CODY BARNES & L. BETH THOMPSON, Dept of Chemistry, Fairmont State University, Fairmont, WV 26554. Development and Optimization of Steam Distillation for Extraction of d-Limonene from Navel Orange (*Citrus sinensis*) Peels.

Essential oils extracted from citrus peels are rich in volatile organic compounds widely used in food, fragrance, and pharmaceutical applications. The chemical composition and yield of these oils may be influenced by post-harvest handling and temperature exposure, which can alter their stability and functional properties. This study investigated both the development of a simple steam distillation method and the effect of temperature-based treatment on essential oil extracted from navel orange (*Citrus sinensis*) peels, with specific focus on d-limonene as the primary constituent. Initial method development involved multiple steam distillation trials using basil and thyme leaves. Early configurations produced negligible oil, requiring refinement of the distillation setup. Successful isolation of orange peel essential oil was achieved after implementing a biomass distillation flask, demonstrating the importance of apparatus optimization in small-scale extractions. Peels were subjected to three pre-extraction conditions: immediate processing at room temperature, freezing for one week, and oven-drying for three hours. Extracted oils were analyzed using gas chromatography-mass spectrometry (GC-MS), which confirmed d-limonene as the dominant volatile component. This investigation aims to provide insight into how temperature-based storage and processing conditions influence the chemical integrity of citrus peel essential oil and to inform optimized handling strategies for analytical and industrial applications.