A Survey of Retail Lavender Essential Oils to Detect Adulterations

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Abstract

Currently there is little regulation of essential oils for fragrance, aromatherapy or homeopathic use. Good Manufacturing Practice (GMP) regulations that went into effect in 2010 require only that the oils be pesticide free, but do not address oil composition, formulation, the Lavender species that make the feedstock, or the claims made by distributors or retailers who re-package these products for individual sale.

Identifying nomenclature is ambiguous. Package labels of most aromatherapy products claim to be 100% natural oil but the amounts of specific ingredients are not listed. Both Lavender angustifolia and Lavender officinalis are used for aroma therapy and labeled as 100% “Natural” Lavender oil. Some references claim that Lavender angustifolia and Lavender officinalis are just different names for the same thing. However, they are two different species, Lavender officinalis lacks the therapeutic qualities needed for aromatherapy.

The need for product uniformity is understandable, as plants, even those grown in the same place, differ in their chemical composition. The need for uniformity is understandable, as plants, even those grown in the same place, differ in their chemical composition. The need for product uniformity is understandable, as plants, even those grown in the same place, differ in their chemical composition.

Introduction

Essential oils come from plants, usually harvested through distillation or pressing. Many of these oils are used to have medicinal properties used for homeopathic medicine, while others are used as fragrances in air fresheners and homeopathic medicine, while others are used as fragrances in air fresheners and homeopathic medicine. Lavender is a common aromatherapy and fragrance staple in both the wholesale and retail markets.

Different species of Lavender have their own advertised uses. Spike lavender is used for burns and cuts to have better medicinal properties than the angustifolia species. Lavandin, a botanical hybrid of spike lavender and angustifolia, are usually used only for their aromatic properties. The spike lavender and lavandin may be used for natural replacement or adjuncts in angustifolia lavender formulations. There may also be synthetic adulterations to lavender oil as well.

Formulations include pure undiluted (unadulterated) oils, mixtures of lavender oils of different species, mixtures of lavender with non-lavender oil and dilutions of the above. Such a variety with lax regulations governing quality control or content labeling leads to consumer and sometime wholesaler confusion. This method provides the analyst the ability to identify synthetic and natural lavender oils and differentiate between feed stocks from different lavender species alone and in mixtures.

Materials and Methods

Lavender aromatherapy products with labels indicating 100% natural oil were purchased from various companies. Analytical standard Linalool and S enantiomers (R/S CAS# 126-91-0) was obtained from ACROS (New Jersey, USA 1-800-ACROS-01) and Lavender (CAS# 8000-28-0), Synthetic lavender enantiomers (R/S CAS# 126-91-0) was obtained from ACROS (New Jersey, USA 1-800-ACROS-01) and Lavender (CAS# 8000-28-0). Synthetic lavender enantiomers from the analytical standard only R and S linalool. Figure 2 presents the same chiral molecules, called enantiomers, are different from each other because they are not superimposable on their mirror images. In plants enzymes produce R and S linalool enantiomers in a ratio of 85:15% respectively, while man made Linalool is synthesized in a 8:9:1 ratio that is closer to 75:25:05.

Because enantiomers have the same structure and physical properties, they cannot be separated by conventional chromatography. Chiral separations are possible using special stationary phases based on chiral stationary phase, but this method is specifically chosen for its ability to separate linalool R and S enantiomers. By determining the Linalool R and S ratios natural Lavender and synthetic lavender can be identified. Figure 3 presents the baseline separation of R and S enantiomers from the analytical standard only R and S linalool. Figure 2 presents the same chiral (R/S) at the same concentration ratios showing how mixtures of natural and synthetic oils can be identified and quantified.

Results

Chiral molecules, called enantiomers, are different from each other because they are not superimposable on their mirror images. In plants enzymes produce R and S linalool enantiomers in a ratio of 85:15% respectively, while man made Linalool is synthesized in a 8:9:1 ratio that is closer to 75:25:05.

The method was also able to resolve other prominent constituents in the retail oils. The other major constituents in Spike and Lavender, ocypetal and lavandul, did not appear in large amounts of the retail Lavender officinalis samples.

Discussion

The method resolved the R and S linalool in the retail samples. The integrated ratios for the R and S linalool were close to 95/5%, well within the accepted values. The samples that had sufficient peak integrations were larger than 95% 15%. The method proved very useful in determining the enantiomers ratios needed for detection and the sufficient separation of the peaks to determine enantiomers. The chiral chromatography is especially helpful in separating the specific enantiomers that may be useful in identifying the product.

Disclaimers

A relationship with the manufacturer or retailer for product promotion, monetary gain or other support for this work did not exist.

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