Volume 3, Issue 4 April 2025 **ISSN (E):** 2938-3757

METHODS OF USING SPENT BLEACHING CLAYS

Murodullaeva N. U., Student
Suvanova F. U., Professor
Karshi State Technical University,
Karshi, Uzbekistan
E-mail: doc.fayoza@mail.ru

Abstract
Abstract: Vegetable oils undergo multi-stage purification processes. In the process of oil bleaching, special clays containing all the macro- and microelements necessary for a living organism are used as adsorbents: The article describes the methods for processing used adsorbents. In particular, a method is proposed for using waste generated in the process of adsorption refining of vegetable oils as additives for enriching feed meal.

Keywords: Refining, bleaching clays, adsorbents, bentonites, fatty clay, feed value, meal.

Introduction

Vegetable oils are complex multi-component systems containing various impurities, including unwanted ones. Along with such useful substances as essential polyunsaturated fatty acids necessary for normal growth and development of the body, fat-soluble vitamins A, D, E, K, phospholipids regulating fat metabolism in the body and others, they contain a number of substances that reduce the nutritional and physiological value of products, as well as complicate their processing. The amount and composition of impurities found in raw oils varies widely and depends on the type of oil, the quality of the raw materials used and the method of its processing. Some oils (sunflower), produced by pressing from mature seeds, can be used in food without purification. Such oils as, for example, cottonseed or soybean, due to the presence of toxic impurities, dark color, high acidity in raw form are not used in food, they must be pre-purified. To remove these impurities (accompanying substances), oils are subjected to refining. Refining is a complex multi-stage process based on physical, physicochemical methods of processing oils in order to improve their quality, food and physiological value, and improve their technological properties. To clean fats from a number of impurities, the process of refining adsorption is used. As is known, adsorption is understood as the absorption of any liquid or gaseous substance by the surface layer of a solid or liquid. This method of purification is used to remove mainly colored substances (pigments) from oils and is called bleaching. When refining vegetable oils, bleaching earths obtained from natural bentonite clays - aluminosilicates are widely used for their bleaching: ascanite, gumbrin, fuller's earth, etc. Mixtures of various bleaching earths and activated carbons are also used as adsorbents-absorbers when bleaching oils [1].

Web of Technology: Multidimensional Research Journal
webofjournals.com/index.php/4

Web of Technology: Multidimensional Research Journal
webofjournals.com/index.php/4

Bleaching clays are mineral products of silicate (SiO_2) or aluminosilicate ($Al_2O_3 \cdot nSiO_2$) nature. The main components of bentonite clays are montmorillonite, which after modification is used in the oil and gas, food, cosmetic, pharmacological and construction industries, mineral salts of aluminum, silicon, calcium, etc. Bentonite is a biologically active substance, its addition to feed and fertilizers in the soil increases the productivity of animals and the yield of agricultural crops. In the process of adsorption refining (bleaching), oils are kept in contact with bleaching powders, and then the spent adsorbent is separated by filtration. The amount of powder introduced varies within 0.5–2.0% of the mass of the bleached oil. The spent bleaching powders, together with absorbed coloring agents and other impurities, contain a significant amount of oil. In addition, it is known that natural adsorbents absorb carotenoids well, which have high biological value. At the end of the technological process, about 60 kg of fatty clay with a fat content of up to 35% and a caloric value of up to 265 kcal/100 g is removed from each ton on average.

Spent bleaching powders are a poorly transportable mass. They can be processed to utilize the fat remaining in them, and subjected to processing with the extraction of absorbed oil. At some enterprises, special soap pastes are prepared from spent bleaching powders. However, such methods are quite labor-intensive and are not used at enterprises [2]. For this reason, a large amount of spent bleaching earth accumulates at oil processing plants.

It should be noted that at oil and fat plants in the Republic of Uzbekistan, as a rule, spent bleaching clays are not degreased and a fairly valuable product is taken to a landfill. Depending on the quality of cottonseed oil and its purpose, different amounts of adsorbent are consumed, on average its rate is 1.5% of the mass of bleached oils and fats. The amount of spent bleaching fat clays in Uzbekistan reaches 1.0-2.0 thousand tons (in terms of fats) per year.

At oil and fat enterprises, imported adsorbents are used for bleaching vegetable oils. At the same time, Uzbekistan has a number of large deposits of natural adsorbents, the use of which will significantly reduce the cost of the refined oils obtained. These include bentonite clays, palygorskites and kaolin [3,4].

We have studied these natural clays as adsorbents in the process of adsorption refining of cottonseed oil, as well as adsorbent-detoxicants in the process of its hydrogenation. Studies have shown that these adsorbents are not inferior to imported analogues [4,5] in their clarifying and adsorption properties.

For preliminary clarification of crude oils obtained from low-grade and non-standard cotton seeds, clay adsorbents were modified with a urea solution. Urea modification of clay adsorbents is necessary to increase their clarifying capacity during refining of dark raw cottonseed oils obtained from low-grade and non-standard cotton seeds.

The resulting refining waste in the form of used bleaching earth was used as an additive for enriching the meal. Considering that in animal husbandry urea is used to enrich feed with non-protein nitrogen, its presence in the meal is a positive moment. Meals are secondary products in the production of vegetable oils by the extraction method. They are formed as a result of degreasing the oilseed raw material and contain from 25 to 40% of solvent and water. The solvent is in the meal in a bound state, in the form of miscella. It is removed by distillation. The solvent is distilled from the meal in a stirred layer in tank evaporators (toasters), in which the

meal is treated with live steam while stirring. During the steaming process of the meal, conditions are created for moisture-thermal treatment, which neutralizes toxic substances contained in cottonseed, soybean and peanut meals. As a result of such treatment, the food and feed value of the meals increases.

The meals are used mainly for feed and food purposes, it is a highly valuable feed product, in which approximately 95% of nitrogen is protein nitrogen. The content of crude protein reaches 50%, and in terms of overall nutritional value it is close to the best grain feed. Therefore, the meal is especially necessary for dairy cows that need a lot of protein. The protein contained in the meal is complete in amino acid composition, especially in comparison with cereal feed. The fiber contained in them affects the digestibility of food and is necessary in the diets of all animals, especially ruminants. The nutritional value of the meal is not only in the large amount of proteins (35...50%), but also in the high content of fats, carbohydrates, phosphorus-containing substances, the presence of ash elements (6...7%), the presence of a significant amount of B vitamins, beta-carotene (provitamin A). [6].

Table 1. shows the chemical composition of cottonseed meal.

Table 1. Chemical composition of cottonseed meal

Indicators	Meaning	Indicators	Meaning
Feed units	0,90	Magnesium, g	4,6
Dry matter, g	900	Sodium, g	3,5
Crude protein, g	410	Iron, g	255
Digestible protein (cattle), g	327	Copper, mg	15,9
Lysine, g	17,8	Zinc, mg	42,7
Methionine+cystine, g	11,5	Manganese, mg	18,1
Crude fiber, g	124	Cobalt, mg	0,14
Starch, g	15	Iodine, mg	0,25
Sugars, g	65	Carotene, mg	1
Biological extractive substances (BES), g	279	Vitamin D (calciferol), thousand IU	3,5
Crude fat, g	14	Vitamin B1 (thiamine), mg	6,1
Calcium, g	4,1	Vitamin B2 (riboflavin), mg	44,5
Potassium, g	9,9	Vitamin B3 (pantothenic acid), mg	67,8
Phosphorus, g	10,1	Vitamin B4 (choline), mg	2886

The meal obtained after oil extraction is an indispensable component in the preparation of concentrated feed for farm animals, as well as a source of protein food products. The meal is important as a nutritional supplement in the manufacture of compound feed for pigs and poultry, because it contains natural proteins, fiber, essential vitamins of groups E and B, potassium, phosphorus and other essential minerals.

When processing cotton seeds, obtaining non-toxic meal is a difficult task. The seeds and cottonseed meal contain a highly toxic substance - gossypol and its derivatives. The most toxic is free gossypol, which, when heat treated, turns into bound, relatively less toxic. It follows that to obtain non-toxic cottonseed meal, intensive heat treatment of the pulp and mandatory

Web of Technology: Multidimensional Research Journal
webofjournals.com/index.php/4

toasting of the resulting meal are necessary. However, with such treatment, the feed value of the meal proteins simultaneously decreases due to the loss of up to 25-30% of essential amino acids.

In order to increase the feed value of the meal, it is enriched at oil-producing enterprises using waste from refining production - soap stock and phosphatide emulsion. Due to this, the meal is enriched with lipids, phosphatides, tocopherols, sterols.

Currently, sunflower and cottonseed meal are most widely enriched. Fats and vegetable oil as a source of energy occupy the first place in terms of caloric content in the composition of complete compound feeds. In recent years, industrial processing products and non-traditional feeds have increasingly been used in feed rations. To optimize the composition and level of metabolic energy, fats and vegetable oils are included in feed. It is relevant to find new sources of feed fats and energy, one of which is spent bleaching earth - a product of processing refined cottonseed oil with bentonite clay or other adsorbents used in refining production.

Bentonite clays contain almost all macro- and microelements necessary for a living organism, in connection with this bentonite clays are used in medicine and veterinary science as adsorbents to combat diseases of the gastrointestinal tract. It is believed that these clays have the ability to adsorb poisons, bacteria and toxins, envelop the inflammation of the mucous membrane of the digestive tract. The use of spent bleaching clays in animal husbandry and poultry farming will solve such problems as obtaining enriched meals containing the required amount of minerals, proteins and lipids, this will increase the biological value of the meals. In addition, the use of waste obtained during the processing of vegetable oils will solve the problem of waste disposal at oil mills. To identify a more rational and safe way of recycling used adsorbents, it is necessary to study the physicochemical properties of spent bleaching clays.

References:

1.Арутюнян Н.С., Корнена Е.П. и др. Технология переработки жиров.- М.: Пищепромиздат, 1998, 452 с.

2. Горелова О. М. Поиск путей утилизации отходов в производстве масел / О. М. Горелова, Л. В. Куртукова. – Текст : электронный // Известия КГТУ им. И. Раззакова. – 2019. – №2 (50). – Часть 2. – С. 232–237.

3.Suvanova F., Ikromov O., Axmedov A., Farmonov J. Changing the cotton oil factors and miscell in process adsorbtion refining. CBU international conference on integration and innovation in science and education. april 7-14, 2013, Prague, Czech Republic.

4.Фармонов Ж.Б., Суванова Ф.У. Подбор адсорбентов для очистки хлопковых масел. Молодой ученый. №11 (58), ноябрь, 2013.-С34-38. (ISSN 2072-0297).

5. Суванова Ф.У., Икромов О.А. Файзиева У.М.Исследование свойств природных адсорбентов используемых при отбелке хлопкового масла. Химический журнал Казахстана. Алматы, Специальный выпуск. 2012. –С.370-373

6. В.Г.Щербаков. Технология получения растительных масел.- М.: Колос, 1992. -207с

7. Suvanova F., Qobilova N., Tuxtamishova G. Improvement of solvent recovery technology in oil extraction production //Science and innovation. – 2023. – Т. 2. – №. A1. – С. 209-212.