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ABSTRACT 5

Potassium sorbate as an alternative to paraben-based preservative blend in creams containing plant extracts

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ABSTRACT

Background: Alkyl esters of 4-hydroxybenzoic acid, known as parabens, are the commonly used cosmetical preservatives. However, recent studies indicated that they could potentially interfere with the functioning of the endocrine system. Sorbic acid and its potassium salt are alternatives to parabens and their application is well-established in the cosmetic industry. Originally extracted from rowan berries (*Sorbus aucuparia* L., Rosaceae), although nowadays it is synthetically produced. The aim of our study was to compare the influence of paraben-based preservative blend (Gujsol-1®) and potassium sorbate on the stability of cream containing plant extracts.

Materials and Methods: In the model emulsion (O/W) of the same composition (Aqua, Propylene Glycol, Glyceryl Stearate, Caprylic/Capric Triglyceride, Persea Gratissima Oil, Butyrospermum Parkii (Shea Butter), Hydrolyzed Elastin, Ceteareth-20, Ceteareth-12, Cetearyl Alcohol, Cetyl Palmitate, Calendula Officinalis Extract, Rosa Canina Fruit Extract, Hexylene Glycol, Fructose, Glucose, Sucrose, Urea, Dextrin, Alanine, Glutamic Acid, Aspartic Acid, Hexyl Nicotinate, Dimethicone, Tocopheryl Acetate, Ethylhexyl Methoxycinnamate, Butyl Methoxydibenzoylmethane, Ethylhexyl Salicylate, Disodium EDTA, Parfum) Gujsol-1® (Phenoxyethanol, Methylparaben, Ethylparaben, Propylparaben, Butylparaben; 1 %) – **cream A** and potassium sorbate (0.6 %) – **cream B** were incorporated as preservatives. Samples were subjected to 6 freeze-thaw cycles (accelerated stability test) consisting of 40 °C/24 h; 25 °C/24 h and 4 °C/24 h.

Results: Creams A and B were evaluated (organoleptic quality, pH, and centrifugation tests) after preparation and after 6 freeze-thaw cycles. Furthermore, the microbiological stability of the creams was investigated. Immediately after processing, creams A and B were white, soft, and homogenous, as well as after accelerated stability testing. Moreover, no phase separation was observed after the centrifugation test (3000 rpm for 30 minutes) in both formulations immediately after processing and after accelerated stability testing. The pH value (5.11 and 6, respectively) of creams A and B were close to the neutral pH of human skin. Furthermore, the pH of creams A and B was stable after accelerated stability testing (5.31 and 5.99, respectively). Microbiological assays (total mesophilic counts, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Candida albicans*) have shown that creams A and B were stable during storage.

Conclusion: Therefore, it can be concluded that potassium sorbate could be an efficient alternative to paraben-based preservatives such as Gujsol-1® in the in cream containing plant extracts. Further studies are needed in order to estimate the efficacy of potassium sorbate and Gujsol-1® during challenge test and real-time stability studies.

Keywords: Preservatives; Parabens; Potassium sorbate; Accelerated stability testing; Cream

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