ACB Bio-Chelate 5 PF

**BACKGROUND**

Outer beauty is a reflection of inner health. Proper nutrition is the key to promoting and maintaining healthy skin, scalp, and hair; therefore, priming the skin and hair with adequate minerals is an excellent means to deeply nourish both. **ACB Bio-Chelate 5 PF** consists of five fermented, essential minerals: zinc, iron, silicon, copper, and magnesium. Through fermentation, these minerals are transformed into a bioactive material that is easily recognized by our skin, scalp and hair. To clarify, the fermented minerals that make up **ACB Bio-Chelate 5 PF** become a powerhouse of benefits, efficaciously enhancing barrier function, increasing growth factor expression, decreasing stress related factors, increasing cellular energy production and acting as an anti-inflammatory.

Both vitamins and minerals are used for their positive nutritional value. They play a key role in the body’s overall health and well-being. However, unlike vitamins, minerals cannot be synthesized within the human body. Without minerals, vitamins cannot easily assimilate within our bodies and many enzymatic reactions cannot take place without a mineral acting as a co-factor. Yet, how do minerals work in personal care products? When applied topically, minerals provide strength and vitality to the skin and hair.

**SCIENCE**

Minerals may be divided into two categories: major elements and micronutrients. The major elements typically consist of calcium, phosphorous, silicon, magnesium, sodium, potassium, chloride, and sulfur. The micronutrients consist of iron, copper, iodine, manganese, zinc, fluorine, cobalt, chromium, molybdenum, and selenium. By chelating vitamins and minerals, the beneficial aspects of both can be fully capitalized on without residual, damaging effects.

The five essential minerals used in **ACB Bio-Chelate 5 PF** work as co-factors in many enzymatic reactions, such as protein synthesis and cellular reproduction. Through fermentation, we enhance the reaction the minerals have with the skin resulting in healthier skin when applied topically.
ACB Bio-Chelate 5 PF

**BENEFITS**
The fermented minerals that make up ACB Bio-Chelate 5 PF work immediately to efficaciously enhance barrier function, increasing growth factor expression, decreasing stress related factors, increasing cellular energy production and acting as an anti-inflammatory.

When incorporating ACB Bio-Chelate 5 PF into hair care products, not only is the scalp deeply nourished, but the hair cuticle is simultaneously primed with nutrients responsible for smoothing the strands for a perfect finish!

**EFFICACY DATA**
To determine the ability of ACB Bio-Chelate 5 PF to smooth the cuticle of the hair as well as its capability to penetrate into the hair shaft, Energy Dispersive Analysis of X-rays, as well as Scanning Electron Microscopy, were used to evaluate the results of the studies. According to the results, ACB Bio-Chelate 5 PF is capable of significantly smoothing the hair cuticle for healthier and shiner looking hair while simultaneously nourishing it as it is capable of enhancing the delivery of minerals into the shaft.

EDAX studies confirmed penetration of magnesium and silicon. The EDAX scan (Figure 1) shows the untreated controls in red and the ACB Bio-Chelate 5 PF treated samples as a black superimposed line. European blonde hair tresses were damaged by a 2x-bleach/wave process followed by a 30-50% elongation of the individual hair fibers in order to stimulate excessive chemical and physical damage. Three fibers were cut into equal halves to produce six hair strands. Three hair strands functioned as the test materials, while the remaining three functioned as controls. The three damaged test fibers were treated with 100% ACB Bio-Chelate 5 PF and allowed to dry. Analysis of the treated fibers by SEM (Figure 2) demonstrated a smoothing of the hair cuticle without a surface buildup of the treatment product.

An in-vivo study was conducted over a period of four weeks to evaluate the effect on skin density of ACB Bio-Chelate 5 PF. Ten M/F subjects between the ages of 23-45 participated in the study. Data gathered from the high resolution ultrasound imaging yielded results that indicate that this material is capable of significantly improving skin density compared to the control. As evidenced in Figure 3, ACB Bio-Chelate 5 PF improved skin density by 11.02% after 24 hours and by 13.54% after 4 weeks when compared to the untreated control. When compared to the base cream, ACB Bio-Chelate 5 PF improved skin density by 14.48% after 24 hours and after 4 weeks ACB Bio-Chelate 5 PF improved density by 13.69%. Results indicate that ACB Bio-Chelate 5 PF is capable of improving skin density when compared to both the untreated control as well as the base lotion. ACB Bio-Chelate 5 PF has a positive effect on skin's density when used at recommended use levels.
Additionally, a half head study was conducted to determine the comparison of a control conditioner vs. 2.0% ACB Bio-Chelate 5 PF in the experimental conditioner. The results of the assessment, shown in Figure 4, indicate that when incorporated into a conditioner, 2.0% ACB Bio-Chelate 5 PF did show improvement in the parameters tested. ACB Bio-Chelate 5 PF is capable of improving dry combability, anti-frizz, overall feel, shine and hydration more than the control conditioner. Furthermore, the subjects reported a significant increase in smoothness, shine and overall feel of the hair, especially when heat was applied for styling.

**Comparison of Control Conditioner vs. Experimental**

![Graph showing comparative analysis of skin density between test materials.](image)

**Figure 3.** Percent difference in skin density recordings between test materials.

**Figure 4.** Hair Assessment results for sensory characteristics.
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To learn about the biological activity of topically applied minerals, we employed a DNA microarray with 21,629 different DNA fragments. In this study, a solution of iron, copper, zinc, magnesium, and silicon chelates was applied to a MatTek tissue model consisting of both keratinocytes and fibroblasts. These models have been shown to have similar gene expression to normal human skin. Given the established biological activity of the five minerals and the associated yeast extract, it is no surprise that 1,155 genes were altered by more than the 30% limit chosen for this study. 591 were down-regulated and 564 were up-regulated by a 24 hour exposure to a 5.0% solution of bio-chelated minerals. To analyze the data, the results were first run through the internet software program DAVID. DAVID is an acronym for Database for Annotation, Visualization, and Integrated Discovery. The software identified five KEGG pathways as being particularly affected. KEGG, an acronym for Kyoto Encyclopedia of Genes and Genomes, is a database collection of diagrams representing molecular interaction networks.

The genes found to be up-regulated in the KEGG pathways indicate a positive impact on skin’s protective properties. The down-regulation of so many neuroactive receptors and the MAPK pathway is a strong indication of the minerals’ anti-inflammatory properties. A noteworthy subset of regulated genes can be grouped under the heading of generalized stress responses. Combined with the neuroactive receptor and MAPK categories, the skin’s response to stress is surely influenced by the topically applied mineral blend.

References: