



DEVELOPMENT OF THE COMPOSITION AND TECHNOLOGY OF SUN PROTECTION PRODUCTS

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ABSTRACT

The Republic of Uzbekistan is located in the central part of the Eurasian continent between 37 and 45°N, 56 and 73°E. Its total area is 447.7 thousand km², of which 78.8% are plains and 21.2% are mountains and foothills. The territory belongs to the arid zone of Central Asia. Almost four-fifths of the country's territory are located within vast semi-deserts and deserts, bordered from the southeast and east by powerful mountain systems.

The high level of solar radiation combined with the peculiarities of atmospheric circulation forms a continental type of climate characterized by significant fluctuations in air temperatures, long dry and hot summers, wet spring and unstable winter.

In recent decades, there has been a global warming of the climate caused by anthropogenic emissions of greenhouse gases into the atmosphere, as well as due to other climate-forming factors.

Based on the above-mentioned, the main objectives of the pharmaceutical industry of the Republic of Uzbekistan are to produce local and affordable cosmetics taking into account the climatic peculiarities.

There are many different types of cosmetics (creams, washes, hygiene products, soaps, scrubs, lotions, tonics, gels, masks) on the markets of Uzbekistan. Cream is a mild cosmetic form that has protective, nourishing, moisturizing effects on the skin. Among cosmetic creams, sunscreen creams play an important role, which protects our skin from unfavorable (wind, sun, dust, frost) conditions of nature. If you do not use sunscreen, the skin thins, dries out, nevi and pigmentation appear, etc. It is advisable to use sunscreen in all seasons. As this type of cream protects the skin from various environmental factors.

Goal of the research: to develop an optimal composition and technology of sunscreen products based on physical filters.

Research materials and methods. There are physical and chemical sunscreen filters. The first - they include zinc oxide and titanium dioxide - reflect the sun's rays like a mirror.

Physical or mineral filters do not cause irritation and allergies and are suitable for children, sensitive and reactive skin. They form a light film on the surface of the skin, preventing the sun's rays from penetrating deep into the epidermis.



This protection is very reliable and safe. A physical filter will also suit you if you have allergies or very sensitive, irritable skin.

Chemicals that provide protection against chemical and physical filters are called photostabilizers. They help protect materials from degradation by ultraviolet radiation, heat and other harmful factors [1].

Table 1.

Selection of sunscreen composition

No	Ingredients	Pronunciation I	Pronunciation II	Pronunciation III
1.	Bismuth nitrate basic	3,0	3,0	3,0
2.	Zinc oxide	20,0	20,0	20,0
3.	Vaseline	30,0	-	-
4.	Anhydrous lanolin	5,0	-	-
5.	Almond oil	40,0	-	-
6.	Olive oil	-	45,0	-
7.	Glycerin	-	-	10,0
8.	Beeswax	-	7,0	-
9.	Na KMC	-	-	4,0
10.	Purified water	2,0	25,0	63,0
	Total	100,0	100,0	100,0

In the development of the composition and technology of creams with physical filters, 3 formulations of creams were developed.

The study evaluated the quality of the obtained gels by the following parameters: description, hydrogen pH, colloidal stability, thermal stability and spreadability. [2,3]

Table 2

Evaluate sunscreen quality across all prescriptions

No	Name of the indicator	Performance standard for cosmetic cream	Pronunciation I	Pronunciation II	Pronunciation III
1.	Appearance	Homogeneous mass, free of foreign impurities	Homogeneous mass, free of impurities	Homogeneous mass, free of impurities	Homogeneous mass, free of impurities
2.	Color	Proper color of the cream of the given name	Colorless slightly white mass	Colorless slightly white mass	Colorless slightly white mass
3.	Odor	Odor of the cream of the given name	Odorless	Odorless	Odorless
4.	Hydrogen value, pH	5,0 - 9,0	5,6	6,0	6,2
5.	Colloidal stability	Stabilized	Stabilen	Stable	Has stratified
6.	Thermal	Stable	Stabilized	Has stratified	Stable



	stability				
7.	Smearability	The cream should be easy to apply to the skin surface	Applies well to the skin and forms a protective film	Absorbed on the skin surface	Absorbed on the skin surface

Evaluation of organoleptic characteristics consisted in describing the appearance of compositions, color and odor, as well as determining their homogeneity (Table 2). The criterion of homogeneity was the absence of separate visible particles of DV, foreign impurities, as well as signs of coagulation, aggregation of particles, phase separation.

All compositions, except for sample №2 are homogeneous masses of colorless, slightly white, odorless. Sample №2, the basis for which is beeswax and olive oil, is a turbid viscous mass, light yellow color, with a weakly expressed characteristic odor.

The hydrogen index was determined by potentiometric method. To do this, 10.00 or 25.00 g of cream placed in a beaker, add 90 cm³ or 75 cm³ of distilled water and stir intensively with a glass rod or magnetic stirrer. The prepared sample suspension shall be placed in a beaker with a capacity of 50 (100) cm³, then the ends of the electrodes shall be placed in the beaker with the sample. The electrodes shall not touch the walls and bottom of the beaker. When using an instrument not provided with a temperature compensation system, the sample temperature shall be (20 ± 2) °C. After the instrument readings have reached a steady-state value, read the pH value on the scale of the instrument.

When determining the colloidal stability filled two tubes with the test samples, weighed and placed in a thermostat, where incubated for 20 minutes at +45 ° C. The tubes were centrifuged and then centrifuged for 20 minutes at +45 ° C. The tubes were then centrifuged at 1,000 rpm for 5 min, after which they were signs of stratification were determined.

Thermostability was established according to the following method: three test tubes were filled with experimental samples in such a way that no air bubbles remained, and then they were thermostated at + 40°C for 1 h, after which the contents of the tubes were carefully stirred with glass sticks and left in the thermostat for 24 h [4,5].

Based on the above results of laboratory tests, we have chosen prescription №1. In this prescription of the cream the following ingredients are included in the composition:

Bismuth nitrate basic 3.0

Zinc oxide 20,0

Vaseline 30,0

Almond oil 40,0

Anhydrous lanolin 5,0

Purified water 2,0

Total mass 100.0

Further studies were conducted to investigate the stability of the sunscreen. To determine the stability of the sunscreen, packed in a dark glass container and stored for 12 months at room temperature (20° C) by natural storage method.

Table 3

Sunscreen shelf life studies



No	Name of indicator	Norm of indicators	3 months.	6 months.	9 months.	12 months.
1.	Appearance	Homogeneous mass, free of foreign impurities	No change	No change	No change	No change
2.	Color	Proper color of the cream of the given name	Colorless slightly white mass	Colorless slightly white mass	Colorless slightly white mass	Colorless slightly white mass
3.	Odor	Odor of the cream of the given name	Odorless	Odorless	Odorless	Odorless
4.	Hydrogen value, pH	5,0 - 9,0	5,6	5,8	5,9	6,0
5.	Colloidal stability	Stabilized	Stabilized	Stabilized	Stabilized	Stabilized
6.	Thermal stability	Stable	Stabilized	Stabilized	Stabilized	Stabilized
7.	Smearability	The cream should be easy to apply to the skin surface	Applies well to the skin and forms a protective film	Applies well to the skin and forms a protective film	Applies well to the skin and forms a protective film	Applies well to the skin and forms a protective film

According to the results of studies found that when stored in natural conditions for 12 months we recommended sunscreen meets all organoleptic and physicochemical properties. It is established that the shelf life of our prepared sunscreen is conditionally 1 year.

Conclusions: We prepared three compositions of sunscreen cream. Based on the results of the study of qualitative indicators such as: appearance, color, spreadability, colloidal in thermostability. According to the data of organoleptic and physico-chemical studies, we selected prescription No. 1. Based on the study of technological indicators, the optimal composition and technology of sunscreen was developed. The stability of sunscreen during 12 months was studied. The shelf life of sunscreen is conditionally set to 1 year.

References:

1. А.Г. Башура, Н.П. Половко, Е.В. Гладух, Л.С. Петровская, И.И. Баранова, Т.Н. Ковалева, А.С. Зуева // Технология косметических и парфюмерных средств Харьков Издательство НФАУ «Золотые страницы» 2002.



2. Государственная Фармакопея Республики Узбекистан.- II-том, 1 часть.- Ташкент, 2022.-С.25-33.
3. Лаас Д. Уход за кожей лица. М.: Аквариум.-1994. -С.282; Матюшина Т.П., Тимофеева Ш.Ю., Краснюк И.И. Лечебно-косметические лосьоны как лекарственная форма // Фармация. -2002. -№3.- С.42.43
4. Н. Х.Арипова, М.Б.Баратова, Н.М.Ризаева Оптимизация технологии и выбора компонентов косметического геля //Farmatsiya va farmakologiya 2024-№1 - 48-53 Б
5. Ризаева Н., Махмуджонова, К. Разработка состава и технологии геля “Мавстат” // Eurasian journal of medical and natural sciences 2024.- 4(4), 136–144.