[ED04]
Process design of hydro-distillation in ginger oil production

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Ginger or its scientific name *Zingiber officinale Roscoe* are extensively used globally for food flavourings, condiments, fragrances, aromatherapy and pharmaceuticals. There are two main products from ginger; (i) ginger oleoresin and (ii) ginger oil. Currently, there are a few conventional and modern methods of extracting essential oils such as by hydro-distillation, supercritical fluid extraction and microwave extraction. Hydro-distillation is the oldest and most common method of extracting essential oil since it is economically viable and safe. In this research, studies were done to identify the ideal operational conditions involved in the extraction of ginger oil by hydro-distillation; steam and water distillation processes so that recommendations on the improvements of the present design used in Malaysia can be made. By doing so, we hope to minimise the operating time, reduce energy consumption and at the same time increase the production of the ginger oil. From this study, dried ground ginger was identified as the best sample type since it gave a higher yield of ginger oil when compared to slice dried ginger. The study on the changes of the cell structure in ginger during processing justified this. Furthermore, the ideal operational parameters for the still proper were identified through the Vapour Liquid Equilibrium (VLE) experiments on the ginger oil and the mixture of ginger oil and water at different ratios. From the same study, the boiling point of ginger oil is 141.0^0C and the boiling point of the mixture is 97.5^0C. Finally, quality analysis done using Differential Scanning Calorimeter (DSC) and Refractive Index (RI) justify the ideal operational conditions used. At the end of this research, we hope to able to give some recommendations on improving the current equipment used in Malaysia for the extraction of essential oil and help boost the Malaysian herbal industry.