

BORONEIGE® - Boron Nitride by ESK

Boron Nitride, the active 'inert' with a velvety feel

BORONEIGE® - The New Sensation of Boron Nitride. ESK offers a complete range of BN powders to improve cosmetic formulations to become softer, easier to apply, giving better coverage and adherence to the skin while also re-enforcing products such as lipsticks or pencils. These high purity BN grades are especially created for cosmetic applications and offered at highly attractive prices.

Introduction

Not so many solid raw materials are used in cosmetics (see Figure 1), and those few mainly in make-up products. Reasons are very simple: the solid materials behaviour strictly depends on the combination of its surface properties, its crystalline lattice characteristics (bulk properties) and of the chemical nature of such a substance, while for traditional non-solid cosmetic raw materials only the last one is important.

Beside just acting as an inert, passive filler, they provide eventually additional functionality onto the skin, they transform sliding friction during spreading and massage into rolling friction. They fill small skin imperfections and wrinkles, help adhesion and slipperiness, interfere with incident light, hiding skin spots and blemishes. They help water and sweat resistance, while modifying interactions of the skin with sunrays and influencing heat dispersion. Their active surface can absorb irritating materials, contribute to a healing effect, like e.g. solid Zinc derivatives can do. Last but not least, they help processing characteristics of finished products and can act as carriers for active ingredients (#1).

Among the historical uses of minerals, cosmetics are now facing the availability of 'new' solids. Their existence has been made possible by modern technology of ceramics, using industrial synthesis processes.

Boron Nitride (BN) is a manmade, synthetic substance, which exists in several modifications. One of them is a hexagonal crystalline modification, forming thin platelets, which is a very soft material.

Approximately 15 years ago, when (hexagonal) BN was first introduced to the cosmetic market in the western world, after several decades of technical industrial applications in protective surface coatings, like handling corrosive chemicals, metallurgy,

glass forming etc., the acceptance was quite high. The initially offered grades had "just" a normal powdery feel, the substance name was very 'synthetic' and they were very costly. Successively, the producers developed many different grades, with variable granulometry, transparency and skin feel, customised powder qualities. Today, BN finds very many different interesting application fields in cosmetics. The main characteristics of the modern grades are: lubrication, ease of spreading, good coverage, velvety and silky touch (see Figure 2+3).

Its ability to dissipate heat at a rapid rate provides formulations with the ability to produce cooling effect upon application to the skin (#2). Indeed, its thermal conductivity is comparable or even higher than of pure metals (400 W/m K) due to Boron Nitride crystalline structure and to the good adhesion of the large surfaces of BN platelets. This nice set of characteristics, together with the high chemical inertness, finds important applications not only in the field of fillers for make-up, but also in the sunscreens formulae. In w/o emulsions, BN has been reported to exert a stabilising effect, together with an increase of product spreadability and skin smoothness (#3). In o/w emulsions, it is easy to verify that even small additions (around 1%) accelerate apparent skin absorption and reduce the greasiness and tackiness of the residual film.

In sunscreens, the additional key characteristic of BN resides in its IR-absorbing properties. This reduces the acute and chronic negative effect of hyperaemia induced by sun exposure both under the sun and after irradiation. Therefore, use in broad-spectrum sunscreens and in after-sun emulsions has been successfully experimented. Its association with micronised titanium dioxide provides synergistic effect in sun radiation absorption.

Colour Cosmetic Uses

Hiding power, ease of spreading, white colour, lubrication, skin adhesion, long-lasting effect have been instrumentally quantified in an early work (#4) together with the high absorbing power toward oils, which can reach the double of that of talc. Use of BN grades has been proposed in foundations, liquid make ups, concealers, mascara, pressed powders, lipsticks and all kind of pencils. An enhancement of haptics has been demonstrated for some grades of BN.

In recent times, sensory evaluations have been applied to the comparison of perceived sensory characteristics, the only



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measurements that allow a direct communication between the formulator and the consumer. No objectively sound sensory evaluation has been ever applied to the evaluation of BN properties. In a series of experiments (#5) the 'Boron Nitride powder' - BORONEIGE® from ESK - was evaluated in comparison with five different fillers (Bismuth Oxychloride, Nylon-12, Talc, Mica, Polymethylmethacrylate), in order to compare their performances related to the following sensory features:

- spreadability: ease of moving product over the skin;
- skin coverage degree: product's ability to cover the skin;
- skin coverage homogeneity: homogeneity level in the skin coverage;
- skin softness: intensity of velvety skin-feel perceived by gently touching the treated forearm area with the fingers.

Following conclusion can be drawn with regard to the test results

BORONEIGE® Boron Nitride is a high potential active filler, as it not only contributes to formulations in terms of lubrication, high oil absorbing power, stabilisation of emulsions, skin adhesion, hiding power and coverage degree, etc., but also provides additionally very homogeneous and easy spreadability and giving the skin a soft and silky feeling.

Although it is a "synthetic" powder, BORONEIGE® Boron Nitride is the perfect additive with the "velvety touch" to all colour

cosmetic formulations. Availability in large volumes at attractive prices enables formulators to use BORONEIGE® Boron Nitride as a raw material for the latest state of the art formulations.

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Common Fillers and solids in cosmetics and make-up

- | | |
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| • Talc | • Calcium stearate |
| • Pigments | • Alumina |
| • Sericite | • Pearls |
| • Kaolin | (Titanium dioxide and other pigments on Mica) |
| • Mica | • Bismute oxychloride |
| • Precipitated Calcium Carbonate | • Nylon |
| • Light Magnesium Carbonate | • Polymethylmethacrylate |
| • Pyrogenic silica | • Zinc oxide |
| • Di-calcium and Mono-calcium phosphate | • Calamine |

Figure 1



Figure 2 & 3



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