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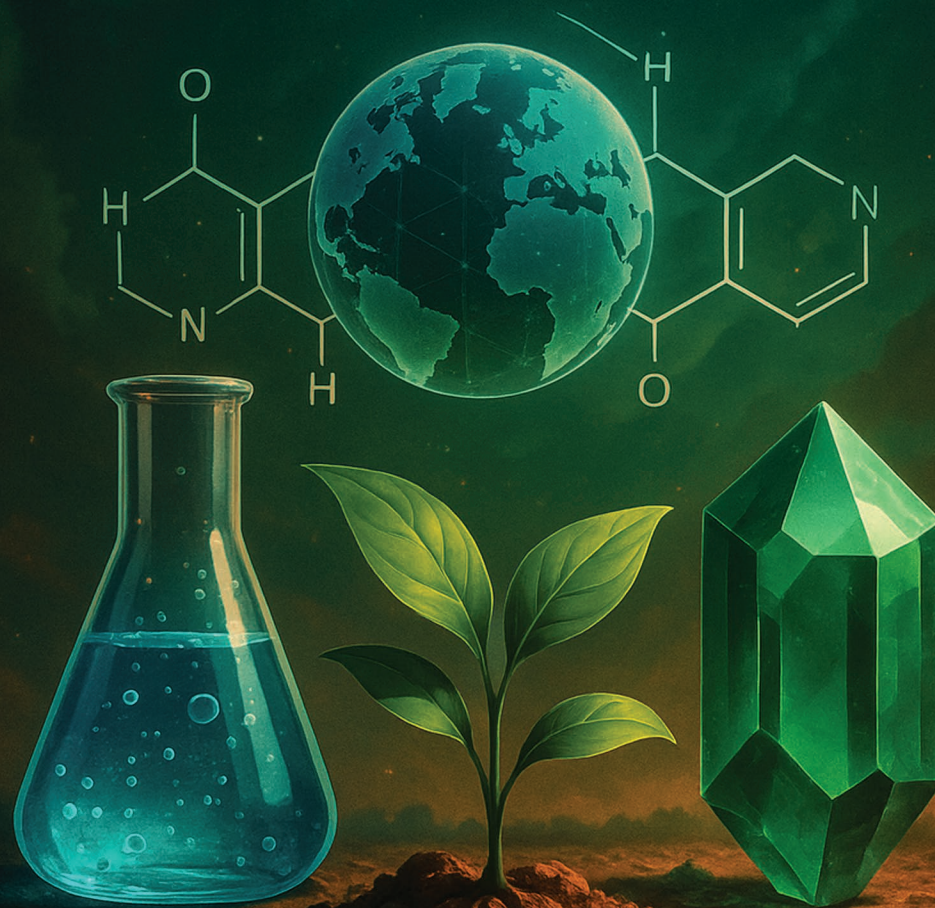
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Perspectives of Medicinal, Material and Environmental Chemistry

PERSPECTIVES OF MEDICINAL, MATERIAL AND ENVIRONMENTAL CHEMISTRY



Editors:
Dr. Saimah Khan
Dr. Naseem Ahmad
Dr. Firoz Hassan



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CHAPTER – 2

The Study on Extraction process and Analysis of Components in Black pepper and White Pepper

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Abstract: Black pepper is one of the most commonly consumed spices, and its pungency is due to the presence of an alkaloid known as piperine, volatile chemical constituents, and essential oils. Piperine is found in black pepper (*piper nigrum*), white pepper, and long pepper (*piper longum*) belonging to the family Piperaceae. Piperine represents diverse biological activities, such as anti-inflammatory, anticancer, antiviral, anti-larvicidal, pesticide, anti-Alzheimer's, antidepressant, and most importantly piperine is known as the bioavailability enhancer. The study aims to explore the extraction of piperine from different species of pepper, its total synthesis, pharmacokinetic study and various biological activities of piperine. In this study the black pepper seeds were collected from local market of Lucknow, India. The extraction was done by using two extraction process - Steam distillation process and Soxhlet extraction process by optimizing conditions that affect the extraction process. Result demonstrated that in steam distillation process 50 gram of black pepper and white pepper dissolved in 300 ml distilled water undergo double distillation process for 3 hours the obtained essential oil yield is 9.2% and 7.88% of black pepper and white pepper respectively whereas from soxhlet process the extracted oil yield for 3 hours is 12.03% and 10.5% of black pepper and white pepper respectively. From the result it was concluded that the % yield of essential oil

(EO) obtained from both black pepper and white pepper using both the extraction follows the order:

% yield EO using soxhlet extraction > % yield of EO using steam distillation.

It was also concluded that the %yield of the EO obtained from black pepper is greater than that of the white pepper.

Keywords: Black pepper, white pepper, essential oil, steam distillation, soxhlet extraction.

Introduction: Black pepper is a family member of Piperaceae. It is well known as a distinctive spice worldwide. It is also known as the king of spices. Due to the presence of alkaloid piperine along with volatile oils and essential oils, it has a distinctive pungent flavor piperine which belongs to the family of piperaceae and varies from 2% to 7.4% in vines of black and white pepper (*Piper nigrum*). However certain reports suggest a higher content of piperine up to 9% in black pepper and 4-5% in long pepper (*piper longum*) (1). The number of piperine contents can be influenced by modifications in the conditions i.e. climate on drugging conditions and place of origin (2). Piperine was initially isolated in 1819 by Hans christian orsted . He extracted a yellow crystalline material having molecular formula $C_{17}H_{36}NO_3$. And which has a melting point of 128-130°C. Later the chemical structure was unraveled and (2E, 4E)-5-(benzo[d] [1,3]dioxol-5-yl)1-(piperidin-1-yl)penta-2,4-dien-1-one was given its IUPAC name. piperine is weakly basic in nature which on hydrolysis(acidic/basic) can be converted into piperic acid and piperidine. A conjugated aliphatic chain acts as a bridging connection structure between piperine and 5-(3,4-methylenedioxyphenyl) moiety (3). This makes piperine a unique and excellent molecule to offer optimum attributes for the tendency of the molecule.