

COMPARISON OF DIFFERENT EXTRACTION METHODS FOR THE EXTRACTION OF TOTAL PHENOLIC COMPOUNDS FROM SPRUCE BARK

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Abstract

Bark is an attractive renewable raw material, comprised of all types of silviculture vegetation. This renewable resource is a major alternative raw material for the food, chemical and pharmaceutical industry. Valorization is a key component of an economic lignocellulosic biorefinery. In this paper are included three extraction techniques and comparisons of total phenolic content.

All extractions were done on milled spruce bark (*Picea abies*). Microwave assisted extraction; accelerated solvent extraction and extraction with deep eutectic solvents were used as a technique for extracts isolation. Choline chloride-based eutectic solvents with carboxylic acids (maleic or malic acid) and glycerol were used as extractants. The extractions were performed for 1 h at 60 °C with continuous stirring. Accelerated solvent extraction (extractant 96.6% ethanol; temperature (120, 140, 160 °C) with steam pre-treatment (10, 20, 30 min.) was used as another type of extraction technique. The total phenolic content was determined spectrophotometrically at 764nm using the Folin–Ciocalteu method. This test is based on the oxidation of phenolic groups by phosphomolybdic and phosphotungstic acids (FC reagent).

Extraction technique using deep eutectic solvents brings results of phenolic contents in ranged from 900 to 2000 mg GAE per 100 g of dry bark. Samples with range of phenolic contents between 136.2 and 230.3 mg GAE per 100 g of dry bark were prepared by using accelerated solvent extraction. Closed-system microwave-assisted extraction (time 3 to 20 min.), and temperature (60; 80; 100 °C) was applied to extract total phenolics from spruce bark, using 96.6% ethanol as an extractant. The total extracted phenolics, as assessed by Folin–Ciocalteu assay, varied between 90.3 and 321 mg gallic acid equivalence (GAE) per 100 g of dry bark for different temperatures.

The results indicated that the highest amount of total phenolic compounds were found in extracts when using extraction by deep eutectic solvents

Key words: Extractives, Antioxidants, Food supplement, Spruce bark.