

Supercritical Fluid Extraction of Bay Oil from *Pimenta racemosa* Leaves and the Modelling of this Process

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Abstract

Pimenta racemosa, also known as West Indian bay, is a tree native to the Caribbean and other parts of the Americas. The leaves of this tree contain an essential oil that has a wide range of uses that have not been greatly investigated. There are several varieties of this *Pimenta racemosa* tree, with some being *Pimenta racemosa var racemosa* and *var ozua*. This study, however, focuses on the *var racemosa* variety and the applications of its extract obtained via supercritical fluid extraction (SFE). SFE uses supercritical carbon dioxide as the extraction solvent and the extracted oil is then characterized by using Gas Chromatography/Mass Spectrometry (GC/MS) techniques. It was found that temperatures above 70°C degraded the oil and therefore, the operating temperatures should be below this value. Further investigation showed that the major components of the bay oil were eugenol and chavicol and some isomers of both, which are contributing factors to its uses. The bay oil can be used for many purposes such as corrosion inhibition in pipelines and to control microbial growth in preserved foods, like fermented fish. However, more research is necessary before it can be commercially used for these purposes. In order to further test the viability of this oil commercially, a mass transfer model is also being developed which attempts to incorporate the solubility of the oil into the model which has not been successfully achieved before. This will serve to predict the outcome of the extraction process at given pressures and temperatures which will be necessary if the oil is used for larger scale processes.

Keywords: *Pimenta racemosa*; eugenol; chavicol; supercritical fluid extraction; corrosion;