Ultrasonic-assisted extraction and purification of phenolic compounds from sugarcane (Saccharum officinarum L.) rinds

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Abstract

In order to obtain highest extraction efficiency of phenolic compounds from the sugarcane rinds, a rapid extraction method based on ultrasound-assisted extraction technique using response surface methodology was investigated. Results showed that the optimal conditions were: solvent concentration 52.19 ml/100 ml, solid-liquid ratio 14.46 ml/g, ultrasonic temperature 61.54 °C and extraction time 31.30 min. The practical phenolic compounds extraction rate was 8.67 g/100 g DW, which was well matched with the predicted value of 8.82 g/100 g DW. Purified by macroporous resins adsorption or solvent extraction method, the total phenolic content of crude phenolic compounds extracts improved from 117.50 ± 13.00 to 302.50 ± 19.50 or 670.00 ± 17.00 mg/g, respectively. Gallic acid, chlorogenic acid and ferulic acid were identified as three main phenolic compounds in the phenolic compounds extract by HPLC analysis. Furthermore, TPC revealed good correlations with antioxidant activities. All of the results indicated that sugarcane rinds could be used as a good source of phenolic compounds with significant antioxidant activities.

Keywords

Sugarcane rinds, Phenolic compounds, Ultrasonic-assisted extraction, Response surface methodology, Antioxidant

Abbreviations

TPC, total phenolic content; E₀, crude sugarcane rind extract powder; E₂, sugarcane rind extract powder purified by MARs; E₃, sugarcane rind extract powder purified by solvent extraction

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