

Catalysts

connect

Nov, Dec, Jan, Feb'18 Volume 28

**15th Anniversary
Celebration**

**Extremely
thermophilic
microorganisms and
their applications**

**Why is Quality
Important for
Business**

**Role of Yeast in
Production of
Alcoholic Beverages**

**Why Certification
is Essential**

15
ANNIVERSARY



COMPLETE ENZYME & ADDITIVES SOLUTION FOR BREWING INDUSTRY

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ENZYMES & ADDITIVES IN BREWING

- Enzymes and Additives in Mashing
- Enzymes and Additives in Fermentation
- Enzymes and Additives in Filtration
- Enzymes and Additives in Maturation

FEATURES

- Customized Solutions
- Trademark Products
- On Demand Analytical Support
- Well Equipped & State-of-Art Labs
- Leaders in Enzyme Solutions for Sugar & Ethanol Industry
- Certified Manufacturing Units
- More than a decade of Excellence
- Qualified Customer Support Teams

ABOUT THE GROUP

The Catalysts Group is among the top 5 Indian biotechnology companies, active in industrial enzymes business segment.

Our 15+ years experience of enzyme application in sugar as well as alcohol industries have given us a distinctive edge in creating customized products. Application of our products not only increases process efficiency, but also results in higher ethanol recovery.

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Contents

Editorial

- 01** Message from the Managing Director
02 Message from the Director

Cover Story

- 03-04** 15th Anniversary Celebration

Features

- 05-09** Extremely thermophilic microorganisms and their applications
10-12 Why is Quality Important for Business
13-16 Role of Yeast in Production of Alcoholic Beverages
17 Why Certification is Essential

Health

- 18** Live life Stress Free

Inspirational

- 19** Everyone has Story I Life
20-21 Let's be Fitness Selves
22 Employees Zone
23 Fun Zone

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MESSAGE FROM THE **MANAGING DIRECTOR**

Hello Friends,

2017 is completed and now we march on in 2018! Life is like a marathon. We set goals, meet them and then move onwards. The race is won by breaking the larger goal into smaller targets, monitoring our performance through these achievements and making course corrections where required. The name of the game is continuous progress.

There is no time for stoppages! If the progress is halted then we end up playing catch up rather than leading from the front. Catalysts, has always believed in leading from the front! Our values and culture are created around progress and achievement.

My message at this point to all of you achievers is to keep raising the Bar for Performance, for yourself and others around you. We have travelled miles! But have miles to travel..... Let us enjoy the journey and keep growing as individuals and as a team.

All the Best!

Munish Madaan



MESSAGE FROM THE DIRECTOR

Dear Friends,

I hope you all had a beautiful beginning of 2018. New year not only brings new dates in our lives but also gives us an opportunity to dream & plan our new assignments & goals both at work place and in the family.

Many of us do make big resolutions for our body fitness & health but somehow with each passing day our work takes the priority & health slips down our list. We all have demanding schedules & time bound commitments but still few easy things we can do at home and at our workplace like-

Stand for 2 minutes after continuous seating for 20 minutes.

Drinking minimum 2-3 liters of water daily.

Eating at right time.

Taking short breaks like 5 minutes after 1 hour of work.

Minimum 30 minutes of walk in a day.

Switching to jaggery instead of sugar wherever possible.

Taking deep breaths even while watching TV etc

These small changes in our daily routine will slowly become part of our lifestyle and automatically we will start liking & appreciating good food, have more calm sleep & more energetic mornings.

We at Catalysts are committed to make work environment a more happy place to be in 2018. Place where employees look forward to walk-in, work tirelessly & remain happy. We understand the fact that a happy environment with healthy body makes a beautiful place to be in. So starting 2018 we look forward to give same experience to all our employees at Catalysts.

Through this newsletter I would like to take the opportunity to request all of you to imbibe the culture of being fit & healthy with in your organisation & family members as that will take us towards the desired happiness we all are struggling for.

Only healthy India can be a happy India. Wishing you a very happy healthy New year again.

With healthy wishes

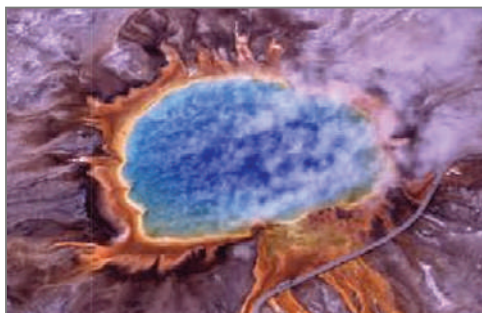
A stylized, handwritten signature in dark ink, appearing to read 'Aditya Malhotra'.

Aditya Malhotra

15th Anniversary Celebration







Extremely thermophilic microorganisms and their applications

Dr. Archana Prakash, Research & Development

In recent years it became obvious that extremophilic microorganisms differ from eukaryotic cells because they have adapted to grow under extreme conditions such as high temperature ($>100^{\circ}\text{C}$), high salinity (saturated NaCl), extremes of pH (<2.0 , >10.0), and substrate stress. These kinds of extreme microbial growth conditions are found in exotic environments which were more widespread on primitive Earth. Extreme environments include also high pressure ($> 50 \text{ MPa}$) and the presence of organic solvents (e.g. $> 1\%$ toluene) or heavy metals.

The evolution and taxonomy of extremophiles, especially the thermophiles, is an area that is receiving increasing attention. In general, moderate thermophiles are primarily bacteria and display optimal growth temperature between 60°C and 80°C . Hyperthermophiles are primarily archaea and grow optimally at 80°C or above, being unable to grow below 60°C .

In the last decades thermophilic and hyperthermophilic anaerobes have been isolated from continental and submarine volcanic areas, such as solfatar fields, geothermal power plants, geothermally heated sea sediments and hydrothermal vents. Sites from which hyperthermophilic organisms have been isolated comprises solfataric fields; steam-heated soils, mud holes, surface waters; deep hot springs; geothermal power plants as well as submarine hot springs and fumaroles; hot sediments and vents, "black smokers" or "chimneys"; and active sea-mounts. Hyperthermophiles are represented at the deepest and shortest lineages, including both genera of hyperthermophilic bacteria and the genus *Pyrodicticum*, *Pyrobaculum*, *Desulfurococcus*, *Sulfolobus*, *Methanopyrus*, *Thermococcus*, *Methanothermus*, *Archaeoglobus* within the Archaea.

Physiological and morphological aspects of thermophiles



Most of the anaerobic thermophilic bacteria are chemoorganotrophic in their metabolism. The bacterial thermophilic thermoanaerobes, for example, belong to nearly the same range of nutritional categories as do mesophilic bacteria. The

hyperthermophilic bacteria *Thermotoga* are able to ferment various carbohydrates like glucose, starch and xylans, forming acetate, L-lactate, H_2 and CO_2 as product, while the hyperthermophilic *Aquifex* is strictly chemolithoautotrophic, using molecular hydrogen, thiosulfate and elemental

FEATURES

hydrogen, thiosulfate and elemental sulphur as electron donors and oxygen (at low concentrations) and nitrate as electron acceptors. In general, the physiological processes for adaptation to environmental stress in anaerobic bacteria seem to have involved different factors from those in aerobic bacteria. First, anaerobes are energy limited during the chemoorganotrophic growth because they cannot couple

dehydrogenation reaction to oxygen reduction and gain a high level of chemical free energy. Second, growth of most chemoorganotrophic anaerobes (except for methanogens) is naturally associated with the generation of toxic end products (e.g., organic acids or alcohols, HS^-), which requires that anaerobic species develop some sort of dynamic adaptation mechanism or tolerance to their catabolic end products.

Biotechnological Applications of thermophiles and hyperthermophiles

Many autotrophic hyperthermophiles are opportunistic heterotrophs able to grow by fermentation or respiration of organic matters. They are able to synthesize heat stable molecules, including enzymes. The current biotechnological interest in enzymes from these microorganisms is motivated by their ability to work under conditions that are normally denaturing for mesophilic enzymes. Particular attention has been focused on enzymes from extremely thermophilic archaea.

Whereas conventional enzymes are irreversibly inactivated by heat, the enzymes from these extremophiles show not only great thermostability, but also enhanced activity in the presence of common protein denaturants such as detergents, organic solvents and proteolytic enzymes. Enzymes from thermophilic and extreme thermophilic microorganisms have received considerable attention from industry, because of their special characteristics such as high stability to changes in pH. Reasons for targeting these enzymes include their suitability as models for investigating protein thermostability and their potential as biocatalysts in modern biotechnology. Thus, these molecules have considerable industrial potentialities, giving better yields under extreme operational conditions.

Source of thermostable and thermoactive enzymes for Industrial process

Enzymes from thermophiles and extremethermophiles can replace their mesophilic counterparts in different industrial processes and thereby reduce the need for cooling. For instance, a variety of industries employ microbial amylolytic enzymes in the enzymic conversion of starch into different sugar solutions, representing an important growth area of industrial enzyme usage. The bioprocessing of starch into malto-oligosaccharides is gaining importance because of their potential uses in food, pharmaceutical and fine chemical industry.

A high value is placed on thermostable and thermoactive amylases in these processes, since the bioprocessing of starch at elevated temperature improves the solubility of starch, decreases its viscosity, limits microbial contamination, and reduces reaction times. Another hydrolytic enzyme, pullulanase, is used in combination with saccharifying amylases for the improved production of various sugar syrups. In addition, pullulanase has gained significant attention as a tool for structural studies of carbohydrates.

FEATURES

An additional application for thermophilic enzymes is the development of new processes to reduce the release of environmentally harmful chemicals by replacement of existing chemical reactions with enzymatic reactions. A good example can be found in the paper-pulping industry. Kraft pulping, a process widely used in paper manufacture, removes about 95% of the lignin by alkaline sulphate cooking. The remaining lignin gives the pulp a brown colour which is removed in a multistage bleaching process with a variety of agents. Currently, there is concern about the environmental impact of some of the compounds used in the process, particularly chlorine and chlorine dioxide. The traditional chemical bleaching of paper pulp can be reduced, however, by introducing a bio-bleaching step using thermostable xylan-degrading enzymes from thermophilic organisms. By adding thermostable xylanases to the unbleached pulp it is possible to remove parts of the lignin by hydrolysing the bonds that link the lignin, via xylan, to the cellulose fibres. The use of hemicellulases in bleaching is considered as one of the most important, new large scale industrial applications of enzymes. Indeed the mesophilic enzymes currently in use have limitations because of the high temperatures used in bleaching. The current prices of the enzymatic treatment, therefore, are expected to decrease as more efficient production strains and technologies are adopted.

Xylanolytic enzymes from hyperthermophiles:

Xylanases can also be used in clarification of juices, preparation of dextran for use as food thickeners, production of fluids and juices from plant materials, in processes for the manufacture of liquid coffee, adjustment of wine characteristics and enhancement of astaxanthin extraction. The characteristics of these enzymes from bacterial and fungal sources have been dealt with detail in several review. However the knowledge about the hemicellulases from extreme thermophilic bacteria (*Aquifex* sp. and *Thermotoga* sp.) are still limited and little is known about this enzyme

in archaea (Crenarcheota and Euryarchaeota). The first description about the occurrence of xylanases in extreme thermophilic bacteria was made by Bragger *et al.* Screening was performed on solid media including 0.1% of polymer. All *Thermotoga* strains were able to degrade xylan forming clear zones on the plates against a red background, after staining with aqueous congo red and destaining with NaCl. The endoxylanase of *Thermotoga* sp. strain FjSS3B.1 exhibited maximum activity at 105°C and the main hydrolysis products of oat spelt xylan by the enzyme were xylobiose, xylotriose and medium-sized oligomers.

Recently, an archaeal xylanase has been detected in extracts of the hyperthermophilic archaeon *Pyrodictum abyssi* (2). The enzyme displays optimal activity at 110°C and pH 6.0, and is very thermostable, showing activity even after 100 min of incubation at 105°C. The analysis of hydrolysis products performed by HPLC showed as main product xylotriose and xylo-tetraose, indicating the presence of an endoxylanase.

Starch-hydrolysing enzymes from thermophiles and hyperthermophiles:

Numerous microorganisms, including bacteria, fungi and yeasts are able to degrade starch and related polysaccharides by the action of enzymes that split α -1,4- or α -1,4- and/or α -1,6-linkages of α -glucan. Thermophilic and hyperthermophilic microorganisms have been found to grow on starch indicating that they possess starch-degrading enzymes (Table 1)

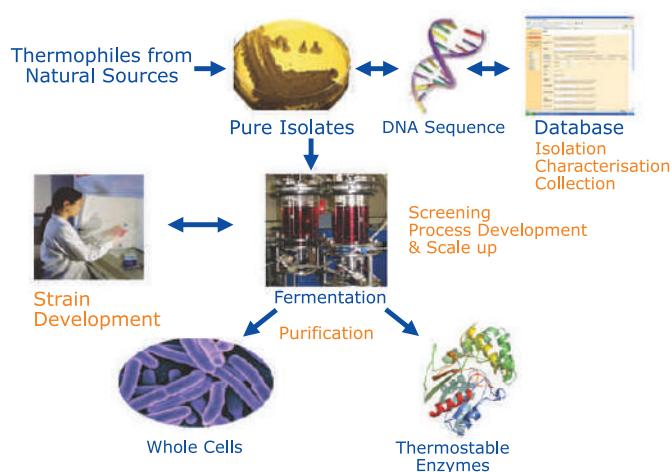


TABLE 1: Enzymes of carbohydrate hydrolysis from thermophilic and extremely thermophilic archaea

SPECIES	T-OPT. (°C)	HABITAT	ENZYMES
Sulfolobales <i>Sulfolobus solfataricus</i>	80	Terrestrial	α-Amylase β-Glycosidase
Thermoproteales <i>Thermoproteus tenax</i>	88	Terrestrial	α-Amylase Cellulase Xylanase
Pyrodictiales <i>Pyrodicticum abyssi</i>	97	Marine	α-Amylase Pullulanase Xylanase
Desulfurococcales <i>Desulfurococcus mobilis</i> <i>Desulfurococcus mucosus</i>	88 88	Terrestrial Terrestrial	α-Amylase α-Amylase Pullulanase Transglucosylase
Staphylothermus marinus	92	Marine	α-Amylase
Thermococcales <i>Pyrococcus furiosus</i>	100	Marine	α-Amylase α-Glucosidase β-Glucosidase β-Mannosidase Pullulanase type II
Pyrococcus abyssi	96	Marine	β -Glycosidase
Thermococcus celer	87	Marine	α-Amylase α-Glycosidase Pullulanase type II
Thermococcus hydrothermalis	80	Marine	α-Amylase Pullulanase α-Glucosidase β -Glucosidase
Thermococcus litoralis	88	Marine	α-Amylase Pullulanase α-Glucosidase α-Amylase Pullulanase type II
Thermococcus profundus	80	Marine	α-Amylase

Pullulanases from thermophilic and hyperthermophilic archaea:

Since the discovery of *Klebsiella pneumoniae* pullulanase, a number of microbial pullulanases have been purified and characterised from thermophilic bacteria and archaea by many investigators. However most enzymes from thermophilic bacteria belong to type II pullulanase. Among the several amylolytic enzymes produced by the hyperthermophilic archaeon *Pyrococcus-furiosus*, pullulanase was characterised by temperature optimum of at least 100°C and a high degree of thermo-stability. The pullulanase from *P. furiosus* was purified and reported to be a glycoprotein with an optimum of activity at 100°C.

Characteristics of Enzymes from hyperthermophilic:

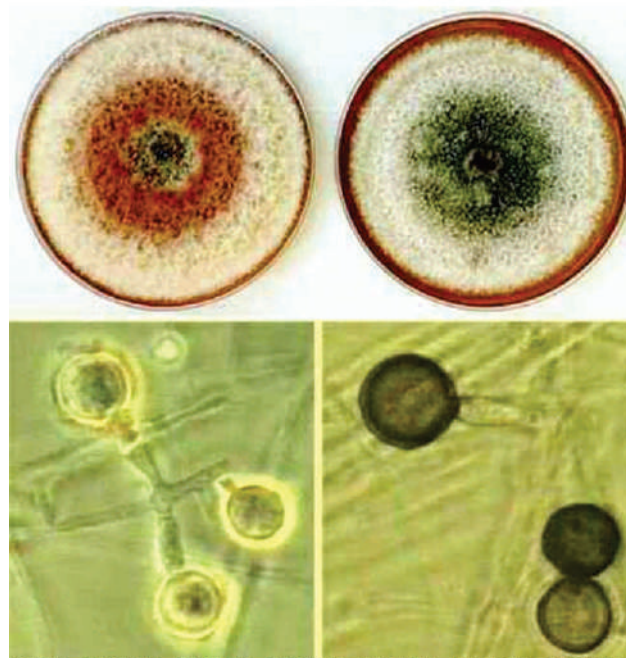
A consistent characteristic of all enzymes from hyperthermophilic microorganisms is their high level of thermostability. The positive correlation between the thermophily of the source organism and thermostability of both intra and extracellular proteins has been demonstrated frequently. A study of enzymes from extremely thermophilic archaea, may reveal the existence of enzymes with still greater thermostability. This suggests that enzyme stability does not need to confine the existence of life to 110°C or below. It has also implications for enzyme applications in the industry at high temperatures

Conclusions

There are many existing applications in which more thermally stable versions of enzymes now used will be advantageous. This is especially true in the hydrolysis of corn starch to produce high fructose corn syrup. Amylolytic enzymes are now used at temperatures exceeding 100°C in some cases to hydrolyse liquified starch to oligosaccharides and eventually to glucose. Glucose is then partially isomerized to fructose using immobilized xylose (glucose) isomerase. Many of these same enzyme activities are available in extreme thermophiles. Given the preference of many of these organisms for saccharides, it should be possible to isolate a range of saccharidases for evaluation in starch processing. There are other hydrolysis reactions that can be catalysed by high temperature enzymes. Cellulose and hemicellulose hydrolysis is important in the processing of renewable resources. Activities to these substrates have been detected among the thermophiles and extreme thermophiles. The isolation of new thermophilic strains on cellulosic substrates is at present an area of great interest. Hyperthermophiles present physiological features and potential technological properties, which must be understood, before an industrial process can be designed or compared with those currently in use.

To take advantage of the biotechnological potential of microorganisms growing at extremely high temperatures, there is still a great deal to be learned about their metabolic and genetic characteristics. An interaction between scientists and engineers will be required to assure that fundamental insights are used effectively for technology development.

On the other side, in food processing enzyme use has been limited because of the need to maintain aseptic conditions. However, if enzymes with sufficient thermostability were available, applications involving modifying the fiber content of foods, perhaps during the baking process, could be considered. The treatment of complex wastes from food processing, such as lactose-laden streams, may also be facilitated by



solubility of lactose at high temperature. At the present the industrial applications of thermostable enzymes are still limited to a few areas. Although the genetic engineering allows the design of "tailor-made" enzymes by altering their amino acid composition, the construction of thermostable enzymes are still highly empirical. This is because little is known concerning the molecular basis of protein thermostability. Enzymes of extremophiles are, however, good starting points for engineering "tailor-made" enzymes. Furthermore, enzymes from thermophiles and especially hyperthermophiles present physiological features and potential technological properties, which must be understood, before an industrial process can be designed or compared with those currently in use.

To take advantage of the biotechnological potential of microorganisms growing at extremely high temperatures, there is still a great deal to be learned about their metabolic and genetic characteristics. An interaction between scientists and engineers will be required to assure that fundamental insights are used effectively for technology development.

Source : Carolina et al Technical University
Hamburg-Harburg, Germany



Why Is Quality Important for a Business?

Managing quality is an important aspect for all type of business but it could be crucial for small businesses. Quality products help to maintain customer satisfaction and loyalty and reduce the risk and cost of replacing faulty goods. Companies can build a reputation for quality by gaining accreditation with a recognized quality standard, such as ISO 9001, published by the International Organization for Standardization.

Customer Expectations

Your customers expect you to deliver quality products. If you do not, they will quickly look for alternatives. Quality is critical to satisfying your customers and retaining their loyalty so they continue to buy from you in the future. Quality products make an important contribution to long-term revenue and profitability. They also enable you to charge and maintain higher prices.

Reputation

Quality influences your company's reputation. The growing importance of social media means that customers and prospects can easily share both favorable opinions and criticism of your product quality on forums, product review sites and social networking sites, such as Facebook and Twitter. A strong reputation for quality can be an important differentiator in markets that are very competitive. Poor quality or a product failure that results in a product recall campaign can create negative publicity and damage your reputation.

Why Is **QUALITY** Important for a **BUSINESS**?

Dharmender Pathak, Research & Development

Meeting Standards

Accreditation to a recognized quality standard may be essential for dealing with certain customers or complying with legislation. Public sector companies, for example, may insist that their suppliers achieve accreditation with quality standards. If you sell products in regulated markets, such as health care, food or electrical goods, you must be able to comply with health and safety standards designed to protect consumers. Accredited quality control systems play a crucial role in complying with those standards. Accreditation can also help you win new customers or enter new markets by giving prospects independent confirmation of your company's ability to supply quality products.

Costs

Poor quality increases costs. If you do not have an effective quality control system in place, you may incur the cost of analyzing nonconforming goods or services to determine the root causes and retesting products after reworking them. In some cases, you may have to scrap defective products and incur additional production costs to replace them. If defective products reach customers, you will have to pay for returns and replacements and, in serious cases, you could incur legal costs for failure to comply with customer or industry standards.

To take advantage of the biotechnological potential of microorganisms growing at extremely high temperatures, there is still a great deal to be learned about their metabolic and genetic characteristics. An interaction between scientists and engineers will be required to assure that fundamental insights are used effectively for technology development.

What Are the Four Ways in Which Quality Can Affect a Company?

Quality affects a company in a variety of ways, from productivity and profitability to customer satisfaction and public perception. In addition, quality affects the overall operating costs of a company. Focusing on quality helps keep a company strong in all areas.

1. Productivity

Poor quality costs a company money in terms of productivity problems. If a company uses low-quality parts, systems break down, regardless of any high-quality parts also used. Low-quality parts can cause mechanical breakdowns, as well as work slowdowns or even stoppages.

2. Profitability

Quality increases profitability. When employees are engaged in a work environment in which teamwork is emphasized and where quality products are the goal, the work environment flows more smoothly than one in which quality is an afterthought.

3. Customer Satisfaction

Quality has a direct bearing on customer satisfaction. If a company produces a quality product, satisfied customers will rank that company higher in surveys than companies that fail to provide quality products or services. In addition, dissatisfied customers are more vocal in their criticisms of a company with quality problems. Various websites will rank different companies according to customer satisfaction and quality products. Poor companies may get an initial sale of a product or service but it will not create repeat customers.

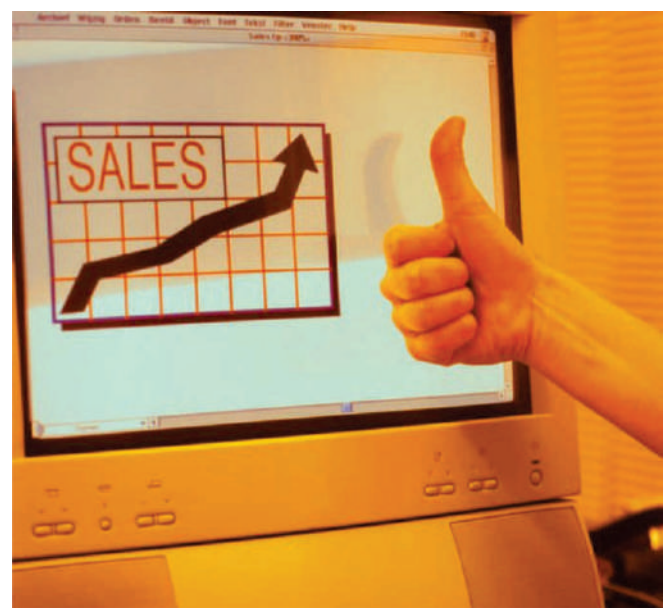
4. Costs

Quality directly affects costs in a business. While using less expensive parts & equipment might cut costs in the short term, the long-term effects might be far more expensive. For example, using certain software that costs less might save a company money in the short term, but that

software might be more complicated than more expensive software or lack customer service. In that case, employees will take longer to understand how to use the software. On top of that, if a problem arises with the software, the lack of customer support means it takes longer to accomplish the job, thereby costing the company more money than if it had used a more expensive, higher quality software product.

What Businesses Can Do

Focusing on quality can help a business maintain a satisfied customer base. In turn, this means the business might continue turning a profit. If a business is not profitable, examining the quality of the product or service is an important step to finding a solution. When focusing on quality, it must be a team effort, with everyone within the company committed to implementing any quality changes managers mandate. Although the initial cost might seem expensive, the overall costs of ensuring delivery of quality products and services might prove to be less than expected.



Why Is It Important for Businesses to Practice Quality Control?

Quality control is essential to building a successful business that delivers products that meet or exceed customers' expectations. It also forms the basis of an efficient business that minimizes waste and operates at high levels of productivity. A quality control system based on a recognized standard, such as ISO 9001 published by the International Organization for Standardization, provides a strong foundation for achieving a wide range of marketing and operational benefits.

Competitiveness

The ability to offer customers quality products provides a strong competitive advantage. Quality helps you to win business from competitors who are not able to match your standards and gives you the opportunity to charge premium prices for a superior product. It can also open new business opportunities in market sectors where quality is critical.

Customer Loyalty

Providing the market with quality products helps to increase customer satisfaction and loyalty. Satisfied customers have confidence that your products will continue to provide reliable performance in the future, and that increases the likelihood that they will buy from you again. Satisfied customers may also recommend your products to other companies, either directly or by providing testimonials that you can use in your marketing communications.

Reputation

Quality makes an important contribution to your company's reputation, particularly with the growth of social media. Customers share their views on products and services on product review sites and social media, such as Facebook. Positive reviews and comments can reinforce your own marketing efforts, but quality problems can have a damaging effect on your reputation if the word spreads. A major quality issue, such as a product recall, may also attract media attention, causing further damage.

Compliance

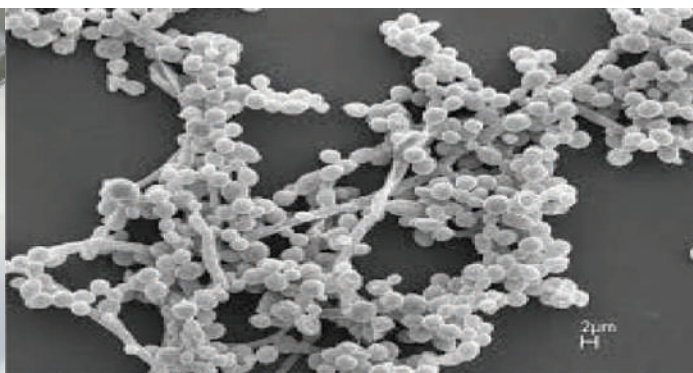
Compliance with recognized quality standards may be essential for doing business with certain groups of customers. If you are part of a supply chain, for example, the lead manufacturer may impose consistent quality standards on all members of the chain. Some customers aim to reduce or eliminate the cost of inspecting incoming components or materials by insisting that their suppliers implement the same quality system. If you operate in a regulated sector, such as chemicals or food, you may have to comply with industry quality standards.

Costs

Quality control can help to reduce your production and product support costs. A quality control system helps to lower levels of waste and rework, cutting costs & improving productivity and production efficiency. Delivering quality products can also reduce the number of returns you have to handle or the cost of repairing or servicing products in the field.

What Businesses Can Do

Focusing on quality can help a business maintain a satisfied customer base. In turn, this means the business might continue turning a profit. If a business is not profitable, examining the quality of the product or service is an important step to finding a solution. When focusing on quality, it must be a team effort, with everyone within the company committed to implementing any quality changes managers mandate. Although the initial cost might seem expensive, the overall costs of ensuring delivery of quality products and services might prove to be less than expected.



Role of YEAST in Production of ALCOHOLIC BEVERAGES

Joole Chauhan, Research & Development

Introduction

Although there is a distinction between beer, wine and liquor as well as other lesser known alcoholic beverages, they share one thing in common. They are the fermentation products of yeasts, mostly *Saccharomyces cerevisiae* or in the case of beers, usually *S. carlsburgiensis*. Yeasts, as you recall, are not mycelial. They are unicellular fungi that reproduce asexually by budding or fission. The reaction by which alcoholic beverages are produced is generally referred to as fermentation and may be summarized as:

Yeast + Glucose Alcohol (Ethanol) + CO_2

This reaction is also important in baking bread, but the desired product is then the carbon dioxide rather than alcohol. The production of alcohol occurs best in the absence of oxygen. However, from the yeast's point of view, alcohol and carbon dioxide are waste products, and as the yeast continues to grow and metabolize in the sugar solution, the accumulation of alcohol will become toxic when it reaches a concentration between 14-18%, thereby killing the yeast cells. This is the reason why the percentage of alcohol in wine and beer can only be approximately 16%. In order to produce beverages (liquor) with higher concentrations of alcohol, the fermented products must be distilled.

What's the Difference Between Beer and Wine?

Generally, beverages derived from fermented fruit juice is wine. However, commercially speaking, "wine" is fermented grape juice from *Vitis vinifera*. Other wines are specifically referred to by the name of the fruit of the juices from which they are fermented. For example, elderberry wine, peach wine, etc. Beer on the other hand is usually derived from fermentation of malt derived from the digestion of germinated barley grains, in western cultures, but other grains may be utilized in other cultures. There is also a difference between processes by which wines and beers are fermented.

There is a perception, perhaps just my own, as to the people that drink beer and the ones that drink wine. Beer drinkers seem to be "blue-collar." People that drink only wine seem to be the "white-collar" people. However, if we compare beer and wine making processes, you might have just the opposite impression. Beer making is almost a science. Compared to wine making, it is rather complex and there's a purpose for everything that is done in making beer and the beer makers know just about everything that goes into beer. Wine making, on the other hand, is relatively simple. It's truly a natural drink and its origin probably preceded beer making. Anyone can do it. The yeast responsible for fermenting the sugars in the fruits are usually present in the grape skins, and fermentation will occur

whenever there is a break in the. So when human production of wine began, it involved collecting fruits, crushing them and allowing them to ferment, a much simpler process than making beer.



The Science of Beer Making

Today, beer is consumed in vast amounts in this country, and beer making is largely automated as in all mass produced products. Despite the sophisticated machinery that is used in brewing beer, it's still essentially the same procedures that has been used for hundreds of years. However, beer making has become very sophisticated because of the advances in knowledge that has resulted from advances in science. Prior to, and even during the 1800's, there were many who knew how beer could be made, but none knew of the science behind each step. It was not until the 19th century that it was realized that during germination, of cereal grains, that enzymes were released that would not break down not only the barley starch and protein into simple sugars and amino acids, but would also do the same for other carbohydrates, such as potato, corn and wheat. This realization cheapened the cost of making beer since germinated barley is a greater investment than the utilization of potato, corn and wheat. It would not be until the 19th. Century that it would be known that yeasts were the organisms that actually were responsible for the fermentation process.

Although the process of fermentation had been used for thousands of years, it was thought to be a magical rather than a material process. As a result, many rituals and superstitions developed to direct and control fermentation. By the 17th. Century, it was known that yeast was present during fermentation, but its role was controversial. There were two opposing views on

this subject. One view was that yeast was required for the fermentation process, while the other argued that the process was purely chemical. It was not until Louis Pasteur's work, in the 1850's and 1860's, was this argument resolved. Pasteur was asked by the distillers of Lille, where the manufacture of alcohol, from beet sugar, was an important local industry, to determine the problem of lactic acid production in their alcohol. Upon examination of the fermentation product under the microscope, Pasteur was able to observe the usual yeast cells, but also noted that there were a large number of smaller rod- and sphere-shaped cells. When Pasteur placed a small amount of this material in a sugar solution, a vigorous lactic acid fermentation occurred along with the formation of a grayish deposit in the solution which proved to be the rod- and sphere-shaped cells. Successive transfers of these cells always resulted in production of lactic acid fermentation and an increase in the number of cells. Pasteur argued that the cells were a new "yeast" that specifically converted sugar to lactic acid during its growth. It would be years later before it was understood that the new "yeast" were actually bacteria. Using a similar method, Pasteur studied a number of organisms and their fermentative processes. He was able to show that the different fermentation products produced were invariably accompanied by specific microorganisms. This discovery, however, had further significance. Just as the different microorganisms caused different fermentation products from sugar, so did

different diseases arise as a result of different microorganisms, and that these microorganisms did not arise spontaneously, as once believed, but that each microorganism was derived from pre-existing cells of the same type. This also led to the concept that by destroying the microorganisms in food products and beverages or by preventing their appearance in sterile products, spoilage could be prevented. This concept led to the heat treatment of food products and beverages that we now know as pasteurization.

In the beginning of beer making, beer was an alcoholic beverage with the flavor of malt and grain. It was flat, slightly sweet and would spoil quickly. It would not be until the 8th. Century that brewers in central Europe found that the addition of Hops flowers preserved the beer and gave it the slightly bitter taste that made it more palatable. However, Hops was not the only bitter additive used. Various cultures used other bitters; tannins from Oak and Ash trees were used in Scandinavia; cinnamon in southern Europe and in America sweet fennel, licorice or sassafras was used. Nevertheless, by the end of the 15th. Century, it was Hops that became the standard bitter and preservative added to beer. Only in England was there resistance to the use of Hops, but they, too, accepted it by the end of the 16th. Century.

Wine Making

Wine is made today much the same way that it was centuries ago. However, unlike beer, there is still a great deal that cannot be controlled in the production of wine. You will see this as we discuss the process.

The grapes from which the wine is to be made is first separated from the stem (stemmed) and then crushed in order to release the juice. The combination of the skin, juice and seeds is called the must. Grapes may be crushed by various means, from stomping on them with bare feet to the use of sophisticated electric presses. If the desired product is a white wine, the free juice is transferred to a fermentation tank and the peels and stems are removed and pressed again. The juice of the second press can be added to the original juice or used to make another lower grade wine. If red wine is the desired product, the skins of the grape go into the fermentation tank

with the juice. The red color of this wine is from the red pigment in the epidermis of the grape skin. Various vessels may be used as the fermentation tank. The most inexpensive and commonly used vessel is a 32 gallon, plastic garbage can.

Once the juice is in the fermentation tank, preferred strains of yeast are often added, but are not needed. The skin of the grapes already have adequate yeasts on them that this step could be omitted. This is one of the uncontrolled quality of wines. Since the yeasts that grow on the grapes vary in different vineyard, especially if they are in different countries, the quality of the finished wine will also vary. The addition of the preferred yeast gives some measure of control to the end product. Sulfur dioxide is normally introduced into the juice at this time to kill bacterial growth that may spoil the taste of the final product. Fermentation is allowed to continue for about eight to ten days, after which the initial wine is drawn off of the skin, if it is still present. Any liquid obtained from the skins that remained during the fermentation is considered to be of a poor quality and is used in poorer quality wines or for vinegar. After the initial fermentation, the liquid is allowed to ferment for 20 days to about a month. During this second fermentation, the dead yeast cells as well as other particulate matter settle to the bottom. When this process is complete, the wine is separated from the sediment and transferred to an aging tank. As the aging process continues, more sedimentation occurs, and the wine is often transferred across a series of tanks during aging. This process is known as racking. If the final tank is a wooden cask, this also adds another uncontrolled quantity into the final product. Because wooden cask cannot be cleaned, they provide a unique character to the wine some of which are said to make the wine "superior." However, the use of stainless steel vats have removed this uncertainty.

The aging of wine is variable. For white wines, usually one year to eighteen months, but red wines can age for as long as five years. At stages during aging, the wine is sampled and judged by a wine master. The fate of the wine is dependent upon the decision of the wine master. The wine may be bottled after aging is complete or used only as a blend to make an inferior wine. The

FEATURES

bottled wine, again, based on the decision of the wine master, may be aged longer in the bottles or sold immediately after bottling. White wines can benefit from aging for up to five years, after which they will tend to deteriorate. Red wines, on the other hand, can continue to improve for thirty or even up to forty years.

The above wines are "still" wines because they are fermented in open tanks and contain no gaseous carbon dioxide. If fermentation stops before the sugars have all been metabolized by the yeast, the finish product is a sweet wine. If all the sugars have been metabolized, the wine is said to be dry. As in the case of beer, the percent alcohol content will be 14-18%. However, in fruit wines, the percentage is lower because the amount of sugars in other fruits are generally lower. Even with the addition of sugar, fruit wines are generally 5 to 7% alcohol.

Champagne and Other Sparkling Wines

In order to obtain carbonation, extra sugar is added to yeast while the yeast is still actively fermenting and then tightly cap. The buildup of carbon dioxide will carbonate the beverage to give you the bubbly effect. This is somewhat tricky since if too much fermentation occurs, the tightly sealed bottle can explode from the built up pressure. What about really cheap champagne? The price of the champagne does not necessarily mean that quality is lacking. Some champagnes are cheap because they are mass produced in

large vats rather than handled as individual bottles.

Mycological Terms

There are a large number of brewing and wine making terms. I have only included a few, below.

Beer: Any alcoholic beverage produced by the fermentation of sugars obtained from grain. In western culture, barley is the grain generally used.

Ethanol: Alcohol that is the metabolic product of yeast in the wine and beer making. Specifically, it is produced by the yeast during fermentation.

Fermentation: The process by which yeast converts sugars into alcohol and CO₂.

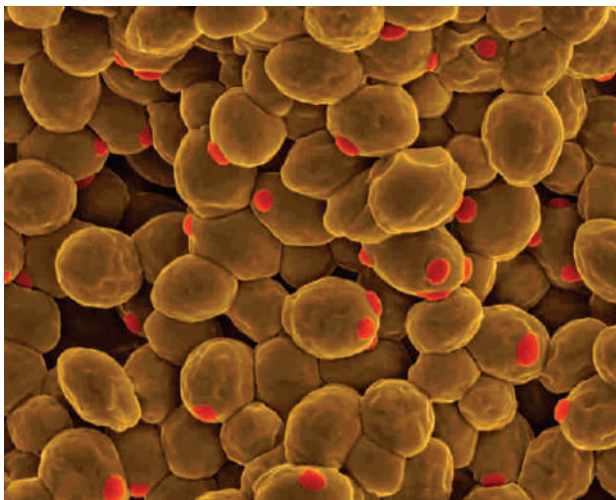
Hops: Flower of hops added as ingredient to beer that gives it a bitter taste. However, it also serves as a preservative that gives it a longer shelf life.

Kombucha: A tea that is brewed with several species of bacteria and yeast and said to be of medicinal value. Also known as Manchurian Mushroom Tea, Fungus Japonicus and Tea Fungus.

Wine: Usually fermentation of grape juice, but may also be other fruit juices as well, e.g., elderberry, peach, apple, etc.

Yeast: In wine and beer making, the "ingredient" that converts the simple sugars into ethanol. The most common species used are *Saccharomyces cerevisiae* and *S. carlsburgiensis*. However, other species are also used

Reference: <http://www.botany>





Dr. Jyoti Vohra, QMS & Internal Audit

Why CERTIFICATION is Essential?

CERTIFICATION: OPENING DOORS TO NEW MARKETING AND PROMOTING RESPONSIBLE PRACTICES

Certification refers to the confirmation of certain characteristics of an object, person, or organization by some form of external review, education, assessment, or audit.

The concrete benefits from getting certified are:

1. It promotes best practices: ISO and other standards give us access to internationally recognized best practices across our business. Standards exist for everything from quality management to environmental performance, information security, food safety, risk management, and health and safety.

2. Increase productivity: Adhering to standards requires us to clearly define, document and monitor our business processes. We also need to set objectives for our company and measure our progress. This work is critical to building a lean, productive business.

3. Keeps customers happy: Standards help keep customers satisfied by improving complaint management, quality control and client satisfaction monitoring. Top benefits from certification include reduced customer complaints. Confidence in customers that our products are safe and reliable as well meet regulation requirements.

4. Improves revenues: Certification can help our bottom line, the best performance results happen when we make a sustained effort to improve operations – not just before the next certification audit- but a good investment by

putting in efforts to continual improvement and focused goals.

5. Open doors to new markets: Standards gives our business access to new markets. For example, we may be eligible for government contracts that require adherence to certain standards. Or, maybe, we'll be able to join the supply chain of a larger company or a megaproject. Many standards are recognized worldwide and can increase your credibility with customers in international markets along with competitive advantage over other companies. Food safety certifications give access to developing countries, transition economies, in their effort to improve market share of products. Also, Religious and ethnic requirements for safe food are met.

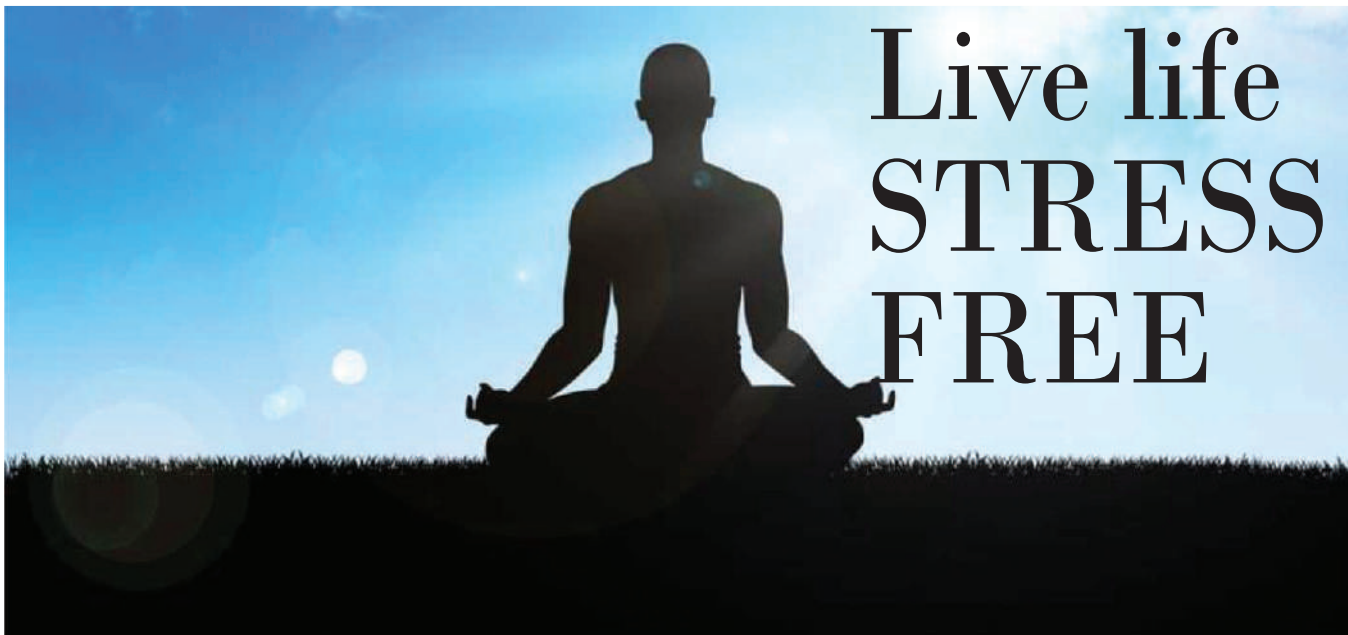
1. Fosters team commitment- Meeting ISO standards can help us foster a more engaged and productive workforce. Certified businesses report better job satisfaction, turnover, absenteeism, employee motivation and manager-employee communication. The process of certification brings together managers and employees to work toward common objectives, using consistent processes, developing more commitment to improve the business.

1. Applies to all sizes: Certification is useful for business of all sizes, even those with only a few employees. Smaller businesses sometimes pursue certification because of supply chain requirements or when they want to adopt best practices in their operations.

Meeting the benefits The Catalysts Group hold :



KOSHER CERTIFICATION (UNDER ISSUANCE)



Meditation or **yoga** can be described as the practice of physical, mental, and spiritual discipline. The objective of meditation or yoga is to accomplish wonderful **harmony** where mind, body, and soul works together. Practicing yoga helps people to maintain their health and create a balance in their life. It is essential to practice yoga for a better lifestyle; the benefit of performing yoga is immense, it not only keeps your body fit, it makes you happy with your surroundings and let you find peace within yourself. An additional major benefit of yoga is that it helps people to overlook upon negative news instead unite their mind and soul for better **concentration** which are beneficial for health, and find a path in spirituality.

Methods of Meditation:

Set aside just a few minutes at first. Choose a time of day when you're able to meditate without interruption. You might coordinate your meditation so you do it right before or after a physical yoga practice.

Sit with good posture either on the floor, cross-legged, or in a chair if it's more comfortable. (If seated cross legged, switch which leg is crossed on top each time you meditate.)

Gaze at a simple object such as a candle's flame or a black dot written on a piece of paper. Or, close your eyes and home in on the rhythm of your yoga breathing. As you become more familiar with how to meditate, increase your practice by a minute or two at a time.

A lot of people practice yoga in order to stay away from back pain, joint pain, **mental stress** and other problems. Yoga helps in increasing the flexibility in one's body by stretching; it also helps in building strength as you are required to ponder your body with the support of one leg or arms etc. Yoga involves breathing techniques which need to be mastered, and done accurately. When people get a hang of breathing technique, the next step is meditation which helps in purifying the mind and focusing on the postures. Additionally, yoga or meditation helps improve health by checking the circulation of blood by decreasing pulse rate, blood pressure, respiratory rate and increasing cardiovascular efficiency, respiratory efficiency and develop excretory functions.

Stress is in fact, dangerous for health, as is the main cause of obesity, diabetes, high blood pressure and many other disorders. One of the most important benefits of yoga is that it performs like a **stress buster**. Adopting yoga or meditation routine can avoid unwanted stress; forget all worries as it oblige the contribution and incorporation of mind, body, and soul. Life's misery can be avoided easily by performing yoga routine.

The benefits of meditation are never-ending as it helps in improving eye, hands movement, reaction time, flexibility, improve strength, and develop the immunity. It is no wonder why many people from different walk of life from different age groups to housewife to celebrities, are engaged in yoga or mediation. The impact of meditation in life is undeniable.

Everyone Has a STORY in LIFE



A 24 year old boy seeing out from the train's window shouted...

"Dad, look the trees are going behind!"

Dad smiled and a young couple sitting nearby, looked at the 24 year old's childish behavior with pity, suddenly he again exclaimed...

"Dad, look the clouds are running with us!"

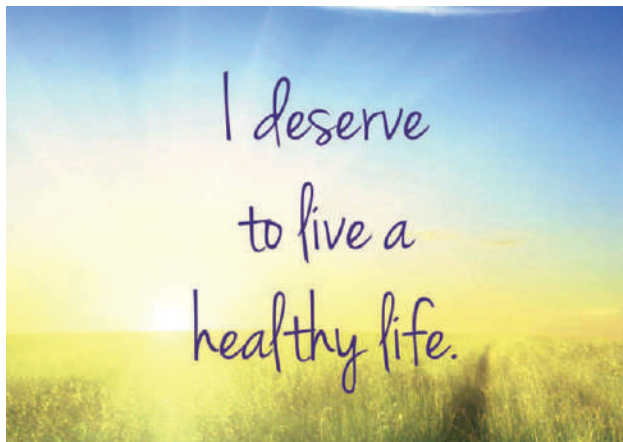
The couple couldn't resist and said to the old man...

"Why don't you take your son to a good doctor?" The old man smiled and said..."I did and we are just coming from the hospital, my son was blind from birth, he just got his eyes today."

Every single person on the planet has a story. Don't judge people before you truly know them. The truth might surprise you.

Moral: Don't judge people before knowing the truth

Let's be FITNESS Selves



“To keep the body in good health is a duty... otherwise we shall not be able to keep our mind strong and clear”
-Buddha

We all want to be our fittest selves, but with so much advice floating around out there, it can be hard to hone in on what healthcare tips work. Proper grooming and healthy personal habits can help you ward off illnesses and feel good about yourself. Find out which personal hygiene habits should be part of your regular routine.

Maintaining good health should be the primary focus of everyone. Regular Hygiene also depends upon your regular diet routine which is always healthy and nutritious as well.

Have a hearty breakfast -

By now you're probably tired of hearing how breakfast is the most important meal of the day—but this tired piece of advice couldn't be truer! In one study completed at the Imperial College of London, participants who skipped breakfast were more tempted to reach for unhealthy, high-calorie foods later in the day. And in case you need more evidence to eat that meal, further research found that women had a larger drop in ghrelin (the hunger hormone) when they ate a hearty breakfast versus a small one.

Say hello to H2O -

Whether you're heading off to spin class, boot camp, or any other exercise, it's always important to hydrate, so you can stay energized and have your best workout. Electrolyte-loaded drinks, though, can be a source of unnecessary calories, so "drinking water is usually fine until you're exercising for more than one hour. When your water intake does not equal your output, you can become dehydrated. Fluid losses are accentuated in warmer climates, during strenuous exercise, in high altitudes, and in older adults, whose sense of thirst may not be sharp. There are now lower-cal sports drinks available, so look out for 'em in your grocery aisles. When you're low on fluids, the brain triggers the body's thirst mechanism. And unless you are taking medications that make you thirsty, you should listen to those cues and get yourself a drink of water, juice, milk, coffee -- anything but alcohol.

Stock up on these -

While there are heaps of good-for-you foods out there, some key ingredients make it a lot easier to meet your weight-loss goals. **Extra-virgin olive oil** - olive oil is one of the reasons why the

oil - olive oil is one of the reasons why the Mediterranean diet is considered one of the healthiest in the world. **Honey** - It'll last in your cupboard for years. And in addition to be a versatile sweetener, honey can serve as a hangover helper, cough soother, and more. **Chocolate** - provides powerful disease-fighting polyphenols and has even been associated with weight loss. **Oatmeal** - Known for helping to lower cholesterol numbers, research suggests oats may also help you control your appetite.

Curb your sweet tooth -

Got a late-night sugar craving that just won't quit? "To satisfy your sweet tooth without pushing yourself over the calorie edge, even in the late-night hours, think 'fruit first,'" says Jackie Newgent, RD, author of *The Big Green Cookbook*. So, resist that chocolate cake siren, and instead enjoy a sliced apple with a tablespoon of nut butter (like peanut or almond) or fresh fig halves spread with ricotta. Then sleep sweet, knowing you're still on the right, healthy track.

Turn your cheat day around -

Feeling guilty about that giant ice cream sundae you enjoyed at your niece's birthday party? Don't beat yourself up! It takes a lot of calories—3,500—to gain a pound of body fat. So really, that one off day doesn't usually result in any significant weight gain. It's about what you do the next day and the day after that's important—so don't stay off-track. So be sure to whittle away at those extra calories over the next day or two, preferably by boosting exercise rather than eating too little. Starvation is not the healthy answer!

Be a weekend warrior -

You've been following your diet plan to the letter but enter: the weekend. To deal with three nights of eating temptations (think: birthdays, weddings, dinner parties), up your activity level for the week. For instance, try taking an extra 15-minute walk around your office each day. Then, go on and indulge a bit at a party or gathering, guilt free. Another party trick? Enjoy a 100-calorie snack before a celebration, which can help you eat fewer munchies at the event.

Fun up your food -

It's easy to get in a diet rut, even if you're loading up on flavorful fruits and veggies. The solution? Have plenty of spices, fresh herbs, and lemons at your cooking beck and call. "It's amazing what a little dash of spice, sprinkle of herbs, pinch of lemon zest, or squirt of lime juice can do to liven up a dish—and your diet. The best part: They contain almost no calories. Experiment with your dinner.

Say goodbye to peer pressure -

Even if you've been eating right on track, it may be tough to stay on track if your partner, coworkers, or friends don't share your healthy-eating habits. What to do? If your partner loves pizza, try ordering a pie that's heavy on the veggies and light on the cheese—then supplement it with a side salad. Or, if your friends are having a girls' night out, suggest a restaurant that's got healthy appetizer options, instead of the typical fare of onion rings and cheese dip. And at work, instead of baked-goods day, suggest a "make it healthy" day, and swamp a mini fruit-and-nut muffins or any other healthy eatable.

Ditch your working lunch -

Munching on your lunch while at the computer could lead to mindless grazing, according to a study in the *American Journal of Clinical Nutrition*. People who ate their midday meals while playing a computer game ended up eating more cookies 30 minutes later than those who hadn't been gaming. So carve out 20 minutes a day (we know, you've got a million things to do, but ...), and eat in your conference room (or outdoors!). Your whittled waistline will thank you.

Slim up your snack -

It's hard to avoid that 3 p.m. stomach rumble, when nothing can stand between you and the office vending machine. And while it's fine to eat something to hold you over until dinner (in fact, we encourage it!), some choices will help you keep on your weight-loss track—while others can surely derail you. So, at the vending machine, instead of choosing that ever-so-tempting pack of snack, try a 100-calorie cookie pack or a Mcvities digestive biscuits. Better yet, bring a snack from home! We're fans of sliced veggies dipped in lime. Delish!

Find healthy fast food -

Have to work late tonight and need dinner—in a hurry? Not to worry. If you find fast food is your only option, pull up the restaurant's nutrition facts online before you go; you can make an informed decision ahead of time about what to order. Nearly every quick-service restaurant has a relatively healthful option or two. We're thinking salads, chili, or grilled chicken. Some low-cal, healthy, on-the-run dishes: the vegetarian burrito bowl, the at Noodles, and the tomato basil bisque.

"The greatest gift you can give your family and the world is a healthy you"

-Joyce Meyer

Fun & Celebrations@Catalysts



Welcome



NAME *Ajay Singh Chauhan*
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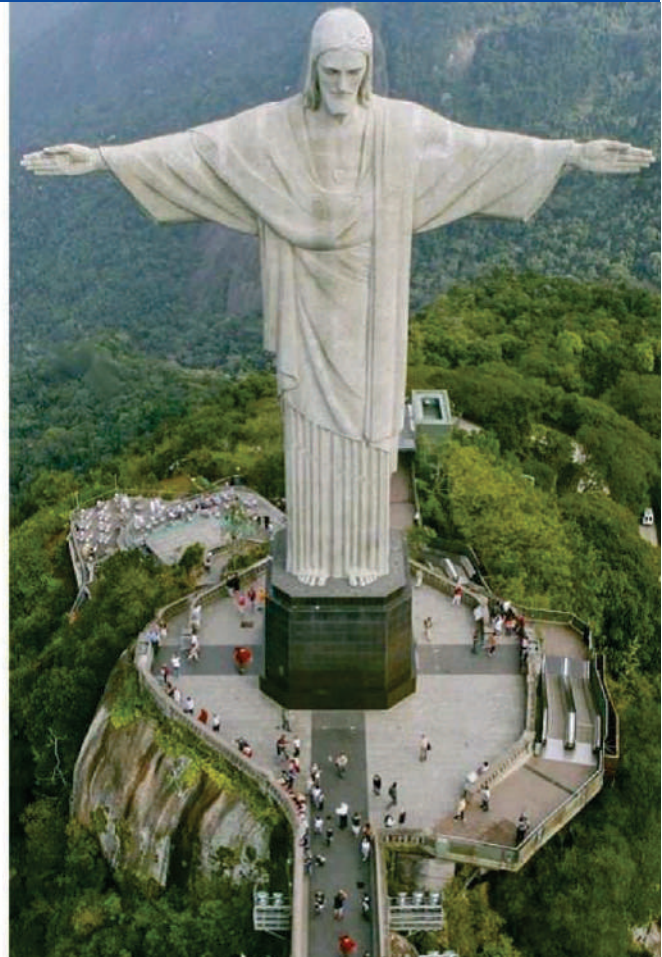
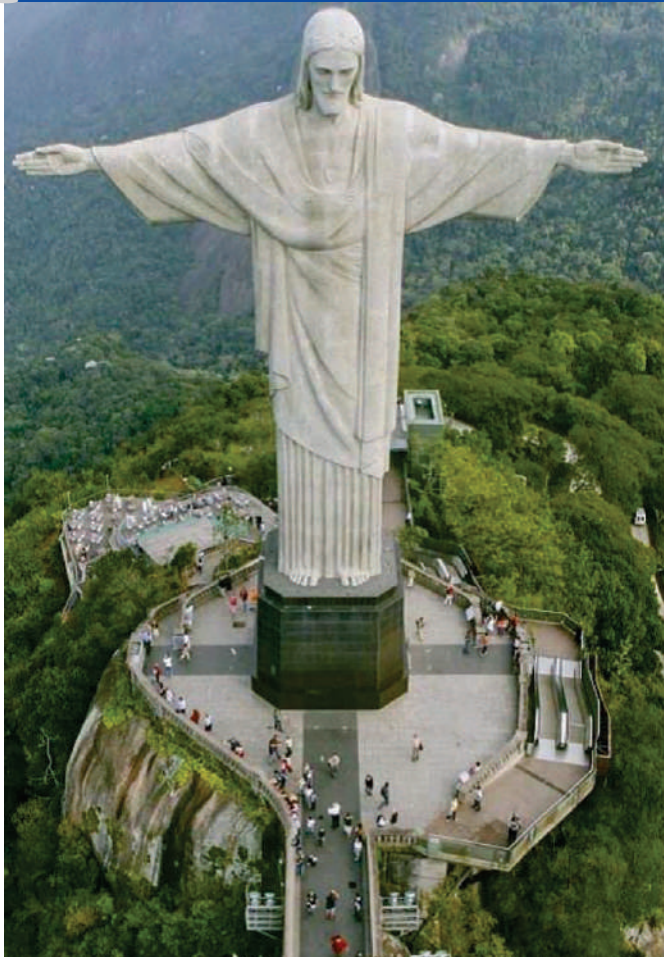


NAME *Chetan Joshi*
DEPARTMENT *R&D*
DATE of JOINING ★ ★ ★ ★ ★ ★ ★ ★

FUN ZONE

1

SPOT THE DIFFERENCE



2

What is the Girl's Full Name ????

Try to answer this...

Let's See who gets it first

Boy : What is your name?

Girl: 100+  +  +  +  =



3

How Many cases do you need if you have to pack 112 pairs of shoes into cases that each hold 28 shoes?

4

Using the four letters below only, create a seven letter word.
UMNI

Send your entries to info@thecatalystsgroup.com and win a surprise gift.

WHO WE ARE

Catalysts was established in 2003. Having its corporate office in Delhi & R&D Centre the largest state of Uttar Pradesh in India and Manufacturing units in the Hill state of Uttarakhand. It is a leading research and quality certified Biotech company. We are engaged in delivering enzyme based eco-friendly solutions to many industry verticals. We are a multilevel quality certified company having certification of ISO 9001:2008, FSSC 22000 and Halal

Our Process expertise based enzyme formulation are a key competitive advantage for Catalysts and thus for our customers. We have a modern fully-equipped technology centre, where application research is done extensively using substrates received from client side.

Our technical team provides real time process and troubleshooting support to various industries like Molasses Ethanol, Grain Ethanol, Carbohydrates processing, Malt extraction, Brewing process and sugarcane juice processing.

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