

Process Improvement of Multiple Agarwood Oil Extractions using Low-Cost Multi-Channel Temperature Data Logger

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Abstract:

The quantity of oil and chemical composition of the Agarwood essential oil should be evaluated to determine the performance of an extraction system. The aim of this work was to investigate the improvement to the three hydrodistillation (HD) systems when heat transfer control (HTC) approach using low-cost portable data logger with multi-temperature sensors is applied. The study focuses on the quantitative and qualitative characteristics of extracted essential oil from inoculated Agarwood for the real-time monitored HD compared to a conventional hydrodistillation (CHD). The extractions by conventional and HTC-ed HD procedures were carried out by supplying heat from liquefied petroleum gas (LPG); the ratio of the raw material to be extracted and the liquid solvent was 0.1 g•mL⁻¹ and the extraction time was 72 hours. The compositions of the extracted essential oils (using HTC-ed HD and CHD) were assessed using gas chromatography with a flame ionization detector (GC-FID). The results of the extraction processes showed that the extraction of inoculated Agarwood essential oil assisted by multi-channel data logger was faster and produced higher yields compared to the CHD without a process monitoring device. Further, the testing of the chemical properties of the Agarwood oil showed that essential oil obtained by HTC-ed HD had better quality compared to the oil obtained by conventional HD. The implementation of real-time thermal management in HTC-ed HD technology in Agarwood essential oil production industry is therefore of great importance.

Keywords: Hydrodistillation; Heat transfer control; Conventional Hydrodistillation