Дослідження сонцезахисного фактору деяких природних сполук та розробка сонцезахисних засобів, що містять їх

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Використання натуральних інгредієнтів у рецептурах косметічних продуктів є новим кроком розвитку інновацій в індустрії краси. Найбільш корисні властивості рослинних продуктів неможливо замінити синтетичними аналогами. До таких властивостей відносяться вітамінні, антиоксидантні, сонцезахисні, адаптогенні, загальнозміцнюючі, імуностимулюючі, тонізуючі властивості рослинних екстрактів, які займають провідне місце серед активних добавок в косметичних засобах догляду за шкірою і волоссям.

В даній роботі висвітлені основні проблеми, пов'язані з розробкою принципово нової рецептури кремів до складу яких входять природні речовини-УФ-фільтри з найбільшим сонцезахисним фактором.

Експериментально досліджено сонцезахисні властивості деяких природних масел і екстрактів: масло ши (каріте), масло виноградної кісточки, сезамове (кунжутне) масло, льнне масло, спиртові і пропіленгліколеві екстракти ромашки та календули.

Робота містить аналіз отриманих експериментальних даних, які дають можливість розробити сучасну оптимальну рецептуру сонцезахисного крему на основі природних компонентів.

Результати дослідницької роботи можуть бути корисними для науковців, які займаються розробкою рецептур сонцезахисного крему, а також технологічним службам підприємств, що розробляють і випускають даний вид продукції.

Ключові слова – конференція, косметичні креми, сонцезахисні креми, косметичні засоби, природні УФ-фільтри, SPF-фактор, спектрофотометрія.

The sun protection factor research of some natural products and production of sunscreens containing them

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I. Introduction

In order to get a suntan it is known that the human skin needs to receive ultraviolet rays. Understanding the influence of ultraviolet radiation to the skin resulted in the active development of sunscreen cosmetics. Sunscreens were originally developed to minimize erythema.The main components of such types of cosmetics are ultraviolet filters.

Some natural additives are known to have sunscreen properties, such as: shea butter, oil of grape seeds, sesame oil, cocoa butter, hazelnut butter, jojoba oil, extracts of chamomile, sage, calendula and others.

The most useful properties of natural products cannot be replaced with synthetic analogues. Aside from sun protection, the natural compounds mentioned above have vitamin, restorative and adaptogenic actions. These natural ultraviolet filters moisturize, soften, saturate the skin and help it to adapt to rays.

Having done the research, it was necessary to analyse advanced innovative sunscreen recipes by using filters with natural ingredients.

II. The experimental part

For the experiments we used the following natural ingredients: shea butter, oil of grape seeds, sesame oil and linseed oil.

There are two test methods used for determining the broad spectrum transmission by a sunscreen according to

the standard AS / NZS 2604, adopted in Australia and New Zealand. These two methods are: the method of thin layer and method of transmission of the solution.

The research was conducted by spectrophotometric method. They are based on measuring the ultraviolet radiation after passing it through a thin film layer of sunscreen product applied on the corresponding surface. The measurements have been carried out on special spectrophotometric equipment with a special ultraviolet - source - spectrophotometer SF-46.

We prepared oil solutions in chloroform for spectrophotometric analysis. To create these test samples of oils, we weighed them on analytical balance and dissolved in 10 ml of chloroform. Hence, the test samples are 0.05 g, 1 g, 1.5 g, 2 g, respectively. We obtained 0.05%, 1%, 1.5% and 2% solutions, which were put in the quartz cell with a thickness layer equal to 10 mm. We

measured the absorption and transmission of samples on the spectrophotometer SF-46 relative to chloroform in the wavelength range of 240 - 350 nm.

The testing of the sunscreen protection of the cream obtained was carried out by the next following method: a thin layer of cream equal to 8 microns deposited between two quartz plates. The thickness was measured by the micrometer.

The absorption and transmission of ultraviolet rays was measured every 10 nm in the range of waves 220-350 nm relative to the air, using the spectrophotometer SF-46.

The sunscreen is believed to be effective against UV-A radiation, if its transmission is less than 10%. Having taken the experiment into consideration, the most effective cream is the cream that contains a shea butter as the ultraviolet filter.

After the experiments were carried out, graphs of the transmission of ultraviolet radiation through the obtained sunscreen with different natural ultraviolet filters were constructed.

For the evaluation of the protective effect of sunscreen we introduced characteristic "sun protection factor" (SPF), which is one of the main characteristics of sunscreen products.

The ultraviolet light spectrum has been divided into three regions: UVA, 320-400 nm; UVB, 290-320 nm; and UVC, 200-290 nm.

UVB light is primarily responsible for sunburns. However, UVA light penetrates the skin deeper and also contributes to long-term skin damage. The sun protection factor shows how much protection is being offered against UVB and some UVA.

UVA, UVB, and UVC can all damage collagen fibers and, therefore, accelerate the aging of skin. Both UVA and UVB destroy vitamin A in skin, which may cause further damage.

The higher the number, the more ultraviolet radiation is filtered and the greater the protection. All sunscreens are filters allowing some radiation to pass through to the skin. The higher the SPF, the smaller the amount of ultraviolet radiation that gets through.The coefficient of degree protection usually varies from 2 to 30.

The cream was manufactured with the new recipe. It has been found that the introduction of oils to the recipe noticeably reduces the percentage of transmission of ultraviolet rays and increases the sun protection factor (SPF) of the cream. We have also studied the sun protection of alcohol and propylene glycol extracts of camomile and calendula.

The data obtained testifies that the sunscreens with the addition of shea butter or calendula alcohol extracts has the highest sun protection factor.

The sun protection properties of calendula and chamomile extracts was determined by using quartz cell. For this purpose 5 ml of each extracts were diluted 100 times with distilled water.

The solutions obtained were put in a quartz cell with thickness layer of 10 mm.

Absorption and transmission were measured on spectrophotometer SF-46 relative to water in the wavelength range 220-400 nm.

Also we performed the spectrophotometric study of the sunscreen where the ascorbic acid was added. The sun protection factor of such creams is 2.

The sunscreens were prepared by using the method given below.

The fat-soluble components: glyceryl monostearate, emulsion wax, a natural ultraviolet filter and liquid paraffin were mixed together. Separately, the water-soluble components were mixed – distilled water and glycerin.

Both fat-soluble and water-soluble components were heated in a water bath to 75 C. The water soluble components were carefully stirred into the fat soluble components.The formed emulsion was cooled to 40 C. After the mixture was cooled, the preservative Rokonsal PB5, odorant, propylene glycol or alcohol extracts, and vitamins were added.

III. Conslusion

Experimentally it has been determined that the natural ultraviolet filters, when used in the complex with vitamins C, E, P, significantly improve the sun protection factor of any cosmetic product, thus making skin less sensitive to the sun and maintaining a uniform tint of the tan.

Introduction of some vitamins to the the formula of sunscreen promotes its ability to oxidation. This issue must be studied in the future.

Thus, the results obtained allow us to develop the optimum advanced sunscreen recipe with different natural ultraviolet filters, which can protect skin from radiation with everyday use.

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