

Effect of heating rate on the pyrolysis of by-products from coffee berry processing

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The production of coffee beans occupies an important place in the economy of many countries and amounts to 90.0 million bags of 60 kg per year. Coffee husks after harvesting and processing coffee berries are a significant agricultural by-product. The type of waste generated depends on the method of processing berries, which have a complex layered structure. Coffee beans production is generates over 2.3 million tons of solid residues per year. These residues can be utilized to generate energy for local needs or for the production of fuel and other valuable chemical products using thermochemical conversion. Pyrolysis involves heating hydrocarbon raw materials in an inert environment and destroying high-molecular compounds. The purpose of this work was to study the pyrolysis of two types of by-products from coffee berry processing: husks after dry processing (a mixture of exocarp, mesocarp and endocarp) and separately coffee endocarp (parchment) after wet processing of the berries. Pyrolysis of the samples was carried out using a thermogravimetric analyzer (NETZSCH STA 2500 Regulus). The heating rate was: 5, 10, 20, 30 °C/min. Qualitative analysis of the composition of volatile pyrolysis products was performed using a Fourier transform IR spectrophotometer (Bruker INVENIO S). Parchment pyrolysis was characterized by a higher decomposition onset temperature, and husk pyrolysis was characterized by the two peaks of decomposition and the formation of CO₂. The CO emissions were significantly less intense and occurred over a narrower temperature range.

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