ABSTRACT

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Podium Title: *Texture analysis/strength evaluation of pressed powders*

Background information (Short introduction)

Pressed powder cosmetics are still a large market, with new product innovations. These can include skin benefits, different texture, pigment selection to meet trends, or replacement of ingredients with negative consumer perception. While the goal is improving consumer performance, effect on processing must also be considered. Consistent pan strength can be reflective of product quality and should be evaluated and optimized when changes are proposed to formulation ingredients or pressing process.

Objective

The objective of this work is to quantify the strength and rigidity of pressed powder pans, looking at the effect of changing ingredient (bulking agent or feel modifier), and effect of processing variables. The change in ingredient could be either a switch from one INCI to another (for example talc to mica), or even between grades of the same INCI. The primary processing variable examined is the applied pressure.

Methodology

Powder formulations were prepared in an Osterizer blender and pressed in a 1” pan using a Carver manual press. A constant press time was used. Powder pan strength (“hardness”), hardness work (area under the curve) and rigidity were measured using a Brookfield CT-3 texture analyzer and a 2 mm cylinder probe. The test speed was 1 mm/minute and a penetration depth of 2 mm was used. The strength is taken as the maximum force applied, and the rigidity is the slope of the force-distance curve. Each sample was run in triplicate.

Formulation parameters included type of bulking powder (talc or sericite mica); different grades of sericite; effect of sericite surface treatment; level of binder; and grade of silica feel modifier. Process parameters included pressure and fill weight. Results are compared to the range of values obtained from commercial pressed powder products in a similar pan size.

Results

In the first set of experiments, pans of one powder formulation were prepared at three different pressures. In this formulation the shape of the curve was similar for all pressures, however hardness and hardness work increased with pressure. Increasing fill weight gave a further increase. In separate sets of experiments, changing the grade of sericite bulk powder altered

pan hardness and rigidity as did use of a surface treated grade or switching from sericite to talc. Altering the oil absorption of the silica feel modifier, while only used at a low level, also affected measured properties.

Conclusion

Many considerations go into the design and selection of ingredients for a pressed powder formulation. The results here show a method to quantify the effect of materials on pressed pan strength and hardness, when an ingredient (INCI or grade within the same INCI) is changed to meet various formulation needs. Process conditions have been shown to also affect pan strength and hardness, and can be altered if needed to address ingredient changes. Further work is need to combine findings from texture testing with other consumer relevant parameters such as pay off, coverage, color development, spreadability and sensory attributes.

Why is this important to the industry?

There is interest in the industry in evaluating raw material alternatives for reasons of texture innovation, availability, cost reduction or a consumer push for INCI replacement such as talc removal. This study demonstrates that there is no “drop-in” solution. Different grades of powders with the same INCI can give different product strength and rigidity. Changing parameters such as binder level and pressing conditions also alter performance, necessitating an effective method of evaluation.

Daphne Benderly, PhD is a Senior Manager Technology at Presperse. She has 25 years of R&D experience in materials science and engineering in various industries including personal care, polymers and specialty chemicals. Her main areas of research are structure-property relationships and development of targeted characterization methods. Daphne received her doctorate in Materials Engineering from Technion - Israel Institute of Technology, MS in Macromolecular Science from Case Western Reserve University and a BS in Mechanical Engineering from MIT. She is active in the New York Chapter of the Society of Cosmetic Chemists (NYSCC) and has chaired educational seminars for NYSCC. She is the head of the NYSCC Sponsorship committee and is also the Treasurer of the Applied Rheology Division of the Society of Plastics Engineers (SPE).