Infinita
Biotech Private Limited

BIOVOICE

KNOW, SHARE & GROW

ANNUAL 2021
Volume no. 2

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Our Mission

To continue to set the bar high as an industry leader in creating unique, eco-friendly enzymes formulations for industrial applications. We are committed to providing high-quality products with international standards to our esteemed clients and prioritising environmental concerns while carrying out our business and manufacturing activities.

Our Vision

To be the leading biotechnology company in the world in the field of eco-friendly enzymes formulations for industrial applications.

Our Values

These are the guiding force behind every action we take.

- I INNOVATION
- N NATURE
- F FOCUS
- I INTEGRITY
- N NOVEL
- I INCLUSION
- T TEAMWORK
- A AGILITY

Corporate Profile

Infinita Biotech Pvt. Ltd., founded in 2015, is a leading Indian multidivisional biotechnology company engaged in manufacturing eco-friendly enzymatic solutions for a variety of industrial applications in India as well as overseas.

Our company comes with technical experience professionals of over 30 years in the field of industrial enzymes. Our leadership and extensive expertise in the domain of biotechnology has enabled us to grow with continued success. This can be attributed to our policy of providing innovative, effective and high-quality products and solutions to meet specific customer needs with continuous research and development. The desire for cutting-edge innovation is defined by our best-in-class research laboratories and state-of-the-art manufacturing facilities. Our production mechanisms are handled by well-qualified and highly motivated personnel and follow stringent control protocols and in-process quality assurance procedures. Our distinctive delivery processes are backed by a strong marketing and distribution network, which is strengthened by the relationship we share with our suppliers and dealers.

We strive to continuously improve our practices and as a part of this process we have acquired certifications and licenses like ISO 9001:2015 through TUV India, FSSAI central license, ISO 22000:2018, HALAL, Kosher and our Research and Development Centre has been recognized by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, Government of India.

Our concern for the environment is at the centre of everything we do. As a result, our products provide multiple benefits that cannot be obtained through traditional chemicals and processes such as superior quality, lower production cost, less wastage and reduced energy consumption.

As of today, our clients belong to a wide range of sectors like

DISINFECTANT
OIL FIELDS
AGRICULTURE
BREWERY AND WINE
DETERGENT
SECOND GENERATION BIOFUELS
CRUDE OIL SPILL REMEDIATION
DISINFECTANT
OIL FIELDS
TEXTILE
SUGAR
DISTILLERY
ANIMAL FEED
WASTE - WATER TREATMENT
PHARMACEUTICALS
PULP AND PAPER

Message From The Managing Director

Adarsh Desai

Firstly, I would like to wish one and all good health and safety from the ongoing Pandemic.

It gives me immense pleasure to present the 2nd edition of our annual magazine - BIOVOICE. A lot has happened over the past year. Infinita Biotech has grown tremendously and is now actively working with all the major continents, which include North America, South America, Europe, Asia Pacific, Middle East and Africa.

As we approach the end of the financial year on March 31st, 2022, we look back on 2021 as the best year in terms of growth since our inception. This year had crippled the whole world due to the Pandemic. However, we were able to achieve a Y-O-Y growth of more than 450%. The major contributing factors to this were diversification in our product portfolio and expansion of our territories.

During the year, we were also able to get our R&D recognition by DSIR renewed. Furthermore, we attained 'Kosher Certification' from the leading Dar Kosher Agency. This certification facilitates us in gaining access to multiple geographies.

Around the end of the year, we attained the ISO 9001: 2015 certification from the world's leading certifying agency - 'TUV Nord'. This has been a major milestone for our organization and everyone behind it. Such certificates and recognition really ensure that we follow the highest international quality standards in terms of our operational efficiency and customer service.

In terms of infrastructure, we expanded our existing facility specifically dedicated to R&D. Here, we have undertaken numerous R&D activities in terms of developing new products and applications. Keeping R&D at the core, we have been able to bring out multiple new products this year which will help in creating a better tomorrow for all of us.

Talking about future plans, while we aggressively move ahead and expand our arms globally, we wish to take up a few core R&D projects which involve specialised enzyme production at a lab and pilot scale. We have been working for quite some time on the research and development of a few specific enzymes for which we plan to have standardised versions ready in the near future. We are confident enough to develop technologies for the production of these enzymes, which can eventually be scaled up for commercial supply.

I hope you enjoy this edition of our magazine as it covers a range of topics right from our product developments to team celebrations throughout the year and more about Infinita Biotech family and its structure.

Infinita Biotech thanks you for your continuous support and patronage. We promise to keep continuing to work harder and with greater efforts to make this world a better place to live for everyone with our environmentally friendly biotech solutions.

BIOSCOPE

Articles

BIOSCOPE
Articles

Enzymes for Human Therapy

Enzymes for Human Therapy

Contributed by:
Milind Kulkarni
Technical Head

Introduction

Enzymes are catalysts that help living organisms catalyze biochemical reactions selectively and efficiently. The catalytic activity of enzymes is very specific and depends on their structural integrity. In this regard, the activity of one or more enzymes is impaired in many diseases due to mutations. Many drugs have been developed to target these. Alternatively, enzymes are used directly as therapeutic drugs, such as pepsin was used to treat dyspepsia.

In 1987, the first recombinant enzyme drug for acute ischemic stroke, plasminogen activator 'Alteplase', was approved by the Food and Drug Administration (FDA), USA. This drug is used to treat acute ischemic stroke.

The industrial market for enzyme-based drugs is expected to increase at a growth rate of 6.8% during 2019–2024.

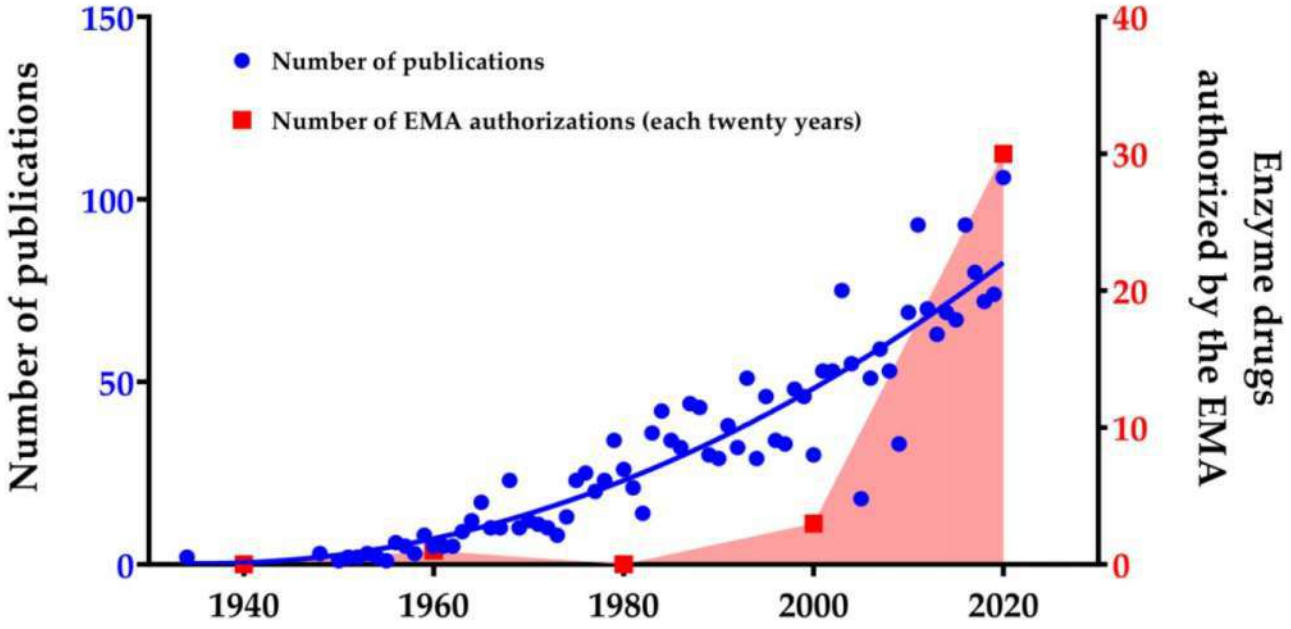


Figure 1. Number of publications and enzyme drugs authorized per year (from 1934 to 2020), by the European Medicines Agency (EMA, Amsterdam, The Netherlands).

Enzyme Therapies for Different Pathologies

Metabolic Deficiencies

Diseases caused by deficiency of a metabolic enzyme are the solution during the target enzyme replacement therapy (ERT). The main metabolic deficiencies treated with ERT are generally lysosomal storage diseases (LSD). LSD is a heterogeneous group of rare inherited metabolic disorders that are the result of lysosomal dysfunctions. ERT has been found to be a promising therapeutic alternative. A summary of LSD treated with enzyme drugs is shown in Table 1.

Table No 1. Summary of diseases that can be treated with enzymes

Disease/Condition	Cause/Pathology	Therapeutic Enzymes
	Lysosomal Storage Disorders	
Gaucher's Disease	Deficiency of Glucocerebrosidase	Glucocerebrosidase [Cerezyme, V prip, Taliglucerase alpha]
Hunter's Disease	Deficiency of iduronate-2-sulfatase	Iduronate-2-sulfatase [Elaprase]
Fabry's disease	Deficiency of α-galactosidase A	α, β-galactosidase A [Replagal, Fabrazyme]
Hurler's syndrome	Deficiency of α-L-iduronidase	α, β-galactosidase A [Replagal, Fabrazyme]
Morquio syndrome type A	Deficiency of N-acetylgalactosamine-6-sulfate-sulfatase	N-acetylgalactosamine-6-sulfate-sulfatase [Vimizim]
Maroteaux-Lamy syndrome	Deficiency of arylsulfatase B	N-acetylgalactosamine-4-sulfatase [Naglazyme]
Sly syndrome	Deficiency of β-glucuronidase	β-glucuronidase [Mepsevii]
α-Mannosidosis	Deficiency of α-D-mannosidase	Velamase α [Lamzede]
Batten disease	Deficiency of tripeptidyl peptidase 1	Cerliponase α [Brineura]
Pompe's disease	Deficiency of acid α-glucosidase	α-glucosidase [Myzyme]
	Metabolic Deficiencies	
Endocrine Pancreatic Insufficiency (EPI)	Insufficient secretion of pancreatic enzymes	Pancreatic enzymes [Enzepi]
Phenylketonuria (PKU)	Deficiency of phenylalanine hydroxylase (PAH)	Phenylalanine hydroxylase and phenylalanine ammonia-lyase [Palynziq]
Severe Combined Immunodeficiency (SCID)	Deficiency of Adenosine deaminase (ADA)	Polyethylene glycol-conjugated ADA
Wolman disease	Deficiency of lysosomal acid lipase	Lysosomal acid lipase [Kanuma]
Acute Intermittent Porphyria (AIP)	Deficiency of hyroxymethylbilane synthase	Hyroxymethylbilane synthase and porphobilinogen deaminase
Congenital sucrase-isomaltase deficiency (CSID)	Deficiency of sucrase and isomaltase	Sacrosidase
Hypophosphatasia	Deficiency of tissue non-specific isoenzyme of alkaline phosphatase (TNSALP)	TNSALP [Strensiq]
Protein C deficiency	Deficiency of Protein C	Protein C [Ceprotin]
Lactose intolerance	Reduction or loss of the activity of lactase-phlorizin hydrolase	Lactase

Disease/Condition	Cause/Pathology	Therapeutic Enzymes
	Fibrosis Conditions	
Chronic total occlusions	Fibrous plaques obstructing coronary arteries	Collagenase Clostridium histolyticum (CCH)
Dupeytren's disease	Thickening of the facia tissue in the hands	Collagenase Clostridium histolyticum (CCH) [Xiapex]
Peyronie's disease	Fibrous plaque formation in the penis	Collagenase Clostridium histolyticum (CCH)
Uterine fibroid	Fibroid tissue growth around the uterus	Collagenase Clostridium histolyticum (CCH)
Keyloid disease	Overgrowth of granulation scar tissue	Collagenases and matrix metallopeptidases
Lung cystic fibrosis	Viscose secretions in the lungs	Deoxyribose nuclease I [Pulmozyme]
Hypophosphatasia	Deficiency of tissue non-specific isoenzyme of alkaline phosphatase (TNSALP)	TNSALP [Strensiq]
Protein C deficiency	Deficiency of Protein C	Protein C [Ceprotin]
Lactose intolerance	Reduction or loss of the activity of lactase-phlorizin hydrolase	Lactase

Further Metabolic Deficiencies

In addition to LSD, several other metabolic deficiencies need to be considered (Table 1). Exocrine pancreatic insufficiency (EPI) is characterized by impaired secretion of pancreatic enzymes and bicarbonate. The most practical approach to control these enzymatic deficiencies is ERT. A list of metabolic diseases that can be treated by ERT has been mentioned in Table 1.

Fibrosis Conditions

Peptidase enzymes are capable of degrading protein deposits in different types of tissues and have generated a lot of interest in recent times. Metalloprotease endopeptidases, which include collagenases and gelatinases are being studied as treatments for different pathologies. The accumulation of collagen plaque in the coronary artery results in low blood flow to the heart. Collagenase produced by Clostridium histolyticum can degrade the collagen plaques and thus is the preferred choice of treatment.

Ocular Affections

Retinal detachment, macular pucker, diabetic retinopathy, macular holes, vitreous hemorrhage and vitreous floaters are ocular pathologies that can now be treated with enzymes, such as chondroitinase, hyaluronidase, nattokinase or ocriplasmin.

Joint Problems

Different kinds of joint problems, associated with pain and inflammation, are now being treated with enzymes. Intradural disc herniation (IDH) can now be treated by injecting Sulfate ABC endolyase, an enzyme into the vertebral disc, so as to dissolve its inner part.

Cancer

Cancer is one of the fastest-growing diseases in the world, as mentioned in the Table, PEGylated arginine deaminase and PEGylated kynureninase are currently under study to deal with increased arginine and tryptophan around the tumour. In addition, L-asparaginase has also been approved and is being used for the treatment of acute lymphoblastic leukaemia using the same strategy described before: amino acid deprivation by enzymes.

Cardiovascular Diseases

Cardiovascular diseases are the most common cause of death around the world. The urokinase enzyme acts on plasminogen, which is an inactive form of the serine protease plasmin. Urokinase converts plasminogen to plasmin, triggering a proteolytic cascade that participates in thrombolysis involving the degradation of the extra-cellular matrix (ECM).

Extracellular Matrix Disorders

Matrix metalloproteinases play a key role in this process of healing and involve several dynamic physiological processes, such as coagulation, tissue formation, re-epithelialization and ECM re-modelling. Cellulite is mainly caused by the accumulation of subdermal collagen in the dermal septa. Collagenase mixture injections have overcome phase III of the clinical trial for cellulite treatment.

Reactive Oxygen Species Damage

Superoxide dismutase, already heavily used in the cosmetic industry, could have a novel application in treating this pathology, as it catalyzes the dismutation of the superoxide radical into oxygen and hydrogen peroxide.

Table No 2. Summary of diseases that can be treated with enzymes

Disease/Condition	Cause/Pathology	Therapeutic Enzymes
Lysosomal Storage Disorders		
Glaucoma	Fibrous formations at the trabecular meshwork of the eye	Collagenases
Ocular affections		
Different ocular diseases treated with vitrectomy	Malfunction of the vitreous humor of the Eye solved by its enzymatic removal	Chondroitinase, hyaluronidase, Nattokinase and ocriplasmin [Jetrea]
Joint problems		
Intervertebral disc herniation	Disc material penetrating the spinal dura	Chondroitin sulfate and ABC endolyase
Cancer		
Different types of cancer	Increased amino acid metabolism in the tumor microenvironment	PEGylated arginine deaminase and kynureninase [Voraxaze, PEG hyaluronidase PH 20]
Leukemia	Increased amino acid metabolism in the tumor microenvironment	L-asparginase[Spectrila, Kidrolase, Erwinase, Oncaspar]
Chemotherapy induced hyperuricemia	Increase in uric acid due to tumor lysis syndrome	Urate oxidase and rasburicase [Fasturtec]
Cardiovascular diseases		
Cardiovascular disease	Formation of fibrin clots degraded by plasmin	Formation of fibrin clots degraded by plasmin

Disease/Condition	Cause/Pathology	Therapeutic Enzymes
Extracellular matrix disorders		
Burns	Denatured collagen in necrotic tissue	Collagenase Clostridium histolyticum (CCH) [Nexobrid]
Cellulite	Accumulation of subdermal collagen in the dermal speta	Collagenases
Reactive oxygen species damage		
Organ injury in haemorrhagic shock	Reactive oxygen species (ROS) tissue damage	Nanozyme (PtCu nanoalloys)
Other applications		
Celiac disease	Gluten intolerance	Gluten-degrading enzymes
Microbial infections	Microbial biofilm formation during infection	Matrix-degrading enzymes (polysaccharide-degrading enzymes, nucleases and proteases)
Inflammation	Inflammation of over expressed pathways disrupting physiological homeostasis	Proteolytic enzymes (trypsin or serratiopeptidase)
Cocaine overdose	Cocaine toxicity	Formation of fibrin clots degraded by plasmin

Current Challenges of Enzyme Therapies

With the application of enzymes vastly possible in a number of diseases, as mentioned in both the tables, yet only a few of them have been approved by FDA and EMA. The multiple interactions in the body with the injected enzyme lead to the inactivation of the administered enzymes. Further, enzymes do not differentiate between normal and pathologic tissue. One of the main issues with enzyme-based therapies is the patient's immune response.

Troubleshooting

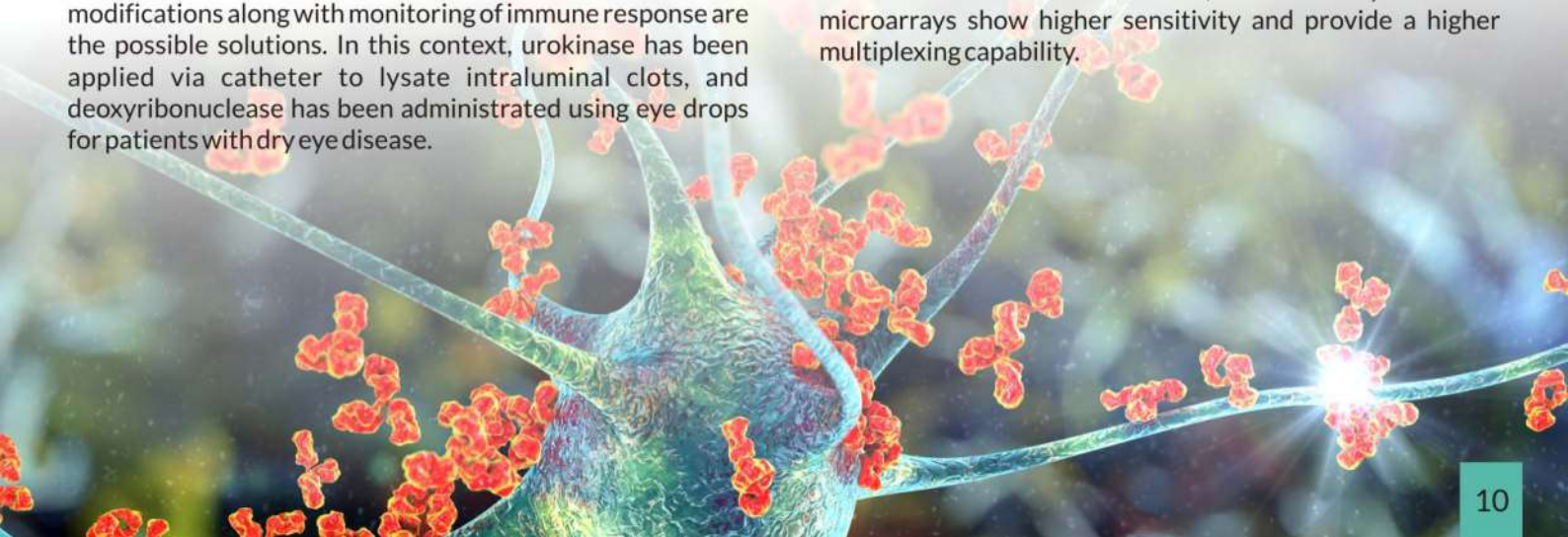
Enzymes have been used as therapeutic drugs for diverse pathologies. To become widely used drugs, enzyme therapies must overcome enzyme rapid clearance in vivo, the unwanted off-target interactions and patient's immune response. Enzymatic encapsulation and molecular modifications along with monitoring of immune response are the possible solutions. In this context, urokinase has been applied via catheter to lysate intraluminal clots, and deoxyribonuclease has been administrated using eye drops for patients with dry eye disease.

Encapsulation of Enzymes

Enzyme encapsulation improves target specificity and reduces immunogenicity and clearance. Some examples of encapsulation vehicles are nanoparticles (Nps), virosomes, liposomes, extracellular vesicles (EVs) and erythrocytes. Liposomes and erythrocytes are considered to be possible future as enzyme delivery vehicles. EryDel in Italy and Erytech in France are focusing on encapsulating small and large molecules, including therapeutic enzymes, in patients' red blood cells.

Monitorization of Patients' Immunoresponses

Finally, it is important to assess the immunogenicity of enzymatic treatments to prevent fatal reactions and the development of autoimmunity. With new methods, in addition to conventional ELISA, commercially available microarrays show higher sensitivity and provide a higher multiplexing capability.



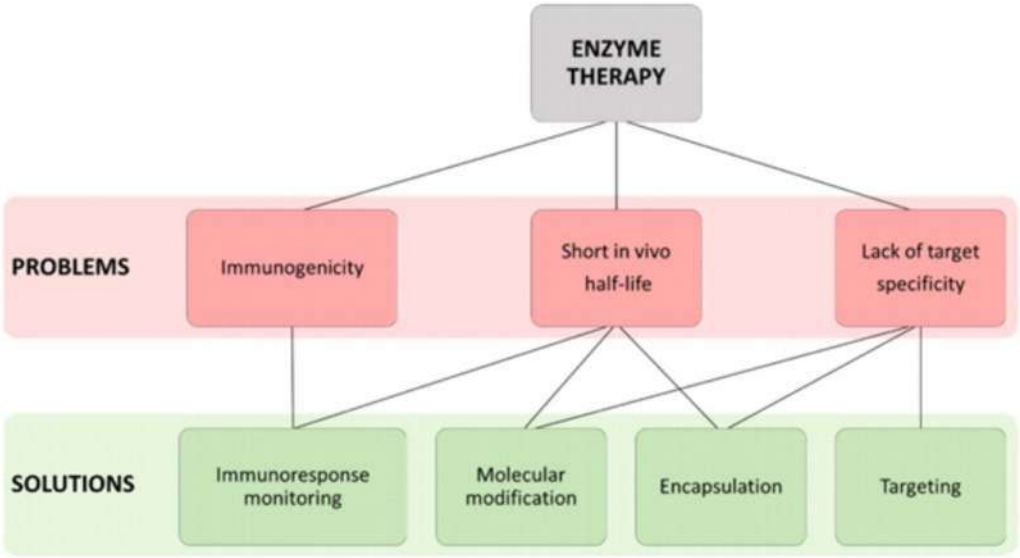


Figure 2. Outline of the main problems presented when using enzyme therapies as well as the different solutions applied to overcome them.

Future Perspectives

With the application of enzymes for treating different diseases, as mentioned in the Tables, it is expected to see light at the end of the tunnel and become a success in the future. With the onset of new biotechnology inventions, it is expected to solve the challenges faced in ERT. One of the promising steps is nanoparticle technology, along with virosomes, liposomes and erythrocytes.

During the Covid-19 Pandemic, ERT has found applications for treating coronavirus infection. The binding function of the virus through protein spikes led to the development of human recombinant soluble ACE2 (hrsACE2). 'hrsACE2' also referred to as APN01 (Apeiron Biologics, Vienna, Austria) has been shown not only to prevent virus entry but also to downregulate inflammation without impairing antibody production. Finally, to summarize and conclude, ERT is an emerging strategy for the treatment of a wide range of life-threatening diseases.

Microarray technology is emerging as a practical tool to improve the monitoring of immune responses in patients treated with ERT.

Enzymes as medications have a lot of therapeutic potential, but extensive research is still needed to expand their application to a wider range of disorders.

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2. *Experimental Ophthalmo-Biology Group, Department of Cell Biology and Histology, University of the Basque Country UPV/EHU, 48940 Leioa, Spain; aacera71@gmail.com (A.A.); elena.vecino@ehu.eus (E.V.)*

3. *Department of Molecular Life Sciences, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, Switzerland; alfonso.gomezgonzalez@uzh.ch*

4. *Department of Pharmacology and Toxicology, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, Switzerland; cristina.solari@uzh.ch*

5. *The Art of Discovery, 48160 Derio, Spain; inigo.ab@tad-med.com*

* *Correspondence: gabriel.barreda@imgpharma.com; Tel.: +34-944-316-577*

Sterile Submerged Fermentation for Enzyme Production and Biomass Valorization

Sterile Submerged Fermentation for Enzyme Production and Biomass Valorization

Contributed by:
Sulagna Roy,
Microbiologist, QC

Introduction

In terms of industrial microbiology, the term fermentation refers to any process for creating a product by the mass culture of a microorganism. The process itself could be anaerobic or aerobic and the final product may be microbial cells/ biomass, microbial enzymes, microbial metabolites or a modified compound. While enzymes have been commercially produced from plant, animal and microbial sources, it is the microbial enzymes that have the advantage of:

i. Being produced in large quantities by established fermentation techniques,
ii Being more amenable to improvements in productivity,
iii. Having good biological activity,
iv. Easier extraction and purification,
v. Being cost-effective, safe, requiring less space and time

Modes of Fermentation

Fermentation can be carried out in the following ways:

I. The submerged approach that would require stirred tank bioreactors or
ii. The solid-state route that would involve the cultivation of the producer strain on solid substrates.

Submerged fermentation (SmF) has the advantages of a smaller footprint, a reduced risk of contamination, and the efficient utilisation of fermentation media. It is energy-intensive as it needs agitation through an impeller and aeration through an air sparger in the case of aerobic processes. The typical large scale fermentors used for SmF are made of stainless steel (SS304, SS316, or SS317) and require utilities like sterile compressed air (through an oil-free compressor), live steam (through a boiler), cooling and chilling lines (through a condenser or cooling tower). Besides these, the downstream processing of the harvested fermentation broth may additionally involve the use of a vacuum line. The fermentor has provision for sensing and control of in-process pH, temperature, dissolved oxygen, and foam, as well as an arrangement for sample collection, harvesting, and in situ cleaning and sterilization. The SmF process can be of a batch type, fed batch type, continuous type or perfusion type.

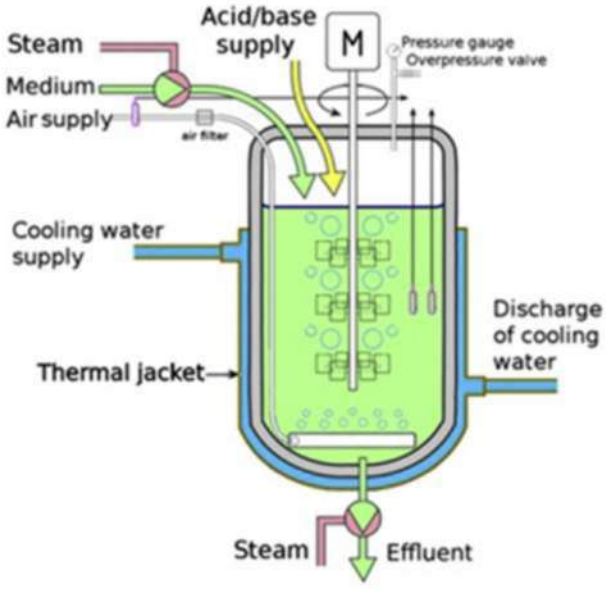

Fig 1: An industrial-scale bioreactor or fermentor

Product and Process Development

Product development through fermentation includes

i. Producer strain development and improvement,
ii. Medium optimization,
iii. Process and parameter optimization in terms of aeration and agitation.

While the first two steps can be developed at a lab-scale level, it is the process and parameter optimization that would require lab scale, pilot scale, and large scale fermentors. During such scale-up projects, it is imperative that all fermentors used have similar vessel geometry. The scale-up would require maintaining a similar tip speed of the impeller and a VVM (Vessel Volume per Minute) aeration rate across all scales of vessels. For any fermentor, the critical parameters would be the heat transfer, mass transfer, and

oxygen transfer functions. Studies of energy balances and heat transfer coefficients would help to determine the heat transfer properties. The determination of the volumetric transfer coefficient, or KLa, of the fermentor, helps to assess its mass and oxygen transfer functions. While the power number of the fermentor can help to determine the power input per volume, the motion of the liquids in an agitated vessel may be described by Reynolds number and Froude number.

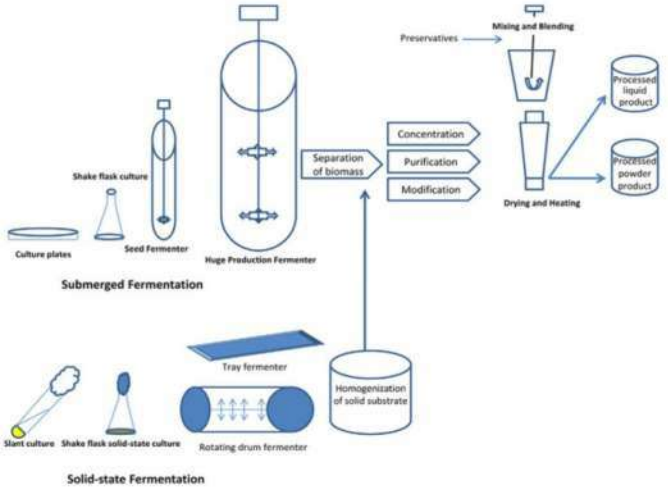

Fig 2: A summary of major steps in upstream and downstream processing

The Enzyme Advantage

The process of fermentation has been around for a long time, but the use of large-scale stirred tank reactors began in the 1940s, especially for the production of antibiotics, amino acids, transformations, and enzymes. Then single-cell proteins were produced using this approach, which involved some of the largest fermentors. Low volume, high-value products like antineoplastic agents are also manufactured using fermentation. Post-1979, foreign compounds not produced normally by microbial cells were manufactured using a genetic engineering approach, e.g., human insulin, interferon, interleukin, erythropoietin, human growth hormone, streptokinase, and various monoclonal antibodies. Enzyme production by fermentation continues to be in demand due to the large number of applications in which enzymes are used efficiently. Recent developments in biotechnology are yielding efficient development of new enzymes, particularly in the areas of protein engineering and directed evolution. In many instances, genetically modified E.coli, Saccharomyces cerevisiae and other heterologous expression systems have also been used for the mass production of enzymes.

Several drugs or pharmaceutical formulations are composed of active pharmaceutical ingredients (APIs) that are synthesised using enzymes as important components of the manufacturing process. The use of biocatalysts for pharmaceutical production as well as rising interest in the production of chiral intermediates and green synthetic processes have substantiated the interest in the applications of biocatalysts in these fields. This has been made possible due to improvements in the technologies for biocatalyst selection, screening, improvement, production, and supply.

Some of the medicinal or therapeutic enzymes include cysteine proteinases, asparaginase, streptokinase, urokinase, serratiopeptidase, sacrosidase, pegademase, glucocerebrosidase, DNase I, hyaluronidase.

Platform Chemicals

A platform chemical is defined as a chemical that can serve as a substrate for the production of various other higher value-added products, e.g., ethanol, furfural, hydroxymethylfurfural, 2,5-furandicarboxylic acid, glycerol, isoprene, succinic acid, 3-hydroxypropionic acid/aldehyde, levulinic acid, lactic acid, sorbitol, and xylitol. Various platform chemicals can and are being produced in bio refineries, which are valorising renewable biomass as a resource. In a bio refinery, instead of fossil-based resources, biomass is used as the feedstock to produce energy and chemicals. Bio refineries are further classified based on the type of feedstocks used, the type of intermediates generated (syngas or sugar), conversion processes (thermochemical, biochemical, two platforms), and the status of technology execution (conventional, advanced, etc.). The biochemical conversion process includes fermentation, while the thermochemical conversion involves gasification. After pre-treatment and saccharification, the biomass sugars obtained are used for fermentation by various microorganisms.

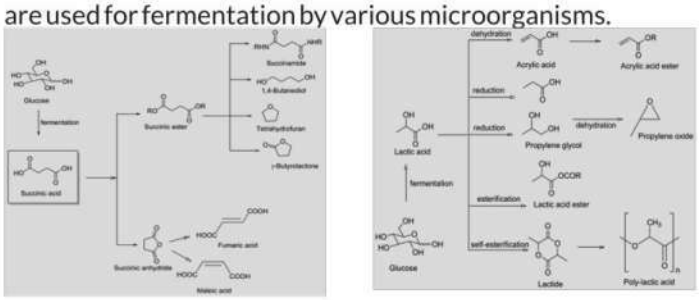

Fig 3: Synthesis of succinic acid and lactic acid and their value-added products

Conclusion

As going green continues to be a global concern, it makes sense to opt for ecologically safe approaches in the long run. Microbial fermentation provides an efficient route to produce eco-friendly agents like enzymes with diverse applications and various platform chemicals.

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BIOSCOPE
Articles

Need of Enzymes in Textile Industry

Need of Enzymes in Textile Industry

Contributed by:
Manish Sharma
Associate Marketing Manager

Introduction

Enzymes are higher molecular weight proteins. They are present in all living cells, where they perform vital functions by controlling the metabolic processes whereby nutrients are converted into energy and fresh cell material. Technically, enzymes can be called Biological Catalysts.
Enzymes work on specific substrates, hence omit the side reactions or unnecessary processes, work in mild conditions, increase reaction speed, originate from natural sources and are biodegradable and environment friendly.

Need of Enzyme in Textile Industry

The Textile processing industry is classified into Textile Fabric Processing and Wet Garment Processing to give various finishes to fabric and garments. The chemicals and auxiliaries used in processing are mostly hazardous in nature. Many of them are carcinogenic and very dangerous to handle. Most of them are not eco-friendly. Due to such hazards, the government and regulatory bodies are banning textile processing using such chemicals or the release of waste liquor into nature. The use of enzymes is the only permanent solution to counteract such problems faced by industries today. Enzymes can be used in replacement resulting in saving energy and preventing pollution. They are also highly specific, which means fewer unwanted side effects and the creation of by-products in the production process.

Infinita Biotech produces highly effective Enzymes for Textile applications in each and every segment of the industry.

Desizing of Cotton Fabrics and Garments

Starch has been the most common sizing agent, for a very long period and this is still the case today, though the use of PVA and Gums is on the rise nowadays. After weaving, the starch/ sizing must be removed to prepare the fabric for steps like Bleaching, Dyeing and Finishing. Conventional desizing is done with oxidising agents like hypochlorites and mild acids for a longer time at higher temperatures, consuming large amounts of water. Also, it degrades the cotton fibres thereby reducing the strength of the fabric.
Enzymes are used for desizing woven fabrics because of their highly efficient and specific way of desizing without harming the yarn. Amylase acts on Starch and converts it to Dextrins, Maltose and finally to Glucose which can be easily removed by washing. Enzyme desizing is carried out through the batch process, pad batch process, exhaust and continuous process. The alpha-amylase enzymes used for desizing are mainly of bacterial origin such as, Bacillus Subtilis.

At Infinita Biotech we offer Enzyme Desizers for both Cotton and Viscose rayon. The Tegawa result of ECOENZYME - TXT LTA L CONC (Low-temperature Amylase) is shown in Fig. 1.

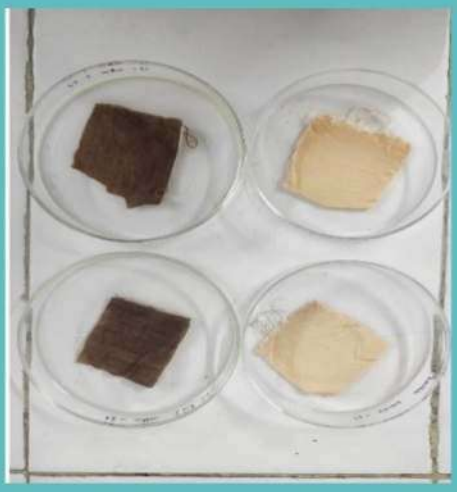

Figure 1. ECOENZYME - TXT LTA L CONC Tegawa results (Iodine test) on Cotton and Viscose rayon.

Biofading and Bio-polishing of Denim Garments and Cotton Fabrics

Biofading

Biofading is a process that gives a worn-out, faded or grains look to denim jeans and garments with the use of Enzymes instead of conventional pumice stones.

Cellulases enzymes are used for surface modification of denim garments and to obtain stone washing effects as well as de-pilling on denim garments.

Denim is dyed with indigo, which adheres to the surface of the yarn. Most denim jeans or other garments are subjected to wash treatment to give them a slightly worn look. Earlier the denim jeans were faded by the abrasive action of pumice stones on the garment. However, too much abrasion can damage the fabric, particularly at the Hems and Waistbands.

This is why denim washers today use cellulases to accelerate the abrasion by loosening the indigo dye on the denim. A small dose of the enzyme can replace several kgs of stones, resulting in less damage to garments, less wear in machines and less pumice dust in the environment, hence increasing productivity through machines containing fewer stones and more garments. With a stone-free process, the need for the removal of dust and small stones from the finished garments is reduced. There is also no sediment in the wastewater, which blocks the drainage.

ECOENZYME - TXT NCP is a benchmark neutral powder enzyme for the stone-wash effect on denim garments. The results are shown in Fig. 2.

Figure 2. Stone-washed Denim jeans with ECOENZYME - TXT NCP

Bio-polishing

Bio-polishing is a technical term that mainly refers to surface cleaning, de-pilling and removal of dead micro-fibres as well as protruding fibres from the surface of cotton fabrics, knitting and cotton garments. Cellulase enzymes remove the fibrils and fuzz that protrude from the surface of the yarn. This weakens the micro fibrils, which tend to break off from the main body of the fibre and leave a smoother yarn surface. A ball of fuzz called "Pill" can result in an unattractive and knotty appearance. Also, the removal of fuzz imparts a softer, smoother feel and superior colour brightness. Back staining at low pH values (4-6) is relatively high, whereas it is significantly lower in the neutral pH range. Neutral cellulases are therefore often used when minimum back staining is required.

For cotton fabrics, bio-polishing is optional. However, bio-polishing is almost essential for the new polynosic fibre Lyocell (Tencel). Bio-polish also enhances the attractive and silky appearance of Lyocell.

Infinita Biotech manufactures both Neutral Bio-polish (ECOENZYME - TXT NCL BP) and Acid Bio-polish (ECOENZYME - TXT ACL BP) for denim garments, woven and knitted fabrics. Results of Neutral bio-polish and Acid bio-polish are shown in Fig. 3 and Fig. 4.

Figure 3. Neutral bio-polishing on Denim jeans with ECOENZYME - TXT NCL BP

Figure 4. Acid bio-polishing on Denim Jeans with ECOENZYME - TXT ACL BP

Bio-scouring of Cotton and its Blends

Bio-scouring is the enzymatic process performed on cotton fabrics to remove insoluble components of raw cotton which include oil, waxes and pectins. This is an alternative to conventional alkaline scouring. The main purpose of scouring is to hydrolyze the non-cellulosic components responsible for the water repellence of cotton, which is done by conventional chemicals which are very harmful to the environment. Enzymatic Scouring (Bio Scouring) is done by using a specific blend of enzymes.

The pectinase enzyme works on the outer walls of the cuticle, hydrolyzing the pectins and removing wax and protein. The pectin binds the wax to the cellulose part. Pectin should be removed at least 60% from the fabric, followed by a wash at 80 - 90°C to eliminate the solubilized waxes.

The maximum removal of pectin components from the cotton will improve fibre hydrophilicity, which will boost dye penetration and substantial water savings when compared to the traditional alkaline scouring process.

Enzymatic scouring is done with a blend of lipases, pectinases, proteases, cellulases and their mixtures to improve cotton properties. The major advantages of enzymatic scouring are to save water and energy consumption. The process is carried out at lower pH values and at lower temperatures as compared to traditional boiling scouring processes.

Hence, the main advantages of bio-scouring are saving water and energy, being environment friendly, lower COD BOD in wastewater, less effect on fibre structure, negligible loss of weight, uniform dying and much better appearance of the fabric.

It is possible to combine the desizing and bio-scouring process in one step in the case of woven fabrics, combining bio-scouring with bio-polishing in knitted fabrics. This also increases the possibilities of scouring cotton blends with more delicate fibres.

Results of bio-scouring on Cotton fabric is shown in Fig. 5.

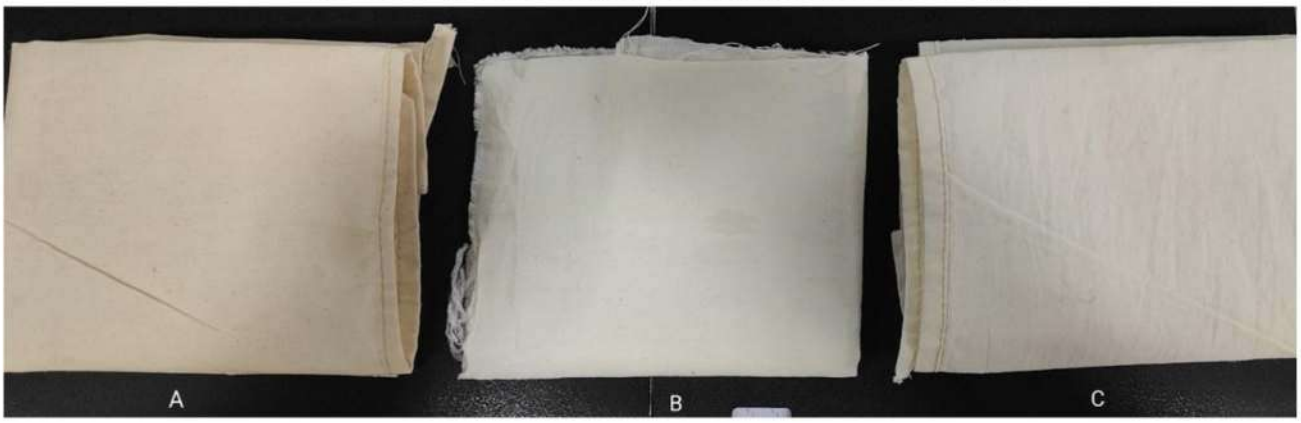

Figure 5. Bio-scouring results, A - Greige Cotton. B - Desized Cotton along with ECOENZYME - TXT BIOSCOUR L, C - Treatment only with ECOENZYME - TXT BIOSCOUR L

A further way of analysis is

A B C

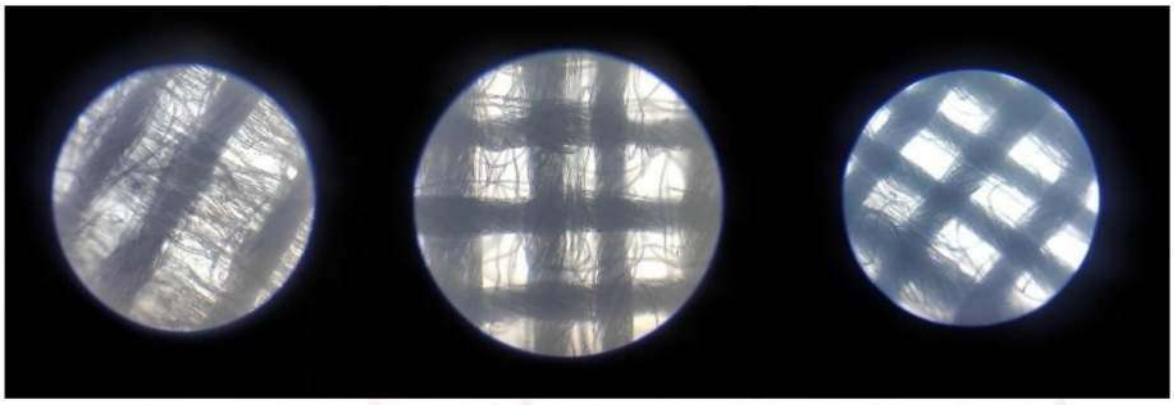

Figure 6. Microscopic view of A) Greige Cotton fabric, B) Desized Cotton fabric, C) Bio Polished Cotton fabric.

AD INFINITUM

Unique Enzymatic Solutions

ECOENZYME - GUAR

As we run through the history of the oil industry, technological progress has always found a way to bring new ways into play. Even with the latest techniques, a large share of the oil in a reservoir remains unextracted during primary and secondary recovery. Some of this oil can be accessed through the use of more complex methods such as - Enhanced Oil Recovery (EOR), which is also called tertiary recovery. EOR is the extraction of crude oil from an oil field that could not be recovered otherwise. EOR has become a promising option to squeeze more oil from the ground.

The three primary techniques involved in Enhanced Oil Recovery are gas injection, thermal injection, and chemical injection. These techniques have been really successful and commercially deployed in multiple countries.

EOR technology uses polysaccharide-based biopolymers to enhance petroleum recovery during well drilling. Biopolymers or polygels play an unavoidable role in the application of Enhanced Oil Recovery Technology. These biopolymers increase the viscosity of a fluid containing water so that the fluid is more difficult to flow than the oil. As a result, it leads to increased oil recovery. But handling these huge amounts of biopolymers becomes a concern. To resolve this problem, Infinita Biotech has developed ECOENZYME - GUAR, an enzymatic solution to deal with biopolymers if it is made up of guar gum. This degradation process of guar gum-based biopolymers is completely environment friendly and does not hinder the oil extraction process.

Why is Guar Gum preferred in EOR?

Guar gum is a natural polysaccharide, mainly consisting of mannose and galactose. It has been extensively used as a thickener, stabilizer, and emulsifier. These properties of guar gum make it potentially useful in EOR. As a viscosity enhancer, guar gum helps to balance the viscosity levels, providing a smoother medium for operation while drilling. Guar gum is also used to fill cracks in coal mine drilling projects for controlled gas releases.

The use of sustainable methods for the sake of environmental and health safety concerns is rapidly becoming mandatory in industrial operations. Using natural polymers is crucial in drilling and mining purposes. Guar gum is explicitly used to regulate the viscosity levels in such operations.

Though the benefits of using guar gum in EOR are enormous, handling such large quantities of guar gum is quite challenging. Out of several methods for degradation of guar gum, enzymatic hydrolysis is more preferred over the other methods. ECOENZYME - GUAR, an enzymatic blend, is capable of hydrolyzing guar gum-based biopolymers. Using ECOENZYME - GUAR has several advantages which are not limited to:

- An eco-friendly way to handle biopolymers
- No interference with the oil extraction process
- Biodegradable
- Precise application
- Escalates biopolymer-based oil and gas extraction
- Can be customized against different biopolymers
- Safe extraction of oil and gas without suffering product loses

ECOENZYME - GUAR has a great potential to degrade and handle biopolymers and is a promising and preferred way over the chemical-based hydrolysis methods.

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ECOENZYME - SOIL REM

ECOENZYME - SOIL REM

Soil - one of the most biologically active, porous mediums, is the principal substrata of life on Earth. Soil not only serves as a reservoir for water and nutrients but is also a medium for the filtration and breakdown of injurious wastes. But with time, the intentional and unintentional activities by human beings have led to soil contamination. Soil contamination is the condition in which the presence of a chemical or substance is present in higher concentrations than normal, which may cause adverse effects. The primary contaminants of soils include pesticides, petroleum products, radon, asbestos, lead, etc. Human activities such as manufacturing, industrial dumping, waste disposal and use of excessive pesticides and fertilizers are a few contributing factors in soil contamination. Soil contamination is considered a "hidden danger" with a lot of serious consequences.

To overcome this problem, various soil remediation techniques are adopted to revive the soil and make it less harmful. Soil remediation techniques involve different chemical and physical methods to remove pollutants from the soil. These traditional methods use oxidizing agents, adsorbents, and electrochemical treatments. However, these methods are not effective enough to lower the contaminants to the regulation limits and come with a lot of disadvantages like high cost, non-specificity, and possibility of secondary contaminants being produced as a result of the degradation of these pollutants.

Bioremediation can be chosen over traditional methods. Bioremediation is a microbiological well-organized procedural activity applied to break down or transform contaminants into less toxic or non-toxic compounds. Bioremediation can be carried out through in-situ or ex-situ techniques, depending upon several factors such as cost, type, and concentration of contaminants.

In-situ bioremediation includes the treatment of polluted substances at the site of pollution, which does not involve excavation. This includes - natural attenuation, bioslurping, bioventing, biosparging, phytoremediation, microbial remediation, and enhanced bioremediation. Ex-situ bioremediation involves the excavation of polluted substances and shifting them to another site for treatment. This includes - winrowing, land farming, etc. Flooding of soil with various contaminants is a result of the continuous activities of human beings over a long period and so will be the time required for rejuvenating the soil.

Enzymes and microorganisms play an important role in soil remediation. To propagate bioremediation, Infinita formulated a blend of multiple enzymes and microorganisms called ECOENZYME - SOIL REM for the purpose of soil remediation. Enzyme-mediated soil remediation renders the contaminants harmless or less toxic.

ECOENZYME - SOIL REM is an environment-friendly approach to decontaminating soil. The ingredients in ECOENZYME - SOIL REM are suitable to work on soil that is contaminated with heavy metals, mineral oil, Polycyclic Aromatic Hydrocarbons (PAH), Aromatic Hydrocarbons (BTEX), Chlorinated Hydrocarbons (CHC), Cyanides, Phenols, etc. The microbes and enzymes present in ECOENZYME - SOIL REM alter the contaminants present in the soil. The chemical contaminants in soil are used as an energy source by the microbes to carry out their normal life functions, in turn rendering the contaminants harmless. ECOENZYME - SOIL REM has several benefits over other traditional methods of soil remediation:

- Eco-Friendly
- Recovery of excavated soil
- No harmful secondary materials
- The efficient and practical approach
- Cost-effective
- Safe alternative to chemical and physical methods
- Improved soil quality

ECOENZYME - SOIL REM is a promising alternative to the conventional soil remediation processes and a promising valuable microbes and enzymes combination to solve environmental threats associated with contaminated soil. ECOENZYME - SOIL REM mediated remediation of soil renders the contaminants harmless and rejuvenates the soil as it targets the contaminants responsible for soil pollution. It ensures safer and better handling of polluted soil and ensures quantitative improvement in soil condition.

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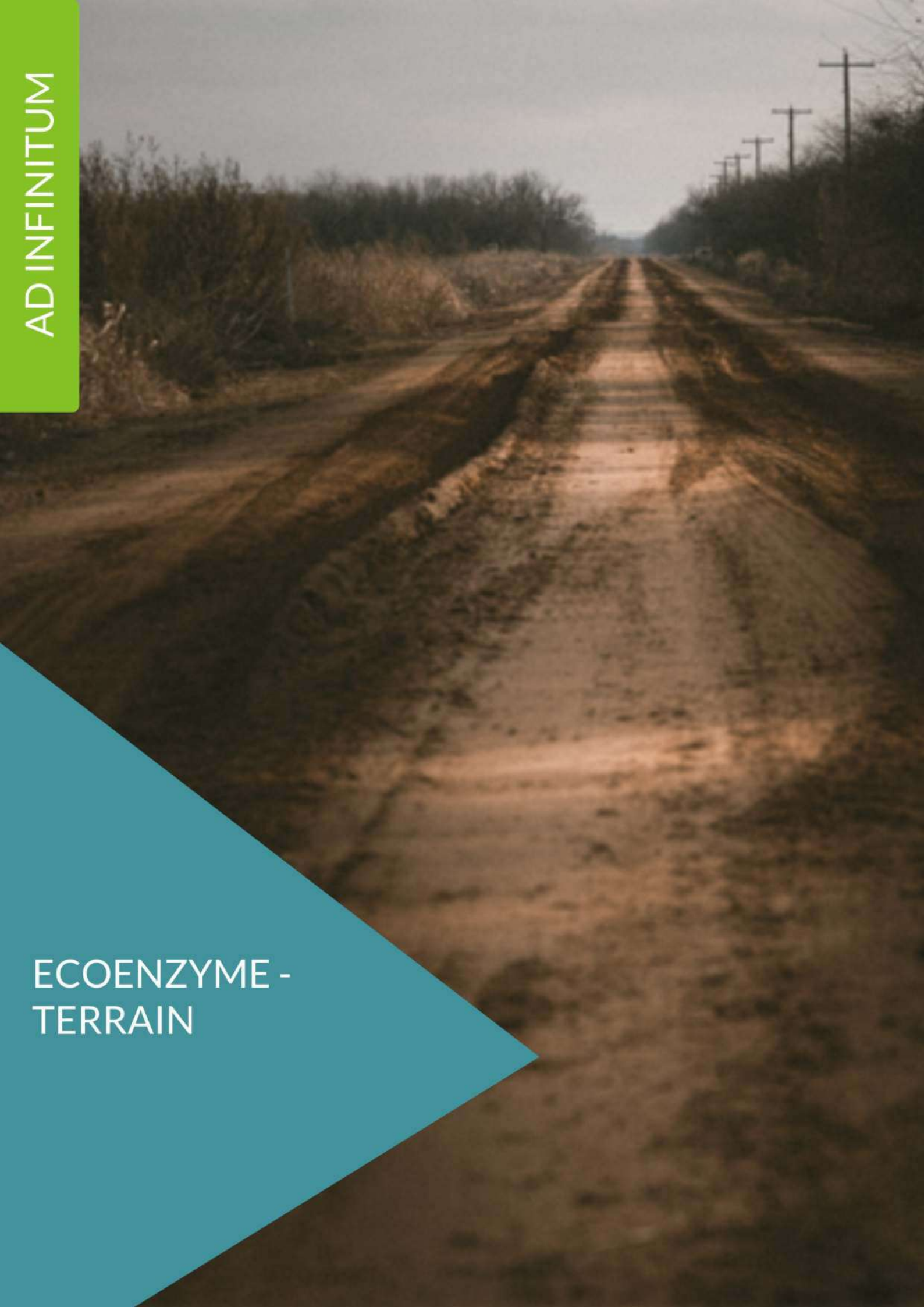

ECOENZYME - TERRAIN

ECOENZYME - TERRAIN

Soil stabilization has gained a lot more attention over time for being a very popular process in road construction. It is defined as changing and improving the structural properties of soil by chemical or mechanical means. Soil stabilization is done to increase the strength and durability of soil.

As conventional methods come with a lot of disadvantages and affect the ecology adversely, there is always a constant search for eco-friendly and cost-effective alternatives. Even though many additions like using bitumen, hydrated lime, and Portland cement are used for soil stabilization now, the bio enzyme benefits for soil stabilization are more promising and rewarding in the long term.

Bio enzymes are increasingly being used for soil stabilization and are replacing the conventional methods. Bio enzymes are biocatalysts that accelerate the rate of chemical reactions without undergoing any changes themselves. They stimulate chemical processes on the soil surface, causing the density of the soil to increase and the water retention to decrease. This gives us stabilized soil and prepares it for the construction on roads, check dams, etc. For bio enzymes to work properly, very less quantity of clay in the soil is required. Bio enzyme-treated soil forms a high density, firm, and water-resistant layer that results in soil surface perfect for road surfacing, dust suppression, constructing different types of hard surfaces and roads suitable for construction and transport purposes.

Infinita Biotech has formulated ECOENZYME - TERRAIN which is a unique multi-enzyme product developed to aid the workability, mix-ability, binding, and compaction of the soil. ECOENZYME - TERRAIN significantly improves the stability of soil in the construction of roads and related projects. ECOENZYME - TERRAIN when added to soil, the multi enzymes increase the wetting and bonding capacity of the soil particles. The enzymes enable soil materials to be wetter and compacted more thickly. It also improves chemical bonding and creates a more permanent structure that is more resistant to water penetration and weathering. The product alters and improves the various physical and chemical properties of soil, which results in a significantly less mechanical effort to achieve greater densities for compaction.

When ECOENZYME – TERRAIN is introduced in the soil, it catalyses the reaction between big organic molecules and small clay particles present in the soil. Large organic molecules have large flat structures which cover the surface of smaller clay particles, neutralizing their negative charge and lowering the hygroscopic nature of clay. This effect prevents additional absorption of water in the soil and prevents further loss of density. Soil compaction in the forest area using ECOENZYME - TERRAIN is a solution to prevent soil erosion. The product can provide more strength to the building of small check dams and many more.

Using ECOENZYME - TERRAIN for soil stabilization comes with a lot of advantages the biggest amongst them is lower construction and maintenance costs. Unlike chemical methods, using ECOENZYME - TERRAIN provides excellent results along with being environmentally friendly and non-toxic. The other benefits include :

- Long-lasting
- Easy to use
- Construction or restoration of rural or forest highways by strengthening the base layers
- Decreases the loss of fine material
- Lowers dust formation
- Reduces carbon footprint and pollution levels
- Biodegradable

Soil stabilization through bio enzymes is becoming quite popular worldwide. Developing countries can drive major economic benefits by substituting conventional soil stabilizers with bio enzymes such as ECOENZYME – TERRAIN, as this method is drastically cheaper when compared to others. Using ECOENZYME - TERRAIN will help in lowering expenses and creating larger roads, thus leading to extensive transport networks all over the world. It will contribute to the prosperity and development of the connected regions where traditional methods have their limitations.

INFINIWORLD

Featured

CERTIFICATIONS

During FY 21-22, we renewed our R&D recognition by DSIR. We also, attained 'Kosher Certification' from the leading Dar Kosher Agency making our product basket fit for new markets and expanding our acceptability and reach worldwide.

Most importantly, we obtained the ISO 9001: 2015 certification from the world's leading certifying agency 'TUV Nord' and FSSAI Central license by the government of India, giving us an added edge over our competitors in terms of enzymes used in the food industry. These have been major milestones for our organization and everyone behind it. We're constantly improving and attaining recognition for our efforts and steps toward becoming industry leaders in enzymatic solutions.

BIOSPECTRUM

Mr. Adarsh Desai, Managing Director of Infinita Biotech, was featured in BioSpectrum, one of the leading magazines in the field of Biotechnology. His insights on "The Enzyme Industry and its Evolution in India" along with the role of Infinita Biotech in this evolution can be seen on the YouTube Channel of BioSpectrum India.

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ENZYMATIQUE

Most Read Blogs

Enzymes in the Cosmetic Industries

We live in a world where we are exposed to many harmful sources - sunlight, natural pollutants and man-made pollutants. We have now started understanding the mechanisms by which these sources can damage us. The skin is our largest organ and is the first line of defence that shields us from the outside world. Skincare and cosmetic products help us in exfoliating and maintaining skin health.

The global cosmetics or personal care market is valued at around USD $300 billion at the retail level and is a highly attractive segment in the consumer products space. The market has been growing at 4.5% per annum in the last 5 years, generating a high return on capital to investors. Products with organic ingredients have been one of the fastest-growing segments of the global personal care industry. Increased awareness for health safety, environmental consciousness and growing consumer awareness toward hazards of harmful synthetic chemicals have given rise to the demand for organic PCPs (Personal Care Products). Among the organic and natural products, certain enzymes derived from microbial and plant sources have found their specific function in the formulations of PCPs, and are already being accepted and used widely.

The use of enzymes in the cosmetic industry has been highly advocated for many years. Enzymes with a proteolytic function (bromelain, papain, etc.) have been incorporated for use in exfoliation and smoothening. However, there are problems associated with the basic application of proteases on the skin surface, where the action is difficult to control and the enzyme has the potential to cause irritation. The topical application of certain enzymes has been shown to realise significant benefits in skin protection. Enzymes are very stable when used as parts of cosmetic formulations. These enzymes are able to trap the free radicals found in the environment, produced by environmental pollution, bacteria, smoke and sunlight among other things. Enzymes work successfully on the skin's surface in reducing these harmful effects caused by the factors mentioned above.

Proteolytic enzymes can be found in bacteria, certain algae, viruses and plants. However, they are most abundantly found in animals. Pepsin, bromelain and papain are the three most common proteolytic enzymes. Pepsin is naturally produced in the intestines while bromelain and papain are food enzymes, found in pineapple and papaya, respectively. Papain and bromelain are often used as cosmetic ingredients.

Some enzymes are also used as topical exfoliants to dissolve and remove dead cells from the surface of the skin, leaving it smooth, fresh and bright. Enzymes are gentler on the skin than AHAs (Alpha-hydroxy acids) and break down the 'glue' that holds the cells together. This results in the shedding of dead cells to speed up the skin's natural exfoliation process. Depending on their activities and concentration levels, enzymatic peels are used in professional-grade products by trained beauticians who occasionally combine these peels with vitamins to enhance their effectiveness.

Oxidoreductases, proteases, and hydrolases are some enzyme groups that have proven useful with PCPs. The search for new and novel enzymes still continues. The anti-aging segment is the largest product category in the PCP market and is the key driver for its growth. Skincare and hair care are the largest and fastest-growing segments, providing sizable growth opportunities for manufacturers and suppliers. Cosmeceuticals, which are cosmetic products with drug-like benefits, are also becoming the fastest-growing segment of the cosmetics and PC industry.

Asian countries mainly Japan, China and India have been fulfilling huge potential in the global cosmeceuticals market, which are destined to catch the eye of major players in the future. Although the PCP market with cosmeceuticals is at an emerging stage in developing countries, like India and China, there still remains a large scope and potential to explore the desire to look young and fair.

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Enzymes in the Nutraceutical Industry

Food choices play a critical role in the survival of life. Due to today's fast paced environment and the stressful lifestyles consumers lead today, they end up consuming large quantities of poor quality food, leading to problems with digestion. This creates an enormous market, as people are seeking better ways to combat gastrointestinal problems that can range from being frustrating to embarrassing and debilitating. An ageing population and an increased occurrence of lifestyle diseases in children and adults have driven attention towards additional nutritional supplements to be taken along with food to meet the need for a balanced diet. An influx in awareness about general wellbeing has been drawing more consumers towards seeking healthier dietary options and realising nutrition to be a key to a better life.

Ideally, functional foods are a part of a normal diet that offers proven physiological benefits and can potentially reduce the risks related to certain recurring diseases, making them different from conventional foods. The functional food domain already utilises enzymes on a large scale to create new and better nutritional products.

Enzymes have been used in a variety of roles such as in the production of nutraceuticals, functional foods as well as in the fortification of food. Enzymes are cost-effective, eco-friendly and result in a higher yield than conventional methods. Nutraceutical and functional food products developed by the application of enzymes include non-digestible oligosaccharides, prebiotic products, cereal and dairy based ingredients, nutraceutical lipids, phytochemicals, special protein hydrolysates, bioactive peptides, and anti-oxidant peptides.

The primary role of enzymes in the body is to disintegrate food into easily digestible particles that help support vitality and give our bodies the ability to fully unlock the benefits of that nourishment. Digestive enzyme supplements provide support to the naturally occurring endogenous enzymes in the body. Systemic enzymes help support general health. Digestive enzymes are more focussed on supporting the body's digestive process. Supplemental use of digestive enzymes is more commonly used type of enzyme supplementation.

Enzymes used in these dietary supplements are generally referred to by their common names and may belong to either animal, plant, fungal, or bacterial origin. Enzymes are highly specific in their ability to catalyse chemical and biological reactions. The most important functional properties of enzymes lie in their high degree of specificity and strong catalytic activity. Such properties make it feasible to target the substrates. Enzyme supplementation through proper dietary supplements, have a potential to play an important role in our lives and in quest to maintain well-being and health.

Current challenge - Consumer awareness of enzymes
Another hurdle that hinders the use of enzymes as dietary supplements is the lack of awareness about this subject. The field of enzymes seems alien to the general public and is generally not an easy subject to grasp. However, consumer awareness levels are growing at an explosive rate. As more research and information comes to light, people are realizing and understanding the numerous benefits that enzymes have to offer.

The enzyme market is taking off and research has been opening doors for new applications across various verticals. We should be able to see enzymes become common over-the-counter supplements like vitamins and calcium supplements in the near future.

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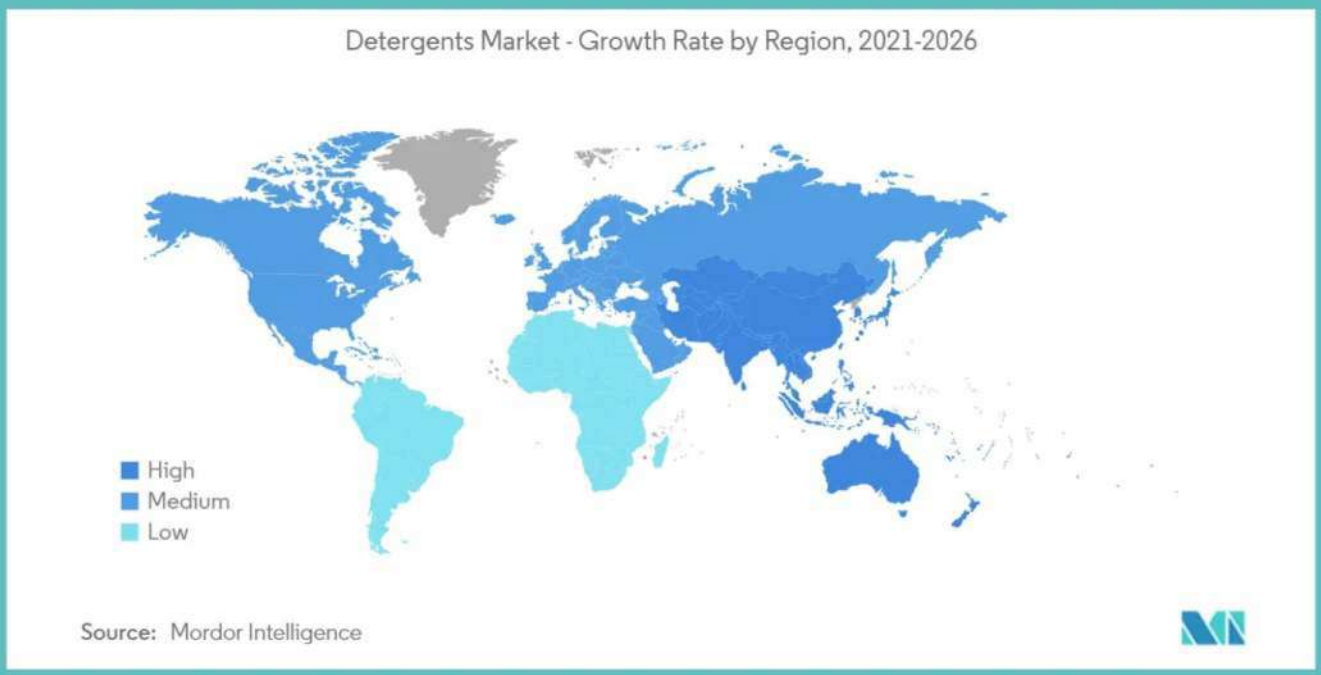
Enzymes in the Detergent Industry

Traditionally, till the 1990s, phosphates and phosphonates were majorly used in the detergent industry to remove soap scum and mineral deposits caused by hard water. Phosphates were gradually phased out of laundry detergents in the 1990s and automatic dishwasher detergents in 2010 to tackle the negative effects they had on the water bodies.

In these times, enzymes provided an alternative technology to decrease the dependence on phosphates and phosphonates, and still maintain the cleaning performance. The energy consumed to heat the water used for washing by washing machines and dishwasher contributes to the largest environmental impact of washing across all life cycle stages. Washing at relatively low temperatures is a pivotal factor for improving the overall sustainability profile of the washing process. Lower wash temperatures not only reduce carbon dioxide emissions, save energy and money but also ensure that clothes will last longer in terms of wear and tear.

Post the Covid-19 Pandemic, the awareness regarding personal hygiene and clean surroundings have increased in the current situation. This has stimulated the demand for laundry and household cleaning products, thus, enhancing the market growth of detergents.

According to the Mordor intelligence report on 'Detergent Consumption Trends', detergents are predicted to grow at a CAGR of over 4% during the forecast period (2021-2026).



Enzymes are already being used to amplify the cleaning action of detergents for over 3 decades and are now one of the most valuable ingredients in products like stain removers, granular and liquid detergents and industrial cleaning products. These are present in most industrial-grade products. Currently, detergent enzymes account for over 30% of the total enzyme production worldwide. The use of enzymes in laundry detergents is preferred more than ever since all enzymes can catalyse reactions at lower levels than stoichiometric detergent ingredients. Moreover, they are biodegradable and help reduce the carbon footprint as compared to traditional products.

The major class of enzymes used in the detergent industry include - proteases, lipases, amylases, and cellulases. Each enzyme provides specific benefits for laundry and automatic dishwashing applications. Enzymes have successfully assisted the improvement of modern household and industrial detergents. Historically, proteases were the first category of enzymes to be used majorly in laundry detergents. In modern practices proteases are now accompanied by lipases and amylases in improving detergent efficacy, especially for household laundry at lower temperatures and also in industrial cleaning operations, at lower pH levels. Cellulases also contribute to overall fabric care by rejuvenating or maintaining the new appearance of washed garments.

The increasing demand for convenient and easy-to-use/apply detergent products have also contributed to the evolution of detergents in India. The world has witnessed rapid growth in terms of acceptability and the usage of enzymes in detergents. The increase of government initiatives and awareness to lead a healthy life among the rural Indian population are contributing to the increased sales of detergents in the country and have also increased the quality of detergents available in the market.

Advantages of using enzymes in consumer detergents-

Dishwashing

Commercially automatic and hand dishwashing detergents contain enzymes that remove food stains effectively with only mild mechanical action.

Laundry

Enzymes remove stains effectively under mild conditions. Clothes can last longer and keep a good appearance, thereby reducing the need to replace them.

Whiteness

Enzymes remove and polish the damaged cotton fibres, thus preventing particulate soil and lint remains from depositing and participating in fabric greying, improving whiteness performance.

Colour and fabric care

Specific types of enzymes help in improving the appearance of fabrics and in prolonging the lifespan of the fabric. Cellulases are used to degrade cellulose and also contribute in fabric care.

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INFINITEAM

Employee Corner

Employee development program following 'MASLOW'S THEORY' at workplace

Maslow's Hierarchy of Needs is one of the most successful concepts followed by many companies. Infinita Biotech is on the pathway to become one such organisation. The management believes and has incorporated the same concept at all levels of the organisation.

Maslow grouped the five needs/requirements into two categories - Higher-order needs and Lower-order needs.

The physiological and the safety needs constituted the lower-order needs. These lower-order needs are mainly satisfied externally. Employees are benefited with provident fund and ESIC. This helps to satisfy their job security and health security needs. Moreover, employees also benefit under the ABRY scheme, where the government pays both employees' and employers' contributions. Under ESIC, the employees are motivated to get treatment from ESIC for themselves as well as for the family members nominated by them. Our HR department plays a vital role in spreading awareness about the same.

The social, esteem, and self-actualization needs constituted the higher-order needs. Infinita Biotech promotes work-life balance by providing a healthy work life. Employee engagement activities are one of the best examples of it. Excursions, games and cultural activities are planned regularly for employees. Extensive training is arranged for the employees to enhance their technical knowledge, skills and even soft skills.

Infinita Biotech believes employees deserve recognition for their hard work and creative thinking. We organise events for giving such rewards and recognition at regular intervals to boost their morale and motivate them to perform even better. We, at Infinita, always look forward to improve the work quality as well as employee satisfaction. Our next steps will be to incorporate TQM including Kaizen and 5s models, to help us reach our true potential.

"Infinita has walked through an impressive journey in the past 6 years and I'am fortunate to be a part of the organisation. The things I like the most about working at Infinita is the work culture where there is always room for new ideas and positive mindset of the management giving you liberty to make decisions, explore the best in yourself. Infinita always encouraged and empowered me to be the "best version of me". The transparent work environment motivates me day in and day out to keep moving forward".

Rashmi Upadhyay -
Assistant QA Manager

I have been working at Infinita Biotech for more than one year. Initially I was a bit hesitant at joining but soon I realised a very helpful, friendly but also very professional environment of the company. Which helped me to enhance my abilities, working style & much more in the way we all want in our professional life. And thank you to Infinita Biotech for giving me the opportunity to be a part of It.

Ajay Thakkar -
Purchase/Admin
Coordinator

Running a successful organisation is not a walk in the park. It requires a lot of hard work, sacrifice and determination. But with determination, perseverance and a drive to achieve, Team Infinita will surely surmount the challenges and obstacles in their way and see success at the end of each day. Congratulations Team Infinita Biotech!

Jimesh Patel -
Marketing Manager

I have got a very remarkable story because, from the starting of my career with no experience I have been offered a job by Infinita, Infinita took the initiative of nurturing the growth of individuals with the company rise. Especially, Everyone enjoys attending the team-building events that Infinita organizes. Thank you for caring about our company culture.

Deep Vyas -
Assistant Marketing
Manager

INFINITALK

Events and Happenings


Happy

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Biotech Private Limited

B/5/22/23, Krishna Industrial Estate, Gorwa,
Vadodara - 390016, Gujarat, India P: +91 265 2280447
e: info@infinitabiotech.com w: www.infinitabiotech.com