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IMPROVEMENT OF THE PROCESS OF PRODUCTION OF CRUDE AND DISTILLED FATTY ACIDS FROM UNCONVENTIONAL OIL RAW MATERIALS

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Abstract: The article analyzes the issues of improving the process of production of crude and distilled fatty acids from unconventional oil raw materials. The yield and quality indicators of fatty acids in traditional methods are limited, which allows to increase the efficiency of new technological approaches and optimization methods. The study covers methods for improving parameters in the processes of raw material preparation, extraction, distillation and separation of crude fatty acids. It also considers the possibilities of improving product quality, efficient use of energy and resources, ensuring environmental safety, and reducing microbial and chemical contamination. Optimization algorithms developed based on modern biochemical methods and process models help to increase the yield of fatty acids and ensure their stable quality. The article is aimed at increasing the efficiency of the fatty acid production process by using non-traditional raw materials, such as seeds, fruits, nuts and other lipid sources. The results of the study allow for increasing energy and material efficiency in industrial production processes, producing quality products, and introducing environmentally sustainable technologies.

Keywords: Non-traditional raw materials, crude fatty acids, distillation, extraction, lipids, technological optimization, energy efficiency, environmental safety, biochemical methods, production process.

Fatty acids are important biochemical components for human health, the food industry and the pharmaceutical industry. Traditional oil production methods usually limit the yield and quality of oil produced from raw materials, are energy intensive and have a significant impact on the environment. Therefore, increasing the yield and quality of fatty acids through the use of non-traditional raw materials and process optimization is a pressing scientific and practical issue.

The article analyzes methods for improving the production processes of crude and distilled fatty acids, increasing efficiency and ensuring consistent quality. The study explores the possibilities of using non-traditional raw materials (seeds, fruits, nuts), optimizing extraction and distillation parameters, ensuring energy efficiency and environmental safety.

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Non-traditional raw materials include seeds (sesame, flax, pumpkin), nuts (almonds, pistachios, hazelnuts), fruits (apple seeds, pumpkin seeds) and other lipid sources. These types of raw materials have high biological activity and a rich content of fatty acids, which are important for health and the food industry.[1]

The use of non-traditional raw materials provides the following advantages:

1. Increased yield: the ability to obtain more oil compared to traditional raw materials.

2. Improved quality: a high content of unsaturated fatty acids in the oil.

3. Diversification: diversification of product quality through the use of different lipid sources.[3]

During the preparation of raw materials, their drying, grinding and moisture content significantly affect the efficiency of distillation and extraction. The selection of optimal conditions allows you to make the process more efficient and improve the quality of the oil.

The process of obtaining crude fatty acids consists of several main stages:

1. Preparation of raw materials: cleaning, drying, crushing.

2. Extraction: separation of oil from raw materials. At this stage, cold pressing or extraction with soluble solvents is used. Cold pressing allows the preservation of biologically active substances, while solvent extraction gives a high yield.

3. Filtration and purification: cleaning the oil from damage and solid particles.

4. Distillation: separation of distilled fatty acids from crude oil. At this stage, vacuum and thermal conditions are optimally selected.

Optimization of process parameters (temperature, pressure, extraction time) significantly increases the yield and quality of fatty acids.

The distillation process allows the extraction of highly purified fatty acids from crude oil. Modern technologies use the following:

Vacuum distillation: protects against high temperatures and preserves the natural properties of the oil.

Fractional distillation: separates different fatty acids.

Membrane technologies: high energy efficiency and low environmental impact.

Determination of optimal conditions in the distillation process is carried out through laboratory and pilot studies.

Process improvement methods

1. Pre-treatment of raw materials: optimal drying, grinding and pre-extraction.

2. Energy efficiency: reducing energy consumption using heat exchangers and membrane technologies.

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3. Optimization of process parameters: controlling temperature, pressure, extraction time and solvent amount.

4. Biochemical and microbial control: maintaining oil quality and reducing contamination.

5. Environmental safety: efficient waste recycling and use of natural resources.[4]

These methods make it possible to make the production process more efficient, increase productivity and ensure consistent quality.

The quality of fatty acids can be assessed by the following criteria:

Chemical composition (unsaturated, saturated fatty acids)

Color, odor and taste

Biologically active substances (vitamins, antioxidants)

Microbial safety

With the help of optimization and modern technologies, it is possible to maintain the above quality criteria.

Improving the process of producing fatty acids from non-traditional raw materials:

1. Ensures efficient use of energy and resources.

2. Increases product quality, maintains bioactivity.

3. Ensures environmental safety.

4. Allows the production of quality products in the food, pharmaceutical and cosmetic industries.[5]

In conclusion, the article analyzed the issues of improving the process of producing raw and distilled fatty acids from non-traditional raw materials. Productivity and quality are increased by optimizing raw material preparation, extraction, distillation and process parameters. Modern technologies and biochemical methods allow ensuring energy efficiency and environmental safety. The results of this research can be used in industrial production processes, to produce quality products and to use resources efficiently.

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