

**DEVELOPMENT OF TECHNIQUES FOR THE EXTRACTION
OF NATURAL PRODUCTS USING LIQUID CO₂**

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

DEVELOPMENT OF TECHNIQUES FOR THE EXTRACTION OF NATURAL PRODUCTS USING LIQUID CO₂

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The study was conducted to study and develop the techniques of liquid CO₂ extraction by measuring and controlling the pressure and temperature of the process and to use the techniques to extract natural products namely orange peel and green tea. 15 ml centrifuge tubes were used as extraction chamber. The centrifuge tube was connected to a pressure gauge, safety valve, and pressure relieve valve to measure the pressure inside the tube and the characteristics of CO₂ phase changes. A thermometer was also used to measure the water bath temperature in which the centrifuge tube was submerged. The pressure inside the tube was set to 5.5, 6.5, and 7.5 bars as for the water bath; the temperature was kept at 20°C, 30°C, 40°C, and 50°C. From the experiment, it could be concluded that the optimum extraction condition using liquid CO₂ was at 7.5 bars and water bath temperature 20°C. Under these conditions the liquid CO₂ was more stable in the liquid phase and had also the longest contact time with the sample compared with other pressure and temperature condition. The effectiveness of the liquid CO₂ extraction was also compared with the solvent extraction using orange peel as its sample. Dried green tea was also used as another sample for the extraction of polyphenol and caffeine. The result showed that liquid CO₂ has the potential to be used as solvent to extract compound from both orange peel and green tea leaves.

DEDICATION

I dedicate this thesis to my family, Mayaswari Handoyo, and everyone who has supported and encouraged me.



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Finally, to the readers, I hope the information in this thesis can improve your knowledge about the subject and I would like to apologize for any errors that occurred in this thesis. Any comments and suggestion for better improvement are absolutely welcomed.

BSD, July 2011

Randy Ferrera

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