Enzymes Assisted Extraction

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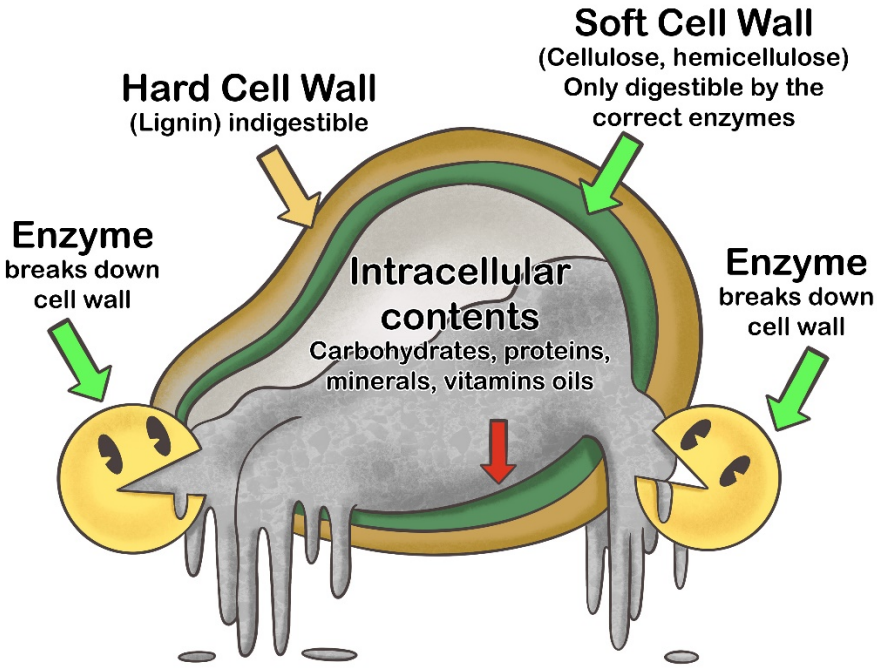
Anti-Aging Extracts Enzyme Assisted Extracts



Plant cell walls are more impermeable than the matrices surrounding animal cells. The cell wall is a filter and only lets friendly compounds penetrate the cell wall, such as water. Alcohol burst the cell wall denaturing the plant material. Enzymes are used to break down the cell walls for greatly improved extraction obtaining higher yields of carbohydrates, proteins, minerals, vitamins, and oils.

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Benefits/Advantages of Enzyme Assisted Extraction

The plant cell wall is mainly composed of cellulose, hemicellulose, and pectin, which are the main barriers to the extraction of bioactives. Enzymes degrade these cell wall components and enable the release of the compound of interest.

There are several benefits with enzyme assisted extraction.

- They preserve the maximum effectiveness of bioactive substances.
- Extracts have the unique ability to EXTRACT oils and non-oils effectively.
- They provide increased yields for stronger, more potent extracts.
- They don't denature (kill) the bioactive substances like alcohol-based, tinctures, powders, and some supercritical CO2 extractions.

●The highest consecrations of bio ingredients: vitamins, proteins, peptides, amino acids, oils, polyphenols, alkaloids, and flavonoids, etc. are extracted utilizing enzymes.
●The enzymes do not become part of the final product of the biochemical reactions. When the biochemical catalyzing action is over, the product of the reaction is separated from the enzyme.
●Enzymes are proteins and start to denature (die) at 106° Fahrenheit and are fully denatured at 118° Fahrenheit.
●Enzymes are also denatured (killed) by alcohol.

Water, Glycerine and Enzymes are the Best Extraction Methods for Skincare Products

Enzyme assisted extracts require water as the solvent to complete the reactions in the plant material. Unlike other solvents, glycerin has the ability to retain high levels of compounds for increased extract concentrations. The combination of water and glycerin have the ability to retain proteins, vitamins, and other bioactive plant compounds and oils. This combination used for skincare extracts will provide the benefits of oils, natural vitamins, and bioactive compounds. No other method of extraction can offer this combination.

Enzymes

Enzymes are macromolecular biological catalysts that accelerate the rate of chemical reactions in our bodies and on our skin cells. Enzymes aren't consumed in the reaction process; they do their job then move onto the next molecule to be reacted. They are vital for all life and serve a wide range of critical biological functions in our bodies. Enzymes are categorized according to the compounds they act upon. Some of the most common types include proteases (which break down proteins), cellulases (which break down cellulose), lipases (which split fats into glycerol and fatty acids), and amylases (which break down starch into simple sugars). Enzyme assisted extracts require water to activate the reactions. Solvents like alcohol and other extraction processes denature (kill) the enzymes and destroy their usefulness.

The Role of Enzymes in Extraction

The extraction of bio ingredients/bioactive substances from plants can be done in a variety of ways. Examples are: distillation, expression, solvent extraction, supercritical fluid extraction (SCFE), enzyme assisted extraction, and more. Enzyme assisted extraction is the leading-edge approach in the extraction of plant materials.

Enzymes Extraction is Eco-Friendly

● No hazardous solvents like alcohols required
● There are no hazardous by-products
● Extremely eco-friendly

Enzyme Assisted Extraction

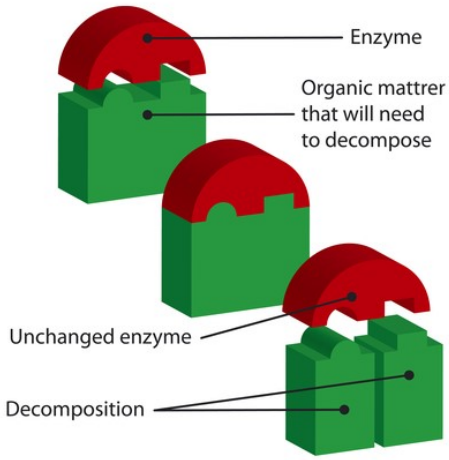
● The most complete extraction method for skincare products
● Highest yields over any other method of extraction

Enzyme-based extraction of plant-based bioactive compounds is an effective alternative to conventional, solvent-based extraction methods like alcohol-based extracts, tinctures, powdered extracts, CO_2, etc. Enzymes are ideal catalysts (they increase the rate of chemical reactions) which assists in the extraction, modification or synthesis of complex bioactive compounds of natural origin. Enhanced release of these bioactive substances from plant cells by cell disruption and extraction through the cell wall are

optimized using enzyme preparations either alone or in engineered combinations. Several studies confirm increased yields with enzyme assisted extraction.

Various enzymes are required in the enzyme assisted extraction process. Different parts of the plant, such as leaves, stems, seeds, and roots, require different types of enzymes. Even the method used to manufacture the enzymes, used in the extraction, affect how well the enzyme performs or doesn't perform.

Enzymes can be difficult to work with. It's not as easy as mixing enzymes into a batch and obtaining full benefits. Their effectiveness is directly impacted by variables such as the solvents used, types of enzymes, the quality of the enzymes, the enzyme source, the pH of the extract, storage conditions, how the enzymes were manufactured, their composition, the extraction methods, and temperature.

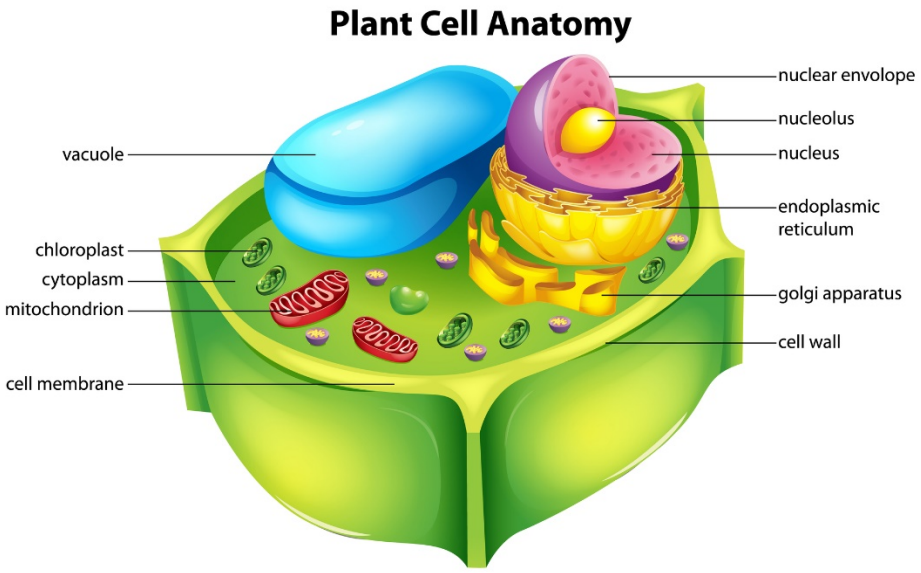


Mode of action of the enzymes.

Enzymes require an exact fit for the enzyme to work on specific compounds

The specificity of Enzymes in Extraction

Enzymes are highly specific. They only react when the enzyme is a perfect match with the compound it is paired with. The ability of enzymes to bind with a specific substrate (an underlying substance or layer such as grime on a surface, or plant cell walls that come in contact with the enzymes) is one consideration. The other is the ability to catalyze (speed up or accelerates the reaction process) with a specific set of chemical reactions, which is called "Enzyme Specificity."



The superiority of Enzymes Assisted Extraction Over Other Methods

The enzyme assisted extraction process maintains and preserves the efficacy and usability of natural compounds derived from plant materials. Compared with other methods of extraction such as alcohol extracts, tinctures, powdered extracts, CO2 extracts, and non-polar compounds, which are oils. Enzyme assisted extraction is superior in many ways. The other extraction methods destroy the bioactive properties or do not retain the bioactive constituents.

Therefore, the enzyme assisted extraction method is considered the most effective method for obtaining the highest yields of bioactive constituents. Extraction capacity of enzymes is increased when they are co-used with water and glycerine. Digestion and maceration methods, using mild or no heat, in combination with enzyme assisted extraction, provides very high yields of non-denatured extracts.

What plant Components Benefit Skincare Products

Many plant parts benefit skincare products. The skincare industry understands and heavily markets the importance of proteins, amino acids, peptides, enzymes, DNA, natural vitamins, oils, and many other compounds. All of which would be found in water, glycerin, and enzyme assisted extracts, when present in the plant material.

If the enzyme assisted method is done correctly, no other extraction method can obtain such exceptional benefits and visible results for skincare products

Enzymes Assisted Extraction for Oils

The applications of enzymes in the extraction of essential oils from oilseeds like sunflower, soybean, rapeseed, corn, coconut, olives, avocado, and for the extraction of rice bran oil, etc. are well documented. They preserve the natural bioactive constituents, providing higher quality oils that haven't been stressed by other methods.

PHENOLS

The mode of action of hydrolytic enzymes on the extraction of phenolics is by cleaving the cell wall components, thus favouring the exposure of phenolics to the extraction. Li et al. (2006) observed a 28% increase in the concentration of phenolic compounds extracted. One of the most crucial properties of plant phenolics is to retain the antioxidant activity. In vitro assays have shown plant phenolics to be a

more potent antioxidant than vitamin C, vitamin E, and carotenoids (Rice-Evans et al.1995,1996). This makes the extraction of phenolics from plant material important. (1)

OILS

Breaking the cell wall makes lipids accessible to the extraction solvent that improves the extraction efficiency. Plant oils are commonly used in food, detergent, and paint industries. Plant oils with a higher content of polyunsaturated fatty acids (PUFAs) are important in food industries. Conventionally, plant oils have been extracted using solvent extraction176S.J. Marathe et al. (Bernardini1973) where hexane is a commonly and commercially used solvent (Rosenthal, Pyle, and Niranjan1996). However, hexane causes many environmental concerns. Hence, aqueous extraction methods are better alternatives to organic solvent extraction. Although aqueous extraction is an environmentally cleaner technique, it is not successful due to the lower oil yields (Rosenthal et al.1996). This limitation can be overcome using enzymatic treatment during aqueous extraction of oils (Badr and Sitohy1992). Moreover, it is also beneficial to the simultaneous extraction of oils and proteins (Jiang et al.2010; Hanmoungjai et al.2002. Latif and Anwar (2011) used enzyme-assisted aqueous extraction to obtain oil and protein from sesame seeds using a mixture of enzymes. This extraction technique not only enhanced the yield of oil but also improved the quality of oils extracted. Oxidative stability, antioxidant activity, and tocopherol profile of sesame seed oil obtained after enzymatic extraction were better than that obtained after hexane extraction. (1)

PROTEINS, PEPTIDES

Among all the bioactives, proteins are most important as a nutritional and dietary supplement. Proteins and peptides together contribute major constituents of regular food and can be obtained from plant as well as animal sources. Various methods of extraction and fractionation of protein and peptides are available, but the choice of method depends on several factors such as solubility, hydrophobicity, molecular weight, and isoelectric point (pI). Efficient and optimized techniques must be used to remove interfering compounds such as lipids, phenolics, carbohydrates, oxidative enzymes, and pigments without protein degradation or modification. The presence of indigenous proteases in plant tissue makes the extraction of proteins complicated (Wang et al.2008). Proteins are usually found in protein bodies (also called as aleurone grains) inside the cells. Hence, the complete solubilization and extraction of proteins depend on cell disruption. Commercially produced protein concentrates usually consist of aqueous solubilization of protein, thus making water as a solvent of choice for extraction. The extraction yield of protein can further be increased by using enzyme-assisted aqueous extraction of proteins. (1)

PROTEINS AND OILS

Simultaneous recovery of protein and lipids using enzyme-assisted extraction method is gaining attraction due to dual benefits. Protease has been used for simultaneous recovery of protein and oil from extruded soybean flakes using enzyme-assisted aqueous extraction method (Moura et al.2008). The yield of oil was 96%, whereas that of protein was 85%. Niu et al. (2012) used the same technique for extraction of rapeseed oil and protein from dehulled cold-pressed double-low rapeseed cake. They obtained 82.10% yield of protein and 71.89%yield of oil. (1)

FLAVONOIDS

Enzymes have been used to increase flavonoid release from plant material while minimizing the use of solvents and heat. (1)

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