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**TITLE: OIL EXTRACTION FROM SPENT
COFFEE GROUNDS USING MANUAL
EXTRACTION BY EMPLOYING METHANOL AS
A SOLVENT**

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ABSTRACT

Spent Coffee Grounds is a waste that resulted from the coffee brewing process. Various research has been done in the past on how to convert the SCGs into valuable materials as the composition in the SCG making it possible to be applied in a whole lot of applications since this waste is contributing a lot to the landfills problem around the globe. In this study, the oil extraction from spent coffee grounds (SCGs) were conducted using the parameters of coffee oil extraction times by employing methanol as a solvent. The manual extraction method that includes extraction and separation process was utilized when doing the experiment. Approximately, 7.07 wt% oil yield could be obtained from the DSCG under the optimal conditions of 30 minutes extraction time. In this study, the miscella from up to six successive extractions was investigated to determine the optimal oil extraction process as well as the free fatty acid (FFA) content in the oil. The results obtained showed a similarity in the data gathered from previous research.

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CHAPTER ONE

BACKGROUND

1.1 Introduction

Coffee is a drink prepared from roasted coffee beans, and undeniably, it has become one of the most popular and widely consumed beverages worldwide. It simply became the second-most traded commodity on the stock exchange after petroleum and the world's most popular beverage after water (Mata et al., 2018). Coffee has the appearance of darkly coloured, bitter, and slightly acidic, mainly due to its caffeine content. It also has a stimulating effect on our body, as it contains caffeine that helped us keeping alerted and awake.

Before a cup of coffee is served, it went through numerous steps before it becomes the addiction to half of the people across the globe. Coffee brewing is a process of extracting the soluble material in roasted and ground coffee. Spent Coffee Grounds or SCGs bring the definition of solid waste by-product that directly associated with the consumption of coffee (Saberian et al., 2021). To put it simply, SCG is the results of the coffee brewing. The SCGs has a chemical composition 30-40% hemicellulose, 20-30% lignin, 13-17% protein, 7-21% lipids, 8-15% cellulose and only 1-2% ash. (Shayene et al., 2023). Conventional extraction methods include the process of extracting the oil from the SCG using magnetic stirrer and simple distillation process to separate the oil from the solvents.

Depending on the coffee variety, the Spent Coffee Grounds (SCGs) is assumed to have 15 percent oil content by weight (wt%) (Araújo et al., 2019). Due to the enormous demand and market size worldwide, 169.6 million bags of coffee has been produced in 2020 (Shayene et al., 2023). SCG oil which is a low-cost material is an ideal and promising feedstock for a bio-refinery production with its complex composition (Jin et al., 2022). Remarkably, this SCGs that people regarded as waste can also be used as renewable energy source with the proper treatment as it provides a sustainable source of bulk raw materials. Additionally, spent coffee grounds can be sold for composting, gardening, producing bioenergy, and cultivating mushrooms.(Campos-vega & Oomah, 2015). Generally, SCGs can be utilized as various purposes if they are

treated well. Therefore, the main objective for this study is to demonstrate the oil extraction from spent coffee grounds (SCGs) at different extraction time by utilizing methanol as a solvent.

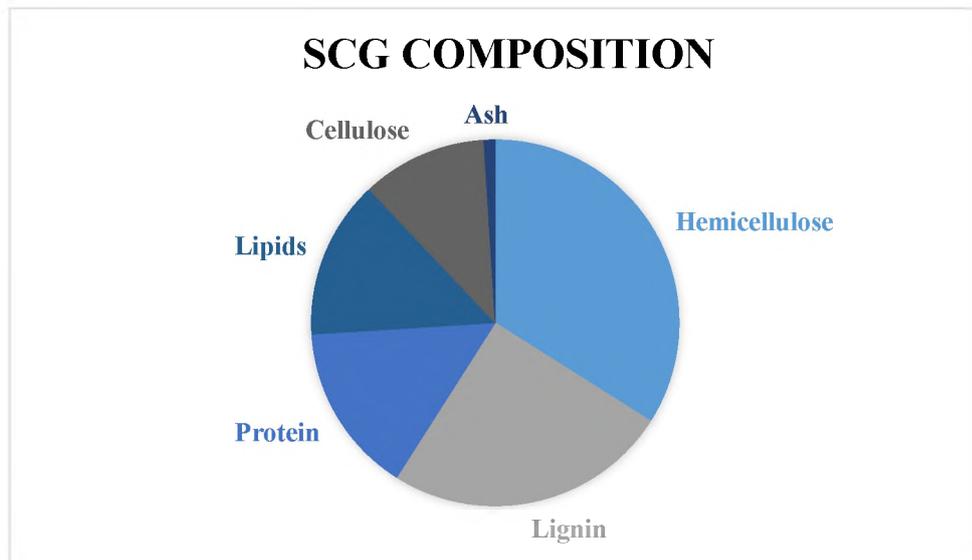


Figure 1 Composition of Spent Coffee Grounds

1.2 Literature Review

Various reading and studies from recent research has been conducted to gather some information related about the oil extraction from the SCGs in terms of its application and methods of extracting it.

1.1.1 Application of Spent Coffee Grounds



Figure 2 Application of Spent Coffee Grounds