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IR - SPECTROSCOPY OF USED FAT SUBSTANCES FOR THE PROCESS OF EMULSION FATLIQUORING OF KARAKUL

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ABSTRACT

The article presents the possibility of using waste oil obtained by repeatedly frying fish, and using it in the process of fattening karakul. The main properties of the purified oil were determined and an IR spectroscopic analysis was carried out. Bleached oil is used in emulsion greasing and karakul is obtained with soft, smooth and elastic leather tissue.

KEY WORDS: *karakul, emulsion fatliquoring, waste oil, emulsifier, fattening material, acid number, vegetable oils.*

Abbreviations
IR – Infra Red

1. INTRODUCTION

The formation of ergonomic, aesthetic, operational and other properties of the quality of fur semi-finished products mainly depends on the natural properties of the raw material, as well as on the methods of its processing and dressing. The processes of dressing fur, which is a unique natural material, are often associated with the use of chemically aggressive compounds that negatively affect the condition and quality of the hairline.

Conducting comprehensive research aimed at improving the quality of fur semi-finished products and the properties of finished products through the use of local chemical materials in technological processes, namely secondary production resources changed during the production of the main product, opens up new opportunities and prospects. and is considered one of the most pressing issues. The term lipid is traditionally used to describe a wide range of natural products, including fatty acids and their derivatives, steroids, terpenes, carotenoids, and bile acids [1]. Natural oils and fats are the main sources of fats for the leather and fur industry.

If the natural oils and fats that make up leather or fur are not properly selected, they can cause a variety of problems with the finished product, including greasy stains, uneven tanning [2], uneven coloring, saponification [3] and greasy emissions [4]. The main causes of these conditions are oil storage temperature, high humidity and the interaction of fats and oils with skin tissues and the microbiological changes that occur.

The main purpose of the fatliquoring process is to prevent thinning and drying of the fibers in the final product obtained after the drying process, as well as to reduce their adhesion. However, excessive use of fattening materials is also not recommended, as any acids used can cause fats to deposit on the surface of the semi-finished product and cause fat to burp out. Such cases also arise from the use of sulfated, sulphated, phosphated oils and various emulsifiers used in the emulsification of natural oils [5].

Fiber fattening is carried out with an emulsion of 8-12% oils in water. Accordingly, a fatliquoring emulsion consisting of fat and emulsifier is described as a multi-component homogeneous mixture. Fat components include natural and synthetic fats, and

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emulsifiers are anionic, cationic or non-ionic. Emulsifiers ensure the solubility of fat droplets inside the structures in the state of aggregation and increase their viscosity, facilitating the diffusion of the emulsion into the dermis. Fats are distributed along the leather fibers and have the necessary physical properties [6].

Most scientific research has focused on the role of emulsifiers in the emulsification of fats and oils and their effect on the quality of the finished product [7]. During the fatliquoring process, 85-90% fat is absorbed, and 10-15% of the unabsorbed material remains in the working solution as waste [8]. The composition of emulsion fats includes a large number of emulsifiers. This is hazardous to the environment as wastewater contains emulsifiers, soap metals, alkylphenylethoxylates, chlorinated paraffin oils and volatile hydrocarbons [9].

2. OBJECTIVES

Most of the fatliquoring materials used at the enterprises of the Republic of Uzbekistan are imported products. This has a significant impact on the cost of the finished product. For example, on average, 4.3 kg of fattening agent is consumed per 1000 pieces of karakul. Considering that the average price of 1.0 kg of fatliquoring material is $6.00, the purpose of the study was to localize fatliquoring substances for karakul.

In this research work, used vegetable oil is selected[10], which is formed as a result of frying fish, as well as an emulsifier obtained on the basis of it. Using them, the technology of emulsion fattening of astrakhan fur has been developed.

3. METHODOLOGY

Waste oil from fish frying was first bleached and then used as a fatliquor in the emulsion fatliquor process. Clay "Super Gold" from the production of Pakistan was used for bleaching and the main physic-chemical parameters [11-12]of the purified oil were determined.Also, literature on the IR-Fure spectrometer [13] was analyzed on the basis of these methods.

4. RESULTS

The bleached and refined butter was analyzed and the results of the analysis were tabulated. As can be seen from the table, the color of the used oil was determined on a scale of standard iodine solutions and observed as it changed from dark brown to yellow. Yellow is the color of most vegetable oils and will not harm the final product produced. Its smell, which is harmless, conveys the likelihood of oil not affecting the smell of the finished product. The specific gravity of the oil corresponds to the density of most vegetable oils. The acid number of the object under study met the requirements, since the fattening substances used in the processes of fattening leather or fur should not exceed 25.

Table
Physical and Chemical Indicators of used oil

Parameters	Before the bleaching process	After the bleaching process
Color, from 0 to 100 on the iodine scale (GOST 5477-2015)	60	40
Odor	Cutting	Characteristicodorofoils
Density 20 °C, g/cm^3	0,39	0,67
Acid number	27,48	24,5

To obtain information about the structure of the object under study, IR spectroscopic analysis was performed.

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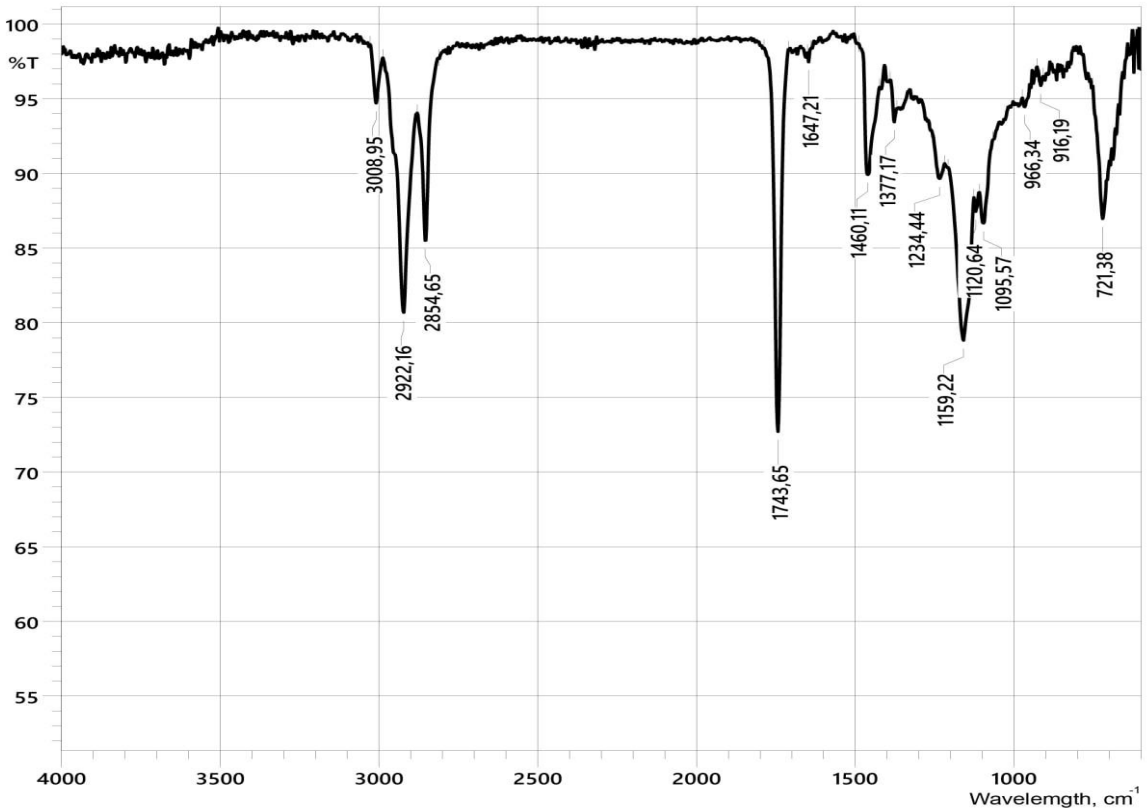

Fig. IR spectrogram of bleached butter

The IR spectra were interpreted using literature data on the characteristic absorption frequencies of various groups of atoms.

In the region of 3008.95 cm^{-1} of the IR spectrogram - COO - H in the alternating stretching vibration, as well as in the region of 2922.16 cm^{-1} - in the strong stretching vibration of C-H, the formation of alicyclic compounds is observed. When hydrogen bonds are formed, the vibrations decrease and the field expands. These compounds are commonly found in oil, essential oils, sterols, steroids, antibiotics, etc. For example, alicyclic compounds present in natural pure oils and esters can also be found in sunflower oil, used oil obtained from frying fish.

In the absorption band 2854.65 cm^{-1} - in the stretching vibration of COO-H with variable intensity, peaks characteristic of carboxylic acids appears. Usually salts of carboxylic acids and alkali metals are used as soaps, emulsifiers and fattening agents. The band in the region of 1743.65 cm^{-1} shows peaks related to esters with a strong C=O stretching vibration. Aliphatic esters usually absorb at 1750-1735 cm^{-1}. When the fields are combined, the frequency of these oscillations decreases.

Peaks related to alkanes appeared in the bending vibration of the CH_3 medium in the regions of 1460.11 cm^{-1} and 1377.17 cm^{-1} of the object under study. In the IR spectra of alkanes, stretching vibrations of the C-N bond are clearly visible in the region of 2850-3000 cm^{-1}. The frequencies of the stretching vibrations of the S-S bonds are not constant and often have a low intensity. Alkanes (paraffins, also saturated or unsaturated hydrocarbons) are acyclic hydrocarbons with a linear or branched structure, containing only simple (single) bonds that form a homologous series.

In the infrared spectrum, the range characteristic of ethers occupies the 1150–1080 cm^{-1} range with vibrations corresponding to the C–O–C group. In particular, in the IR spectroscopy of the studied fat in the regions of 1159.22 cm^{-1}, 1120.64cm^{-1} and 1095.57 cm^{-1}, ethers appeared in a strong asymmetric stretching vibration and were divided into three components. On the IR spectrogram in a strong stretching vibration, one can observe S-O sulfoxide and sulfonic groups at an absorption frequency of 721.38 cm^{-1}. This ensures the thermal stability of the oil.

5. CONCLUSIONS

The results obtained showed that after the bleaching process, the waste oil obtained by repeatedly frying the fish can be used as a greasing for fur. The process of fatliquoringkarakul is usually carried out on the basis of the emulsion fatliquor method. An emulsifier is required to form an emulsion. The emulsifier was also obtained from oil, from waste oil.

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In the process of preparing the emulsion, the emulsifier is added while stirring the fatliquoring solution. The emulsion did not separate within one hour, which indicated the stability of the emulsion.

The process of fatliquoring karakul was carried out on the basis of this emulsion. Process temperature 36-37°C, duration 3 hours, pH 8.5. After the lubrication process, the pressing process was carried out. Drying of karakul fur was carried out in the open air, indoors.

When organoleptically assessed, it was noted that the skin tissue of karakuldeeply absorbed the fat emulsion, was soft and elastic. According to the organoleptic analysis, it should be noted that the level of absorption of fattening materials from the working composition after the fatliquoring process was high.

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