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Short Communication

Features of Extraction of Valuable Components from Plant Raw Materials

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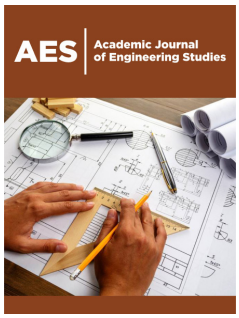
ISSN: 2694-4421



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Submission: August 11, 2020

Published: September 11, 2020

Volume 1 - Issue 4

How to cite this article: Kasyanov GI. Features of Extraction of Valuable Components from Plant Raw Materials. Academic J Eng Stud. 1(4). AES.000516. 2020.
DOI: 10.31031/AES.2020.1.000516

Abstract

The article presents the hierarchy of the process of extracting valuable components from spicy-aromatic and medicinal raw materials: from essential oils to supercritical extracts. The description of installations for obtaining essential oil, carbon dioxide from flue gases, subcritical CO_2-extraction and supercritical fluid extraction is given.

Keywords: Essential oil; Carbon dioxide; Subcritical; Swerczek

Introduction

In practical terms, the extraction of CO_2-extractive substances from secondary grain processing resources makes it possible to obtain high-quality products [1]. New ways to intensify the process of extracting valuable components from raw materials are being implemented relatively quickly at the existing extraction plant [2]. The development of modern sub-and supercritical technologies has been recognized not only in the country, but also abroad [3]. The process of obtaining CO_2-extracts from grains and nuts can be supplemented with pre-enzymatic and extrusion processing [4]. The prototype for obtaining CO_2-extracts has always been essential oils obtained by steam distillation [5]. However, the high temperature of obtaining essential oils leads to the destruction of some of the thermolabile substances. Automation of technological processes plays an important role in increasing the efficiency of extraction production [6,7].

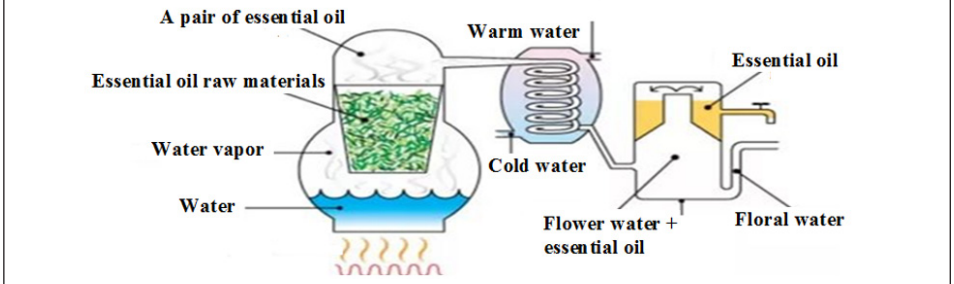

Figure 1: Scheme for obtaining essential oil from vegetable raw materials.

The simplest and most affordable way to process aromatic raw materials is steam distillation (Figure 1). Essential oils are widely used in the perfume and cosmetics industry. The most suitable solvent for essential oils and related substances was liquefied carbon dioxide. Figure 2 shows the line for producing carbon dioxide from flue gases.

The use of liquid carbon dioxide as an extractant has a long history. Scientists and specialists of the scientific and pedagogical school operating at KubSTU made a significant contri-

bution to the development of this technology. Figure 3 shows a diagram of a subcritical CO_2-extraction unit operating in the range of temperatures from +10 to +25 °C and pressures from 5 to 6.5MPa. Another option for processing plant raw materials is supercritical fluid extraction, in which the extractant is a dense gas at a temperature of 40 to 60 °C and a pressure of 10 to 60MPa. Thus, the extraction industry has made a transition to high technologies for extracting target components from raw materials with liquefied and compressed carbon dioxide (Figure 4).

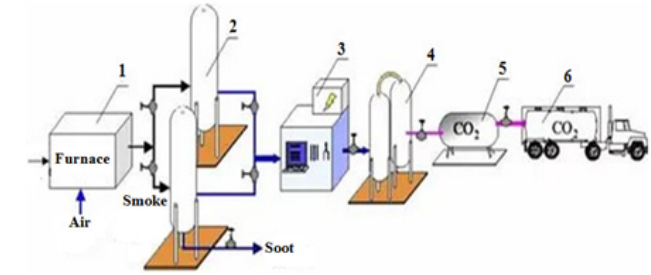

Figure 2: line for producing carbon dioxide from flue gases.
1-firebox, 2-heat exchanger, 3-compressor, 4-CO_2-production plant, 5-CO_2-collector, 6-CO_2-tanker.

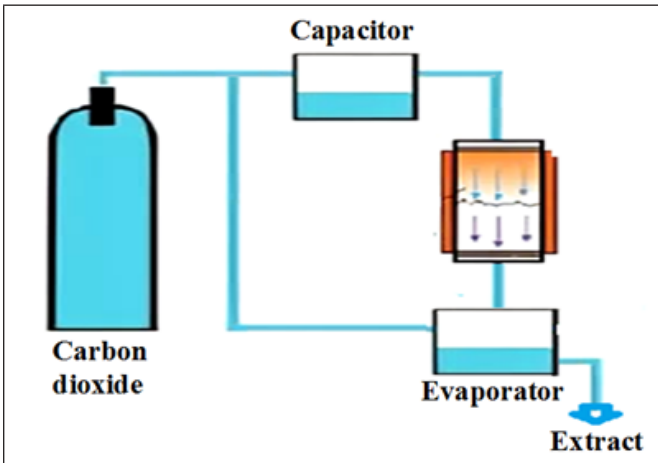

Figure 3: Scheme of subcritical CO_2 extraction plant.

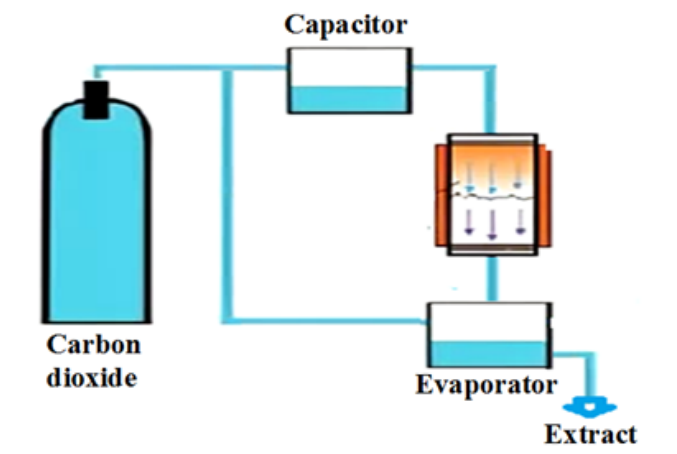

Figure 4: Diagram of a fluid CO_2-extraction unit.

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