Regulation of the Concentration in the Extraction and Distillation Aggregate

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ABSTRACT

This article discusses the technology of extraction of vegetable raw materials for the complete extraction of oils. The issue of process automation in the extraction-distillation unit is also being solved. According to the existing theory, the preparation of raw materials for pressing is to destroy the cell of oilseeds as much as possible. The extraction of essential oils from plant materials is based on extraction with organic solvents or steam distillation. This allows a significant loss of volatile aromatic substances and leads to a violation of the natural balance of the components in the composition of essential oils.

Keywords: process, extraction, distillation, automatization, controlling system, microcontroller, product quality

Introduction. A refining prepare is at that point conducted to total the division of the remaining components and deliver the purest conceivable oil. It is worth noticing that indeed in spite of the fact that a source fabric has been winterized, as much as 40% of the remaining feedstock may comprise of undesirable materials. Moreover, within the case of ethanol extraction, ethanol must at that point be dissipated to partitioned it from components. As within the extraction process, the refining handle that's utilized to completely filter oils requires closely controlled temperature, weight and source fabric nourish rates to guarantee that the vital intuitive deliver a high-quality wrapped up item with characteristics that produce the most noteworthy conceivable esteem. The foremost common pieces of hardware are wiped film, atomic short-path stills. In this approach, the feedstock of oil is encouraged into a jacketed vessel that's regularly warmed with an oil circulating to attain temperatures up to 343°C (650°F), in spite of the fact that the normal refining temperature run is 130 -180°C (266-356°F). In these frameworks, the bolster stock is dispersed on the dissipation chamber divider with a extraordinary wiper. The coming about lean film permits the more unstable terpenes to vanish through the beat of the chamber into their possess outside collection vessel, whereas is collected along controlled central condenser unit which is cooler. The process of moisture-thermal treatment weaken the forces that hold the oil in the cell by increasing the plasticity of the cell membrane by moisturizing and then drying to giving it certain elastic properties that provide conditions pressing. In the technology of extracting medicinal oils from the kernel of fruit stones, grape seeds, etc., the oil is extracted from raw materials by cold

threefold pressing. In this case, the yield is up to 30-40% of the total the amount of oil in the raw material. The development of methods of energy-saving technologies that allow obtaining new high-quality products in the pharmaceutical, perfumery and food industries is due to an acute public the need for high-quality medicines and food, and also in environmentally friendly industries [1, 2]

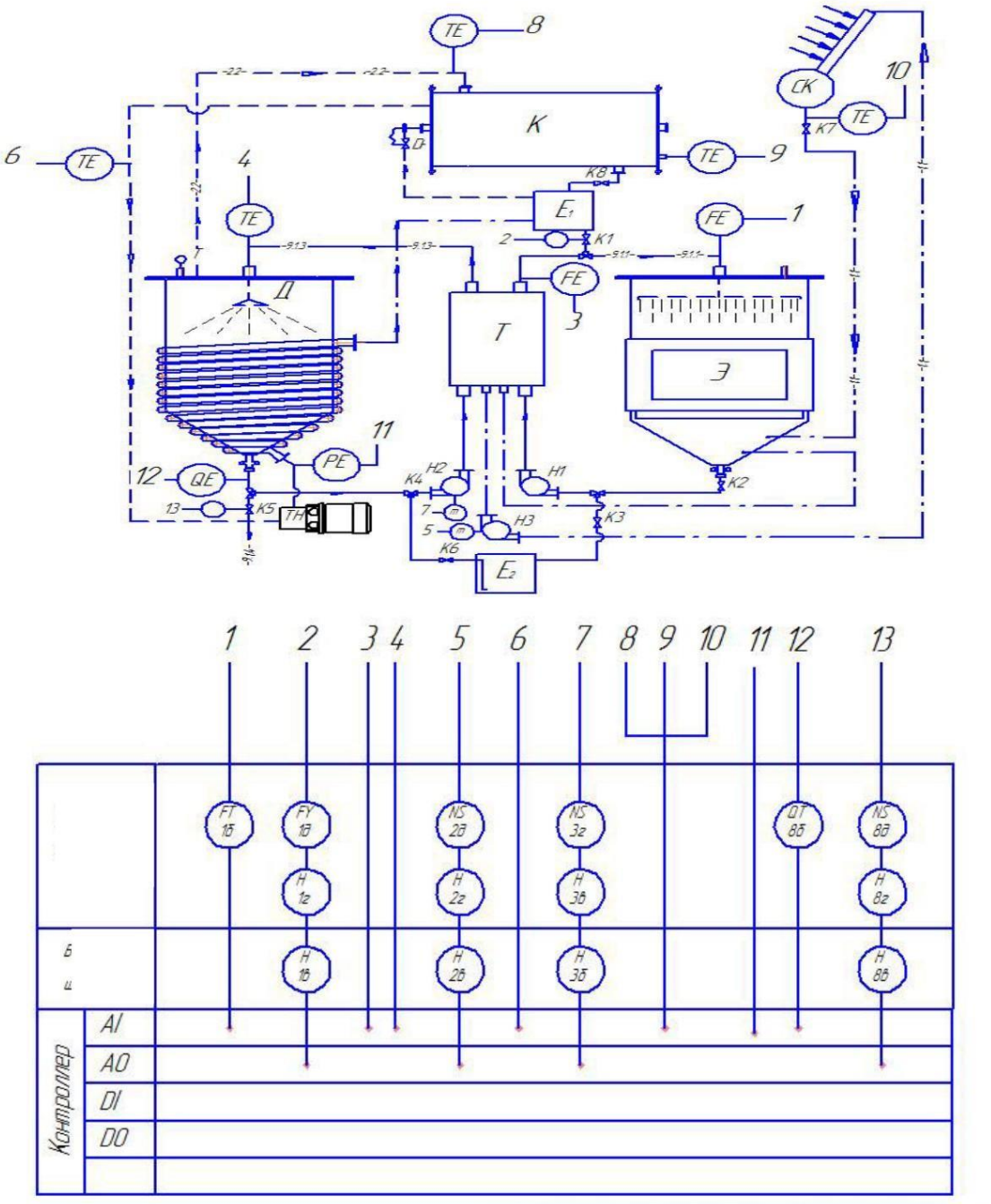

Figure 1 - Scheme of automation of the extraction and distillation unit

Scheme of automation of the experimental setup for extraction and distillation of oil from fruit stones consists of three single-circuit automatic control systems, each of which performs one of the control tasks. The technological scheme of the developed and manufactured pilot plant using a heat pump and a solar collector for extracting extracts from plant materials by direct extraction consists of an extractor - irrigation E, heat exchanger T, distiller D, condenser K, heat pump compressor ***TN,*** pump owls ***H1, H2*** and ***H3,*** solar collector ***SK,*** and capacity ***E*** for accumulation solvent. The extraction of oil by extraction is carried out in the following order: the cassette with crushed oily material is inserted into the extractor E and the required amount of solvent is poured into container ***E.*** The externally insulated heat exchanger is filled with water and heated with C from the heat pump condenser and salt up to a temperature of 85 - 90 of ^{0}C the final collector. Then taps K1 and K9 are opened, taps K2 and K10 are closed, the pump is turned on, and the solvent is sprayed onto the oily material that was in the extractor cassette [3].

After the accumulation of the required ratio of the amount of solvent to the extracted raw material in tap K1 closes on the conical bottom of the extractor. By opening tap K2, the oil material is further irrigated with the circulating solvent in a closed system by means of a pump. When the miscella circulates through the heat exchanger, the miscella heats up to 55 - 60^{0}C, which is necessary to intensify the extraction process.After completion of the extraction process, valve K10 is opened and K9 is closed, and the miscella from the extractor is pumped into the distiller. By end of miscella pumping, pump 6 is switched off, taps are closed K2 and K10, the extractor is loaded with a new portion of the oil material and the cycle is repeated. The purpose of automation of the extraction-distillation unit is to achieve its stable peration at the maximum productivity of the extractor, to ensure a high concentration of miscella and the depth of oil removal, with minimal solvent and energy consumption. max. Functional diagram of extraction-distillation automation the unit is shown in Fig. 1. The miscella pumped over by the pump is atomized by a nozzle located at the top of the distiller. In the distiller, miscella circulation is carried out by the pump through the heat exchanger by opening the valve *K5.* Due When the miscella is heated to a temperature of 55–600 ^{0}C and sprayed, the intensive evaporation of the solvent from the miscella begins. The solvent vapors enter the condenser through the droplet eliminator, where they condense on the surface of the heat pump evaporator and the condensate returns to storage tank. At the end of the distillation process, valves K3 are closed, the pump stops and valve K6 opens. The resulting oil is sent to cleaning. The extraction process continues until 97% of the oil contained in the material is released, the distillation process continues until 99.2% of the solvent contained in the miscella evaporates [4].

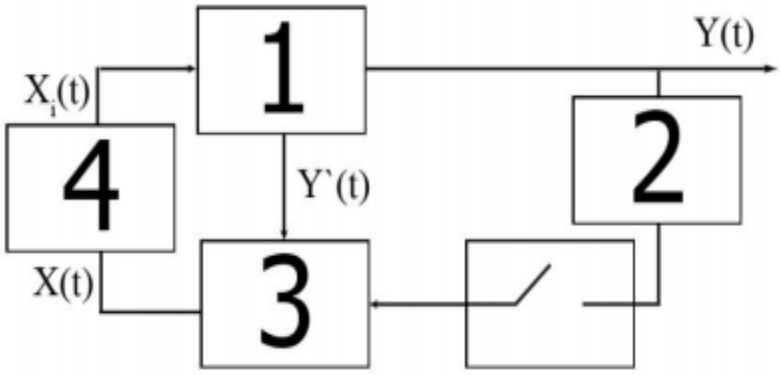

Figure 2 - Block diagram of ATS product quality.

Stabilize the solvent flow, a single-loop control system consisting of a flow meter, a microcontroller and a control valve installed on the solvent supply line. The automatic miscella temperature control system after the heat exchanger consists of a temperature sensor that measures the temperature and converts it into a unified signal. This signal is measured by the microprocessor microcontroller. The same way the temperature in the condenser and solar collector is controlled.

The oil concentration at the outlet of the distiller is measured by a concentration meter, the converted unified signal after the concentration meter is fed to the input of the

The microcontroller continuously calculates the quality score s

$$X(t) = F_1 \sim (y(t) + F_2(t - t_i), y(t_i), y(t_{i-1}), \dots)$$

measured process variables dynamically associated with them, and the second is from the output of the extrapolating filter. To improve the accuracy of composition and quality control, devices with an automatic calibration device. In this case the control system performs periodic calibration of the analyzers composition, adjusting their characteristics. The discreteness of the measurement leads to significant additional delays and reduce the dynamic accuracy of regulation. To to reduce the undesirable influence of the measurement delay, we use a model for linking product quality with variables that measure continuously. We refine the coefficients of the model by comparing the calculated it and found as a result of the next analysis the value of the qualitative parameter. Thus, one of the rational ways quality regulation is regulation by indirect calculated indicator with clarification of the algorithm for its calculation according to the data direct analyses. Between measurements, the quality index product is calculated by extrapolating previously measured values [6].

icrocontroller, which generates a control signal to change the position of the regulator threading mechanism. Precise maintenance plays an important role in this process. Qualitative parameter - miscella concentration. This setting characterized by the complexity of measurement. In some cases, to measure composition using the chromatographic method. At the same time, the result measurement is known at discrete times, separated from each other for the duration of the chromatograph cycle. A similar situation arises when the only way product quality measurement is mechanized sample analysis [5].

The nearness of two bulk stages, stagnant dissemination layers, the interfacial locale as well as the interface itself, and the chemical slopes inside these zones makes experimentation and conclusive distinguishing proof of particular extraction instruments and their rate-limiting steps exceptionally troublesome. To date, extraction energy ponders on the uncommon earths have centered on liquid-liquid extraction frameworks that are of intrigued for potential application in industrial-scale uncommon soil divisions basically utilizing a few form of a Lewis cell. Numerous bunches have designed modern cells as workarounds to the disadvantages experienced within the utilize of Lewis cells, but each development in steady interfacial range cells comes with its claim interesting disadvantages. More as of late, to utilize of microfluidics to ponder dissolvable extraction energy speaks to a promising elective to Lewis-type cells [7].

By giving fast and careful blending in both stages and well-defined particular interfacial ranges, microfluidics approaches show up. Understanding the nature of the species display at the interface is basic to long-term of investigate in this field, but redress elucidation of the extraction information is additionally vital. A shocking number of thinks about disregard to account for the arrangement of unextractable complexes within the fluid

stages or known extractant accumulation equilibria in their examinations. The arrangement of fluid complexes by proton trade responses can have especially expansive but troublesome to recognize impacts on the pH reliance of the extraction rates and the clear stoichiometry of the extricated complex. Falling flat to account for this has driven a few kineticists to propose clearly erroneous rate laws and unlikely instruments, most strikingly those involving uncommon soil hydroxide complexes in tolerably acidic arrangements. Slant investigation must be carefully connected, and partitioned thinks about of the speciation within the bulk fluid and natural stages by other physical strategies can be exceptionally enlightening here [8].

The oil concentration at the outlet of the distiller is measured by a concentration meter, the converted unified signal after the concentration meter is fed to the input of the icrocontroller, which generates a control signal to change the position of the regulator threading mechanism.

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