THE MYTHS ABOUT CINEOLE IN TEA TREE OIL

The international and Australian standards (ISO 4730 and AS 2782) for Australian tea tree oil includes a specification for 1,8-cineole of 15% maximum. The purpose of the maximum limit for cineole in the standards was to avoid the high-cineole plant variants of M. alternifolia which have coincident low levels of terpinen-4-ol (the main bio-active component in tea tree oil). However, this purpose appears to have been interpreted as “the lower the cineole the better the oil”.

From the outset of the plantation based tea tree oil industry in the 1980s, Australian farmers have selected to plant low-cineole varieties of M. alternifolia. Over the last decade all new tea tree plantings have been exclusively very low (<3%) cineole chemotypes.

Generally, tea tree oil markets around the world insist that the cineole content of Australian tea tree oil be <4%.

Markets have been lead to believe the following myths:

1. Cineole is a skin irritant. WRONG!
2. Higher cineole always means lower terpinen-4-ol. WRONG!
3. Higher cineole means lower bioactivity. WRONG!
4. Lower cineole is pharmaceutical grade. WRONG!
5. Lower cineole doesn’t smell as strong. WRONG!

An explanation of each of these myths is described below.

WHY HAVE AUSTRALIAN TEA TREE OIL PRODUCERS ACCEPTED AND EVEN SUPPORTED THE HIGH CINEOLE MYTHS?

The markets have believed and promoted the cineole myths and because “the market is always right”, Australian growers have worked diligently and successfully to be able to supply the market what it demanded.

Whether growers believed the cineole myths or not, it has suited their purpose to produce and promote low cineole tea tree oil also. In this way their product could be differentiated from much of the oil produced in other countries. Furthermore, low cineole oil could not be adulterated with eucalyptus oil without penalty from the buyer. [Eucalyptus oil is at least 70% cineole and about one third the price of tea tree oil. Unscrupulous traders could “stretch” low cineole Australian tea tree oil with eucalyptus oil and still claim conformance with the standards which set the maximum at 15%. Such adulterated oil would simply undermine genuine pure Australian product.]

Today, Australian tea tree oil is unofficially specified at “40:3:3” referring to the minimum terpinen-4-ol and maximum cineole and p-cymene percentages. Tea tree oil, either Australian or from overseas, (that is outside of this unofficial specification) is very often regarded as inferior and priced accordingly.

For the first time discerning buyers can now source a unique type Australian tea tree oil with all the benefits of high terpinen-4-ol, the credit of high cineole and the highest quality and environmental assurances possible.

There is nothing wrong with 40:3:3 tea tree oil but.... MCNE’s CinRich is simply the best tea tree oil in the world.

THE CINEOLE MYTHS EXPLAINED

1. Cineole is a skin irritant. WRONG!

Because of a few uncorroborated statements in the early 1980’s and 90’s that cineole is a skin irritant, “high” cineole tea tree oil (meaning that anything with more than 4%) has been regarded by much of the market as inferior and even avoided.

Since the 1970’s numerous scientific studies demonstrated that the cineole content in tea tree oil is not contributory to any cases of skin irritation by tea tree oil. In 1997 leading scientists reported to the Australian Government a study titled “Why Cineole is not detrimental to tea tree oils”. The report included details showing no human skin irritancy at levels up to 28% cineole (twice the specified maximum in the ISO and Australian standards). The report further includes appendices with complete copies of various supporting earlier scientific reports. [A complete report is free online – see reference at end of document.]

In 2005, three of the world’s leading scientists in tea tree oil research conducted a rigorous search of the literature and toxicology databases and published their findings as a compilation of toxicity data for the 15 tea tree oil components specified in the ISO 4730. This work included specifically the scientific literature/databases review for 1,8-cineole skin irritancy. No scientific literature was cited that demonstrated any human skin irritancy by cineole. [A complete report is free online – see reference at end of document.]

It is worth noting that eucalyptus oil (which is specified as a pharmaceutical ingredient at a minimum of 70% 1,8-cineole) is well known for its long and extensive usage in skin formulations. As with tea tree oil products and indeed any product, usage should be discontinued if sensitivity or allergy is observed.

2. Higher cineole always means lower terpinen-4-ol. WRONG!

Extensive studies have shown that generally there is an inverse relationship in tea tree oil between cineole and terpinen-4-ol concentration. Low cineole tea tree oil (<4%) generally has the highest concentration of terpinen-4-ol (>36%) in M. alternifolia. Terpinen-4-ol is responsible for much of tea tree oil’s biological activity. Therefore, the inference has been that higher cineole means lower bioactivity.

The inverse relationship between cineole and terpinen-4-ol is a generalised one derived from the analysis of thousands of tea tree oil samples. However, there are M. alternifolia chemotypes (plant variants) that have high concentrations of both components. Indeed MCNE’s special CinRich field has for many years consistently produced tea tree oil with >37% T-4-ol and 7-10% cineole. According to the general observation, a tea tree oil with 8% cineole could be predicted to have a T-4-ol concentration around 33%. However, a coincident high terpinen-4-ol, (as with CinRich), is certainly not inconsistent with the biogenetic pathways of monoterpenes in Melaleuca tea trees.
3. Higher cineole means lower bioactivity. WRONG!

This has not been demonstrated - various studies over the last 20 years have shown that the cineole content (up to 20%) does not detract from the bioactivity of Australian tea tree oil where concentrations of terpinen-4-ol is greater than 30%. Some studies have indicated that higher cineole contents in tea tree oil may enhance bioactivity particularly antifungal performance. The increase overall percentage of oxy-terpenes associated with higher cineole oils (with high terpinen-4-ol content like CinRich) contributes to a greater overall water solubility of the oil which can contribute to relatively greater bio-activity. Cineole has also been shown to be a (dermal) penetration enhancer.

4. Lower cineole is pharmaceutical grade. WRONG!

Low cineole content tea tree oil has been promoted as an implied requirement for the elevation of tea tree oil to "pharmaceutical" or "therapeutical" grade. This is simply deceptive – in no pharmacopoeia referring to tea tree oil/Melaleuca oil is reference made to low cineole indeed reference is made to the ISO 4730 and AS 2782 where cineole is specified to be a maximum of 15%.

5. Lower cineole smells better. WRONG!

The subjectivity of smell remains a cornerstone of the fragrance industry. Tea tree oil finds minimal use as a fragrance. Its smell is possibly best likened to a mild industrial solvent – pleasant to some, disagreeable to others. The variation of cineole content in tea tree oils between 2 and 10% is not readily discernable by the average human nose. Cineole “competes” with a range of terpenes of similar volatility and type of smell, none of which could be regarded as subtle. The overall smell of tea tree oil is predominated by the terpinen-4-ol smell.