

Optimization of Extraction Temperature for Volatile Organic Compounds in Turmeric.) Using SPME GC-MS

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Structured Abstract

Background: Turmeric (*Curcuma longa* Linn.) is a widely used spice known for its distinctive aroma, flavor, and medicinal properties. Its volatile organic compounds (VOCs) play a crucial role in these characteristics, making their extraction and analysis essential for both scientific and industrial applications. Optimizing the extraction temperature is critical in ensuring the highest possible recovery of VOCs while maintaining their chemical integrity. Different temperatures can lead to variations in compound profiles, affecting the quality of analysis and subsequent applications in food, pharmaceuticals, and cosmetics. This study focuses on optimizing the extraction temperature for VOCs in turmeric using SPME-GC-MS to determine the most effective conditions for capturing a comprehensive chemical profile.

Methods: Fresh turmeric samples will be cleaned, sliced, and stored under controlled conditions before analysis. The SPME fiber will be exposed to the headspace of samples at different temperatures (30°C–70°C) to determine the optimal VOC yield. After extraction, the fiber will be inserted into the GC-MS injector for thermal desorption, and the VOCs will be identified. Peak areas will be analyzed to determine the most effective extraction temperature.

Results: The number of VOCs increased as the temperature rose from 30°C to 50°C. However, at higher temperatures, some compounds degraded, and highly volatile analytes were lost at 30°C and 40°C. Both temperatures yielded 8 VOCs but failed to capture middle volatile compounds. Beyond 60°C, high volatiles compound could not be detected, with only low volatile compound remaining and only 6 VOCs that detected. The optimal extraction temperature was determined to be 50°C. At this temperature, 13 VOCs were extracted and identified, demonstrating a more efficient extraction of both high and low volatile compound in turmeric. Thus, 50°C was selected as the optimal temperature for extracting VOCs from turmeric.

Conclusion: This study identified 50°C as the optimal extraction temperature for VOCs in turmeric using SPME-GC-MS. Lower temperatures failed to capture middle volatiles, while higher temperatures caused degradation. The findings emphasize the importance of temperature optimization for efficient extraction, ensuring a comprehensive and accurate volatile compound profile in turmeric.

Keywords: Turmeric, medicinal properties, volatile compound, optimization

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