EXTRACTION OF STINGING NETTLE (Urtica dioica L.) WITH SUPERCRITICAL CARBON DIOXIDE

V. Rafajlovská, Z. Djarmati, V. Najdenova, Lj. Cvetkov

1 Faculty of Technology and Metallurgy, 1000 Skopje, Republic of Macedonia
2 Faculty of Technical Science “Mihajlo Pupin”, 23000 Zrenjanin, Yugoslavia

The stinging nettle designated as a detestable weed plant, spread almost all over the world is a treasure of active components. Due to the fact that stinging nettle leaves are rich in flavonoids, chlorophylls and carotenoids and their degradation products, vitamins, proteins, mineral materials, organic acids, oil, and other components, the stinging nettle is of high value in the folk medicine as well as in scientific medicine. The large number of produced preparations from the stinging nettle is found to be used in the process of prevention or treatment of various diseases. The sitosterols and agglutinins isolated from the nettle root, which show positive effects on the treatment of benign prostate hyperplasias, are lately becoming more and more interesting.

Apart from the use of the organic solvents, supercritical fluids, especially CO₂, are used for extraction of plant materials.

The lack of literature data for extraction of stinging nettle with supercritical CO₂ set the objective of this work. The influence of the pressure, temperature, density of supercritical CO₂ on the contents of chlorophylls and β-carotene in the obtained stinging nettle extracts was followed.

The extraction of the stinging nettle leaves was performed with 20 kg/h flow rate of supercritical CO₂. The influence of the working parameters: pressure (140 bar, 210 bar and 350 bar), temperature (from 40 °C to 60 °C) on the quantity of extract and contents of chlorophyll a+b and β-carotene in it is determined. The biggest quantity of extract (4.48% in relation to the dry matter) with 0.88% contents of chlorophyll a+b and 0.50% β-carotene is obtained at 350 bar, 60 °C, 6h extraction time.

UNIFIED GAS CHROMATOGRAPHIC METHOD OF DETERMINATION OF METHANOL IN NATURAL GAS AND RELATED PRODUCTS

N.N. Kislenko, S.A. Arystanbekova, A.A. Geras’kina

All-Russian Scientific-Research Institute of Natural Gases and Gas Technologies VNIIGAZ, Pos. Razvilka, Moscow Region, 142717 Russia; saule@nv.vniigaz.gazprom.ru

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Methanol is widely used during production and processing of natural gas at main gas fields of Russia. Presently, application of methanol grows up because of more intensive exploitation of gas-condensate fields containing quite a lot of hydrocarbons heavier than methane. Due to technology requirements, permanent control of concentration of methanol in semi-finished natural gas products is necessary. Before transporting, main part of methanol separates from the gas to be used recurrently. However, one must control the rest traces of methanol in transporting gas because of its high toxicity. The most appropriate method for this is gas chromatography due to its high selectivity and sensitivity.
Up to date, there is a standardised method of the determination of methanol traces in liquefied gases [1]. According to the international standard [2], methanol is determined by direct analysis of the natural gas taken from its flow. Our method is based on pre-concentration of methanol from a natural gas sample by passing it through two glasses containing water solution of sodium sulphate. Then the content of methanol was determined in the solutions obtained by means of analysis of their equilibrium gas phase at 60 °C. For this purpose, gas chromatography with a packed column filled with a modified polymer adsorbent was applied. When probe containers with a volume of 300 ml are applied, the method developed allows to determine methanol in natural gas in the range 0.010-5 mg l\(^{-1}\) (1.3x10\(^{-6}\) – 6.5x10\(^{-4}\) vol%). This high sensitivity of the method is reached due to the pre-concentration of the analyte. Partial separation of methanol from the matrix components allows to decrease superposition of the corresponding chromatographic peaks that improves correctness of the analysis and decreases the detection limit. If direct analysis from the natural gas flow is not possible, application of salt solutions allows to determine traces of methanol sorbed on the probe container surface. With the corresponding changes in sample preparation procedures, the method developed may be used for analysis of various technological semi-products (such as non-stable and stable condensate), as well as wastes.

References

2. ISO 6977-83 “Natural Gas – Determination of Water and Methanol by Gas Chromatography”.

DETERMINATION OF PENTOXIFYLLINE IN WORKPLACE AIR BY SPECTROMETRIC AND HPLC METHODS

V.L. Christova-Bagdassarian, T.M. Angelov, V.S. Galabova, F.T. Ribarova

National Center of Hygiene Medical Ecology and Nutrition, 15 D. Nestorov str., 1431 Sofia, Bulgaria; e-mail: krisva93@yahoo.com

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The drug Pentoxifylline is used to eliminate or reduce disturbances in the peripheral blood circulation. It is possible to contaminate the workplace air with pentoxifylline aerosols in the process of production.

Two methods with the same sampling and sample preparation for determination of pentoxifylline in workplace air are developed.

The sampling from air is performed by means of perchlorovinyl filters (FPP). The samples are extracted for 40 min with methanol.

A simple UV-spectrophotometric procedure is described for the quantitation of pentoxifylline. A measurement range is 0.005 – 0.1 mg/cm\(^3\) at 275 nm (R\(^2\)=0.9866). The method is not selective in presence of caffeine and theophylline. The average recoveries by UV-spectrometric analysis are 82.37% at 10 \(\mu\)g/cm\(^3\) and 95.01% at 25 \(\mu\)g/cm\(^3\).

A HPLC method for determination of extracts from FPP of pentoxifylline is established, too. A RP LiChrosorb C\(_{18}\) (5 \(\mu\)m, 250 mm x 4.6 mm i.d.) column is used. The mobile phase is 70% acetate buffer (pH 4.3) and 30% acetonitrile (v/v) at a flow rate of 1.0 ml/min. The detection wavelength is 275 nm. The method is selective, because the retention time of...