

A Grain Neutral Spirit Sample

Conclusions as noted in our 3rd party analytical report –

Taste improvements in Persedo™ enhanced grain neutral spirit (GNS), which can be diluted directly with a water of choice to make a “one-step vodka”, can be explained by chemical analysis of the before and after samples.

Over 150 different congener taste and aroma chemicals were detected by GC/MS in GNS samples, including fusel alcohols, acetals, esters, carboxylic acids, lipid oxidation products, terpenes, etc. Methods for ultra-trace analysis, including solid-phase sorptive extraction and special instrumentation systems are required for analysis of GNS at taste and aroma concentrations thousands of times lower than typically found in more complex distillates.

Our 3rd party flavor analysis expert concluded that the following decreased levels of undesirable compounds were consistent with the improved aroma and taste of Persedo™ enhanced GNS from a major supplier. The compounds are ordered by the difficulty distillers experience in removing them by GNS distillation alone, as these contaminants co-distill.

Undesirable Flavors and Tastes in GNS Reduced by the Persedo™ Process

Acetol	32% reduction	pungent, ethereal odor
3-methyl Butanoic Acid	80% reduction	sour, stinky feet, cheesy, tropical, acidic, pungent, rancid, ripe, fatty, fruity odor cheesy, dairy, creamy, fermented, sweet, waxy, berry taste
Hexanoic Acid	35% reduction	barnyard animal odor
ortho-Guaiacol	58% reduction	smoky odor and taste
Dodecanoic acid	38% reduction	soapy taste and mouth feel
Tetradecanoic acid	55% reduction	Soapy, waxy taste and mouth feel
n-Hexadecanoic acid	99.1 % reduction	fatty, slightly waxy taste

While vodka is inherently neutral, some of the best vodkas have retained the characteristics of the commodity from which they are distilled. The Persedo™ process both enhances these characteristics while undesirable compounds are removed by ejection or conversion. The unique conditions of the Persedo™ process cause esterification and sweetening enhancement reactions to improve and reveal naturally occurring and desirable congeners, or mild esterifications and modifications of naturally occurring compounds. Note that these compounds are present at part-per-billion levels which, after treatment, provide mere hints on the palette when a vodka is tasted neat and works well with mixers. These reveal considerable character that is a natural part of the starting GNS. Our 3rd party flavor expert identified the following enhanced congeners as consistent with the improved character of Persedo™ treated GNS:

Background Traces of Desirable Flavors and Tastes in GNS Enhanced by the Persedo™ Process

Butanoic acid, ethyl ester	3.1 X increase	Fruity, juicy, pineapple, cognac, sweet, tutti frutti, lifting and diffusive aroma reminiscent of banana fruity, estery, sweet, rum-like, strawberry-like ,tutti frutti, apple-like, fresh, ethereal taste
Isoamyl acetate	4.9 X increase	Sweet fruity, banana-like, pear-like, estery, ripe aroma with a green ripe nuance Sweet fruity, banana taste with a green ripe nuance
Hexanoic acid, ethyl ester	4 X increase	Sweet, fruity, pineapple taste and aroma
D-Limonene	24 X increase	Citrus taste and aroma
γ -Terpinene	new aroma / flavor revealed by release from glycoside (sugar) binding by the	Woody, tropical, herbal taste and aroma

	Persedo™ process	
Geranyl acetate, 2,3-epoxy-, cis- and trans - Geranyl acetate, Geranyl acetone	new aroma / flavor revealed by release from glycoside (sugar) binding by the Persedo™ process, esters enhanced by Persedo™ process	floral, geranium aroma
Terpinolene	110 X increase	herbal, woody aroma
Octanoic acid, ethyl ester	1.9 X increase	fruity, sweet aroma creamy taste and mouth feel
Decanoic acid, ethyl ester	420% increase	Sweet, fruity, brandy, apple aroma Creamy, slightly oily taste and mouth feel

Based on seq-SBSE GC-TOFMS analysis, the Persedo treatment tends to increase concentrations of favorable flavor compounds and decrease concentrations of acetals, free fatty acids, and other undesirable flavor compounds.