

Transforming industries through enzymatic innovation



For Pulp & Paper Industry

Xylacid

Recypa

Dexamyl-HTP

β -Glucanase Enzyme

Cellulase Enzyme

Lipase Enzyme

Mannanase



Xylacid

Fortified Xylanase enzyme

Xylanase produced by a modified species of *Aspergillus* with the help of controlled fermentation falls in the category of endo-1,4- β -Xylanase which are the most important enzymes for hydrolysis of xylan polymers. Xylans are polysaccharides composed of β 1,4-linked xylopyranose units. They are mostly highly branched and in tight association with other biopolymers.

As the most abundant hemicelluloses, they account for more than 30% of the dry weight of terrestrial plants. Xylans thus belong to the main food source of farm animals and also represent a major component of the raw material for many industrial processes ranging from baking to paper production. Xylanase breaks xylan to short-chain xylo-oligo-saccharides of varying lengths.

Benefits

Bio bleaching paper pulp: The use of Xylanase leads to a reduction in organochlorine pollutants such as dioxin from the paper making process. In addition, chlorine-free bleaching (such as peroxide or ozone bleaching) can achieve brighter results with the addition of Xylanase. Because Xylanase does not harm cellulose, the strength of the paper product is not adversely affected.

Improving animal feed: Adding Xylanase stimulates growth rates by improving digestibility, which also improves the quality of the animal litter. Xylanase thins out the gut contents and allows increased nutrient absorption and increased diffusion of pancreatic enzymes in the digesta. It also changes hemicelluloses to sugars so that nutrients formerly trapped with in the cell walls are released.

Improving silage: Treatment of forages with Xylanase (along with cellulase) results in better quality silage and improves the subsequent rate of plant cell wall digestion by ruminants. There is a considerable amount of sugar sequestered in the xylan of plant biomass. In addition to converting hemicellulose to nutritive sugar that cow or other ruminant can digest, Xylanase also produces compounds that may be a nutritive source for the ruminal-microflora.

Activity

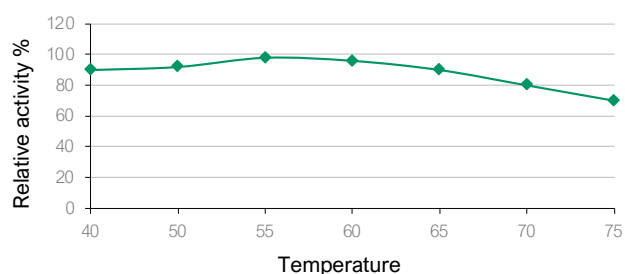
Activity of Xylanase is determined using Oat spelt Xylan as substrate.

Properties

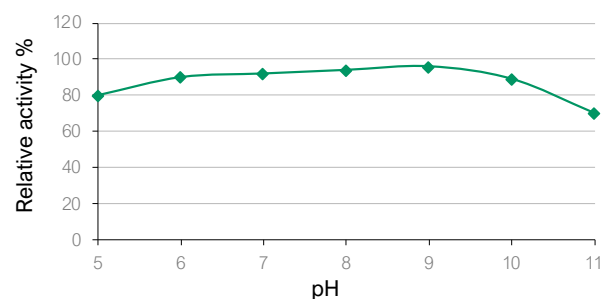
Xylanase has been screened to have negligible cellulase activity (FPU). Xylanase is active over a wide range of pH and

temperature i.e. from 5-9 pH and from 40 to 70°C respectively. The temperature and pH profile of the Xylanase has been well studied and the data can be provided on request.

Xylanase Temperature Profile



Xylanase pH Profile at 55°C



Availability

Xylanase is available in 50 kg HDPE containers.

Storage

Xylanase maintains the declared activity for 12 months if stored below 25°C. At higher temperature the shelf life will decrease and may lead to high doses requirements.

Handling

Xylanase is formulated in a way that gives the highest degree of safety during handling. The product is non-flammable, completely miscible with water and safe when used according to direction. Use normal handling precautions against direct contact. In case of accidental spillage or contact to skin or eyes, rinse with plenty of water.

Safety

MSDS sheet is available on request.

Recypa

The balanced deinking enzyme

Printed waste paper is an important source for producing recycled paper. Recycling of printed waste paper generally requires deinking and bleaching of the printed waste paper pulp to a suitable brightness before being used in the production of recycled paper.

The recycling industry is in search of new environment friendly technologies, which can improve the quality, reduce the production cost and can be accommodated easily in to the existing process design of deinking in pulp industry. Recent biotech research has shown that enzymatic deinking might be an alternative solution.

Non –impact printed papers are more difficult to de-ink and the amount of such recycled waste continues to grow as a proportion of total recovered paper volume. Thus removal of ink remains a major technical obstacle towards greater use of recycled paper. Enzymatic deinking may provide a means to meet these needs.

Recypa is an enzyme formulation having optimum concentration to give better results. It is a light brown coloured light viscous liquid.

Operating conditions for enzymatic Deinking

pH : 4.5 to 5
Temperature : 45-50°C

Retention time : 45-55 minutes
Recypa dosage : 0.3-0.5 Kg/MT of waste paper

Availability

Recypa™ is available in two variants in 50 HDPE containers.

Storage

Recypa™ maintains the declared activity for 12 months if stored below 25°C. At higher temperature the shelf life will decrease and may lead to high doses requirements.

Handling

Recypa™ is formulated in a way that gives the highest degree of safety during handling. The product is non-flammable, completely miscible with water and safe when used according to direction. Use normal handling precaution against direct contact. In case of accidental spillage or contact to skin or eyes, rinse with plenty of water.

Safety

MSDS sheet is available on request

Benefits

Lower

BOD/COD values due to mild conditions

Reduces

ink particle size regardless of ink type or printing process

Improves

strength properties of the paper sheets and freeness and reduces fine content of the recycled fiber.

Reduces

effluent toxicity

Higher

brightness

Saves

energy

Ecofriendly

application

Improved

drainage properties

Avoids

alkaline chemical deinking which prevents alkaline yellowing of the recycled fiber and simplify deinking chemicals.

No alkaline

hydrolysis of cellulose fibers

Dexamyl-HTP

Thermostable α -amylase

Starch is generally insoluble in water at room temperature. Starch granules are quite resistant to penetration by both water and hydrolytic enzymes due to the formation of hydrogen bonds within the same molecule and with other neighboring molecules. However, these inter- and intra-hydrogen bonds can become weak as the temperature of the suspension is raised. When an aqueous suspension of starch is heated, the hydrogen bonds weaken, water is absorbed, and the starch granules swell to form a gelatinous, highly viscous consistency. In paper mills this gelatinous starch is required to be liquefied to a suitable viscosity for proper application in plant.

Dexamyl-HTP is an enzyme based product designed for application in production of paper. It contains high-temperature alpha-amylase produced from a non-GMO modified strain of *Bacillus licheniformis*. Dexamyl-HTP is suitable for use in liquefaction of starches in jet cooking at 80-90°C.

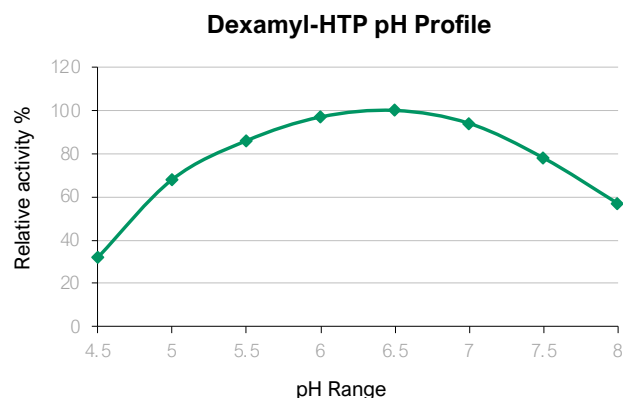
Properties

Colour	:	Yellowish to brown coloured liquid
Odour	:	Normal fermentation order
pH Range	:	5.5-8.0, optimum 6.0-7.5
Bulk density	:	1.05-1.35g/mL
Temperature range	:	80-100

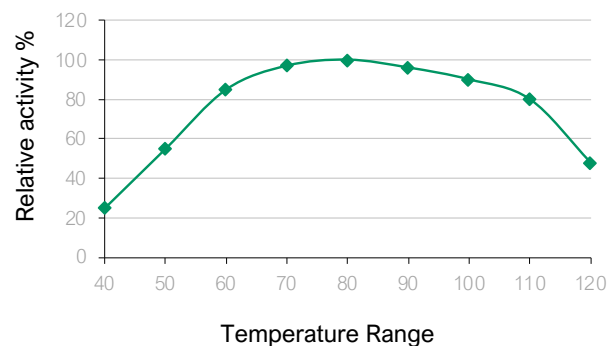
Operating conditions

Dexamyl-HTP can be used at different temperature and pH. Its activity profile at wide range of temperature and pH range is given below:

Relative Activity Vs Temperature and pH



Dexamyl-HTP Temperature Profile



Enzyme Inactivation

Enzyme inactivation can be achieved by processing the reaction product at greater than 120°C for 3 - 7 minutes or by adjusting the pH of the reaction product to less than 3.0.

Doses

Dexamyl-HTP dosage can be adjusted between @ 0.1% to 0.5% depending on kind of starch material being used and desired level of hydrolysis in the end product. Parameters like temperature, pH and time also play a role in dose adjustment. It is recommended to do a trial at laboratory scale before using Dexamyl-HTP at commercial scale.

Storage

Stability In sealed containers, under cool, dry conditions. It should be used within 12 months beyond which loss of activity starts which may accelerate in the case of improper storage.

Safety

Contact or Inhalation of enzymes in any form may cause allergic reactions and should be avoided. In case of contact with the skin or eyes, promptly rinse with water for at least 15 minutes. Please refer Material Safety Data Sheet (available on request) for all safety instructions.

Packing

Dexamyl is available in HDPE drums of 50 Kgs.

β-Glucanase Enzyme

Industrial grade. Efficient Hydrolysis of β-Glucans for enhanced industrial production

β-Glucanases are a class of enzymes that hydrolyze β-1,3 and β-1,4 linkages in β-glucans—polysaccharides found in cereals, fungi, and cell walls of yeast and plants. These enzymes are essential in various industries for improving viscosity control, nutrient availability, and processing efficiency.

Applications

- Removal of slime-forming β-glucans from recycled Fiber
- Pitch and deposit control

Properties

Form	:	Liquid / Powder
Activity	:	≥8,000 BgU/g (customizable based on application)
Source	:	Aspergillus spp.
Optimal pH Range	:	4.5 – 6.5
Optimal Temperature	:	45°C – 60°C
Stability	:	Stable in feed, brewing, and pulp process conditions
Compatibility	:	Compatible with cellulase, xylanase, amylase

Packing

Available in 50 Kg drums.

Storage

- Store in a cool, dry place below 25°C
- Shelf Life: 12 months (in sealed condition)

Benefits

Improved
paper machine
cleanliness

Reduced
microbial contamination and
production downtime

Enhanced
runnability and product
quality

Lower
chemical usage and energy costs

Cellulase Enzyme

Industrial grade cellulase. Eco-efficient Biomass conversion for pulp & paper industry.

Cellulases are enzymes that hydrolyze β -1,4-glycosidic bonds in cellulose to release glucose and cello oligosaccharide. Cellulases are a group of hydrolytic enzymes that break down cellulose, the major structural component of plant cell walls, into simpler sugars like glucose.

Applications

- Deinking of recycled paper
- Fiber modification & brightness enhancement
- Pitch & stickies control

Properties

Form	:	Liquid/Powder (as per need)
Enzyme Activity	:	$\geq 30,000$ U/g (customizable)
Optimal pH Range	:	4.5 – 6.0
Optimal Temperature	:	45°C – 60°C
Stability	:	Stable under feed & textile process conditions
Compatibility	:	Compatible with protease, xylanase, amylase
Source organism	:	Trichoderma reesei

Packing

Available in 50 Kg drums.

Storage

- Storage: Cool, dry place below 25°C
- Shelf Life: 12 months (sealed condition)

Benefits

Eco-friendly
replacement for harsh chemicals

Improved
drinkability and brightness

Enhanced
paper strength & smoothness

Reduced
effluent load and chemical costs

Lipase Enzyme

Industrial grade. Targeted Lipid Hydrolysis for pulp & paper applications

Lipases are hydrolytic enzymes that catalyze the breakdown of triglycerides into glycerol and free fatty acids. These enzymes exhibit broad substrate specificity and operate effectively at oil–water interfaces, making them valuable in industries that deal with fats and oils. Lipases also support esterification and transesterification reactions, expanding their utility into biosynthesis and green chemistry.

Packing

Available in 50 Kg drums / 25 Kg bags.

Storage

- Store in a cool, dry place below 25°C
- Shelf Life: 12 months (in sealed condition)

Properties

Form	:	Liquid / Powder
Activity	:	≥900000 FIT /g (customizable based on application)
Source	:	Candida.sp.
Optimal pH Range	:	6.0 – 8.5
Optimal Temperature	:	35°C – 55°C
Stability	:	Stable under detergent, biodiesel & food processing conditions
Compatibility	:	Compatible with protease, amylase, cellulase

Benefits

Controls

pitch and resin deposition in wood pulping

Degrades

stickies in recycled fiber processing

Reduces

chemical load and enhances process stability

Mannanase

Industrial grade. Eco-efficient Mannan breakdown for industrial excellence.

Mannanase is a hydrolytic enzyme that specifically breaks down mannans, a group of complex polysaccharides found abundantly in plant cell walls, especially in legumes, palm kernel, guar gum, and copra meal. Classified primarily as endo- β -1,4-mannanase, it cleaves the internal β -1,4-mannosidic linkages in the backbone of mannans, glucomannans, and galactomannans.

This enzyme plays a vital role in various industries by improving process efficiency, enhancing nutrient availability, and reducing anti-nutritional factors in feed and food matrices. Its use contributes to clean-label, sustainable processing solutions.

Application

Acts on hemicellulose-rich biomass to improve pulp bleaching and refining processes.

Properties

Appearance	:	Light brown liquid / off-white powder
Enzyme Activity	:	25000 U/g (customizable)
pH Range	:	4.5 – 7.5 (optimum ~6.0)
Temperature Range	:	30°C – 60°C (optimum ~50°C)
Solubility	:	Completely soluble in water (liquid)
Shelf Life	:	12 months at 25°C (sealed, dry state)

Packing

50 kg HDPE drum

Storage

- Store in a cool, dry place away from direct sunlight.
- Keep container tightly closed when not in use.
- Use personal protective equipment (PPE) during handling.

Regulatory & Quality

- Non-GMO production strain
- Compliant with ISO 9001, FSSAI, and GMP standards
- Halal and Kosher certification available (on request)
- Safety Data Sheet (SDS) available upon request

Benefits

Reduces
need for chemicals in
pulp and bleaching

Enhances
fibre quality and
drainability

Reduces
pitch and
extractive-related
problems



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