P-086	**Skin-cleansing compositions for cosmetic applications enriched with Vitamin-E encapsulates**	

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INTRODUCTION AND OBJECTIVES

Human skin is continuously exposed to internal and external influences which may alter its condition and functioning. As a consequence, the skin may undergo alterations leading to photoageing, inflammation, immune dysfunction, imbalanced epidermal homeostasis, or other skin disorders. Skin functioning and skin attractiveness are dependent on nutrition (Boelsma Et al. 2001). This is evidenced by the development of skin lesions in response to nutritional deficiencies. Dietary supplementation with the deficient vitamins, minerals, or essential fatty acids improves skin conditions in these situations (Roe, 1986). Another study convincingly showed that vitamin supplementation effectively protects the skin against sunburn, the doses of vitamins used were much higher than amounts generally ingested from habitual diets (Roe, 1986). The protective effect of a combination of vitamins E and C was shown by Fuchs et al. (1984). It was concluded that short-term supplementation with moderately high doses of vitamin E and C exerts a photoprotective effect.

A-Tocopherol, or vitamin E is a ubiquitous, naturally occuring agent derived from plants. It is a lipid-soluble, non-enzymatic antioxidant, which protects skin from the adverse effects of oxidative stress including photoageing. Its chemistry and its physiological function as a major antioxidative and anti-inflammatory agent, in particular with respect to its photoprotective, antiphotoageing properties, are well known (Nachbar et. al., 1995). Because of its strong antioxidative properties it is widely used in many medical and cosmetic applications, although it is rapidly degraded, due to its light, heat and oxygen sensitivity. Thus, all of its formulation has to avoid contact with light, heat or air.

The present paper aims at developing photo, heat and air stable formulations of vitamin E reich, wheat germ oil, entrapped in alginate matrices for cosmetic applications.

MATERIALS AND METHODS

***Essential oil and chemicals*:** Wheat germ oil was purchased from, Kaanta Chemicals, Tilak Bazar, Delhi, India. HPLC grade n-Hexane was purchased from Merck, sodium-alginate from Sigma Aldrich and calcium chloride from Merck. All chemicals were of the highest grade commercially available supplies. Double distilled water was used for the preparation of bead formulations of calcium alginate-wheat germ oil formulation.

***Formulation Preparation*:** A thick slurry was prepared by dissolving sodium alginate (5% wt) in boiling hot water under vigorous stirring using mechanical stirrer. Preparation of bead formulations was carried out from aqueous solutions of sodium alginate and wheat germ oil 1:1 w/w. The beads (approx 5mm dia) were prepared at the ambient temperature (27 ± 2^{O} C) by dripping the alginate and wheat germ oil slurry from a height of approx 200 mm into 100ml of stirred 5 % wt $CaCl_2$ solution from a burette at the rate of 4 drops/min. Beads were left undisturbed in the calcium solution for 6 hrs for curing and then left in distilled water They were than subjected to content analysis using HPLC. Beads without active ingredient were also prepared as a control formulation.

HPLC Analysis : Tocol content of the samples were analyzed by HPLC according to Katsanidis and Addis (1999).

RESULTS AND DISCUSSION

The amount of each active ingredient found in wheat-germ oil bead formulations from 0 to 84 days is shown in Figure 1. Wheat germ has high content of tocopherols (0.3 - 0.5%). The tocopherols content (vitamin, E) of wheat germ oil is also extraordinarily high. It is reported that one kg of oil contains about 1179 mg α-tocopherols, 398 mg β-tocopherols, 493 mg γ-tocopherols and 118 mg δ-tocopherols (Swern, 1996). The data obtained on zero-day clearly shows that α-tocopherols, β-tocopherols, γ-Tocotrienol +γ-tocopherols, δ-tocopherols and δ- Tocotrienol are present as 1364, 1205, 47, 5, and 7 ppm concentration, respectively. However α-Tocotrienol and γ- Tocotrienol were not detected at all.

It is evident from Figure 1 that α-tocopherol is released at a very low rate and it maintains a very high concentration after even 84 days of storage. Similarly other constituents of Vitamin E family i.e. β-tocopherols, γ- Tocotrienol +γ-tocopherols, δ-tocopherols and δ- Tocotrienol also maintains their high concentration upto 84 days without being degraded by light, heat or air. However, it was observed that concentration of α-tocopherol decreased from 1364ppm to 1325 ppm accounting for an overall loss of 39 ppm of α-tocopherol. In the same way β-tocopherols was also released in the system amounting to a 32 ppm loss. Loss of other constituents is not that significant. In-

spite of this loss the bead formulation of calcium alginate-wheat-germ oil significantly preserves the high amount of Vitamin E family from photo, air and heat degradation.

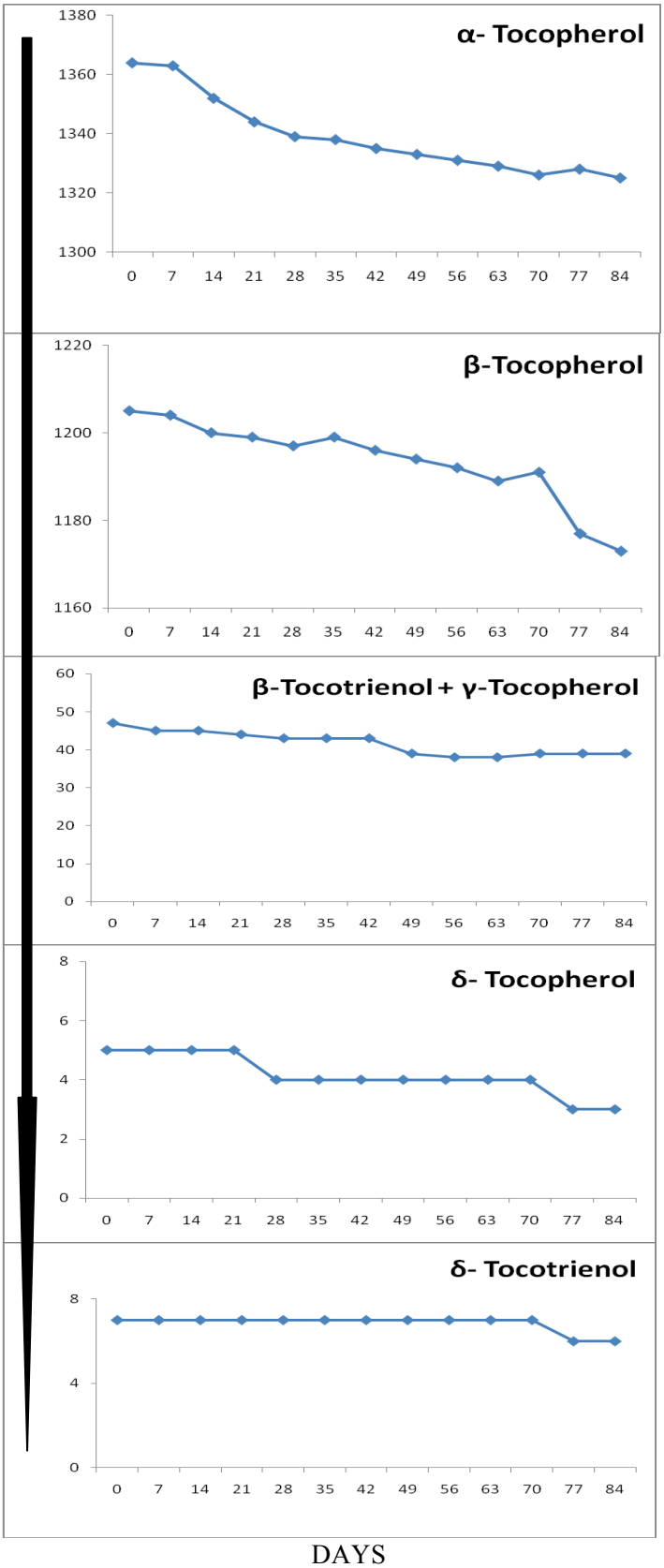

Figure 1 : Showing amount of each constituent present in bead formulation after days of storage .
NOTE : (i) Y-axis marks in ppm ; (ii) α-Tocotrienol and γ- Tocotrienol were not detected.

CONCLUSIONS

It is evident from the data and above discussions that alginate entrapment is an effective, cheap and safer method for entrapment of active ingredients. The wheat germ-oil has Vitamin E complex which is very much susceptible to degradation by photo, air and heat. Therefore, in designing a formulation for Vitamin E containing substances, it is necessary to ensure that the various tocoherols etc should not get degraded. This is the reason that in face-washes and creams used for cosmetic application cannot use Vitamin E as such. They require to stabilize the vitamin-E which is quite difficult to achieve because of commercial reasons. Particularly in face-washes, Vitamin E is unstable because various homologs of tocopherol are degraded on saponification. So the developed bead formulation of calcium alginate-wheat germ oil can be used in facewashes and other cosmetic to stabilize the Vitamin-E constituents from all the factors including air, light and saponification. The bead formulation of calcium alginate-wheat germ oil is very soft and can be squeezed easily to release vitamin E in suspended face-wash or other creams for cosmetic applications.

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