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RESEARCH EXTRACTION ABILITY OF POLYORGANOSILOXANES OF COSMETIC APPOINTMENT

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Possibility of using silicones for cosmetic purposes as extractants of biologically active substances of vegetable raw materials considers in this paper. The dependence between the physico-chemical properties of silicones and their extractive ability is revealed. The qualitative composition and quantitative content of the main biologically active substances was determined. It was found that the composition of amodimethicone and tridecet-12-cetrimonium chloride 1288, PEG-12 dimethicone 526, cyclopentasiloxane CM 50, phenyltrimethicone PTM 20 have high extractive properties. The prospect of further research in this direction has been proved.

Introduction

The presence in the formulations of biologically active substances of plant origin significantly affects the properties of cosmetics. The value of plant extracts is that they include a naturally balanced complex of biologically active substances, which is capable of exhibiting a directional effect of the cosmetic. The most common extractants of biologically active substances of plant raw materials include water and ethyl alcohol. Each of these substances has advantages and disadvantages. In particular, water has not antiseptic properties, causes hydrolytic decomposition of many compounds, has a relatively high surface tension. Ethyl alcohol is not pharmacologically indifferent (exerts local and general effects on the human body), can cause dryness, irritation and skin rashes [1].

As alternative to known extractants, silicone polymers (silicones) can be offered. In cosmetics due to their sensory-modeling properties they are widely used [2]. The physico-chemical properties of some liquid silicones determine their ability to extract biologically active substances of plant origin [3]. The chemical structure and configuration of silicone molecules increases their permeability to plant tissue

[4]. The paucity of information on the use of silicones as plant material extractants and the use of such extracts in the cosmetic industry makes these studies of relevance [5 – 7].

Material and methods

The subjects of the study were selected calendula flowers and herbal wormwood [8] as vegetable raw materials and silicones (CM 50, PTM 20, DM 350, BRB 1834, BRB 526, BRB 1288) manufactured by BRB International BV, of the Netherlands [9].

Silicone extracts were prepared by the method of infusion [5], at a ratio of raw materials - extractant 1: 5. The composition of the silicone extracts by qualitative analysis was determined [10]. The quantitative content of biologically active substances by iodometry, permanganometry and photometry methods was determined [10].

Results and discussion

One of the main indicators of extractant quality is viscosity. It characterizes the ability of the extractant to penetrate the tissues of the raw material. Physico-chemical characteristics of silicones by the manufacturer claimed [9] are given in table 1.

Table 1 – Physico-chemical parameters of the investigated silicones

Parameters	*The investigated silicones*					
	CM 50	PTM 20	DM 350	BRB 526	BRB 1834	BRB 1288
Appearance	Colorless liquid				Muddy liquid	White liquid
Viscosity at 25 °C, m^2/sec.	4,0	22,5	367,5	300	6000	5
Content, % mass.						
- cyclopentasiloxane	99,9	-	-	-	-	-
- phenyltrimethicone	-	100	-	-	-	-
- dimethicone	-	-	100	-	-	-
- PEG-12 dimethicone	-	-	-	100	-	-
- cyclotetrasiloxane	-	-	-	-	100	-
- dimethicolol	-	-	-	-	15	-
- amodimethicone	-	-	-	-	-	35
- trideceth-12-cetrimonium chloride	-	-	-	-	-	100

Given the viscosity of silicones (Table 1), it can be assumed that CM 50, PTM 20, and BRB 1288 may have better extractive properties, since their low viscosity may contribute to better extraction of biologically active substances.

Studies of the obtained silicone extracts were to confirm the presence and identification of a qualitative composition of biologically active substances. The results of qualitative analysis are shown in table 2.

Table 2 – Qualitative determination of biologically active substances in silicone extracts

Calendula extract						
Parameters	CM 50	PTM 20	DM 350	BRB 526	BRB 1834	BRB 1288
B vitamins	+	+	+	+	+	+
P, routhine	+	-	+	+	+	+
C, ascorbic acid	+	+	+	+	+	+
A, retinol	-	-	-	-	-	+
E, tocopherol	-	-	-	-	-	+
General reactions to:						
- flavonoids	+	+	+	+	+	+
- tannins	+	+	+	+	+	+
- terpenoids	+	-	-	+	-	+
Wormwood extract						
B vitamins	+	+	+	+	+	+
P, routhine	+	+	-	+	-	+
C, ascorbic acid	+	+	+	+	+	+
A, retinol	-	-	-	-	-	+
E, tocopherol	-	-	-	-	-	+
General reactions to:						
- flavonoids	+	+	+	+	+	+
- tannins	+	+	+	+	+	+
- sexviterpenic lactones	-	+	-	+	-	+
- glycosides	+	+	+	+	+	+

Taking into account the results of qualitative reactions (table. 2), that silicones are capable of removing a complex of biologically active substances from plant material it can be noted. All samples of the extracts did not show vitamins B2, B6, and vitamin B3 found only in the samples using silicone BRB 1288 it should be noted. Also in the samples of extracts with BRB 1288 revealed vitamins A, E. The ability of this silicone to exhibit both lipophilic and hydrophilic properties by this explained [9].

The presence of biologically active substances in silicone extracts is also confirmed by quantitative studies. The results of the quantitative content of biologically active substances are shown in table 3.

Table 3 – Quantitative determination of biologically active substances in silicone extracts

Calendula extract						
Parameters	CM 50	PTM 20	DM 350	BRB 526	BRB 1834	BRB 1288
The content of ascorbic acid, mg%	0,020	0,027	0,006	1,137	0,036	0,157
The content of the sum of flavonoids,%	13,14	4,51	13,71	13,93	23,87	45,12
The content of tannins,%	0,314	0,257	0,519	1,685	0,681	0,594
Wormwood extract						
The content of ascorbic acid, mg%	0,032	0,005	0,005	1,649	0,021	0,419
The content of the sum of flavonoids,%	13,89	24,89	16,29	19,85	13,46	40,48
The content of tannins,%	0,153	0,241	0,253	1,387	0,335	0,649

The data in Table 3 indicate that all the samples of calendula and wormwood extracts contain high content vitamin C, flavonoids and tannins. Such results confirm the ability of silicones to extract biologically active substances from plant raw materials.

That the better extractants among the tested silicones can be considered CM 50, PTM 20, BRB 526, BRB 1288 it should be noted. This is due to their low viscosity and surface tension, which contributes to the better coverage of the extractives and their transition into the environment of the extractant. The results obtained suggest that silicone extracts can be used in cosmetics, since one component will exert a complex effect on human skin.

Conclusions

The possibility of using organosilicon substances as extractants of biologically active substances of plant raw materials was considered. The qualitative composition and quantitative content of vitamins, flavonoids and tannins in the composition of the silicone extracts of calendula and wormwood was determined.

A composition of amodimethicone and tridecet-12-cetrimonium chloride 1288, PEG-12 dimethicone 526, cyclopentasiloxane CM 50, phenyltrimethicone PTM 20 have the better extractive properties has been shown. Prospects for research

and application of silicone plant extracts as components of cosmetics have been proved.

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