Cosmetic, Toiletry and Other Personal Care Uses for Dow Chelating Agents

Chelating agents are used in almost every type of cosmetic and personal care preparation. The end products have increased effectiveness and improved stability, and thus earn better customer acceptance. Due to the purity and consistency required by the Personal Care formulator, recommended products for these applications include VERSENE™ 100XL, VERSENE 220 Crystals, and VERSENE Na_2 Crystals Chelating Agents. The versatile nature of Dow chelating agents is seen in the following applications.

Creams, Oils, Ointments

Use of 0.1% Dow chelating agent is quite standard in most emulsified and multi-phase personal care products. Control of trace metal ions with Dow chelating agents can prevent discoloration, rancidity, and other undesirable metal-catalyzed reactions. Many products may also be protected from spoilage.

Discoloration and rancidity of lotions may be prevented with 0.2-0.5% (by weight) of Dow chelating agent.

In sulfide and sulfhydrate-containing products, 0.5-1.0% of Dow chelating agent may be used to prevent metal sulfide formation.

Shampoos

It is recommended that all shampoo products include 0.1% Dow chelating agents for control of deleterious spoilage. In addition, Dow chelating agent may be used to soften the water with which the liquid shampoo is diluted during manufacture. Recommended products are VERSENE Na_2 Crystals, VERSENE 220 Crystals or VERSENE 100XL Chelating Agent.

Hair Preparations

Dow chelating agent at 0.1-0.3% concentration in alkaline sulfite preparations stabilizes the formulations against air oxidation catalyzed by copper, manganese, and other metals. Dow chelating agents also help prevent precipitation of sulfites in hard water areas.

Dow chelating agent (0.02-0.5% based on dye concentration) is used to protect against precipitation, color change, and rub-off caused by calcium, copper and iron.

In hard water areas, a water solution containing 0.5-1% of Dow chelating agent is an effective rinse for removing insoluble calcium and magnesium soaps. A similar rinse may also be used prior to cold waving or coloring.

Liquid Soaps

Dow chelating agent imparts clarity, improved detergency, foaming characteristics, and extended shelf life in these liquid products. The chelating agent is preferably added at the soap saponification stage before finishing off to the desired pH. Both the filtration step for removing higher titer fatty acids and unsaponifiables and the chilling step may be unnecessary.

If addition at this preparation stage is not practical, chelating agent may be added at other points. To minimize possible pH effects, the pH of the solution of Dow chelating agent should be adjusted to that of the liquid soap before addition. Compatibility may be improved if potassium, amine, or alkyl amine salts of VERSENE™ Acid are used instead of VERSENE 100, VERSENE 220 Crystals or VERSENE Na_2 Crystals.

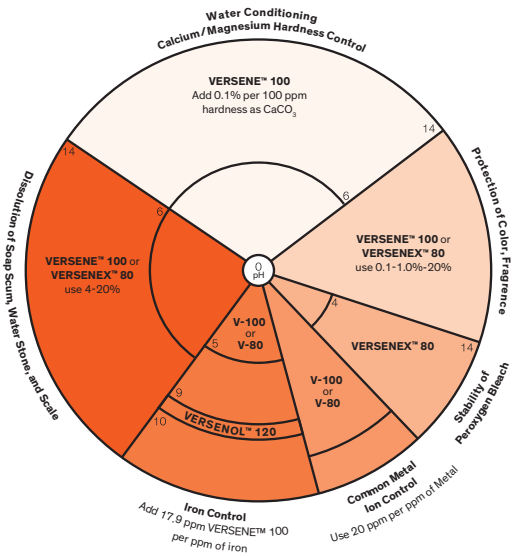
The chelating agent requirement depends on the water hardness and metal ion contamination in the soap. Figure 1 will help determine the amount of VERSENE 100 Chelating Agent required; a slight excess should control the metal content. When cloudiness forms in liquid soaps, it may be cleared by adding a VERSENE product; the reaction is quite rapid when the soap is warmed.

Dow chelating agents also reduce the adverse effects of metal ions on foaming properties of liquid soaps. The amount required can be calculated based on the water hardness. See "Control of Water Hardness" in the Water Hardness section.

Bar and Solid Soaps

A concentration of 0.1% VERSENE Chelating Agent is recommended for most bar and solid soaps. This is to prevent deleterious spoilage. VERSENE Chelating Agents will also prevent chalking, rancidity, and metal-catalyzed discoloration, in the soap noodle or in the final bar form. Iron-based spotting of soap bars can be reduced by incorporation of VERSENE Chelating Agent at 0.1 to 0.2%.

Figure 1: Formulation Guide for Using VERSENE Chelating Agents in Cleaning Applications



Bath Preparations

A 3-10% concentration of VERSENE 100XL or 1.2-4% VERSENE Na_2 Crystals (based on weight of detergent-based bubble bath formulations) counteracts the defoaming action of hardness ions on toilet soaps.

Toilet Water, Perfumes

A range of 0.1-0.5% Dow chelating agent, based on the weight of the aqueous alcohol, retards oxidation catalyzed by heavy metal ions. At a level of 0.5-1.0 wt.% in aqueous solution, VERSENE Na_2 Crystals may be successful as a wash to remove metal impurities from essential oils and nonaqueous preparations.

Fungicidal and Microbial Properties

The use of trace amounts of Dow chelating agents has been studied and reported extensively through the open literature. However, there is no registration of Dow chelating agents with the EPA as an antimicrobial agent. It is generally believed that Dow chelating agents may be useful in affecting the performance of other antimicrobials and fungicidal agents and in maintaining proper metal ion balance in such systems.

Formulation Notes

Dow chelating agents are only soluble in aqueous solutions (with negligible organic solubility). They also have very limited solubility in acidic media (below pH 3.5).

If sodium ions are undesirable in a cosmetic preparation, the ammonium, potassium, or various amine salts of EDTA may be prepared from VERSENE Acid. The desired salt can be prepared in a separate operation by adjusting the pH of an aqueous slurry of VERSENE Acid to the pH of the cosmetic with the proper base. It may also be prepared in-situ by adding VERSENE Acid in an earlier step in the preparation of the cosmetic, followed by addition of base and final pH adjustment in the normal manner. VERSENE Acid is also used to lower the pH of VERSENE 100XL without also adding extraneous anions.

Many of these uses may be regulated by federal agencies and by local authorities. Care must be taken that applications conform with any such regulations.

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