

ENZYME WORLD



Taking you to the
greener world

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Agriculture Division

Enviro Care

Nutraceutical Division

Leather Processing Division

Textile Processing Division

Baking and Milling Division

Grain Processing Division

Pharmaceutical Division

Animal Healthcare and Nutrition Division



ADVANCED
ENZYME TECHNOLOGIES LTD

Where ENZYME is Life

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ADVANCED
ENZYME TECHNOLOGIES LTD

Where ENZYME is Life

From The Desk Of The MD

Dear Family Members,

JAI GURUDEV

I have been reminded time & again by several people who await the new issue of Enzyme World! This has infused a new enzymatic energy in all the people who have been working on this project.

ENZYME is life. This word has a Greek ORIGIN - EN ZYME where ZYME is YEAST & In-Yeast is called YEAST. No wonder, PROBIOTICS, PRE-BIOTICS (the food which support propagation of Pro-Biotics) & ENZYME go hand in hand with Co-Enzymes such as VITAMINS, & Buffer Salts - such as Calcium, Magnesium, Sodium, Chlorides, etc. This becomes very basic & very important link to Human Life!!

We everyone at **AETL** have dedicated to help humanity seek maximum benefits from this very safe & effective science of ENZYME WORLD! **AETL** is determined to integrate all the above to offer our Customers the unique benefits from such Natural & Wonderful Enzymes. PROBIOTICS play a very important role in our human as well as in Animal Life. It is said that there are about 400+ known beneficial species of bugs which help us in maintaining our good health. One of such well discovered bug is Yeast called S. Boulardii. This is proven to provide high immunity when someone is suffering from Stomach upset or digestive problems. Lactic Acid Bacillus of various types along with S. Boulardii and Hemicellulase Enzyme has shown remarkable effect in such problems. Yeast is also known to produce Vitamin B factors for better health & immunity.

To help us all, at **AETL**; we have set up a special plant to produce these wonderful PROBIOTICS with India's largest Lyophiliser! Freeze Drying is well known technique to preserve the life supportive micro-organisms in their natural habitat so that as soon as they enter our body; they do not take time to expand their presence & give us desired relief from the problem. **AETL** is also setting up a WHO cGMP facility to manufacture various products in Special Economic Zone near INDORE in Madhya Pradesh, India. This facility is expected to become operational in last quarter of this FY or from January 2007.

Besides Human Life, Gurudev His Holiness Sri Sri Ravi Shankarji has time & again given tremendous important to taking care of our Environment. Here we started working on Waste Reduction process help through enzymes. We did successfully patent & have commercialized a process for processing of LEATHER without Lime & Sulphide! Now, our scientists have developed two great products for PAPER INDUSTRY where about 25% reduction in Chlorine & Hypochloride can happen reducing over 40% toxins produced by the present process. These products have been tested vigorously in our Laboratories & shall be launched in Jan 2007 for commercial sales world wide.

I welcome your contribution to this process. You are requested to post your articles & experiences by email or normal letters. Let us all make this life a CELEBRATION & make our planet better!

Jai Gurudev
Chandrakant Rathi



Pharmaceutical Industry

SACCHAROMYCES BOULARDII

A Powerful Anti Diarrheal



INTRODUCTION

The Saccharomyces Boulardii is a powerful microbe belongs to the class of Yeast called Saccharomyces. This microorganism helps to maintain a normal balance of friendly bacteria in the intestines, and belongs to a group of supplements referred to as "Probiotic"

Saccharomyces boulardii is non-pathogenic yeast that is recognized to have probiotic effectiveness used alone and/or in combination with other probiotics to support digestion. Its usefulness was discovered by a group of French physicians investigating intestinal issues.

DESCRIPTION / CHARACTERISTICS

Saccharomyces boulardii is considered a non-pathogenic, non-colonizing baker's yeast species, which is very closely related to brewer's yeast also known as *S. cerevisiae*. The *S. boulardii*, although it is recognized as a yeast, is not related to the *Candida* species (*Candida albicans*, *tropicalis*, etc.), which can cause pathogenic infections in the

gastrointestinal and genitourinary tracts. *S. boulardii* is a unique probiotic in that it is known to survive gastric acidity; it is not adversely affected or inhibited by antibiotics and does not alter or adversely affect the normal flora in the bowel. For this reason good friendly probiotic organisms (including *Lactobacillus* and *Bifidobacterium*) can be taken at the same time as *S. boulardii*.

How Saccharomyces Boulardii Work?

The test tube results show it doesn't directly kill the bugs (bacteria, fungi, or parasites) causing infection. Theories of how it works include:

- 1) Saccharomyces Boulardii secretes a component which may prevent gut inflammation that causes diarrhea, by interfering with how various bugs bind to gut cells;
- 2) Saccharomyces Boulardii might increase certain protective immune proteins that in turn kill the infection-causing bugs; and/or
- 3) Saccharomyces Boulardii might be a superior non-toxic competitor with amebas and candida in the intestine.

Saccharomyces Boulardii favorably alter the intestinal microflora balance, inhibit the growth of harmful bacteria, promote good digestion, boost immune function, and increase resistance to infection. People with flourishing intestinal colonies of beneficial bacteria are better equipped to fight the growth of disease-causing bacteria. Probiotics generally maintain a healthy balance of intestinal flora by producing organic compounds such as lactic acid, hydrogen peroxide, and acetic acid that increase the acidity of the intestine and inhibit the reproduction of many harmful bacteria. Probiotic bacteria such as *Saccharomyces Boulardii* also produce substances called bacteriocins, which act as natural antibiotics to kill undesirable microorganisms.

Saccharomyces Boulardii is a unique Probiotic in that it is known to survive gastric acidity; it is not adversely affected or inhibited by antibiotics and does not alter or adversely affect the normal flora in the bowel. For this reason good friendly Probiotic organisms (including Lactobacillus and Bifid bacterium) can be taken at the same time as Saccharomyces Boulardii. Regular ingestion of probiotic bacteria may help prevent vaginal yeast infection. A review of the research concluded that both topical and oral use of acidophilus can prevent yeast infection caused by candida overgrowth.

Diarrhea flushes intestinal microorganisms out of the gastrointestinal tract, leaving the body vulnerable to opportunistic infections. Replenishing the beneficial bacteria with probiotic supplements can help prevent new infections. The incidence of "traveler's diarrhea" caused by pathogenic bacteria in drinking water or undercooked foods can be reduced by the preventive use of probiotics.

SPECIAL PROPERTIES OF SACCHAROMYCES BOULARDII:

The Saccharomyces Boulardii is resistant to antibiotics, Sulphonamides and other antibacterial agents. This property is genetic. This property is present to all antibiotic groups and concentration much more than the minimum inhibitory level.

Indications of Saccharomyces Boulardii

Treatment of Diarrhea in Children:



The acute infectious diarrhea is one of the frequent cases observed by doctor. The condition involves

acute dehydration which requires rapid rehydration and treatment designed to influence the condition of infection.

Antibiotic Induced Diarrhea

Antibiotic induced diarrhea is a complication in 10-30% of patients taking such drugs. Apart from causing discomfort of diarrhea, it causes abrupt discontinuation of the antibiotic therapy. The diarrhea experienced by some people who take antibiotics also might be due to an overgrowth of the bacterium Clostridium difficile, which causes a disease known as pseudo membranous colitis.

Traveller's Diarrhea

Traveller's diarrhea typically results from bad



bacteria entering your body when you eat or drink contaminated food or water. Salmonella, Escherichia coli, Staphylococcus aureus, and Listeria produce intestinal problems like nausea and cramping, and Shigella causes the intense abdominal pains of dysentery. The severe diarrhea triggered by these invaders dehydrates you, reduces your absorption of nutrients, and destroys good bacteria.

Treatment of Irritable Bowl Syndrome.

The Irritable Bowl Syndrome is characterized by abdominal pain, disturbed intestinal transit, diarrhea or constipation, dyspepsia and distension. The factors responsible for this syndrome are imbalance in digestive micro flora and more widely intestinal ecosystem.

Saccharomyces Boulardii is one of the ingredients widely used in the treatment, proving valuable therapeutic benefit in such patients.

Treatment of Crohn's Disease

Crohn's disease, a subcategory of inflammatory bowel disease, contributes to significant morbidity, particularly in industrialized nations. It can affect people of any age, but is more commonly diagnosed in adolescence and young adulthood. Inflammation and ulceration occur primarily in the terminal ileum and colon, although any portion of the intestinal tract can be affected. No etiology has been identified for Crohn's disease, although a number of factors contribute to its etiopathogenesis, including genetic, microbial, inflammatory, immune, and permeability abnormalities. Conventional medications are not curative but can contribute to resolution of acute flare-ups and help maintain remission. Because significant side effects are associated with many of these medications, *Saccharomyces boulardii* help in treatment of the disease.

Dosage of *Saccharomyces Boulardii*:

The amount of probiotics necessary to replenish the intestine varies according to the extent of microbial depletion and the presence of harmful bacteria. One to two billion colony forming units (CFU) per day of *Saccharomyces Boulardii* are considered to



be the minimum amount for the healthy maintenance of intestinal microflora. Some *Saccharomyces boulardii* research has used 250 - 500 mg taken four times per day depending on the condition of treatment.

The following are the different dosage of *Saccharomyces boulardii*:

- Daily dosage (children older than 2 years/adults):
- For prevention of traveller's diarrhea, beginning 5 days prior to journey: 250 to 500 mg/day
- For therapy of diarrhea:
250 to 500 mg/day
- For diarrhea due to tube feeding:
- Add 500 mg *Saccharomyces boulardii* per liter of nutrient solution. The treatment should be continued for several days after diarrhea has ceased.
- The *Saccharomyces boulardii* can also be formulated with other probiotics for broad spectrum therapeutic effect. The combination may include Lactic Acid Bacillus, Bifidobacterium, Lactobacillus Acidophilus and Fructo oligosaccharide (FOS).

Compiled By
Dr. Vadiraj Jahagirdar

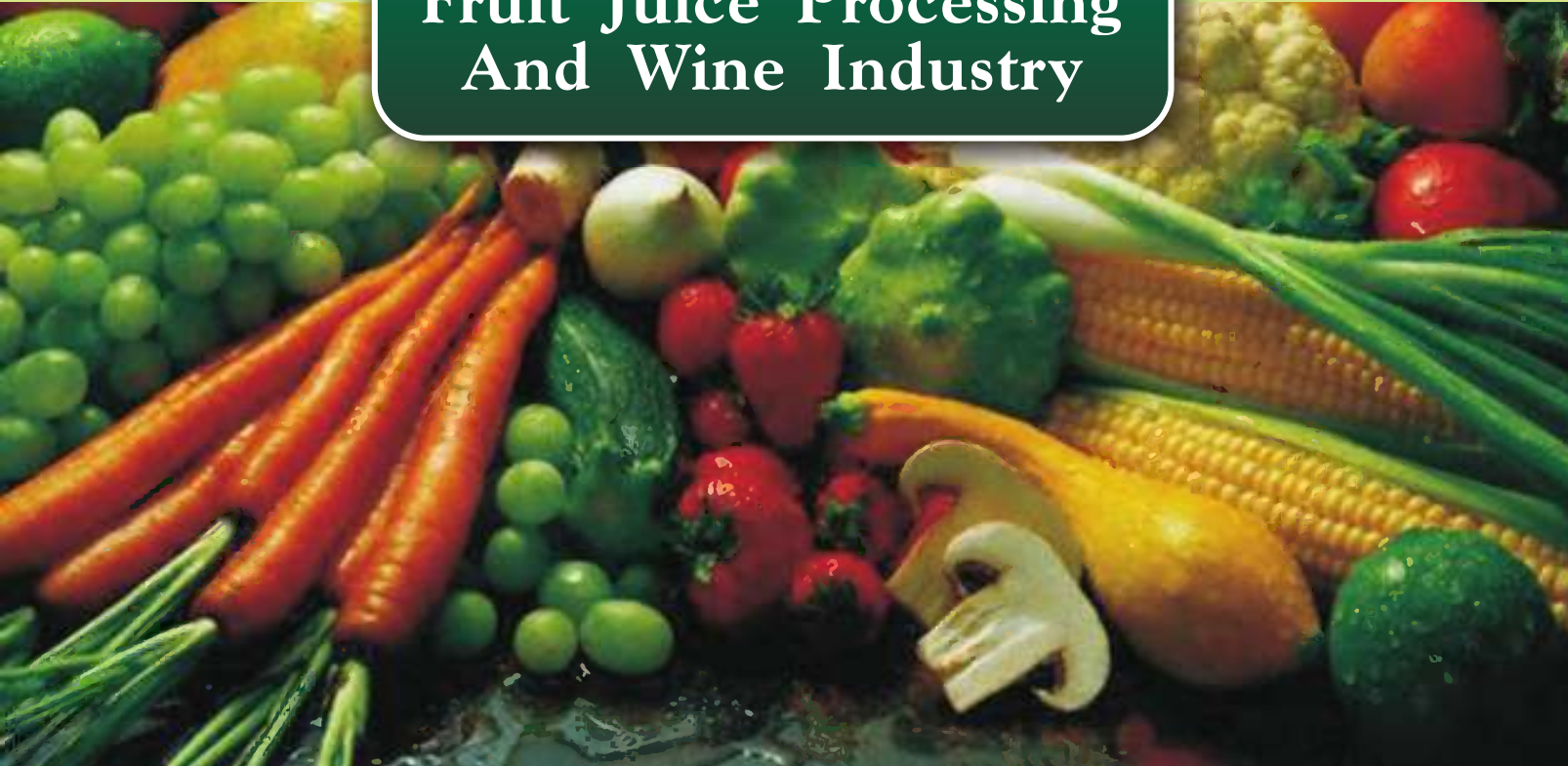
AET is granted its first Patent!

AET has been awarded its first patent for the development of a lime & sulphide free process for de-hairing of leather. The process indigenously developed by AET includes use of an enzyme based product which allows the leather



processing units to carry out de-hairing of leather hide without the use of limes or sulphides and still get a wrinkle free material. The process reduces pollution load and simultaneously gives a 5-6% area increment in the hide.

Enzymes In Fruit Juice Processing And Wine Industry



Use of Enzymes In Fruit Juice Processing And Wine Industry

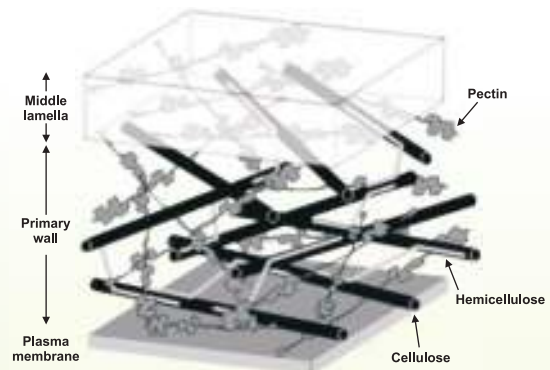
One of the most important uses for enzymes is in processing fruit, vegetables and grains. Both the quality and the yield are significantly improved with the proper use of enzymes. Fruit juice is clearer and sweeter. Wine, beer and alcohol production are all significantly enhanced with enzymes. In order to understand why enzymes are important, it is necessary to understand the one common denominator of all plants: the cell wall.

Unlike animals, plant cells have a non-living cell wall with a living cell membrane in the interior. The cell wall has several functions: structural support, shape, control of growth and ultimately the shape of the plant. The cell wall is made up predominantly of carbohydrates: cellulose, hemicellulose, pectin and in the case of cereal grains, beta glucans. The cell wall serves an essential service for the plant, but presents real difficulties when it comes to processing fruit and grain in particular.

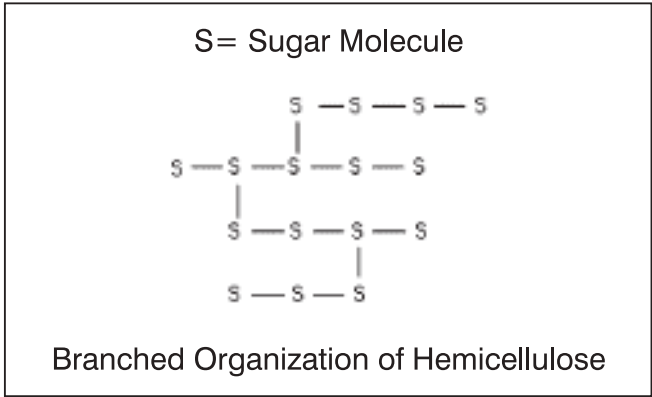
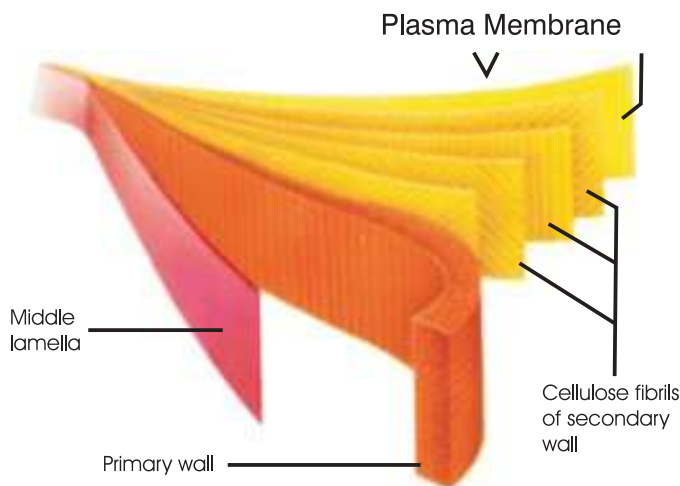
A cell wall has 3 different layers

1. **The Middle lamella** is the first layer formed during cell division. It makes up the outermost portion of the cell wall and is the material that cements adjacent cells to each other. It is composed of **pectic** compounds and **protein**.

2. **The Primary Cell Wall** is formed after the middle lamella and consists of a rigid skeleton of cellulose microfibers embedded in a gel-like matrix of pectic compounds, hemicellulose, and glycoproteins. The primary cell wall gives shape and structure to plant cells. These walls are sufficiently strong to prevent rupturing yet must be flexible enough to accommodate **growth**.



3. **The Secondary Cell Wall** is often layered and rigid, providing further support and protection. It is made of cellulose, hemicellulose and lignin. As the cell grows, it deposits new layers of cellulose adjacent to the living plasma membrane. So, the newest layers are in the secondary cell wall and the oldest are in the primary wall and middle lamella.

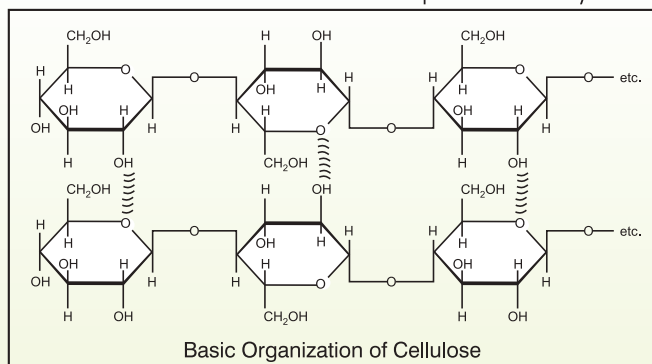


Cellulose:

Humans lack both the enzymes and the microflora necessary to metabolize cellulose. Herbivores like cattle and certain insects like termites have specialized microbes to do the job for them. In order for humans to get the most nutrition out of some plant products, a product like **CelluSEB-TL** with its powerful cell wall degrading enzyme combination is needed to release the vital nutrients present inside the plant cell.

Cellulose is a polymer of the simple sugar glucose - typically 1,000 to 10,000 glucose molecules. Individual cellulose polymers attach to other cellulose polymers through something called hydrogen bonding. When many cellulose molecules bond to each other, they form microfibrils and the microfibrils interact to form fibers.

Hemicellulose is another complex carbohydrate



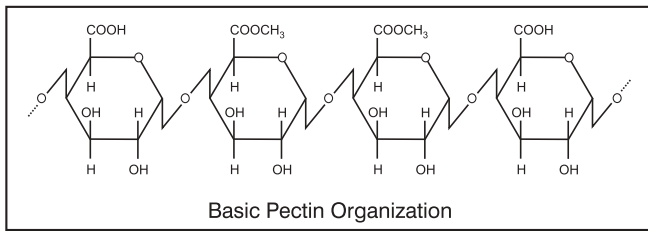
that is an important part of the cell wall. Hemicellulose, like pectin and cellulose, is present in the cell walls of nearly all plants. Unlike cellulose with its long chain of glucose molecules, hemicellulose includes a variety of sugars like xylan, arabinoxylan, glucomannan, and xyloglucan,

among others. In addition, hemicellulose tends to have a lower molecular weight and a more branched, irregular shape. It functions as part of the ground substance of a cell wall as it binds with pectin and cellulose to form a network of cross-linked fibers. Like the pectic compounds, hemicellulose molecules are very hydrophilic, forming gels when they become hydrated. As a result of this property, hemicellulose can make processing fruits and vegetables a thick, viscous mess. Again, a product like **CelluSEB-TL** or **LiquiSEB-RL** can improve the yield and filtration time significantly.

Beta Glucan: The hemicelluloses of plants in the cereal grain family Poaceae are distinct from those of other vegetables and fruit. Many of the most important food crops are cereals grains including rice, maize, wheat, oats, barley, rye and sorghum. Compared to other vegetables and fruit, the cereal cell walls contain smaller amounts of pectin, large amounts of glucuronoarabinoxylan (*GAX*) and large amounts of a particular hemicellulose called mixed-linked glucan (*MLG*) or **beta-glucan**. Beta glucan is what makes processing cereal grains a challenge because they make the mash viscous and sticky. A good beta glucanase enzyme product like **SEBflo-TL** can significantly improve the quality and processing time for grain products. This is extremely important in processing beer, liquor and bio-ethanol. Beta glucan is absent from other plant species.

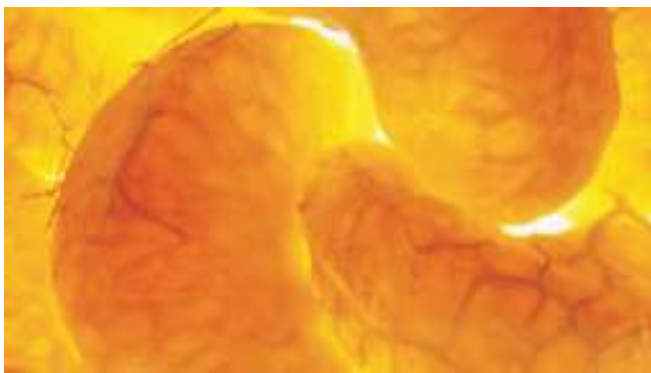
Pectin is Generally a straight chain of D-Galacturonic Acid molecules interspersed with another sugar, L-Rhamnose. Pectin is part of the ground substance found in cell walls of plants along with hemicellulose. When processing fruit in

particular, pectins are the culprits that make the mash viscous and sticky. Pectinase enzymes, like **LiquiSEB-RL** are very effective at reducing viscosity and increasing filtration rates.



High pectin fruits:

Citrus (oranges, tangerines, grapefruit, lemons, limes, etc.), tart cooking apples, Granny Smith apples, cranberries, currants, gooseberries, sour plums, quince and blackberries.



Medium pectin fruits:

Apricots, peaches, rhubarb, strawberries.

Low pectin fruits:

Cherries, nectarines, pear, pineapple and rhubarb

The pectin content in fruit is generally higher when



fruit is just barely ripe and diminishes as it matures from fully ripe to overripe. The process of ripening involves the breakdown of pectins, which softens the fruit as it ripens. Apples and crabapples (especially unripe ones) are good sources of pectin and are



often used in making commercial pectin.

Structural proteins: In addition to carbohydrates, cell walls contain a variety of proteins. Structural proteins are found in all layers of the plant cell wall but they are more abundant in the primary wall layer. Proteins are simply a complex chain of amino acids bound to each other by peptide bonds.

When processing requires fermentation, e.g. beer, wine, distilled spirits and bio-ethanol, the hydrolysis of protein becomes a very big deal. It is nutritionally important to provide free amino-nitrogen to yeast during fermentation and the free amino-nitrogen comes in the form of the free amino acids released during hydrolysis of protein.

Our own **SEB-Neutral-PL** is an ideal protease enzyme for this process.

As you see, the cell wall is a complex structure that requires very specific enzyme solutions when processing fruits, vegetables and cereal grains. Fortunately, Specialty Enzymes and Biochemicals and Advanced Enzymes Technologies have the solution.

Compiled by
Mike Smith
Specialty Enzymes And Biochemicals Co.

Paper Industry

USE OF MICROBIAL ENZYMES IN PULP BLEACHING



It takes a lot of chemical processing to turn trees into white paper. The pulp and paper industry employs chlorine oxidants to bleach pulp. As a result, chlorine-containing organics, a class of compounds with toxicity concerns, are produced as by-products. The classic problem with chlorine bleaching is that in whitening the paper, papermakers are also left with a waste stream containing a range of chlorinated organic compounds, some of which scientists have demonstrated to be detrimental to our ecosystem.

Enzymes can help papermakers reduce the use of harsh chemicals such as chlorine bleach. Enzymes such as pentosanases and Ligninolytic enzymes can enhance the bleaching efficacy allowing a dramatic reduction in the consumption of chlorine. The enzymatic treatment opens up the pulp matrix allowing better penetration of the bleaching chemicals and better extraction or washout of lignin and the associated dark brown compounds.

Chemical structure and distribution of xylan in plant biomass

Xylan is the most abundant noncellulosic

polysaccharide present in both hardwoods and annual plants, and accounts for 20-35% of the total dry weight in tropical plant biomass. Xylan is found mainly in the secondary cell wall and is considered to be forming an interphase between lignin and other polysaccharides. In nature, they are partially substituted by acetyl 4-o-methyl-d-glucurono-syl and l-arabinofuranosyl residues, forming complex heterogenous and polydispersed polymers.

Effect of pulping operations on xylan

Extensive modifications in the chemical structure, including removal of the acetyl groups and decrease in the glucuronic acid side groups, are observed after pulping. With the high-alkali concentration during the kraft cook, part of the xylan is dissolved in the pulping liquor; while short-chain xylan precipitates in a more or less crystalline form on the surface of cellulose microfibrils. This xylan forms a barrier against effective extraction by chemicals of the residual brown-coloured lignin from the fibres. As a result, quantities of chlorine or chlorine-containing compounds are required to be used for effective reduction in the kappa number, and increase in pulp brightness. Enzymatic solubilization of the hemicellulose settled on the pulp fibres would be an 'environmentally compatible' technology to improve the accessibility of the brown lignin to chemical bleaching together with substantially reduced quantities of bleaching chemicals required to achieve the same degree of



Lignin:

Lignin is a three-dimensional biopolymer composed of oxygenated phenylpropanoid units. It is a biopolymer made of coniferyl, sinapyl and coumaryl subunits. The most common linkage between the units is an arylglycerol-b-aryl ether or b-O-4 bond.

Bleaching Chemical Pulps

Bleached kraft pulp is a major, relatively high value component of the total production of kraft paper. Kraft pulping removes most of the lignin, and dissolves and degrades hemicelluloses without severely damaging cellulose. The kraft process results in excellent pulp from a wide variety of wood species. Unfortunately, kraft pulping also generates large quantities of chromophores. Chromophores are composed of residual lignin and carbohydrate degradation products. They are hard to extract because they are physically entrapped in and covalently bound to the carbohydrate moieties in the pulp matrix. Manufacturers use elemental chlorine (Cl_2) and chlorine dioxide (ClO_2) to bleach the chromophores, and then they extract them, along with residual lignin, to make white ("bright") pulp.



Because of consumer resistance and environmental regulation of chlorine in bleaching, pulp makers are turning to oxygen, ozone and peroxide bleaching, even though they may be more expensive and less effective than Cl_2 .

The biggest success story in the use of enzymes in the pulp and paper industry is, it improves pulp fibrillation and water retention, reduction of beating

times in virgin pulps, restoration of bonding and increased freeness in recycled fibres, and selective removal of xylan from dissolving pulps. It was discovered that treating kraft pulps with fungal pentosanases decreases the amount of bleach chemical required to attain a given brightness. The reason for this high interest lies in the economic importance of kraft pulping and the regulatory pressure against chlorine



Enzyme Characteristics

Effective paper bleaching enzymes should have several properties. First, they should be stable on kraft pulps. Some enzyme preparations non-specifically absorb to pulp fibers and are inactivated by degradation products from kraft pulping. Second, they should have a neutral to alkaline pH optimum. Residual alkali leaks out of the pulp during enzyme treatment and the pH of even well washed pulp stocks can shift upwards dramatically. Third, they should have good thermal stability. The pulp is hot ($75^{\circ}C$) when it first comes out of the stock washers, and heat-tolerant enzymes generally have higher turnover numbers.

Current efforts are aimed at process optimization, simplification, eco-friendly solutions and cost reduction of enzyme application in pulp industry. From an industrial point of view, it is simple to adjust the pH but difficult and expensive to control temperature due to the cost of cooling. The ideal solution therefore would be to use enzymes with higher pH and temperature stability, which will make the large-scale operations more simple and cost effective.

BIOBLEACHING ENZYMES

They can be divided in two separate categories.

I) Lignin Modifying Enzymes:

These Enzymes do not remove the lignin directly; they just make the lignin accessible to bleaching chemicals in the subsequent bleaching steps. Pentosanases are being used, primarily, for the removal of the lignincarbohydrate complex (LCC) that is generated in the kraft process and acts as physical barriers to the entry of bleaching chemicals. Pentosanases act on Xylan, hemicellulase portion of wood. It causes the partial depolymerisation (Hydrolysis) of xylan and breaks the β 1-4 linkage between the xylan and lignin.

II) Ligninolytic Enzymes:

These are the lignin degrading enzymes which include Laccases, Lignin peroxidases, Mn peroxidases. They are more effective than lignin modifying enzymes as they cause 3-4 units reduction in Kappa No. Laccases are mostly extracellular glyco-proteins and are multinuclear enzymes with molecular weights between 60 and 80 kDa Laccase only attacks the phenolic subunits of lignin, leading to C α oxidation, C α -C β cleavage and aryl-alkyl cleavage.

Advanced Enzyme Technologies has prepared a unique formulation consisting of both lignolytic and lignin modifying enzymes exclusively for the paper industry. These Enzymes developed by AETL are stable at alkaline pH and active upto 60 to 75 °C temperature.

• Based on Lab Trials

The Enzymatic bleaching process is commercially competent than conventional bleaching process. The details shall be available on request.

Compiled by
Piyush Verma
 Consultant Paper Division



| Advantages | Conventional Bleaching | Enzymatic Bleaching |
|--|------------------------|---------------------|
| Reduction in Kappa No. | - | 2-3 units |
| Improvement in Brightness% ISO | - | 2-3% |
| Reduction In Elemental Chlorine | - | 15% |
| Reduction In Hypochlorite Dosage | - | 15% |
| Reduction In Post Color No. | - | 30% |
| Reduction In Absorbable Organic Halogens AOX | - | 20% |
| Reduction in COD/BOD Ratio | - | 20% |

Nutraceuticals



WHY SEBKINASE.....?

SEBkinase helps maintain healthy blood. Blood has a sticky quality that helps it clot and stop the bleeding from wounds. When a wound occurs, blood platelets rush to the wound site and cause a series of reactions that produce strands of fibrin. These fibrin strands form a thin, web-like structure that covers the wound and stops the bleeding. Research has established that these fibrin strands are the main cause of sluggish blood, so researchers next began looking for a substance that would act to maintain healthy levels of fibrin. That breakthrough discovery was SEBkinase, a natural, food-based supplement that supports healthier fibrin levels so that blood flows at a faster rate, reducing blood pressure and cholesterol levels.

What Is SEBKinase?

SEBkinase is a potent fibrinolytic enzyme extracted and highly purified from bacterial fermentation. SEBKinase is natural, side effect free, proven remedy for heart and vascular diseases. SEBkinase Is A Proprietary Preparation Specially Formulated To Assist And Defend Body From The Damaging Effect Of Fibrin. As Fibrin Builds Up In Our Bodies, It May Cause Many Unhealthy

SEBKinase: ANSWER FOR HEALTHY HEART

Increase in cardiovascular diseases (CVD) is a major concern in developing countries like India. Prevention of chronic disease is a key to meeting this goal. Cardiac infarction patients may have an inherent imbalance in their thrombolytic enzymes. Advanced Enzyme Technologies Ltd is keeping a keen eye in studying the pathology of these conditions. Focused scientific effort was not yet put to study the role of systemic oral enzymes in circulatory health. AET has conducted such focused research on role of SEBKinase in circulatory health. Completed as well as ongoing studies have highlighted it as an effective preventive measure.



Conditions. SEBKinase Can Help Keep Fibrin And Its Harmful Effects Under Control.

SEBKinase is Superior Fibrinolytic, Systemic Enzyme Formula, Offering Tremendous Synergistic Effect in the Body and Excellent Cardiovascular Support.

SEBKinase is useful in following Indications:

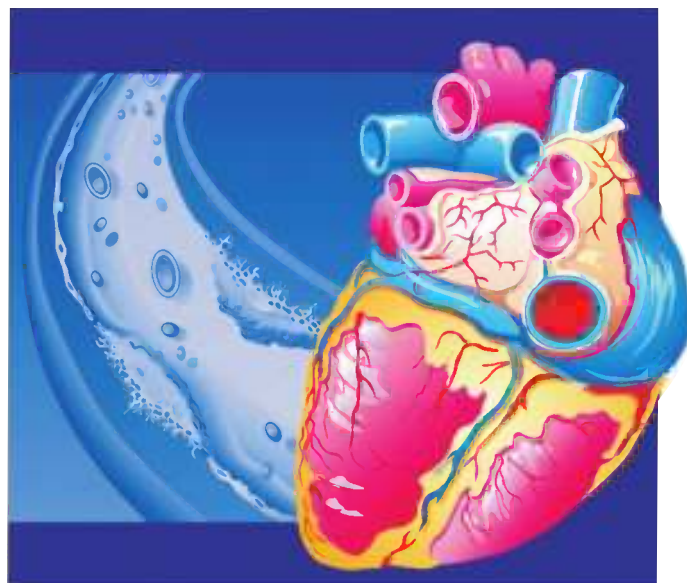
- Cardiovascular Disease
- Blood Clotting And Thrombosis
- Stroke
- Angina
- Thrombosis
- Emboli
- Atherosclerosis
- Fibromyalgia/Chronic Fatigue
- Hemorrhoid
- Varicose Veins
- Soft Tissue Rheumatism
- Chronic Inflammation And Pain
- Peripheral Vascular Disease
- Hypertension



The Benefits Of SEBKinase:

- Strong Antioxidant properties help keep you fresh and healthy.
- Antibacterial Properties Help Clean The Bowels And Eliminate Dead Debris
- Oxidizes Fatty Acids and keep your lipid levels.
- Lowers C - Reactive Protein, An Inflammation Marker linked To Heart Attack
- Helps Maintain Normal Blood Pressure And Cardiovascular Health
- Clinically Tested For The Dissolution Of Arterial Plaque And Thrombus "Blood Clots"
- Excellent Cardiovascular Support And Cellular Regeneration Properties
- Potent Fibrinolytic Activity that reduces Systemic Fibrin Concentrations
- Maintains Normal Blood Viscosity
- Antioxidant Effects are Beneficial To Normal Prostate Health

The fibrinogen is unique among the blood protein in that it is readily converted into insoluble fibrin by the action of enzyme thrombin. When thrombin act on fibrinogen, a fibrinopeptide molecule becomes activated and a meshwork is formed which act as a

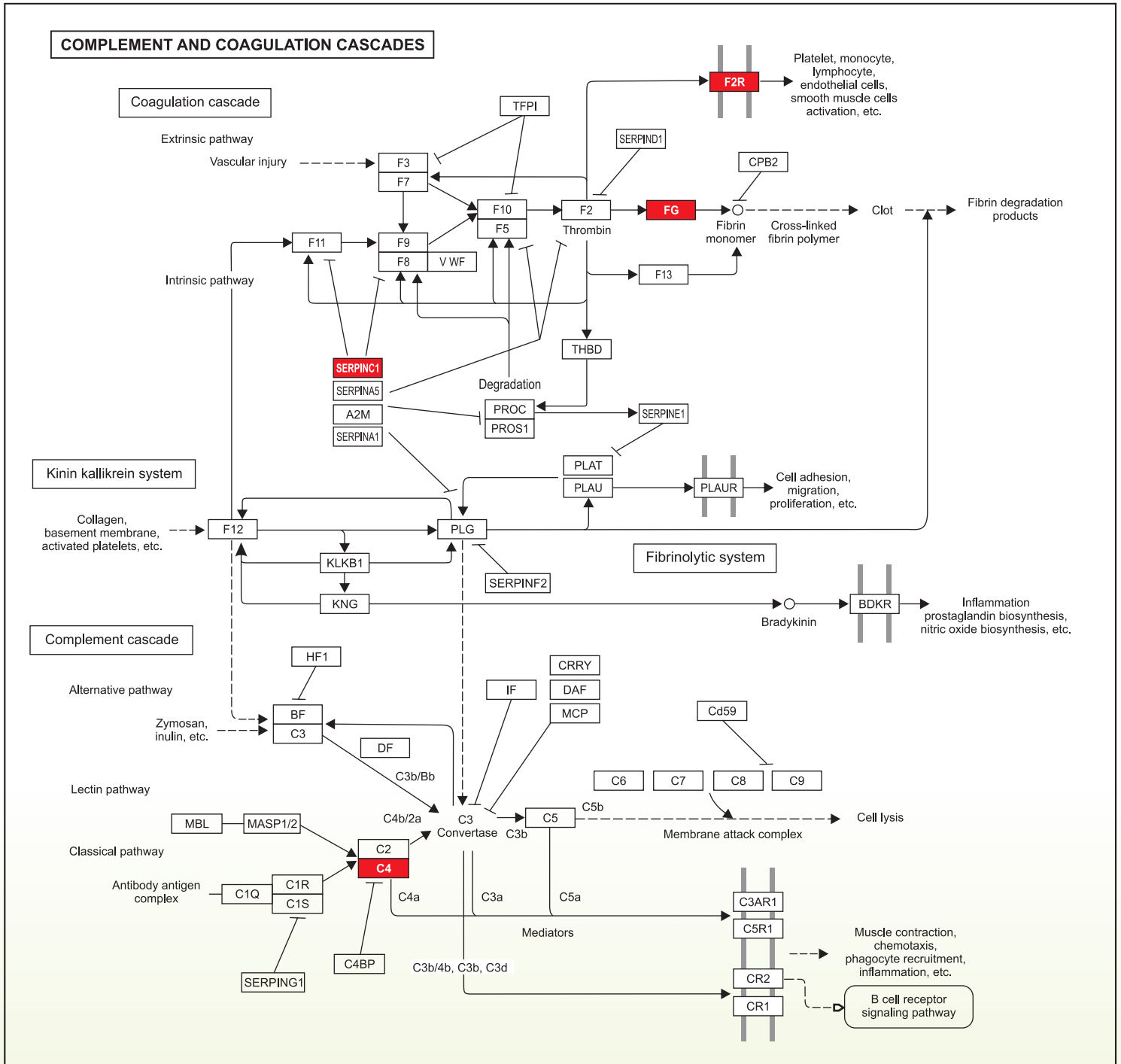


framework of clot (Bernard L. Oser, 1965). The globulin fraction consists of variety of proteins of similar physical characteristics. Two general types of globulin are recognized euglobulin and pseudoglobulin. It is in pseudoglobulin that we find the conjugated protein, primarily the lipoproteins. Euglobulin predominantly consists of plasmin, plasminogen, plasminogen activator and fibrinogen and thus the euglobulin is the key factor for the process of lysis of the blood clot. Thrombus a intravascular clot leads to lethal condition Thrombotic diseases typically include cerebral hemorrhage, cerebral infarction, cardiac infarction and angina pectoris, and also include diseases caused by blood vessels with lowered flexibility, including senile dementia and diabetes (caused by pancreatic dysfunction). Hemorrhoids are





Mode of action of SEBKinase as a thrombolytic agent:



considered a local thrombotic condition. If chronic diseases of the capillaries are also considered, then the number of thrombus related conditions may be much higher.

Cardiac infarction patients may have an inherent

imbalance in that their thrombolytic enzymes are weaker than their coagulant enzymes (Chatterjea & Rana Shinde, 2005). Thus prevention and treatment of the thrombotic diseases by preventing and early treating the thrombus is essential to save the life. Whenever thrombus is formed it is digested by the

Pictorial results of an in-vivo study conducted on 42 mice:



Clot Formation in Control Group (0 min)



Initiation of euglobulinolysis in Control Group (239 min)



Complete euglobulinolysis in Control Group (350 min)



Clot Formation in Warfarin Group (0 min)



Initiation of euglobulinolysis in Warfarin Group (45 min)



Complete euglobulinolysis in Warfarin Group (223 min)



Clot Formation in SEBkinase Group (0 min)



Initiation of euglobulinolysis in SEBkinase Group (90 min)



Complete euglobulinolysis in SEBkinase Group (204 min)

enzymes of fibrinolytic system present in the plasma and saves the disastrous effect of thrombus. The lysis time of these clots is determined as a measurement of the activity of activators of fibrinolysis (e.g. plasminogen activators). Thus, compounds can be detected which stimulate the release of tissue-type plasminogen activator from the vessel wall. The thrombolytic activity of SEBKinase is a measure of Euglobulin Lysis time.

Dose dependent effect in complete euglobulin lysis time was observed in the SEBKinase 25, 50 and 100 mg/kg dose levels. The efficacy of SEBKinase 50 mg

/kg dose level is better than that of Warfarin 200microgram/kg. It is recommended that the SEBKinase at 50 mg and 100 mg/kg can be used in the treatment of thrombotic diseases.

Company Update

AETL AT THE PHARMA LEADERSHIP SUMMIT, 2006

Advanced Enzyme Technologies Ltd. participated and was associate sponsor in the Pharmaceutical Leadership Summit held at Hotel JW Marriott on 20 & 21 September, 2006. The Summit deliberated critical leadership topics confronted by the Industry in general & the CEO's in particular.



C. L. Rathi engaged in a chat with the eminent delegates at the Summit

Mr. C. L. Rathi had been invited to deliver the speech as a distinguished speaker. He delivered the speech on the **Concept on ENZYME as a Therapy or Drug Action Enhancer with side effect reducing agent.**



Piyush Rathi interacting with a delegate at the Summit

Mr. Abhijit Mali (Business Development Manager) looked after the stall and interacted with the visitors at the stall, filling them up with the required information regarding the Industry.



(From left to right) N.Y. Patil-Business Head, Pharmaceuticals, Mr. C. L. Rathi-MD & Mr. Piyush Rathi at the AETL stall

Mr. Piyush Rathi (Head Business Development) also attended the summit along with Mr. N.Y. Patil (Business Head Pharmaceuticals), for both the days and updated the leaders regarding the enzymes and particularly EXCLzyme EN.

AET ADDRESSES VIETNAM BREWERS ASSOCIATION!

AET was invited to address the **Vietnam Brewers Association in Hanoi, Vietnam on 12th Oct 2006.** The conference was attended by about 60 members of the VBA. **AET** and **SEB** (Specialty Enzymes & Biochemicals Co, USA) jointly addressed the audience on 'The use of Non GMO enzymes in Brewing & Distilling'. **AET** was represented by **Mr. Dipak Roda (General Manager - Marketing)** and **Mr. Surendra Rao (Business Head - Grain Processing)** whereas **SEB** was represented by **Mr. Mike Smith (Sales & Marketing Manager)**



Above: (L to R) Mike Smith, Dipak Roda and Surendra Rao paying close attention



Above: The audience taking serious notes of the presentation



Above: Mr. Surendra Rao giving a presentation

New Joinees & Birthdays for Nov-Dec'06

NEW JOINEES

New Joinee details:



September 18 - Dr. Pratibha Kamble
as a R&D Executive



September 25 - Mrs. Nilima Prabhu
as a Front office Executive



THANE EMPLOYEES

| Sr. | Name | Date of Birth |
|----------------|---------------------|---------------|
| Nov' 06 | | |
| 1 | Mrs. Nilima Prabhu | Nov 13 |
| 2 | Mr. Piyush Verma | Nov 30 |
| 3 | Mr. Alok Kumar | Nov 18 |
| Dec' 06 | | |
| 1 | Mr. Imtiyaz Momin | Dec 22 |
| 2 | Mrs. Saylee Pradhan | Dec 29 |
| 3 | Mr. Nainesh Koli | Dec 15 |

AET celebrates Diwali in Traditional Style!

AET celebrated Diwali Dhanteras Pooja in traditional style with all Head Office as well as Research Centre people gathering together to participate in the Pooja and festivities. Everyone was clad in the brightest and newest of clothes and jewellery thus adding glamour to the entire event.



Above: Mr. C L Rathi, and Mrs. S C Rathi carrying out the Pooja



Above: The gang gossiping and smilingly onlooking the Pooja proceedings

Quiz

- **Plant are useful because they:**
a. Take water, give Co2 b. Take CO2, give O2
c. Take Water, give H2 d. Take 2, give CO2
- **Which body part has eight bones?**
a. Wrist b. Palm c. Elbow d. Finger
- **Who was the supreme God of the Olympians?**
a. Zeus b. Poseidon c. Apollo d. Hercules
- **Fill in the missing word from this famous phrase or proverb...**
"If you can't beat them, ----- them."
a. Leave b. Meet c. Join d. Buy
- **What word does the following definition describe?**
"A condition of the eyes wherein all persons of the opposite sex look very attractive."
a. Aposiopesis b. Game
c. Jackanapes d. Beer-goggles
- **Who is the only tennis pro to be disqualified from both the Grand Slam and Australian Open Tournaments for misconduct?**
a. John McEnroe b. Andre Agassi
c. Boris Becker d. Patrick Rafter
- **Which animal can communicate using sounds that are below the human hearing range, between 14 to 35 Hz?**
a. Elephants b. Zebras c. Giraffes d. Monkeys
- **What was the name of the fiery freedom fighter fondly known as Sarahadi Gangh (Frontier Gandhi)?**
a. Khan Abdul Gaffar Khan b. Vinobha Bhave
c. Sardar Patel d. Lal Bahadur Shastri
- **Who is the important Muslim ruler from the South who is known to have made grants to several temples?**
a. Aurangazeb b. Tipu Sultan
c. HyderAli d. Emperor Humayun
- **Who was the first man in space?**
a. Niel Armstrong b. Rakesh Sharma
c. Yuri Gagarin d. Kalpana Chawla

Rush your answers to nainesh@enzymeindia.com

Answers of the Quiz Sept-Oct '06

1. c Femur 2. b Jupiter 3. d Graphology 4. b Seismology
5. a Geneva 6. d Challenger Deep 7. c Luna 8. b Carrot
9. d Field Marshall 10. b Moon

And The Winner is.....Ms. Neha Kalra, Chandigarh.

Grapevine

COMMUNICATION IN OFFICE!!



From : Managing Director
To : Executive Director
Tomorrow morning there will be a total eclipse of the sun at nine o'clock. This is something which we cannot see everyday. So let the work-force line up outside, in their best clothes to watch it. To mark the

occasion of this rare occurrence, I will personally explain the phenomenon to them. If it is raining we will not be able to see it very well and in that case the work force should assemble in the canteen."

From : Executive Director
To : Departmental Head

By order of the Managing Director, there will be a total eclipse of the sun at nine o'clock tomorrow morning. If it is raining we will not be able to see it in our best clothes, on the site. In this case the disappearance of the sun will be followed through in the canteen. This is something we cannot see happening everyday."

From : Departmental Heads
To : Sectional Heads

By order of the Managing Director, we shall follow the disappearance of the sun in our best clothes, in the canteen at nine o'clock tomorrow morning. The Managing Director will tell us whether it is going to rain. This is something which we cannot see happen everyday."

From : Section Heads
To : Foreman

"If it is raining in the canteen tomorrow morning, which is something that we cannot see happen everyday, the Managing director in his best clothes, will disappear at nine o'clock."

From : Foreman
To : All Operators

"Tomorrow morning at nine o'clock, the Managing Director will disappear. It's a pity that we can't see this happen everyday"

In Technical collaboration with



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