



Advanced FAQ

We are delighted by the number of questions we have received from the medical community, scientists, and health & wellness focused individuals worldwide. The more one learns about this sophisticated colloidal droplet delivery system, the more intrigued they are by the simplicity and effectiveness of this naturally self-assembling VESISorb[®] technology.

Consequently, we have developed this “**ADVANCED FAQ**” for those interested in gaining a deeper and clearer understanding of why natural actives like CoQ10 Ubiquinone and Ubiquinol, Omega-3 EPA/DHA, Citrus Polymethoxylated Flavones, Resveratrol, Tocotrienols, and more are better absorbed when delivered in this patented natural colloidal droplet system.

Q: In the case of CoQ10, I understand that that the crystals inhibit absorption. One company claims “crystal free” so it is better absorbed. Is it that simple?

A: It is simple to say that all one needs to do is solve the fat soluble active (CoQ10) in an applicable oil and just fill it into a soft gel capsule. Within the capsule (oil environment) it is indeed solved but NOT in an aqueous environment. As soon as the oil, containing the active in a solved form, comes in contact with water, the solution medium (oil) gets diluted and is not stable or mixable with water because the “linking molecules” (emulsifier) are missing. So, immediately upon losing its oil solubility feature, the former solved active starts crystallizing in the water environment (e.g. GI-tract). When this occurs, there is no dissolution, no absorption, and no effect.

Q: How does CoQsource[®] in the VESISorb[®] natural colloidal droplet delivery system succeed where “crystal free” fails?

A: VESISorb[®] is a carrier system which keeps water-insoluble, respectively fat-soluble, molecules in a hydrophilic environment (e.g. water, gastric fluids, etc.). It’s a “nano”-scale solubilized system. VESISorb[®] does not change a molecule chemically. It is a solubilization vehicle comprising oils and monolayer forming agents (emulsifiers). Emulsifiers, due to their nature (hydrophobic tail & hydrophilic head) - arrange in an aqueous environment at the interface between oil and water. Without this linking of molecules, it is not possible to get a stable oil/water mixture (e.g. emulsion). A stable emulsion is able to keep fat-soluble molecules solved in a water environment. Upon adding VESISorb[®] to an aqueous environment, it naturally self-assembles into a “colloidal emulsion,” where no energy is required to build up the emulsion droplets. Their “colloidal droplets” are not static systems. They are dynamic, meaning their molecules (emulsifiers, oils and actives) could move by a so-called perpetual “flip-flop” effect from one droplet to another or to other membranes (e.g. enterocytes).

Solubility in humans means your supplement molecule must remain in solution within your body fluids (e.g. gastric, intestinal fluid); for example, a “Coenzyme Q10 crystal” would never be absorbed. For water insoluble molecules (e.g. Vitamin E, triglycerides), Mother Nature had to develop a system, which keeps the molecule soluble in body fluids, so it created phospholipids/bile-salts micelles, lipoproteins, etc. VESIsorb[®] mirrors such kind of natural delivery systems.

Q: I have read where you suggest that the VESIsorb[®] system mimics the body's natural digestion process. CoQsource[®], for example, is “BODY READY” when taken orally. Can you explain what you mean?

A: We use “natural” in describing the VESIsorb[®] technology because it mimics the natural physiological process of the human body. It is known that poor water soluble drugs, e.g. fat soluble vitamins, are better absorbed when administered after a meal containing fat. One of the reasons for the improved absorption is the enhanced drug solubilization by bile salt mixed micelles which are formed from the digestion products of dietary triglycerides (monoglyceride and fatty acids) and bile - a nanotechnology tool developed by Mother Nature. The task of naturally formed bile salt-mixed micelles, having a size below 10 nanometers, is to transport the lipophilic molecules through the aqueous environment of the GI-tract and across the unstirred water layer to the absorptive epithelium. Individual lipid molecules, and not the micelles per se, are the species that enter the absorptive membrane. It is very important to understand that nano-size micelles are produced naturally in our bodies each and every day.

On the other hand, there are methods used in nanotechnology that are “top down” which simply means they use energy and force to decrease the size to less than 100 nanometers. They use high-pressure homogenizers or micro-fluidizers. They are, in some cases, fundamentally milling down crystals from microns to much smaller nano-sized hard particles. This never happens in the body, and it is far from a natural occurrence.

Q: Is there a spectrum of "natural" and safety concerns with nanotechnology – ranging from technology that is closer to natural processes vs. more highly engineered products? Can you give some examples along the spectrum?

"Natural" is normally linked with purity and safety. Nanotechnology is a broad and complex field that needs to be discussed under certain rules of nomenclature and distinguishing aspects. Experts agree it is critically important to differentiate between solid “nano-particles” versus “nano-size” fluid droplets as well as differentiating between those that disintegrate in vivo and those that do not.

The VESIsorb[®] naturally self-assembling association colloidal droplets disintegrate within the GI-tract into take out the single components; thus the formed droplets are of transient nature and considered safe by the experts. In contrast, the safety of solid, non-disintegrating nano-particles such as carbon nano-tubes, is more uncertain and they have raised concerns about safety.

However, aside from the mentioned aspects, many other factors can influence the safety of nano-systems. Various scientific expert groups are discussing this complex issue and are trying to establish guidelines for the safe use of nanotechnology. A recent and excellent

report published by the IRCG (International Risk Governance Council; “Risk Governance of Nanotechnology Applications in Food and Cosmetics”) summarizes some of the activities regarding safety of nanotechnology.

Q: The difference between micelles, liposomes and VESIsorb® naturally self-assembling colloids is confusing. Can you explain the differences?

VESIsorb® vs. Micelles

Micelles are composed of a surfactant or surfactant mixture and the active substance to be solubilized within the center of the micelle. A micelle is like an aggregate of surfactant molecules dispersed in a liquid solution. A surfactant molecule has a hydrophilic part - called “head” - and a hydrophobic part - called “tail”. A typical micelle in an aqueous solution forms an aggregate with the hydrophilic "head" regions in contact with surrounding water (solvent), sequestering the hydrophobic tail regions in the micelle center. In this “hydrophobic tail center,” the active substance is dissolved. A “classical” micelle system does not contain oil and is a surfactant-rich system. If a micelle contains small amounts of oil, they are called “swollen” micelles.

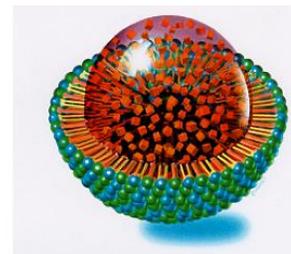
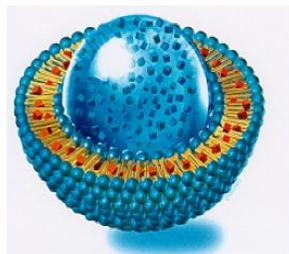
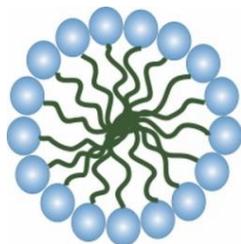
Like micelles, VESIsorb® is an aqueous dispersion. However, the dispersed phase is composed of both surfactant AND oil and belongs, therefore, to the systemic group of micro-emulsions. The dispersed phase of VESIsorb® can be envisioned as nano-droplets composed of an oily core (triglycerides/orange oil/CoQ10) surrounded by a hydrophilic shell (polysorbate/polyglycerol esters). Compared to a micellar system, the VESIsorb® contains lower amounts of surfactant (which is highly desirable) and high amounts of oil (lipophilic core/center where the active substance is dissolved).

Micro-emulsions acting like real solutions are in a thermodynamic equilibrium and thus, cannot be accountable to the classical image of an emulsion. It is a “colloidal” solution with extremely tiny (< 100nm), highly flexible associates.

VESIsorb® vs. Liposomes

Liposomes are vesicles and composed of a phospholipid bi-layer membrane surrounding an aqueous core. Fat-soluble active substances can only be solubilized within the bi-layer membrane, thus the loading capacity is limited and lower compared to VESIsorb®.

Micelles vs. Liposome vs. Colloidal Delivery System



Micelle

Shell: Hydrophilic surfactant head
Core: Hydrophobic surfactant tail

Liposome

Shell: Bi-Layer
Core: Water

Colloid

Shell: Mono-Layer
Core: Oil

Semi-solid to Liquid Conversion

VESIorb[®] has been designed to function and perform in the human body at body temperature (37°C). This system ensures a 100% CoQ10 solubility at body temperature both in the VESIorb[®] fill mass and in the aqueous body environment (compared to the “crystal free oil solution” on the market which works in the capsule but not in the body). The CoQ10 VESIorb[®] system has been designed to completely dissolve the CoQ10 at body temperature (37°C) but not necessarily at room temperature (so called temperature dependent solubility). Thus, by cooling down the system below body temperature, the clear solution may become oversaturated and the system becomes semi-solid to solid (certain precipitation of CoQ10). By re-warming the system to body temperature of 37°C, it completely liquifies again and then rebuilds in contact with the gastric/GI fluids in the colloidal delivery system.

Q: Can VESIorb[®] successfully be applied elsewhere, other than CoQ10?

Yes, we have successfully developed VESIorb[®] formulations with many other natural bio-active ingredients including CoQ₁₀ in both the Ubiquinone and Ubiquinol forms, Omega-3 EPA/DHA, Vitamin D, Resveratrol, Palm Tocotrienols, Gamma Tocopherols, Citrus Polymethoxylated Flavones (PMFs), and more. PMFs are notoriously poorly absorbed, and we have dramatically improved their absorption, solubility and application in food and beverages.

Q: Are there other advantages to VESIorb[®] solubilization technology besides bioavailability? On the manufacturing side/formulation – does it facilitate production? Or raise particular challenges?

The advantages of the VESIorb[®] Delivery System go well beyond absorption and bioavailability. We have been able to broaden the applications for certain bio-active ingredients into food products, drink mixes, beverages, and personal care products. We have succeeded in this area by addressing issues such as water solubility, oxidative stability, shelf life and uniformity of dispersion in the delivery medium. The VESIorb[®] system is easy to work with in production and effectively improves many production systems.