2.00 |
| Citric Acid | q.s. |

| PLACEBO GROUP | |
|------------------------------|------------|
| INGREDIENTS | % w/w |
| Aqua | Up to 100% |
| Magnesium Aluminium Silicate | 1.90 |
| Xanthan Gum | 0.20 |
| Glycerin | 4.00 |
| Dehydroxanthan Gum | 0.20 |
| Sodium Laureth-2 Sulfate | 23.00 |
| Cocomidopropyl Betaine | 4.00 |
| Sodium Cocoyl Sarcosinate | 4.00 |
| Cocamide DEA | 2.00 |
| Glyceryl Caprylate | 0.25 |
| Fragrance | 0.50 |
| Xanthan Gum | max. 2.00 |
| Glycerin | q.s. |

FORMULATION SUGGESTION

1. Hair mask with Black Clay

| | |
|--------------|---------------------------|
| Formulation: | HAIR MASK WITH BLACK CLAY |
|--------------|---------------------------|

| INGREDIENTS | INCI name | % | SUPPLIER |
|-------------|-----------|---|----------|
|-------------|-----------|---|----------|

| PHASE A | | | |
|---|--|-------------|---------------|
| WATER | <i>Aqua</i> | Up to 100% | - |
| AB20161B BERACLAY 20161 (BLACK CLAY) | <i>Kaolin</i> | 4.00 | BERACA |
| GENAMIN CTA-50ET | <i>Cetrimonium Chloride</i> | 1.50 | - |
| VERSTATIL PC | <i>Phenoxyethanol, Caprylyl Glycol</i> | 1.00 | - |
| Panthenol | <i>Panthenol</i> | 1.00 | - |

| PHASE B | | | |
|--|--|-------------|---------------|
| DERMOFEEL PS | <i>PCA Glyceryl Oleate</i> | 3.00 | - |
| Cetearyl Alcohol | <i>Cetearyl Alcohol</i> | 7.50 | - |
| DERMOFEEL GSC | <i>Glyceryl Stearate Citrate</i> | 2.00 | - |
| GENAMIN BTMS | <i>Behentrimonium Methosulfate</i> | 4.00 | - |
| BA34110B BERACARE ADA SYSTEM (ANTI- DUNDRUFF OIL) | <i>Copaífera officinalis (balsam copaiba) resin, Bertholletia excels seed oil, Tocopherol</i> | 2.00 | BERACA |
| BR05710B RAIN FOREST 05710 (REFINED PATAUA OIL) | <i>Oenocarpus bataua fruit oil, Tocopherol</i> | 1.00 | BERACA |
| DERMOFEEL TOCO 70 | <i>Tocopherol, Helianthus Anuus (Sunflower) Seed Oil</i> | 0.50 | - |

| PHASE C | | | |
|-----------|------------------|------|---|
| FRAGRANCE | <i>Fragrance</i> | 0.25 | - |

| PHASE D | | | |
|---------------------------|--------------------|------------------|---|
| CITRIC ACID (SOL. 20%) | <i>Citric Acid</i> | q.s 4.0 – 4.5 | - |

Procedure:

Weigh phase A, homogenize and heat up to 75-80°C.

Weigh phase B, homogenize and heat up to 75-80°C.

Emulsify phase B in phase A under agitation. Mix for 1-2 minutes using the Ultra Turrax.

Start cooling on medium agitation.

Add phase C below 35°C and keep under stirring until cooling.

If necessary, adjust pH with phase D.

Sample formulations are provided for your convenience but Beraca Ingredientes Naturais S.A. does not warrant their merchantability, fitness for use, performance, safety, microbiological profile or freedom from patent infringement. They are not commercial formulations and have not been subjected to extensive testing. It is your responsibility to thoroughly test any formulations before use. All warranties, indemnities or liabilities implied or expressed by law are hereby excluded by Beraca Ingredientes Naturais S.A. to the fullest extent permitted by law.

PHYSICAL AND CHEMICAL PROPERTIES

| ANALYSIS | UNITS | SPECIFICATIONS |
|---|--------|----------------|
| Appearance | Visual | Powder |
| Color (in natura) | Visual | Black |
| Odor | - | Characteristic |
| Granulometric distribution in suspension (maximum medium diameter) | µm | Max. 15.00 |
| Organic Material | % | Max. 7.00 |
| Loss for Dehydration | % | Max. 4.00 |

CHEMICAL COMPOSITION

| | | |
|--------------------------------|---|---------------|
| SiO ₂ | % | 52.00 – 68.00 |
| Fe ₂ O ₃ | % | 0.50 – 2.00 |
| Al ₂ O ₃ | % | 22.00 – 40.00 |
| TiO ₂ | % | 1.50 – 3.25 |

MICROBIOLOGICAL ANALYSIS

| | | |
|-------------------------------|-------|--------|
| Total bacteria | cfu/g | < 100 |
| Fungus and yeasts | cfu/g | < 10 |
| <i>Staphylococcus aureus</i> | cfu/g | Absent |
| <i>Pseudomonas aeruginosa</i> | cfu/g | Absent |
| Total Coliforms | cfu/g | Absent |

STORAGE INFORMATION

This product is stable for 48 months when stored in dry, well ventilated and light protected surroundings. Once open it should be used immediately. As it is a raw material of natural origin, there may be variations in color and composition between batches

REGULATORY INFORMATION

| INCI name (PCPC / COSING) | CAS Number |
|---------------------------|------------|
| KAOLIN | 1332-58-7 |



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