



Basil Essence Storage Study

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ABSTRACT

At Sensus, essences are generally stored refrigerated with the exception of a few which are frozen. This study was performed to determine the affects of storage under different temperatures on the essence quality. After 8 weeks of storage, sensory analysis judged the ambient samples unacceptable and the GC-MS analysis confirmed many aroma active compounds decreased dramatically over time under different conditions.

INTRODUCTION

Approximately 200 constituents have been identified in basil. The composition of Sensus basil essence has 3 compounds of considerable concentration followed by compounds a much lower concentration levels. These 3 are eucalyptol, linalool, and estragole (chavicol). In order to determine the affects of storage under different conditions, samples were stored ambient, refrigerated, and frozen and then analyzed both analytically and organoleptically.

MATERIALS AND METHODS

A Gerstel MultiPurposeSampler (MPS-2) (Baltimore, MD) was used with a 2-cm 3-phase (divinylbenene, Carboxen, Polydimethylsiloxane) for sample preparation. A 10-min incubation followed by a 40-min exposure was used to capture the volatiles on the fiber for injection into the GC. The sample was stirred using a 3x12mm stirbar in the 20mL vial. The fiber was desorbed for 5-min in the GC injector for 5 min. An Agilent 7890A gas chromatograph (Palo Alto, CA) was used for the analysis. Analysis was performed in the splitless mode with a helium flow rate of 1.25mL/min through a 60mx0.25mmx0.25 μ m RTX-5ms column. The initial oven temperature was 50°C immediately followed by a 4°C/min temperature ramp to 170°C which was followed by a 100°C/min ramp to 250°C and held for 5min in order to ensure no sample to sample contamination. The transfer line to the Leco TruTOF MS (St. Joseph, MN) was held at 240°C. Data was collected for 30-250 m/z at an acquisition rate of 10 spectra per sec. Identification was based on a combination of MS library matching along with reported retention indices. The samples were then prepared for analysis by pipetting 50 μ L into 4.9mL of water along with 50 μ L of internal standard (phenol-D6, 100 ppm).

Basil essence was stored in 2oz Oberk glass bottles with a nitrogen headspace and sampled at time zero, 1 day, and weeks 2, 4, and 8.

Sensory analysis was conducted by assigning the frozen sample a value of 9 and comparing the ambient and refrigerated samples to it at 0.2% in water.

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RESULTS AND DISCUSSION

The sensory analysis results are presented in Figure 1. As can be seen, the average response for samples under ambient storage conditions decreased over time. Samples under refrigerated storage conditions were judged lower quality than the frozen samples, but did not degrade as the samples stored at ambient conditions. Looking at the GC-MS runs from week 8 show some striking differences for ambient versus refrigerated or frozen. Figure 2 is the entire chromatogram. Looking at individual portions of the chromatogram is more informative. Figure 3 is a zoomed view of the first large peak which is eucalyptol followed by ocimene. There is not a lot of difference between the treatments for eucalyptol, but an increase in ocimene for the ambient storage. Figure 4 is a close view of γ -terpinene, cis-linalool oxide, and terpinolene. One can see the increase in cis-linalool oxide and decrease in terpinolene for the ambient storage sample. Figure 5 is the peak for linalool. Clearly the sample is overloaded, but also clearly seen is a marked decrease in linalool concentration. Even more dramatic is the decrease in estragole as seen in Figure 6. Approximately a 90% decrease is seen in the ambient sample. The same relative decrease is seen in bornyl acetate (Figure 7). Lastly two chromatograms are shown of the sesquiterpene region. Firstly Figure 8 is the general area, and Figure 9 is the same area but zoomed in. It is clear that the ambient storage sample had large decreases in sesquiterpenes.

Figure 1. Sensory results for basil storage

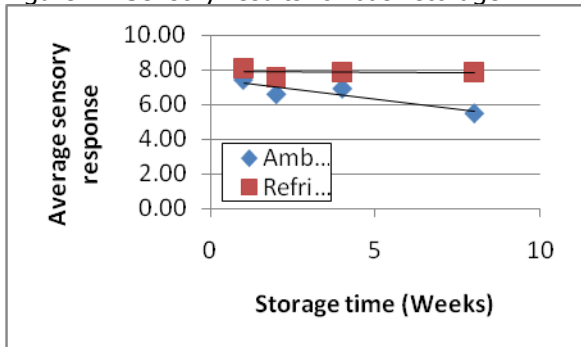


Figure 2. Entire chromatogram

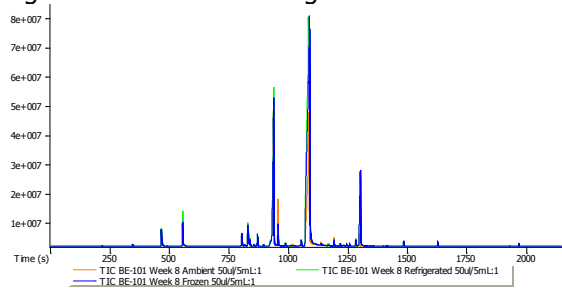
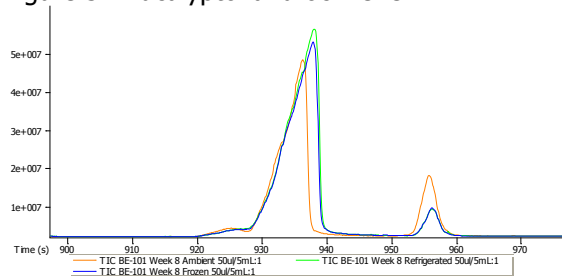


Figure 3. Eucalyptol and ocimene



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Figure 4. γ -terpinene, cis-linalool oxide, and terpinolene

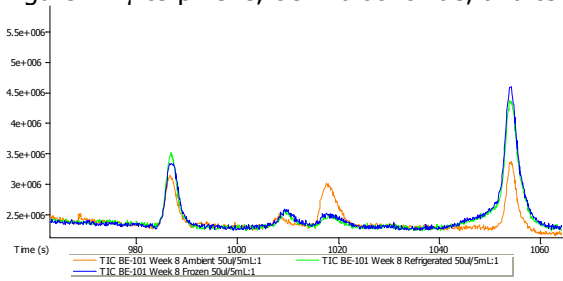


Figure 5. Linalool

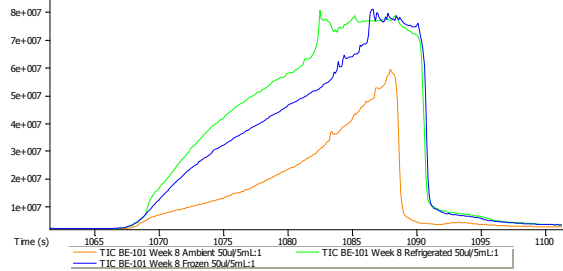


Figure 6. Estragole (90% loss for ambient)

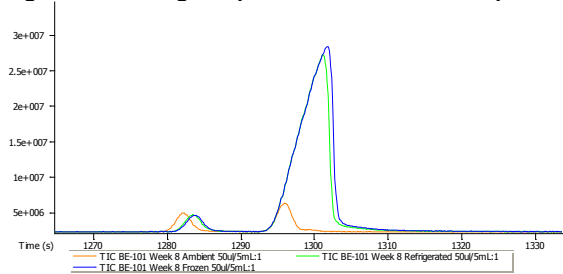


Figure 7. Bornyl acetate

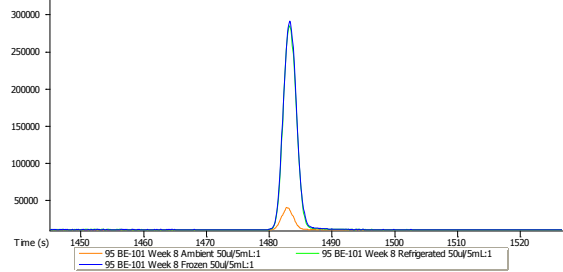


Figure 8. Sesquiterpene region

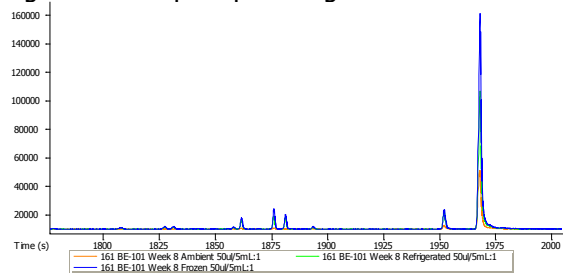


Figure 9. Zoom view of sesquiterpene region

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