Glycerin versus Alcohol – Concerning Herbal Liquid Extracts

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WHAT IS GLYCERIN?

Glycerin, sometimes spelled glycerine, also called glycerol, is a commercial byproduct of making cooking oils, soaps, and other products where oils and sterols (i.e., lipid-based waxy solids), as pure fatty acid compounds are separated (via 'fractionation'), clarified and purified from plant or animal fats leaving glycerol as the main byproduct. The terms glycerin, glycerine, and glycerol are often used interchangeably in the literature.

Glycerin is one of the most versatile and valuable chemical substances known to man. It possesses a unique combination of physical and chemical properties that are utilized in a myriad of products, both consumable and technical. Glycerin has over 1,500 known end uses, including many applications as an ingredient or processing aid in cosmetics, toiletries, personal care, drugs, *food, beverage, and confectionary products*. Glycerin's dietary supplement category ingredient product is also utilized in totally alcohol-free liquid herbal processing and extraction technologies.

In addition, glycerin is highly stable under typical storage conditions, compatible with many other chemical materials, virtually non-toxic and non-irritating in its varied uses, and has no known adverse environmental effects. In other words, glycerin is for the most part… safe! We are here referring to USP grade, Kosher certified, Halal certified, GMO-Free vegetable glycerin when making this assertion. A water-clear, odorless, viscous liquid with a sweet taste, glycerin is derived from both natural and petrochemical sources. It occurs in combined form, as triglycerides, in all animal and vegetable fats, and constitutes, on average, about 10 percent of these materials. Glycerin is obtained from both saturated and unsaturated triglycerides during soap and fatty acid separation/clarification/purification production, and by transesterification (an interchange of fatty acid groups with another alcohol). The separated glycerin is subsequently concentrated and purified prior to commercial sale. Synthetic glycerin is produced from petrochemical building blocks via several processing steps designed to achieve a desired concentration and high product quality. Synthetic glycerin is typically used for pharmaceutical reagent work and pharmaceutical production, and highly technical applications, but NOT for food-grade use! Glycerin, whether recovered from triglycerides or synthesized, is principally used as a highly refined and purified product, with a very high concentration of glycerin.

Glycerin has the chemical formula C 3 H 5 (OH)3. It is a trihydric alcohol, possessing two primary and one secondary hydroxyl groups, which are its potential reaction sites and the basis for glycerin's versatility as a chemical raw material. For example, glycerin esters, the reaction products of glycerin with various fatty acids form an important class of derivatives that are extensively used in the food, beverage and confectionery industry. The physical properties and characteristics of glycerin are as significant as its chemical properties for many applications. These qualities enable glycerin to be used as a humectant, plasticizer, emollient, thickener, solvent, micro-encapsulating agent, dispersing medium, lubricant, sweetener, bodying agent, antifreeze and processing aid. It is not unusual for glycerin to contribute two or more features or attributes to a product or application. In all applications, whether as a solvent, reactant or as an additive, the virtual non-toxicity and overall safety of glycerin is always of significant benefit. Glycerin applications appear to be limited only by the imagination and creativity of the scientific and technical communities. It is this final statement of "imagination and creativity" that was behind the invention and its continuing development of a proprietary serialized multi-step process for using glycerin as a solvent medium for making liquid herbal concentrates and a totally alcohol-free mono-element-based triiodide of fixed iodine (commonly called 'nascent' iodine).

Most of the glycerin marketed today is manufactured to meet the stringent requirements of the United States Pharmacopeia (USP) and the Food Chemicals Codex (FCC). However, technical grades of glycerin that are not certified as USP or FCC are available. For herbal glycerites and glyceride of single-element-

based diiodine-molecular (I_2) iodine making purposes only, the USP FCC grade Kosher and Halal vegetable glycerin is used. Glycerin is used in many consumer products such as personal care preparations, cosmetics, pharmaceuticals, foods, beverages, and confectionery products because of its contribution to product properties, stability, micro-encapsulating properties (i.e., in chemistry called 'Protective Caging'), and compatibility with a wide variety of chemicals, and relative non-toxicity. For these consumer-oriented applications, the quality and purity of the ingredients are crucially important. The use of USP and FCC certified glycerin, versus technical grade glycerin, in medical and consumer product applications ensures that the manufacturer has specified the glycerin quality and consistency required for these products.

Compliance with USP and FCC requirements means more than meeting the specifications given in the USP and FCC glycerin monographs as determined by analysis. It also means strict compliance with FDA regulations, specifically, in the context of this White Paper, for the dietary supplements industry, that includes the liquid herbal products manufacturers, with procedures outlined in CFR Title 21 of the FDA Good Manufacturing Practices (GMP) to assure facility and equipment cleanliness and to avoid contamination during handling, distribution, or packaging. Facilities, warehouses, and clean rooms, where processing, bottling, finishing, packaging, or repackaging is done, are subject to intermittent unannounced FDA inspections. Complete record-keeping and documentation of all aspects of operations are obligatory to ensure that every batch of product is traceable by lot number, and where a quality problem may arise, can be expediently and efficiently identified and resolved. A Certificate of Analysis also accompanies every shipment of USP and FCC glycerin from a vendor.

[Parts of the above text are taken from 'The Soap & Detergent Association' website, with inserted clarifications and further detailing by the author of this White Paper. We thank 'The Soap & Detergent Association' for their well-written and easy-to-understand information.]

WHAT DO 'USP' AND 'FCC' MEAN?

The abbreviation USP stands for United States Pharmacopeia, a document first published in 1820 by the Medical Society of New York State. Recognized as official by Congress in 1848, this document was used as a standard reference by physicians for prescribing medicines. Today, the USP includes chemical descriptions, differing 'fit-for-use' identifying tests, and purity tests, primarily for active ingredients. All materials listed in the USP are considered drugs and/or ingredients for drugs by law and subject to all the U.S. Food & Drug Administration requirements pertaining to drugs. Labeling a product or a substance as USP implies that it is indeed USP and qualifies for medical use, and also must conform to all the legal requirements of FDA, and that it was produced in accordance with the principles outlined and currently published in FDA's Good Manufacturing Practices (GMP). A new edition of the USP is published every five years, in years ending in "0" and "5," with ongoing revisions and additions issued during the intervening years.

Many other nations also have compiled an official national pharmacopeia, similar in scope and content to the USP. Currently, there is a collaborative international program to harmonize the glycerin monographs in the USP and in the European Pharmacopeia, which may later be expanded to include other nations.

The abbreviation FCC stands for Food Chemicals Codex, an internationally recognized compendium of monographs covering food ingredients. It contains specifications for many direct food additives, that includes glycerin. The Institute of Medicine of the National Academy of Sciences developed and maintains the FCC. The FDA also supports this compendium. The specifications for food-grade glycerin given in the FCC are generally comparable to those given in the USP.

A definition of USP and FCC has been included in this presentation since the Kosher and Halal vegetable glycerin used in a proprietary serialized multi-step liquid herbal glycerite extraction process technology is not only G.R.A.S. listed as a food ingredient (as opposed to a food *additive*), but is both USP grade and FCC listed.

What is GMP?

Good Manufacturing Practices (GMP), as in FDA GMP, for the dietary supplements industry, of which herbal products are part of, are governed under the Code of Federal Regulations (CFR), Title 21, Sections 110 and 111. These policies govern every aspect of the procurement, testing, production, labeling, and claims of all dietary supplements. For example, the unique proprietary serialized multi-step alcohol-free glycerin-based liquid processing technology mentioned herein and its resultant products are manufactured in accordance with the policies outlined and published in FDA Title 21, Sections 110 and 111. Foods, beverages, and prescription and OTC drugs are also governed by CFR FDA Title 21, with their own specific sections addressing each, and are referenced in the current editions of the USP and FCC.

Some GMPs include, but are not limited to, 3rd party ingredient identity testing/verification and contaminant testing, separate or defined areas for raw materials, in-process materials, completed products to prevent contamination or mix-ups, and post-production/finished product 3rd party safety and stability testing. Facility traffic flow must also be controlled to minimize vectors of contamination. Requirements for lighting (i.e., minimal lumens per cubic foot), ambient dust and moisture control, ventilation and filtration, water supply source and purity, facility maintenance, and cleaning, and refuse containment and disposal, to name a few.

Additionally, a company that attains NSF GMP certification for its facility and operations is adding another layer of quality oversight via an independent 3rd party verification of meeting GMP standards for both FDA and NSF's own additional GMP standards they may additionally require. Being Organic certified is another level of quality control that typically deals with 'what not to use' in growing, harvesting, and processing consumables. Being Vegan certified verifies that no animal ingredients are used, with only botanical-based and certain mycelium ingredients being used in products. A Company that meets and obtains Kosher certification and/or Halal certification is adding another level of quality standards that are intended to meet a more consumer-desired basis for meeting religious-based dietary standards. Typically, a company has a mix of these additional QC-based certifications.

Glycerin – A Protein, Fat, or Carbohydrate?

While classified by the FDA as a carbohydrate, due solely to biochemical, not source-of-origin considerations, as is done for defining carbs, fats, and proteins, this category placement was decided upon by default only. Even though, in nature, glycerin is derived from complex fats (i.e., 'triglycerides'), it cannot be listed as a fat since it does not contain fatty acids or is derived from fats, and is therefore not a fat, and it cannot be listed as a protein because it has no amino acids or is derived from proteins, and is technically not a sugar, because it is not derived from carbohydrates; nevertheless, glycerin, which possesses a macronutrient of caloric value, ended up being categorized as is a carbohydrate. This determination was based on the biochemical fact that glycerin is ultimately converted, via the liver's gluconeogenic pathway, into glucose, a sugar, even though fatty acids and amino acids can also be converted into glucose as well.

Even so, glycerin possesses its own distinctive macronutrient qualities apart from carbs, fats, and proteins, with some of the view that it should be listed as its own macronutrient category because it is chemically not a fat, protein, or even a carbohydrate in the classical chemistry or source-origination sense. The problem is further complicated in that it's chemically referred to as a 'sugar alcohol.' The name sugar alcohol is often taken to imply that it is composed of a sugar, i.e., 'carbohydrate,' which it is not, just like the term 'alcohol' does not mean alcohol in its effect sense regarding glycerin. This terminology conundrum further complicates the addition of a 4th macronutrient category, which is, in turn, resisted.

For clarification, a sugar alcohol is typically, but not always, defined as any compound that ends in 'itol' (i.e., sorbitol, mannitol, xylitol, erythritol, etc.). Glycerin's names don't end in 'itol.' Two other points defining 'itol' sugar alcohols are that 'itols' are typically derived by hydrogenation and are referred to as polyols. However, glycerin is not a polyol, it is chemically known as a trihydric alcohol and is not derived from hydrogenation, but from a process known as 'fractionation' – a totally different process altogether,

which results in a much safer and more natural end product than hydrogenated sugar alcohols, which do not possess the same food-like macronutrient basis glycerin does.

Glycerin, while 'chemically' and source-origin appears to be its own unique calorie category, continues to be included in the carbohydrate macronutrient category based solely on its biochemical considerations, unlike carbs, fats, and proteins, which are based solely on chemical makeup and source-origin considerations, thereby technically skewing currently accepted 'chemistry & source-based' macronutrient classification. The point being, carbs, fats, and proteins are classified as macronutrients one way, while glycerin, technically its own macronutrient classification, is considered a carb in another way.

Proprietary Serialized Multi-Step, Multi-Dynamic Processed Liquid Herbs – 100% *true* Alcohol-Free Glycerites

The proprietary serialized multi-step, multi-dynamic glycerin-based processing technology mentioned herein, as developed by L. Carl Robinson, MH, FH, TT, CCHt, RH(AHG), now in a 12th-generation iteration as of this writing, is a commercially applied, glycerin-based liquid botanical manufacturing process that exclusively utilizes this unique processing technology to make totally alcohol-free liquid herbal products. Though trade-secreted, this process is fully 'manufacture standardized,' fully documented, and securely kept. It is not intended for this presentation to be an advertisement for a specific company's products or the like, which is why no specific brand is referred to herein. However, due to the fact that only one company incorporates all the principles and complete manufacturing protocols of this unique and original proprietary serialized multi-step 'manufacture standardized' liquid herbal processing technology, we are left with no choice but to at least refer to the process itself due to its unique and exclusive position in the industry and marketplace it holds.

Glycerin versus Alcohol

SUMMARY:

1 – Glycerin does NOT denature, render inert, or drive REDOX/oxidation of constituents and components, whereas alcohol denatures, renders inert, and drives REDOX/oxidation of many constituents and components. [This is the MOST important and overriding consideration of all]

2 – Glycerin preserves the integrity of constituents and components. Hence, it preserves therapeutic potential, whereas alcohol's denaturing, inert rendering, and REDOX/oxidation effects diminish it. [Preserving constituents' integrity is the second most important consideration]

3 – Glycerin is a macro-nutrient and possesses a low glycemic index AND a low glycemic load – whereas alcohol is not a nutrient and, while also possessing a low glycemic index, does possess a high glycemic load. [Many dieticians and nutritionists consider the glycemic load more critical than the glycemic index]

4 – Glycerin possesses a succulent quality, making it more compatible with soft tissues, whereas alcohol has a biting, harsh quality that compresses oral tissues, distorts taste, hinders immediate oral absorption, and makes it less compatible with soft tissues. [Oral response and taste are essential to the digestive utilization of constituents and systemic synchronicities]

5 – Glycerin possesses high versatility and solvent extractive potential greater than that of alcohol, whereas alcohol possesses limited versatility and lower solvent extractive potential than glycerin. [The point is, that different constituents require different processes to remove. The 'TincTract®'process is, as the name implies, a multi-method-based technology for removing different constituents from the same botanical ingredient being processed, in a way no other fluid extraction methodologies do]

6 – Glycerin, as used in the serialized multi-step TincTract® process, is 'worked' in a unique proprietary way that accesses and utilizes the high versatility and full potential of glycerin as an effective extractive solvent for liquid herbs. [How an extractive solvent is utilized determines the range of what it can remove]

7 – The serialized multi-step TincTract® process uses less amount of herbs than alcohol-based or other glycerin-based processed products do, making TincTract® herbs one of the most eco-friendly products in the industry and contributing to the biological sustainability of herbs in a way other companies don't. [Using more herb material does not always mean a better or more efficacious finished product outcome]

8 – The ability to use less herb amounts for making TincTract® processed products and yet produce as great or greater efficacy gain than other liquid herbal processes that use more herbs, often far more, in the making of their products is based on the principles and applications of 'serialized' fluid chemistry, which is the opposite of typical 'saturate' based fluid chemistry principles and applications used by other liquid herbal products producers. [Fluid chemistry is not exclusive to saturate-based processes. There's more, such as 'serialized' processes, which are just as, or more effective in extraction potential]

9 – Glycerin possesses a 'microencapsulating' quality (aka 'protective caging') that contributes to stability, flavor integrity, staunching REDOX, and no post-process/blending complexing of constituents – whereas – alcohol does not possess any microencapsulating properties to enhance stability, flavor integrity, staunch REDOX, or prevent post-process/blending complexing of constituents. [Microencapsulation possesses many benefits that are additionally important to liquid herbal product quality and stability]

10 – Serialized TincTrace® made herbal products taste remarkably good, often similar to a freshly harvested herb, and are unmatched in tasting good, even by other herbal glycerite producers – whereas alcohol-based herbal products, even alcohol-removed, typically do not taste good (due to the denaturing, inert rendering, and distorting effects of alcohol upon flavor components). [As far as consumerism is concerned, at the end of the day, taste holds the high ground for consumer approval and use of a product]

11 – Serialized TincTract® processed herbal products possess an independent third-party lab-verified six (6) year label expiry – the longest expiry listing of any liquid herbs in the industry – which is a testament to the astounding stability of a 'true' alcohol-free serialized multi-step TincTract® made product. [*The long-term stability of a product, especially without preservatives, additives, or enhancers, is one of the best indicators of a process technology's integrity and finished product quality there is*]

GLYCERIN VERSUS ALCOHOL DETAILED PRESENTATION:

Serialized multi-step processed liquid herbal products result in a premium class of liquid herbal products, that also possess a unique nutrient and micronutrient aspect. Every step of this process is totally alcohol-free (meaning 'ethanol' free). Alcohol is NEVER used anywhere or at any time in the process. This particular process approach preserves extracted water-soluble and alcohol/heat-sensitive components such as aromatics (especially rarified top note aromatic components), vitamins, enzymes, co-factors, and other water-soluble constituents that are diminished, denatured, rendered inert, or altered in alcohol-based processes. The later points are proven scientific facts based on the known intrinsic characteristics of glycerin versus alcohol. These facts are also withheld from consumers by some (but not all) companies that process their herbal products with alcohol. Most surprisingly, many companies in the liquid herbal products industry are either unaware of or ignore the intrinsic denaturing and inert-rendering effects of alcohol on many of the herbal constituents they process for.

Am I saying that alcohol-processed herbal products have no place in the clinician's dispensary or on a store's shelves? No! Far from it. Both glycerin-based and alcohol-based herbal products have their place in herbalism and herbal medicine. However, what is being specifically pointed out is that many important facts and factors concerning alcohol-processed herbal products, such as the intrinsic denaturing, inert rendering, and REDOX driving effects of alcohol on many biological constituents and compounds, are either knowingly withheld from practitioners and consumers, outdated in their premise, or simply not realized by the makers of alcohol-based products, thus depriving practitioners and consumers of making more informed choices. The latter two points will be addressed later.

To be sure, glycerin, amount for amount, is second to alcohol in outright disinfecting-antiseptic action (alcohol has the upper hand on that one), and if that were all there is to be concerned with as to the

subject of glycerin versus alcohol relative to liquid herbal products, nothing more would need to be said. But there is more… Much more indeed.

'Denaturing' Defined

Denaturation is a process in which the application of external stress causes affected components to lose their complex structures, as present in their native state. However, denaturation reactions are not strong enough to break many strong bonds, such as the peptide bonds of proteins. Therefore, they don't lose their primary structure basis but do lose their functional and interactive basis. This stress promotes the disruption of interactions and can be applied as a chemical stress, a physical stress, or both.
For instance, when proteins in a living cell are denatured, the cell activity is disrupted, which can lead to diminished potential, aberrant activity, or cell death. An example of a denaturing process is the difference between a fresh or soft-cooked egg yolk and a hard-cooked, solidified egg yolk. The former is in its 'natural' whole complex colloid-bound state, but the latter is in a denatured state where the yolk, in a more solidified state no longer possesses its intrinsic ratio-intact, delicate, complex bonds with minerals (such as sulfur), enzymes, lecithin, etc., but are now dissociated in a denatured concrete state, which accounts for why a soft yolk egg is easier to digest and benefit from than a hard yolk egg is with its denatured non-beneficial lecithin and sulfurous forming gasses as a digestive side reaction to the aberrant state of the cooked solidified egg yolk. Denaturing is about changing the 'nature' of something.

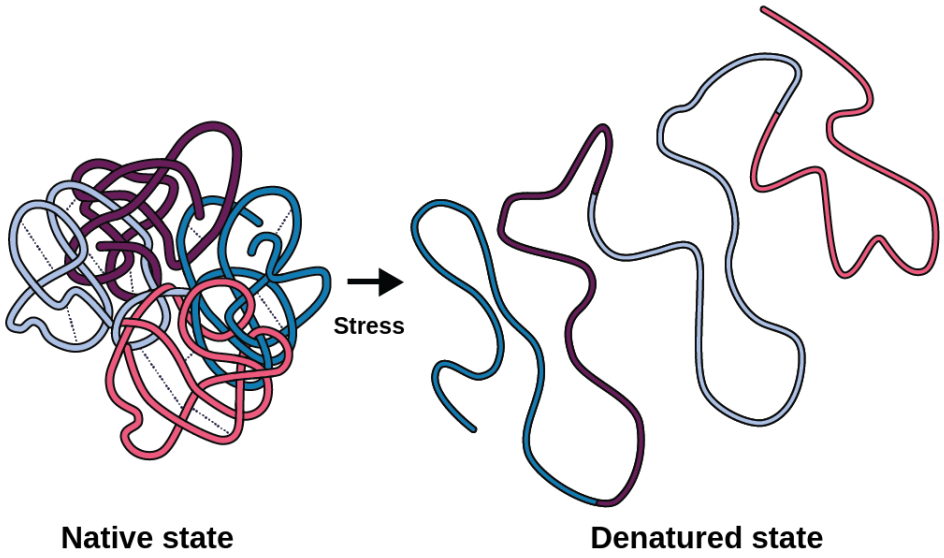
Furthermore, denaturation is not a one-directional process in terms of the resulting states. While denaturing results in breaking down and de-complexifying intrinsically bound molecules and their parts, denaturing can also involve a sort of post-denatured reverse super-binding of molecules and components, taking place within fractional moments of the denaturing process, such as happens with the hard cooking of an egg's yolk and white, and similar to alcohol's effect on a mushroom mycelium chitin hetero-saccharide complex, resulting in a post-denaturing over-binding, to crystalizing the chitin complex, making it even harder to break down and extract from. Denaturing is a bi-directional phenomenon.

This same alcohol-based post-denaturing over-binding also occurs with certain other hetero/polysaccharide compounds found in foods and herbs. Not all, but some. Either way, an initial 'changing,' 'simplifying' of the intrinsic complex state has been denatured from its delicate, natural ratio-intact complex state.

The concept of 'denaturing' is a standard purpose-oriented process in food science, where protein denaturation, for instance, is used as a tool to cook, create new ingredients, and enhance specific cooking processes, rather than using alcohol, which would, technically speaking, achieve the same sort of 'denaturing' effect. These are simplified descriptions of denaturing in the context of organic chemistry and biological molecule dynamics, acknowledging that it is a more complex subject than presented here. Nevertheless, the fundamentals detailed here convey the rudimentary basics.

One further note regarding alcohol's denaturing effects. In 2015, the New York State Attorney General moved to shut down the herbal products industry's selling of herbal products in the state was triggered by his receiving an unverified report that alleged herbal products did not contain the herbal ingredients listed on their product labels due to a plaintiff-sort of investigation using an emerging nascent DNA barcode testing protocol that showed there was no detectable DNA of the stated herbs in the bottles tested. It turns out that it was the liquid herbal products segment of the industry being DNA barcode tested that set off this action by the AG of New York. This action was picked up nationally by the media, but it quickly escalated into an embarrassing career-diminishing scandal for the Attorney General of New York, as two issues were brought to light. First, DNA barcoding was still in its infancy, working out the bugs, and in the final stages of defining its protocol standards, which did not exist at the time. The lead developer of the technology, based outside Canada, stepped forward and publicly stated that it had been used and jumped on by the New York AG in a 'Not-Fit-for-Use' manner. This leads to the second point. The tested liquid herbal product samples that triggered the AG's actions had previously been subjected to the DNA-denaturing and inert-rendering effects of alcohol! So, it would not have been possible to obtain fully intact DNA in the alcohol-based samples for analysis, as the DNA had previously been denatured and rendered inert by alcohol. The New York AG had to rescind his actions and issue a detraction.

The following illustration shows what happens to a biological structure when it is denatured:



Intact/Complex Structure Disassembled/Collapsed Structure

The effect of denaturing (i.e., 'Stress') on complex molecules and components

Denaturation Process Explained

Here, I'll describe protein denaturation as an example. Alcohols (e.g., ethanol, methanol) disrupt hydrogen bonds in secondary, tertiary, and quaternary structures. They form new hydrogen bonds with the amino acids. This leads to the exposure of hydrophobic amino acids at the surface, as they are more soluble in organic solvents such as alcohols, and subsequently to a conformational change that denatures the protein. This happens, for instance, when using, say, 70% ethanol to disinfect the skin before getting an injection. The alcohol denatures proteins in any bacteria present on the skin, rendering them non-functional and thereby preventing a possible infection at the injection site. This means a denaturing process also renders the affected subject inert, meaning it loses the ability to be active and concurrently loses its natural capacities and potential. The same denaturing effects of alcohol can, and do happen at much lower concentrations, say as low as 10%, especially if something is left in the alcohol solute for a period of time.

Alcohol's Intrinsic Nature

(Highlighted text is intended to emphasize the core of the point being presented LCR)

All simple (diatomic) ethanolic alcohols used in making herbal products possess the intrinsic property of denaturing and rendering inert many of an herb's extracted constituents. This is a chemical fact about the intrinsic nature of diatomic alcohols. A long-standing premise of chemistry (and biochemistry) states that if the structure of something is changed, then the outcome (i.e., effect) of that something will, to some degree, be changed as well. It's part of the cause-and-effect equation of chemistry and also life itself. This fundamental chemistry principle regarding the denaturing and inert-rendering effects of alcohol on the biological integrity of botanical constituents and components was a significant determinant in the author's reinvention of botanical extraction, and hence, 'Reinventing Liquid Herbs™.'

The structures of aromatic components (e.g., essential oils, resins, gums), glycosides, certain polysaccharides (especially linked and cross-linked polysaccharides), enzymes, many co-factors, etc., of a plant are altered by the denaturing and inert-rendering effects of alcohol. Even though removed from a

plant, these alcohol-denatured, inert constituents and components were significant contributors to a raw herb's therapeutic value, which is the basis for making an herbal extract in the first place.

The perfume and fragrance industry knows of the denaturing and inert rendering effects of alcohol on different aromatic components and often requires that alcohol be used for denaturing high-grade essential oils and resins used in their fragrances as part of preparing their scents for the marketplace so as their products maintain proper preservation and the sought for finished scent/aroma quality while being void of unwanted therapeutic effects (commonly known as 'emotional triggers') that could potentially cost them sales and market share.

This was verified by a perfumer with many decades of experience who worked for Berje' Inc. (name of person purposefully withheld) to the author. Also, being a flavorist who worked with food, beverage, and confectionary customers who knew of and understood alcohol's denaturing and inert rendering effect on certain biological constituents and components, and the distorting of flavor components that results in unwanted flavor effects, he was surprised that an herbalist who uses liquid herbs, let alone someone in the liquid herbal products manufacturing industry was even aware of the denaturing and inert rendering effects of alcohol on many botanical constituents, components, especially aromatic ones, and its effect on therapeutic potential, given the alcohol-based liquid herbal manufacturers, and practicing herbalists, were ignoring and even averse to considering these facts regarding the use of alcohol for making liquid herbs, and looking at alternative extractive solvents that don't denature or render inert many constituents and retain therapeutic value, and flavor profile, which for him was indicative that a botanical's constituents and components biological integrity were more intact and of higher quality where alcohol was not used.

Polysaccharides, particularly linked and cross-linked ones, various aromatic components, many glycosides, vitamins, enzymes, co-factors, and other micronutrients, are denatured and rendered inert when brought into contact with alcohol. This is due to alcohol's disinfecting, sterilizing, and dissociating qualities. It's true that important marker constituents and compounds may be removed by alcohol solutes, some to a high degree, but to what end?

If those constituents and compounds are denatured and rendered inert due to alcohol's intrinsic ability to do so, then those same constituents and compounds would also be diminished, and in some instances potentially of no therapeutic value in biological systems due to their denatured and/or inert state, resulting in diminished results or the need to substantially increase the 'effective' dosage to get enough biological value, which appears to be the fall-back recommendation for those mono-constituent-based fraction/isolate Standardized phytopharmaceutical potency enhanced preparations, which is both ironic and contradictory, since the higher percentage of a specific constituent is supposed to imply concurrent higher effectiveness with the super-potency dose, which has and is not proving to always be the case, again due to the denaturing and inert rendering effects of the extraction and concentrating process used in making such products.

Just because something is removed and present, even at high potency concentrations, in an end-product does not automatically mean that it will be biologically active, viable, or utilizable to the degree represented or sought. *How* something is removed and *what* it is removed with are as important as what is being removed, because the 'how' and the 'what' will definitely affect the state of what is being removed. These are all scientific and technologically verified facts that are not only part and whole of the science of fluid chemistry but also studied in advanced high school chemistry courses and 101-level college chemistry courses, so simple and basic are the concepts.

Which brings us to an interesting point. While it is generally known that glycerin exists in both animals and plants as a part of triglycerides (i.e., complex fats), what is less known, and contrary to what some in the herbal products industry have said or would have us believe, is that certain plants can contain intrinsic ethanolic alcohol, such as Agave for instance, but in very small 'trace' amounts, and such ethanolic alcohol is sequestered from other constituents, components and structures within the plant's cellular complex. Science has, as of this writing, still not figured out what the purpose of this alcohol content in plants entails, if any. Some have hypothesized that it may be part of those plants' immune systems, or that alcohol has no intrinsic effect on the plant's biology, but that a protective sequestering of alcohol is triggered in the event of a lack of oxygen, in which in vivo micro-fermentation would ensue. What is being

pointed out here is that nature endowed these plants with the ability to 'sequester' any in vivo-produced alcohol, so that no denaturation or inertization of other constituents or components in the plant occurs.

Compensating For an Intrinsic Weakness of Alcohol

Super-saturating liquid alcohol-based extraction processes in pursuit of high levels of a given marker constituent (that also may be denatured and/or rendered inert due to the process itself) may have the resultant physio-biochemical effect in the body of 'forcing' a metabolic pathway, especially when the 'effective' dose is high, just like pharma-based chemically synthesized drug analogs do, of the denatured and inert rendered constituents into the body's systems, that might otherwise require much less of that same active constituent(s) if it was in a non-denatured or non-inert rendered, and intrinsic synergy-preserved ratio-intact poly-constituent retained state – not too dissimilar to the difference that's been biochemically noted for needing less of a natural cold-processed source of biologically active pro-vitamin C, with all its secondary and tertiary companion factors, versus the otherwise high amounts of heat/solvent processed fractionate/isolate-based crystalline concentrated vitamin C, as pure ascorbic acid, to get a similar benefit (again, speaking 'biochemically' here, not just pure in-vitro based chemistry shills). The same can be said for pre-vitamin A, as ß Carotene versus high-dose synthetic vitamin A. All of this also applies to dried herbal preparations as well.

Again, because a higher amount of a fraction/isolate constituent is present, it doesn't necessarily mean it possesses the high synergies-driven ratio-intact poly-constituent-based biological activity it formerly possessed in the raw un-fraction/un-isolated state in a natural ratio to the other naturally occurring constituents and compounds in a whole herb, or increased efficacy thereof, especially when the type of 'solvent' for extracting a compound and the methodology used for doing so is also taken into consideration.

Not all 'saturate' based liquid processes of a raw whole herb ingredient are aimed primarily at a 'Standardized' phytopharmaceutical-type of outcome that utilizes 'super-saturate' processes. However, the intrinsic nature of a super-saturating approach, as different from a serialized multi-step approach, results in certain constituent or constituent groups, sometimes to a highly specific and concentrated degree, being extracted to the exclusion of other secondary and tertiary constituents and components if the liquid extraction process goes from a traditional saturating approach to a 'super' saturating approach.

Those endeavors that keep their liquid extraction process to a traditional saturating approach will result in a more ratio-intact poly-constituent-based product than those that utilize a 'super-saturate' process that mitigates the ratio-intact poly-constituent nature of the raw whole herb being liquid processed. Typically, those herbal practitioners and liquid herbal manufacturing companies who operate on a more 'traditional' model of herbalism utilize the 'general' saturate approach to making liquid herbal products, whereas the 'Standardized' phytopharmaceutical manufacturers with their potency-enhanced fractionate/isolate-based products utilize the 'super-saturate' approach to making their products. The latter phytopharmaceutical manufacturers utilize aggressive extractive technologies and solvents such as HPGE (High Pressure Gas Extraction, with CO_2, Propane, etc.), Acetone, Benzine, Hexane, Ether, and Alcohol, all in the name of a 'Natural' alternative to pharmaceutical chemically synthesized drugs, when in fact, push comes to shove, they are a sort of mirror image of the very thing they believe them to be different from, which chemistry fundamentals clearly bear out.

Alcohol's Many-Fold Problematic Nature Regarding Its Use For Herb Extraction

Ethanolic alcohol, typically derived from grains, sugar cane, sugar beets, and potatoes, is also implicated as being problematic for either causing or aggravating many health problems, from the subtle to the profound. Alcohol, in any form or amount, can, in sensitive individuals, be an endocrine disruptor and is contraindicated for pregnant mothers, and recovering/recovered alcoholics, who often 'trigger' even with so-called "alcohol-free" products that were actually processed with alcohol and then had the alcohol removed (realizing that 100% of alcohol is not able to be removed, leaving a percentage residue of alcohol). It's as though the 'energetic' signature for alcohol seems to remain, which alcohol-sensitive individuals will be aware of and trigger to.

According to some religious and philosophical beliefs, there are injunctions against alcohol even touching any consumable at any time that would be internally consumed, such as the Muslim dietary code of Halal, banning alcohol as being Haram and not approved for use in making or ever coming into contact with consumable foods, drinks, confectionery, and medicines. The Halal standard is specifically mentioned because it is one of the fastest-growing segments of the global dietary and herbal supplements industry and, therefore, cannot be ignored. Jainism and Mormonism are two other religions that strictly forbid ingesting alcohol.

Again, I reiterate that, in principle, I am not opposed to alcohol-made herbal preparations as they have a 'proven' place in herbal medicine. However, I do question if alcohol-based herbal preparations are, in fact, as effective as they could be, given that constituents and components are denatured and rendered inert, and therefore, as a chemical fact of biology, would, in turn, affect therapeutic potency and integrity. It is a question for which an answer has never been pursued on a clinical basis, either in herbalism or orthodox medicine. This does not mean alcohol-based herbal preparations don't work. They do. But are such alcohol-based preparations actually as potent as non-alcohol-based preparations, based on an equal constituent amount-for-constituent amount, when denaturing and inert rendering factors are considered?

As of this writing, the best that can be ascertained regarding this question is what we know regarding when something of a chemical or biological nature is denatured or rendered inert, put in a simpler term, 'changed,' that such a change, whether inorganic or organic, will result in a concurrent consequential change in outcomes. Given these facts, it should be reasonable to surmise that since alcohol does possess the intrinsic properties to change the biological integrity (i.e., denatures and renders inert) of an herb's constituents and components then, in turn, it can be expected to change (i.e., effect) the now altered outcome/action(s) of the changed constituents and components, and hence therapeutic integrity and potential. To deny this possibility would be foolhardy and smack of a cognitive bias, even cognitive dissonance at its most extreme.

Alcohol not only denatures and renders many constituents in herbs inert, but has also been documented to impair and damage many nutrients and to suppress digestive enzymes in the digestive tract (including the oral cavity). Would the same apply to an alcohol extractive/tincturing component in finished alcohol-based herbal products? On the surface, the answer is an obvious yes. Even alcohol-tinctured herbal blends that are then distilled into 'liquor,' digestive aperitif will upset digestive enzymes and processes should the alcohol portion make it to the gut due to ingesting too much of the digestive aperitif liquor, which is why a small half-finger amount in the bottom of a small aperitif glass is recommended, slowly sipped and kept in the mouth for a time before swallowing to allow the alcohol to orally vaporize and escape from the mouth with a small portion orally absorbing into the oral tissues, because the digestive aperitif liquor's action of stimulating digestion takes place in the mouth due to the aromatic and bitter components, not in the gut itself! Of course, this same alcohol consumption factor has led to decades of on-again and off-again determinations to the controversy of whether wine, with its typical 9% to 13% alcohol content (by weight), is really healthy for digestion or not, whether short or long term – a subject best suited for another presentation elsewhere.

Even though alcohol may be a great sterilizing agent, due to its '-cidal' disinfecting and disassembling nature, it nevertheless, denatures and renders inert so many constituents and nutrients that an alcohol-based product would possess a reduced level of therapeutic efficacy, due to the alcohol limiting its full potential and therapeutic benefits, especially when compared to the broad benefits contained in a 100% alcohol-free serialized multi-step processed liquid herbal glycerite. Again, this is not to say that alcohol-based liquid herbs don't have a place in herbal medicine – they do. However, there are limitations to their place in herbal medicine; more remain to be ascertained and/or recognized, especially since, compared with efforts to determine the effects of alcohol-based preparations, little effort has been made to identify the efficacy limitations of alcohol-based herbal preparations. A lot is known about what herbs may do, even what an 'effective' dose for doing so, but studies determining how much therapeutic potency is lost due to alcohol's denaturing and inert rendering effects has not been done.

What is being said, both from an alcohol chemistry effect, and common sense perspective, is that the prior, and long outdated claim that "Alcohol is the preferred medium for extracting botanicals." is no

longer valid, with the understanding that with there being a denaturing and inert rendering effect on many herbal constituents and components, previously not realized or acknowledged, then there would be a concurrent diminishing effect on certain therapeutic aspects of such alcohol made products. To reiterate, denying this observation would be considered a form of 'cognitive dissonance': the inability to see and accept the facts even when the proof is in plain sight, since it is, after all, a scientific fact!

Glycerin's Highly Versatile Nature & Intrinsic Stability

It is becoming more evident to those who study and use both alcohol-made and glycerin-made botanical preparations that a fair and comprehensive evaluation of each, both on their own merits and compared to each other, supports the premise that the serialized multi-step processed botanical glycerites may be more versatile in their applications (as opposed to other process-types of glycerite products) than previously realized. And, because of glycerin's non-denaturing and non-inert rendering quality and stability, the extracted constituents and compounds retain more of their synergistic integrity and ratio-intact biologically active nature, thereby, on an equal constituent-for-constituent amount basis, presenting the distinct possibility of requiring less of a given active constituent or compound for an anticipated effect of the serialized multi-step processed herbal glycerite than an alcohol extracted processed product might otherwise require.

Also to be recognized is the driving need for alcohol-based processes that super-saturate for their finished products, or even post-extraction add Standardized phytopharmaceutical potency enhanced Fraction/isolate ingredients to their products results in the disturbing observation that almost all super-saturate based extraction technologies have incredible wastage of their partly spent herbs, along with the pressure it puts on the harvesting of and commercially-driven demand for herbs, especially those of questionable biological sustainability, that have become more prevalent in the marketplace.

On the other hand, the serialized, multi-step glycerin-based processing of liquid herbal products offers a versatility previously and currently unavailable in at-large glycerin-based processes and their resulting products, a fact that does not go unnoticed by health practitioners, herbalists, and consumers alike. A serialized, multi-step, glycerin-based, processed herbal product can be taken straight, with water, in juices, or sprinkled over foods, without tainting the taste or quality of the medium to which these true 100% alcohol-free herbal glycerites are added.

Additionally, it is worth noting that the proprietary, serialized multi-step glycerin-based processing technology uses significantly less raw herbal material, yet yields potent concentrates and efficacious products that taste remarkably good. Taste, especially a potent one very close to that of the raw harvested herb itself, indicates that the extraction potential to retain the synergies and intrinsic ratio-intactness of an herb's polyconstituent basis is present.

The 'Herb-to-Fluid' Ratio Marketing Ploy Is Irrelevant To A Serialized Multi-Step Processed Product, And Has No Relevance To Quality or Efficacy When Listed On Product Labels.

Because the serialized multi-step glycerin-based liquid herbal processing technology utilizes less raw material to obtain similar or in-kind efficacy and results for finished products, the 'herb-to-fluid' ratio listing on product labels, which is the rage for many companies, particularly alcohol-processed products, has no relevance as to the 'implied' product quality or efficacy potential, as such herb-to-fluid ratio listings attempt to represent, intimate, or imply.

Even for companies who use this marketing ploy, as far as distributors, wholesalers, retailers, consumers, and practitioners are concerned, it has no relevance as to the finished quality of their particular product, especially regarding efficacy potential, when other factors such as raw material consistency from harvest to harvest, solvent used, manufacturing methodologies, etc., are taken into account as regards final concentration, potency, and the afore stated efficacy potential of a finished product, that substantially varies from company to company, and therefore, from product comparison to product comparison where the same herb-to-fluid ratio might be listed for each, as an example, clearly shows that herb-to-fluid ratio listings on a product label are irrelevant when the other factors for making products are taken into

account. There is no across-the-board industry manufacturing standard that applies to all, justifying its use on product labels and in marketing endeavors, and it's a disingenuous market and sales ploy as well.

The following example illustrates what is being said here:

These 3 cups of tea have identical herb-to-fluid ratios.
Same herbs. Same amount of herbs in each tea bag.
The same amount of water in each teacup.

The same herb-to-fluid ratios.

So, why different outcomes?

Answer: THE PROCESS!

The quality of efficacy is measured not only by what goes in but, most importantly, by what comes out.

Why are the different colors of steeped teas indicative of the concentration levels of the differing tea cups? All things are supposed to be equal – the amount of raw herb material in the tea bags and the amount of water in the cups are the same, except for one essential factor. The time the tea bags are exposed to hot water. The 'process' factor! The first cup takes little time to steep; the second takes longer; the third takes much longer. Different steeping times, akin to different processing approaches for making liquid herbs, make them distinct from each other, yet they have the exact same herb-to-fluid ratios. Are you beginning to see why herb-to-fluid ratio listings on liquid herbal product labels are absurd and disingenuous?

Herb-to-fluid ratios are relevant only to a company's internal operations as part of its FDA GMP-required MMR (Master Manufacturing Records) documentation, SOP (Standard Operating Procedures) standards, and manufacturing protocols, and have no tangible marketing relevance regarding implied quality, particularly with respect to efficacy potential, when listed on a finished product label. This is even more true when a totally alcohol-free serialized multi-step processing technology is utilized to make herbal glycerites. Fact is, on finished product labels, the listed herb-to-fluid ratio 'numbers,' sans, for example, any harvest-to-harvest constituent content levels data of raw materials, or production methodology specifics used, as just two examples of many, does not validate or is remotely indicative of the quality or efficacy potential of a product, and are deemed by this author to be disingenuous sales puff and misleading as to an assumed quality standard that is non-existent when used outside a company's internal documentation and operations. As for a consumer, herb-to-fluid ratio listings on product labels represent an assumptive phantom for something that in fact does not exist.

Source of The Misconceptions, Misunderstandings & Misrepresentations Surrounding Glycerin

So why is ethanolic alcohol (i.e., alcohol derived mainly from grains, cane, and root crops) listed as it is in the texts dealing with making liquid herbs, so dogmatically accepted in the industry at large as the 'preferred' extractive medium for liquid processing of botanicals? The answer lies in the early research and assumptions made by botanically based eclectic physicians from the mid-1800s through the early 1900s. These holistic physicians, who are legendary for their safe, sane, effective *eclectic* approach, and

became involved in the emerging pharmaceutical search for botanically-based crude drug medicines. Their research and work were astounding and, in many areas, groundbreaking for their time.

Part of their early research involved determining what they believed would be the safest, most universal, and preferred extractive medium for the liquid processing of medicinal botanicals, especially botanically-derived crude drug extracts. In the end, they settled on ethanolic alcohol, and though not the only extractive solvent available to them, nevertheless made that the generally accepted 'standard' extractive medium – a tenaciously held-to premise that still prevails among many herbal practitioners and in the liquid herbal products industry at large today as of this writing.

However, regarding glycerin as a viable extractive solvent for botanicals, in 1869, the eclectic physician William Cook, MD, said, "*Glycerin possesses a peculiar and powerful solvent property, and is also an excellent preservative. For both these qualities, it is second only to alcohol and deserves to come into considerable use.*" It should be noted that the last part of Dr. Cook's statement, "*… and deserves to come into considerable use.*" was never really taken to a level of serious consideration by his peers or later eclectics (and not by the modern contemporary liquid herbal products manufacturers and most practicing herbalists who utilize alcohol-based liquid herbs in their practices). Instead, they appear to have dogmatically opted for alcohol as the dominant, and in most cases, exclusively preferred, extractive medium for extracting botanicals, and largely excluded glycerin, except in highly remote instances, from their efforts. Dr. Cook's view that glycerin is "second only to alcohol" as an extractive solvent would eventually be proven incorrect.

Within a short time following the apex of the Eclectics work in this area, three very important things would challenge and even invalidate some of the early assumptions that alcohol was the best, hence, preferred medium for liquid extraction and preservation of liquid-processed botanicals, even challenging Dr. Cook's assertion that glycerin "… is second only to alcohol,' with glycerin instead, later being verified as being 'second only to water' (not second to alcohol) in its solvent and extractive potential and efficiency, which would mean it is a more 'universal' extractive solvent than alcohol, since glycerin (and alcohol by implication) are exceeded in a 'universal' extractive potential, by water, with glycerin, not alcohol, being the second most effective extractive solvent as later studied and verified.

Enzyme Theory

Firstly, in their time, enzyme theory had not yet happened, and so was not considered in the implications of eclectic theories and work, not only as related to the processing of botanical products but, most importantly, relative to the 'actual' denaturing and inert rendering effects upon the constituents of alcohol-processed liquid botanical preparations both therapeutically and nutritionally. Without this foundational enzyme theory knowledge, they could not possibly, beyond their meta-science premise, have been aware of the 'biologically' active nature that certain constituents, enzymes, and enzyme cofactors play in the therapeutic and, just as important, nutritional building efficacy of an herb, which alcohol intrinsically denatures, dissociates, and renders inert. Enzyme theory was decades away from being theorized, verified, and elucidated, and a time after that before the effects of alcohol on enzymes and enzyme cofactors would be fully elucidated by science.

This is especially ironic, given that the Eclectics were firm believers in the principle of a 'Vital Force,' which is why Eclectics were referred to as 'Vitalists.' They believed that their endeavors, at their core, revolved around correcting, vivifying, and maintaining the body's vital force, and were intent on preserving the vital forces inherent in the botanicals they extracted with alcohol. Once enzyme theory came into being, further research, elucidation, and peer review would ascertain the modern premise that enzyme theory explains the vital force principle, as enzymes and their actions have been found to be key to energy, vitality, stamina, and longevity, all principles associated with the 'vital force' principle espoused by the Eclectics.

It's a pretty sure bet that had the Eclectics known of enzyme theory and had any idea that alcohol denatures and renders inert enzymes and suppresses enzymatic actions, today deemed by many to be the core of vital force activity and energy, along with alcohol's denaturing and inert rendering effects on

constituents of herbs, it is highly doubtful they would have dogmatically continued with the premise of alcohol being the preferred universally accepted extractive medium for making liquid herbal medicines, and in all likelihood would have been more attentive in working with glycerin, as their contemporary, Dr. Cook asserted be done. But alas, that would be left to a later generation when the author of this white paper, a non-Eclectic learned non-dogmatist clinical & formulary herbalist, nutritionist & CAM practitioner, would broaden his studies and views by re-reviewing high school and college chemistry, delving into food and fluid chemistry, as he dealt with his glycerin versus alcohol observations, questions, and experimentations leading to the development of an industry-first ever serialized multi-step glycerin-based process for making totally alcohol-free liquid herbal concentrates.

Unrealized & Unmatched Versatility

Secondly, although they utilized glycerin in several of their experiments and in some remote product preparations, the Eclectics appear to have been unaware of and/or unconfident in its enormous *versatility* as an extractive solvent. Except for occasional glycerin-based decoction processing. When glycerin was used for making 'tinctures,' it was typically subjected to an alcohol-type tincturing methodology (resulting in 'weak' herbal glycerites), possibly due to two factors known to eclectics at the time – 1, that chemically glycerin is technically an alcohol, not in the effect sense, but in structure sense, being a triatomic alcohol, like comparing refined sugar (ethanolic alcohol) to a complex polysaccharide carbohydrate (glycerin). And 2, the Eclectics (or later adherents to the Eclectics) did not have (nor attempt to develop) a serialized, multi-step processing technology with specialized equipment and implements for processing botanical glycerites in their day. In other words, whatever the reasons, they didn't *work* the far greater spectrum of glycerin's versatility beyond the critical narrow limits intrinsic to ethanolic alcohol's tincture-making methodology limitations. Why they didn't do so, no one knows.

Even so, by the 1930s-early 1940s, the Eclectics assumptions concerning alcohol versus glycerin had been invalidated by the medical and food products industry (apart from industrial uses of glycerin) which reached the zenith of glycerin-based research relative to food use, medicine and veterinary use and concluded, through both industry and scientific research, that aside from water, glycerin is not only the most versatile naturally occurring 'universal' solvent/extractive medium yet discovered, but one of the safest as well. This is borne out by Leffingwell, PhD & Lesser, BS, in their seminal work, 'CHEMISTRY, Its Industrial and Commercial Applications' (1945 Chemical Publishing Co. Inc., Brooklyn, N.Y.), in which they state, "*Glycerin combines the extractive qualities of water and alcohol: and many substances dissolve even more easily in it than in either of the two liquids*." The key that the Eclectics had missed was not so much whether glycerin was a suitable extractive medium or not (which they assumed was less versatile and weaker than ethanolic alcohol in its extractive qualities) but *how* glycerin would later be worked and used in the afore-described serialized multi-step processes it is used with to bring out its intrinsic versatility and greater extractive potentials.

The *working* of glycerin in a serialized, multi-step, and multi-dynamic liquid herbal extraction process versus a passive, non-dynamic tincture-type process (i.e., infuse, macerate, percolate, etc.) is precisely what the Eclectics had missed, and the following adherents of Electicism continued to miss. The manner in which glycerin is used was a paramount consideration in developing the serialized multi-step, multi-dynamic glycerin-based liquid herbal extraction process described earlier.

The point is the Eclectics were not aware of glycerin being much more versatile and a better extractive medium for numerous constituents and components of botanicals than alcohol could ever be because they did not have access to later research and facts to give them greater clarification, nor had they ventured further beyond their own original alcohol biased premises, that limited their R&D of glycerin's use to find out, with the resultant dogmatic insistence on alcohol being the preferred extractive solvent for making liquid herbal medicines predominating throughout the Eclectic era, and thereafter, even to the present.

Non-Denaturing & Non-Inert Rendering Nature of Glycerin (as opposed to Alcohol)

And thirdly, it is the most efficacious and clinically relevant point of all. It was noted in the late 1960s/early 1970s and further observed in the 1980s by clinical aromatherapists that certain therapeutic

benefits of essential oils and plant-based aromatic compounds would be denatured and/or altered (often disassembled and dissociated into simpler, inert compounds) when placed in contact with alcohol. Though most of the aroma quality remained, the therapeutic benefits were substantially reduced and/or rendered inert due to alcohol's denaturing action of taking extremely complex molecules and breaking them down (i.e., 'disassembling') into simpler component molecules that no longer possessed the complex nature that contributes to nuanced therapeutic potential. Perfumers worldwide are aware of this due to the fact that they often blend a naturally derived aromatic blend of essential oils with a small amount of alcohol to 'fix' it, or, in this case, intentionally render it therapeutically inert while retaining aroma quality. Again, the denaturing and inert rendering effect of alcohol also affects other components.

This aspect of alcohol's effect on the aromatic constituents of a plant was unknown to the Eclectics. The Eclectics were also unaware that glycerin is a superior non-denaturing/non-inert-rendering solvent to alcohol for removing essential oils and certain volatile components from plants and preserving their intrinsic complex state, since this aspect of glycerin research would not come to light until the 1940s. In fact, glycerin has been found to be an excellent non-denaturing, non-inert-rendering agent for preserving aromatic compounds and essential oils (via its microencapsulating properties), which is also particularly important for the confectionery, beverage, and flavoring industries.

Today, many accomplished clinical aromatherapists have noted similar observations and share a similar feeling among their professional peers in regards to their own practices, even stating that they refuse to add ethanolic alcohol to any of their therapeutic intended blends for the very reasons conveyed in this presentation, but instead 'cut' (i.e., dilute) their essential oil(s), whether for topical or internal use, with a fixed oil such as olive oil, almond oil, hemp oil, etc., and in some specific use instances, glycerin.

Regarding glycerin and its use in flavorings, beverages, and confectionery industries. The aforementioned industries all utilize glycerin not only for its emulsion quality, adding body and humectant properties, but also for how it captures flavor components and keeps those flavor components in a 'captured' stable state. This flavor-capturing quality is commonly known as 'micro-encapsulating,' and in chemistry as 'protective caging.' It is a property totally lacking in alcohol. In herbs, glycerin's microencapsulation properties not only encapsulate and stabilize aromatic and flavoring components but also capture, encapsulate, and stabilize most all other constituents and components of an herb, which is one of the factors that contribute to a serialized multi-step processed liquid herbal glycerite's astounding stability and shelf life, provided the percentage concentration of glycerin in a finished product is high enough.

Time to Question and Rethink Outdated Assumptions

Given the above evidence, has the time come to determine and recognize that the longstanding status of alcohol as the 'preferred' extractive medium for herbs is outdated and no longer supported in either scientific or intrinsic (evidence-based) terms? And what about the clinical considerations regarding the denaturing and inert-rendering effects of alcohol on diminishing the therapeutic potential and nuances of constituents and components extracted from botanicals? For almost a century and a half, a premise that was outdated within half a century of its peers' acceptance has been dogmatically held to despite the facts clearly showing otherwise.

Glycerin Has Greater Solvent Versatility and Qualities Than Alcohol

Even with the denaturing and inert-rendering effects of alcohol being an undisputable fact, the point of glycerin having greater solvent qualities than alcohol is difficult for alcohol aficionados to accept, especially those who have difficulty looking beyond a 'tincturing' (i.e., cold process-based) approach.

But consider that following the eclectic era and their published works, glycerin was further researched by the food, medical, and manufacturing industry, and thereafter listed in food ingredients and industrial texts as possessing the greatest solvent powers known for a naturally sourced solvent, exceeded only by water itself (only because water can take on the three states of matter). According to research from science and multiple industries, ***glycerin has greater solvent qualities than alcohol!*** Not the other way around. This is why glycerin (not ethanolic alcohol) is called a 'universal' solvent, second only to water!

The problem in the past, presently besetting many alcohol-aficionado oriented herbalists and in the liquid herbal products industry at large, has been that accepted glycerin-extractive processes typically utilize one of two methodologies in their making: 1. Alcohol-type passive liquid tincturing macerate or percolate cold process techniques for fluid-extracting herbs, which makes these particular glycerite preparations very limiting, dilute, and not all that much more potent or any more efficacious than alcohol based herbal products, – often being less so. And 2. Subjecting the glycerin to sustained high heat decoction-type methodologies that by itself, alter and destroy components and too often reduce the fluid to a state of caramelizing and even scorching (i.e., burning) when done by an inexperienced person or a person unfamiliar with glycerin chemistry and its unique properties, that's passed off as being a more concentrated product, but one that is heavily denatured and rendered inert and of highly limited therapeutic potential as a result, unless taken in large heroic 'effective' doses, which typically taste awful.

In other words, glycerin being treated as if it were alcohol (or solely a decoction – single-step super-critical processing) is, allegorically speaking, akin to treating and using sugar and honey the same way in a baking recipe, resulting in different mixed outcomes. Since baking recipes are typically sugar-based, using honey in the same way will result in a baked item that is less sweet, has higher moisture content, does not bake through, and often differs substantially from the original when sugar is used. It is not too dissimilar to making the proverbial claim that both are apples when, in fact, it is comparing apples to oranges. Such has been a large part of the glycerin versus alcohol narrative. Lots of straw-man inflections into the narrative that are out of context with the subject matter, and miss important points and facts.

As of this writing, over 40 years ago, the original 1st generation serialized multi-step alcohol-free herbal glycerite process for making totally alcohol-free liquid herbs that the writer conceived of, realized that to obtain the full solvent extractive potential of glycerin as an extractive medium, it needed to be subjected to a series of steps that involved much more than a mere alcohol-based 'cold' tincture or percolate technique or a sole high heat super-critical decoction process. This serialized, multi-step, multi-dynamic glycerin-based process technology represents a "Thinking Outside the Box" approach that challenges many prior, hard-and-fast, industry-standard beliefs and notions about alcohol-type-dominated fluid-extraction processes. This serialized multi-step, multi-dynamic extraction technology consistently yields finished products that often leave practitioners, retailers, other herbal product companies, and the food, beverage, and confectionery industries scratching their heads in wonderment. All because of ***how*** glycerin is worked in this proprietary, serialized multi-step process. This unique process is more than a TINCture and more than an exTRACT – hence, it's being called the TincTract® process.

Glycerin's Many Other Pluses

• Unlike alcohol, glycerin is not only a food ingredient in thousands of foods, beverages, and confectionery products, but is also listed as a nutritive for both humans and animals! Glycerin's nutritive qualities are astounding! Though it has caloric value, the calories are not *simple* carbohydrate-based calories like sugar or alcohol, which spike blood sugar levels and are metabolized too quickly, causing blood sugar crashes and excess fat. Instead, glycerin is processed slowly in the body, using a specialized enzyme pathway in the liver called the 'gluconeogenic cycle,' which doesn't stress or damage liver function or tissues and has a beneficial effect on the liver, while not stressing the pancreas, thyroid, or adrenals. Alcohol cannot claim any of these features or resultant benefits, and in fact, stresses the liver, pancreas, thyroid, and adrenals. Alcohol possesses no nutritive benefits.

• Unlike alcohol, which has a potentially deleterious effect on the liver (and cannot be adequately metabolized by children or by animals at all), glycerin possesses detoxifying attributes that are non-stimulating (especially important for challenged livers). Dr. Edward Shook, the eminent physician, biochemist, and phytotherapist who specialized in liquid herbal glycerites, taught that glycerin possesses the distinct quality of aiding in the removal of sequestered toxins from the body's tissues, especially liver tissues —a quality not shared by alcohol. This is especially important in today's environmentally polluted and chemically laden world.

• The low glycemic index is the same for glycerin and alcohol. However, the glycemic 'load' for alcohol is high, whereas for glycerin, it is very low. Alcohol's high glycemic load stimulates the pancreas to

overproduce insulin while suppressing the liver's ability to convert alcohol into glucose for balancing the high insulin levels, potentially leading to hyperinsulinemia and eventual pancreatic failure (diabetes). Glycerin, on the other hand, possesses both a low glycemic index and a low glycemic load. Many physicians, dieticians, clinical nutritionists, and clinical herbalists consider the glycemic load factor more important than the glycemic index in dealing with blood sugar imbalances. This is especially important for individuals already experiencing diabetic, hypoglycemic, or hyperinsulin problems, as well as those on special 'low carb' diets.

Though the FDA requires that glycerin be listed on a food or dietary supplement product label as a *carbohydrate* source of calories, due to the National Academies of Science only recognizing fats, proteins, and carbohydrates as sole macro-nutrient sources of calories, the FDA also allows glycerin to be listed as having a 'o' (zero) Net Carb Count, meaning that it does not act the same way in the body as a sugar or starch-based carbohydrate does. Therefore, due to its chemistry and not being derived from sugar/starch carbohydrate sources, but from fats (i.e., triglycerides), it possesses a different effect on the body's biochemistry than a typical carbohydrate per se.'

(*Of note: Since alcohol is not classified as a food or dietary ingredient per se,' the FDA currently allows for an insidious exemption of not requiring it to be listed as a calorie/carbohydrate source on labels, even though alcohol is clearly a verified source of calories derived from carbohydrates!*)

• For children who don't have well enough developed enzyme systems to convert or metabolize alcohol into glucose, glycerin is a perfect ingredient for liquid herbal products for children, and it makes the more bitter and astringent herbs taste better, a real plus for children (and parents too!). The ever-present problem and reputation for which liquid herbal products are typically known – a bad taste – is not a problem for a serialized, multi-step processed liquid herbal glycerite product, especially for its formula blends.

• Glycerin does not drive oxidation (i.e., REDOX) and is therefore non-corrosive to certain constituents in its effects. It does not drive the oxidation of metals, minerals, or mineral-bound constituents of botanicals that are susceptible to reduction-oxidation (REDOX) processes when in a fluid suspension, making it an excellent preservative medium for foods and herbs that are particularly high in REDOX-sensitive minerals, constituents, and components. And glycerin possesses a unique *micro-encapsulating* property, in chemistry called 'protective caging,' that also has a REDOX staunching and buffering effect in liquid formulations where highly REDOX-sensitive minerals, and/or bitters-rich herbal extracts might be mixed with other herbal extracts of high tannins and/or organic acid content, which would in a solution accelerate REDOX activity substantially, whereas glycerin retards and/or arrests REDOX activity of essential REDOX sensitive constituents, compounds, and certain minerals in a fluid extract of botanicals. This same REDOX moderating effect of glycerin also applies to lipids and the aromatic constituents susceptible to REDOX-driving effects of 'turning' or going rancid.

• Unlike other solvent/water-based solutions, glycerin/water-based solutions do not become *inverted* after a period of time, meaning that glycerite solutions remain pure and limpid and maintain their suspension quality long after many other solutes have inverted (of which alcohol solutions are very susceptible to over time).

• Another little-known fact concerning glycerin's positive effect on solutions has to do with the fact that old wines kept in barrels and having a greater market value than new wines are characterized by a higher proportionate of naturally occurring glycerin content, which may explain why these wines typically possess a lower REDOX value and hence, retain a smoother finish and more mature and mellow character over a more extended period of years. (Many experienced wine vintners maintain that monitoring glycerin content is as important as managing alcohol content for producing premium quality fine wines.)

Safer and Preferred For Veterinary & Pet Care

In veterinary medicine, glycerin is listed for medicinal and nutritive uses. Except for critical life-saving short-term dose-monitored use by an animal health care specialist, alcohol should not be used in any

form with animals, as they do not have the enzyme systems to convert or metabolize alcohol. Heart, nerve, and liver damage, and chronic digestive problems are just a few of the potential problems a pet can have when given alcohol-based products, especially over long-term use. Glycerin's use in the serialized, multi-step, glycerin-based processed pet liquid herbal products line is a significant advantage, as it also tastes good to the most finicky pets.

A Glycerite's Superior Absorption (as opposed to Alcohol)

There is a popular but unproven notion that an alcohol-based liquid herbal product's constituents and compounds are the most readily absorbable of all herbal preparations. Some say immediately, with some incorrectly stating even more so than herbal glycerites. This is an assumption based only on personal opinion and not on scientific, clinical, or physiological facts. Such assumptions have never stood up to scientific scrutiny or clinical review and are contrary to the known effect of alcohol on tissue contact responses.

Consider this: Students of medicine know that alcohol is not the best medium for the quick introduction of something onto (topical) or into the body through ingestion (oral) if immediate absorption is the goal. Basic tissue physiology shows that alcohol causes tissues to initially pucker and contract (i.e., astringe) and has the added physiological effect of drying and dehydrating tissues—*actions that distinctly block immediate absorption!*

On the other hand, the serialized multi-step processed liquid herbal glycerites, due to the succulent nature of glycerin, possess a high degree of absorption and bioavailability, especially orally. One indicator of this is that glycerin initiates an immediate salivation response that draws the blood and lymph vascularity of the mouth to the surface and brings enzymes essential to absorption into action, which is a tissue physiological effect completely the opposite of alcohol's effect on tissues. Another indicator of glycerin's superior absorptive-enhancing properties is its distinctive moistening quality due to its intrinsic humectant properties. In veterinary medicine, glycerin is a preferred carrier for many medicines in preference to alcohol. No wonder more and more veterinarians and pet care specialists like the serialized multi-step processed herbal glycerite pet products.

Glycerin's Antimicrobial-Based Preservative Qualities In A Serialized Multi-Step, Multi-Dynamic Processed Liquid Herbal Glycerite.

A serialized multi-step, multi-dynamic processed herbal glycerite product also has a well-established and proven preservative quality unmatched by any other company's glycerite-based liquid herbal products in the industry at large. How is this so? Because along with the serialized multi-step process itself, the appropriate glycerin to water ratio for each specific herb processed is used – it is one of the reasons why the serialized multi-step processed liquid herbal products pass an independent 3rd party lab real-time safety/stability analysis now validating an astonishing 6-year BBD (Best By Date) on product labels, the longest label listed BBD for a liquid herbal product in the industry, that is indicative of astounding stability! In the beverage industry, the serialized, multi-step-processed botanical glycerite is even rated as acceptable for 'cold fill' purposes. (For nay-sayers of glycerin's clean and preservative qualities, read the previous sentence again.) This quality is naturally part of all serialized, multi-step-processed liquid herbal products that use a high glycerin-to-water ratio in the product-making process.

It should be further noted that alcohol does not 'preserve' per se, but sterilizes by its vitality-zapping disinfecting and denaturing actions. To *preserve*, in the actual meaning of the word, a medium must capture and *maintain* the prior, original, ratio-intact, synergy-driven, biologically active state and integrity of an herb's extracted components. Glycerin does this with constituent-maintaining stability, which alcohol cannot do. Therefore, alcohol is not a *true* preservative in the biological viability-preserving sense.

Also, though both glycerin and alcohol help keep a finished product pure and safe, the ways they do so differ. Alcohol possesses an antiseptic action upon pathogens, spores, etc., via a direct chemical action upon the fluid medium and its components (the 'disinfecting' factor), being bactericidal, whereas glycerin possesses a 'static' action via its dehydrating action on pathogens, spores, etc. (wherein germs, spores, etc.

are deprived of moisture – the culprit in reproduction, spoilage, decomposition, etc.), being bacteriostatic. Alcohol is bactericidal, whereas glycerin is bacteriostatic. Even so, both actions are considered antimicrobial. However, in glycerin's instance, the concentration of glycerin must be high enough to result in an antimicrobial effect.

The exclusive manufacturer of the serialized, multi-step-processed (i.e., TincTract®-made) liquid herbal products also manufactures bulk ingredients for other dietary herbal supplement companies, the beverage industry, cosmetic/personal care product manufacturers, food products, and confectionery manufacturers. The 'bulk ingredient' customers require ingredients from this producer that are not only totally 100% alcohol-free and flavor-rich but can also be 'cold filled' or 'cold packed.' This means the serialized, multi-step-processed ingredient must possess, prior to being added to other ingredients that make up their finished product, a high degree of antimicrobial activity, which it does.

All of this should put to rest, once and for all, the concerns and arbitrary or misguided misinformation regarding glycerin as a poor preservative medium, when in fact the opposite is true, especially for the serialized, multi-step-processed liquid herbal glycerites described herein. Of course, along with the process technology used, the glycerin-to-water ratio in both the processing of an herbal glycerite and the finished product must be high enough to maintain glycerin's intrinsic antimicrobial properties.

Identifying The Actual Problems Of Traditional Tincture/Macerate/Percolate Passive Cold-Processed Glycerites

To be accurate and fair to the industry and herbal glycerite-averse herbal practitioners, it should be recognized that there is a justification, albeit limited, for prior concerns and doubts of glycerin's extractive potential, potency outcomes, and preservative quality regarding efficacy, shelf-life, and ingredient stability, which also explains the basis for the prevalent and overstated misinformation regarding glycerin and its use in making liquid herbal glycerites.

The following information relates only to 100% 'true' alcohol-free based glycerite products, not the alcohol processed, then alcohol removed, then replaced with glycerin products (more accurately, truthfully, and legally referred to as 'dealcoholized' or 'alcohol-removed'), or products of low glycerin content that have had alcohol post-process added for boosting aseptic quality, that only serves to introduce the denaturing and inert rendering effects of alcohol to the product. (Just keeping things apples-to-apples here.)

Other companies dealing in glycerin-based liquid herbs typically contain 60% down to 50% glycerin in their finished products, with some even less! This is more economical, to be sure, but does not result in the extractive potential, potency outcomes, consistency, stability, and quality of liquid herbal products that a high glycerin-to-water ratio can result in, or comply with the tenets of the serialized multi-step glycerin-based process, especially concerning extractive potential and the *antimicrobial* preservation quality the serialized multi-step processed (i.e., TincTract® made) product possesses to which glycerin is intrinsically known to possess – again, provided glycerin is used in high enough percentage of the extractive solvent and finished product accordingly.

Past texts on the subject state that, generally, preservative stability can be achieved with liquid herbs at a minimum glycerin content of 60% for an herbal glycerite. However, decades of personal and manufacturer-based experience of this white paper's author utilizing the serialized multi-step process for making liquid herbal concentrates has decidedly shown, in innumerable instances, that this 60% (glycerin)/40% (water) ratio only works in two instances, and on a limited basis at that.

First, depending on the herb, the finished 60% glycerin containing glycerite product sometimes needs to be hot (i.e., pasteurized) in its entirety upon being bottled and sealed, and No! Based on decades of research and experience regarding this kind of product, Flash UV sterilization doesn't work. Secondly, once the finished glycerite product is opened by the end-user, only in very few instances with certain specific herbs or certain types of formulas, will the opened product remain contaminant-free throughout a bottle's usage. In all cases, this minimal stated glycerin content is best refrigerated after opening, which only slows but does not stop contaminant growth and perishability.

The situation becomes even more critical regarding the quality, potency, and contaminant-free preservation, as well as being static, if the minimal threshold for glycerin's preserving action (i.e., 60%) is lower in the finished product, which is the case for many other glycerite liquid extracts on the market. And Again, No! Adding a chemical preservative would not be acceptable to herb-consuming customers for a 'natural' whole-herb-based product.

For instance, one competing company's owner, who makes herbal glycerites, admitted to the author at a trade show that they use a 50/50 glycerin/water ratio across the board and do not employ a viable antimicrobial *finishing* process anywhere along the way. There are even indications that they now use an even more dilute glycerin concentration in their products to cut costs, which can only reduce their product's preservative (i.e., antimicrobial) potential and substantially reduce their product's potency and quality. In the years since this admission, the author has learned that many other makers of herbal glycerites are at a 50/50 glycerin/water ratio. Most claim to be totally 'cold processed,' with no sterilizing heat (i.e., 'pasteurization') applied to the finished products, with some producing what this author calls a 'dirty' herbal glycerite, meaning that they do not thoroughly filter the spent herbal residue (called the 'marc') and fine marc particulates from the finished liquid extract (called the 'menstruum'), resulting in a product that is potentially contaminated by the unfiltered out marc particulates, especially for 'cold' only processed herbal glycerites.

This means that many herbs and formulas that are especially susceptible to molds and bacteria in dilute glycerin solutions (i.e., 50/50 ratio or less), such as the mucilage-rich and very alkaline pH single herbs and herbal combination blends, would not have strong enough antimicrobial properties to counter these contaminants once in a liquid form, as well as increased post-process REDOX in the bottle, further compromising the quality. To counter this, some, according to their own published admission, use flash UV sterilization to disinfect their finished products at the point of bottling/sealing. However, the problem with using flash UV radiation disinfection technology for liquid herbal products is threefold.

First, UV sterilization, which typically uses UV-C rays, has a limiting factor regarding UV 'penetration' into a liquid medium. UV rays have limited penetration potential. For instance, UV-A and UV-B rays have limited penetration through glass. UV-C, the type used for UV sterilization, also does not penetrate through glass. Additionally, UV penetrates only a very short distance into water, provided the water is clear, not colored, or not particle-dense. Typically, a UV sterilizing unit for fluid sterilization consists of a transparent tube through which the fluid passes, with the UV generator aimed at the tube to bombard the contents coursing through it with UV rays. If the tube is made of glass, used for UV sterilization, UV-C will not pass through the glass. If a transparent non-glass material is used, such as a polymer-based material, it must also be ascertained that the non-glass material is not degraded by the high UV exposure and that there is no micro-contamination of the fluid with residual byproducts or toxins of UV-decayed tube material, and, if the fluid is highly colored or of dense constituent-causing opacity, the UV rays will only touch the exposed surface of the fluid passing through the tube. If the fluid is passing through the tube too quickly, it may not receive enough UV sterilization. There are additional considerations, but the key point is that UV sterilization is typically a 'Not-Fit-for-Use' protocol for sterilizing an herbal glycerite.

Second, once the product is opened and exposed to the air, microbes are immediately reintroduced into the product, where the medium has so little static property that they quickly multiply in this dilute glycerin/water medium, thereby accelerating perishability and posing serious health and safety risks for consumers. Here's where the claim that alcohol is a better *sterile* medium might apply and be preferred, regardless of alcohol's denaturing and inert rendering effects on an herb's constituents and components.

The third problem with UV sterilization presents a significant product quality issue related to the intrinsic nature of a product's constituents and phytochemicals, particularly when a cold extraction process is used to preserve heat-sensitive components. It is well known that UV alters and/or destroys many of the components that a liquid herbal cold process intends to remove and preserve in their stabilized, bioactive state. It can be safely surmised that even flash UV sterilization would have a similar potential to alter components, akin to the denaturing and inert-rendering effects of alcohol, and that UV rays can potentially initiate and accelerate REDOX reactions and the byproducts they produce.

Enzymes, certain vitamins and cofactors, many phytoconstituents, active components, and certain aromatic compounds are altered or destroyed by both sustained and intense (flash) UV radiation – in many instances, like that of alcohol's denaturing and inert rendering actions. It has been observed that quality varies dramatically from batch to batch when flash UV radiation sterilization is used for herbal glycerites, due to its reduced sterilizing effect, which can be influenced by factors as simple as the depth and density of color in the fluid being UV-irradiated.

This is not to say that flash UV sterilization does not have its place, even in our industry, especially where safety and purity are concerned, such as sterilizing or disinfecting working surfaces. However, if it is used for 'finishing' liquid herbal glycerite products, it is essential to recognize that its application is limited in its effectiveness, to the point of being 'Not-Fit for Use.'

A company that claims its liquid herbal glycerite products are UV sterilized is a strong indicator that the manufacturer is using a dilute amount of glycerin in the liquid extract medium, thereby necessitating, in their minds, the need for using UV sterilization and, hence, a distinct indicator of potentially low quality, minimal potency, inconsistent efficacy, and questionable safety. It is upon these latter points that the industry and herbal glycerite-averse practitioners have been justified in their assessment of the safety of traditional, low-glycerin-to-water-ratio tincture/macerate/percolate-style cold-processed herbal glycerite products. However, to say that all herbal glycerites don't meet adequate extractive potential, decent potency, efficacy, and preservative/antimicrobial quality standards is not only an unfounded premise, but it is also patently not true, especially where the serialized multi-step, multi-dynamic herbal glycerite-processed products are concerned. The following paragraph explains why this is so.

All of the trade secret, serialized, multi-step, multi-dynamic-processed (i.e., TincTract®-made) liquid herbal products are processed in a proprietary, pre-prepared glycerin-water base at a specifically established glycerin-to-water ratio for each herb and herb part being processed. However, in all cases, the finished liquid herbal products are standardized to a glycerin content of +/- 70%, resulting in exceptional extractive qualities and remarkable antimicrobial preservative properties. Stringent analysis of the purity and safety of this process's finished products by independent third-party laboratories over the decades has consistently verified this, with the latest, as of this writing, confirming a 6-year BBD (Best By Date) listing on its product labels, and no refrigeration required after opening.

The author of this white paper, as the developer of the serialized multi-step, multi-dynamic glycerin-based process (i.e., the TincTract® process), has liquid herbal samples he made during the first generations of the process back in the early 1980s that, every 7 years or so, are opened for organoleptic testing (i.e., color, taste, tactile sensation, microbial activity, etc.). None of those samples have degraded, including no inversion, stable color, and no precipitates or scaling. All shows continued preservative quality and have remained as aromatic, flavorful, and stable as the day they were made – over 40 years ago as of the writing of this White Paper. And no – the 40+-year-old serialized multi-step, multi-dynamic glycerin-based processed finished products have no additional preserving additives or flavorings and are not pasteurized, irradiated, or flash UV sterilized either, yet are astoundingly stable. Products made using the current generation of this unique process continue to exhibit the same astounding stability.

The serialized multi-step, multi-dynamic TincTract® processed liquid herbal products possess a higher vegetable glycerin to water ratio, which is more costly but pays off in greater extractive potential, more consistent quality, stability, higher potency, and efficacy as a result of extracted ratio-intact constituents and the broad-spectrum components' intrinsic synergies and benefits remaining intact and biologically viable.

The TincTract® Serialized Multi-Step, Multi-Dynamic Process – 100% true Alcohol-Free – An Industry Setting Standard For Over Four Decades!

Serialized multi-step, multi-dynamic processed 100% *true* alcohol-free liquid herbal products possess one of the highest degrees of extractive potentials and qualities derived by a 100% 'true' alcohol-free all-natural glycerin solvent base there is, that also results in extracting a broad spectrum of constituents and

compounds in their stabilized ratio-intact poly-constituent and biologically active synergies state, and is non-destructive (i.e., non-denaturing and non-inert rendering) in its effects and preservative powers, is super-absorbed into the body to a degree unmatched by alcohol, is highly nutritive, possesses important yet gentle detoxifying actions, does not trigger glycemic problems or provoke alcoholic addiction reactions, and has a fabulous flavor-enhancing quality that doesn't alter the benefits of the herbs used. The serialized, multi-step, multi-dynamic-processed products developed by the author of this white paper are the most differentiated liquid herbal products in the industry. So much so that they are considered a 'reinvention of liquid herbs.'

Does alcohol possess ALL the stated qualities and benefits of glycerin? Does alcohol even possess a simple majority of these qualities? No, it does not. Alcohol lacks the aforementioned qualities of glycerin. Though it calls into question and challenges one of the most tenaciously held dictums of herbal lore – that alcohol is the preferred solvent for extracting botanicals – the evidence overwhelmingly shows that glycerin, when utilized and worked from a standard different than that for alcohol-type tincture/macerate/percolate-based passive cold processes, is in many instances superior to that of alcohol as an extractive solvent agent both generally and specifically, for many herbs and botanical constituents, and potentially matches alcohol in safeguarding finished products if used at appropriate glycerin percentage levels, which places a serialized multi-step, multi-dynamic processed 100% 'true' alcohol-free liquid herbal glycerite products as one of just a few *premium* herbal products available in the industry. And not to be forgotten, glycerin does not contain the denaturing and inert rendering effects of alcohol on botanical constituents and compounds.

The fact is, serialized, multi-step, multi-dynamic-processed herbal glycerites are unmatched by anything else of their kind in the herbal products industry and have remained so for over four decades as of this writing, and have proven that glycerin is an extractive solvent that, on the whole, is more versatile and possesses greater extractive potential than alcohol on numerous points of consideration and use.

REFERENCES:

Organic Solvents, by Weissberger and Proskauer – translated by Randal G. A. New.,
© 1935 Oxford At The Clarendon Press

Glycerin and the Glycols – Production, Properties and Analysis, by J. W. Lawrie, Ph.D.,
© 1928 American Chemical Society

Glycerin – Its Industrial and Commercial Applications, by Leffingwell, Ph.D. & Lesser, B.S.,
© 1945 Chemical Publishing Co., Inc.

The Manufacture of Glycerin, 2nd Edition, by G. Martin, D.Sc., Ph.D. & H.J. Strausz, M.A.,
© 1956 The Technical Press Ltd.

What Is Glycerin?, The Soap & Detergent Association,
critical review 2003, www.sdahq.org

Use of Nutritive and Nonnutritive Sweeteners, by the American Dietetic Association.
© 2005 American Dietetic Association (ADA)

The Physiomedical Dispensatory, by William Cook, M.D.
© 1869 Wm. H. Cook, Cincinnati

The Thermodynamics of Protein Denaturation. III. The Denaturation of Ribonuclease in Water and in Aqueous Urea and Aqueous Ethanol Mixtures, by John F. Brandts and Linda Hunt (Department of Chemistry, University of Massachusetts, Amherst, Massachusetts 01003)

© 1966/67 Journal of the American Chemical Society, Vol 89/Issue 19 (Received December 19, 1966, Released September 1, 1967)

Effect of Ethanol on the Textural Properties of Whey Protein and Egg White Protein Hydrogels during Water-Ethanol Solvent Exchange, by Christian Kleeman (Chair of Food and Bioprocess Engineering, Technical University of Munich, Welhenstephaner Berg 1, 85354 Freising, Germany); Joel Zink (Laboratory of Food Process Engineering, ETH Zurich, Schmelzbergtrasse 9, 8092 Zurich, Switzerland); Ilka Selmer (Institute of Thermal Separation Processes, Hamburg University of Technology, Elßendorfer Straße 38, 21073 Hamburg, Germany); Irina Smirnova (Institute of Thermal Separation Processes, Hamburg University of Technology, Elßendorfer Straße 38, 21073 Hamburg, Germany); and Ulrich Kulozik (Author of study)
© 2020 Molecules, 25(19) 4417; https//idol.org/10.3390/molecules25194417

The Merck Index, 10th Edition,
© 1983 by Merck & Co., Inc.

The Merck Manual of Medical Information,
© 1997 by Merck & Co., Inc.

Taber's Cyclopedic Medical Dictionary, 14th Edition,
© 1982 by F.A. Davis Company.

Textbook of Medical Physiology, 6th Edition, by Arthur C. Guyton, M.D.
© 1982 by W. B. Saunders Company.

Biochemistry, by Lubert Stryer
© 1981 by W.H. Freeman & Company, San Francisco.

Effects of Alcohol on the solubility and structure of native and Disulfide-Modified Bovine Serum Albumin, by Hiroki Yoshikawa; Atsushi Hirano (National Institute of Advanced Industrial Science and Technology); Tsutomu Arakawa; Kentaro Shiraki (University of Tsukuba)
© 2012 International Journal of Biological Macromolecules, March 2012, 50(5):1286-91

Gattefosse's Aromatherapy, by Rene'-Maurice Gattefosse'
© 1993 (English Translation) by The C.W. Daniel Company, Ltd.

Advanced Treatise in Herbology. by Dr. Edward E. Shook,
republished from the public domain. 1978 Trinity Center Press.

Ethyl Alcohol, by New Jersey Dpt. of Health & Senior Services,
© 1990 State of New Jersey

Hazards of Alcohol, by Dr. K. Shantibala Devi
© 2002 ManipourOnline, www.manipouronline.com

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