PROCESS BULLETIN

Antiperspirants

Description

Many antiperspirants are based on aluminum chlorohydroxide (aluminum chlorohydrate), aluminum zirconium tetrachlorohydrate or other similar compounds. The active antiperspirant ingredient reduces sweat by causing the sweat gland ducts to swell and close stopping the flow of water. Since these aluminum compounds can develop acidity under moist conditions and are irritating to the skin, various oils and emollients are added to the formulation to minimize this irritation. Whether they are liquids, lotions, roll-ons, stick or aerosol, the various products on the market are either the wet type or the dry type.

Aluminum chlorohydroxide is soluble up to 50% in water. It may be used in antiperspirant systems in concentrations up to 25%. In the wet type of antiperspirant, this solution is premixed with suitable oils (such as silicone oil), emollients and an emulsifying agent and is then homogenized to produce an oil-in-water emulsion. In some cases, a water-in-oil emulsion is prepared; but this type of system would be less effective than an oil-inwater emulsion, because the active ingredient is dissolved in the water phase. Since the active antiperspirant ingredients are salts that may destabilize the emulsion, special formulations and protocols may be needed to prepare these oil-in-water emulsions. The dry type of antiperspirant for aerosols uses an anhydrous aluminum compound together with anhydrous alcohols plus suitable lubricants, emollients and propellants. This product requires an extremely fine ispersion of the aluminum compound in the carrier liquid, because oversize particles will plug the aerosol nozzle. Homogenization provides this fine dispersion. The antiperspirant stick product may contain ingredients such as aluminum zirconium tetrachlorohydrate, cyclomethicone, stearyl alcohol, polyethylene glycol and other additives. A fine particle size of the active ingredient during preparation will minimize the settling of this ingredient, before the stick hardens.

Objective

Homogenization can reduce the particle size of the active ingredient by deagglomerating and dispersing the particles to their primary size throughout the product. There are a number of reasons for having a small particle size of the active ingredient.

1. A small particle size will increase the surface area of the active ingredient and will improve the dissolution and the onset of antiperspirant activity.
2. A smaller particle settles less rapidly when dispersed in the product. When the particle size is less than 75 micrometers, it cannot be felt when it is applied to the skin.
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4. Small particles will not clog the aerosol nozzle.

Processing

Wet antiperspirant emulsions may be prepared by making a premix of the emulsion in a jacketed kettle with sufficient agitation to maintain a uniform premix and enough heat to melt or dissolve any solid ingredients. The premix is pumped hot to the homogenizer and then to storage or filling, using a heat exchanger for cooling, if required. Homogenizing pressures will vary from 3000 to 8000 psi, depending upon the formulation. The homogenizer should have wear-resistant parts. Temperatures may vary from ambient to 180°F (82°C).

With dry formulations for aerosol use, the liquid ingredients would be combined with the dry aluminum chlorohydroxide added, preferably, with a high-shear mixer. The premix is pumped from the mixing tank to a high-pressure homogenizer and then to a storage tank for addition of the propellant and final packaging.

Testing

Wet-type antiperspirants can be checked either microscopically or by standard shelf-life tests. The dry-type products may be tested only by actual fill and spray test in an aerosol container. Once the dispersion parameters for a particular formulation have been determined, the viscosity and microscopic examination can form a control test.

References

Laba, D. “Antiperspirant technology - preformulation.” Cosmetic Technology, (1982): 28 - 33

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