Our Vision

We will endeavor to make 'Catalysts' a global brand in the Industrial Biotechnology space. Catalysts would be identified with a work culture of integrity, respect, teamwork, ownership, trust, learning and happiness for all stakeholders.

Catalysts

making things happen...

ISO 9001:2015 Certified | FSSC 22000 Certified

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Catalysts

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OUR VALUES

CORPORATE PROFILE

Catalysts
making things happen...

Founded in 2003 in India, The Catalysts Group is an Indian Biotechnology company, focused on offering wide range of enzyme based eco-friendly solutions to many industry verticals in India and Overseas.The company leverages latest technology trends and disruptive approach to create process-based enzyme formulation. The goal is to provide measurable outcomes to its customers, across industries and sectors by offering a gamut of enzymes solutions, from strategy to execution.

Over 17 years and with more than 140 crores in, Catalysts is well on its way to become a global brand in the Industrial Biotechnology space in this decade. With a reach already spanning 3 continents, 10+ countries and 400+ cities globally and a clientele that's rich in industry-leading companies, the company has traversed the evolution from an Indian to an Asian and soon a Global company. Catalysts is focused on generating employment opportunities through manufacturing and delivering centers across globe and focusing on safeguarding the environment.

Dedicated team consists of highly qualified, dynamic, passionate and experienced research professionals. They have the capability of delivering robust results for customer centric requirements. Catalysts team always strives to use innovative tools and technological advancements to stay abreast with the rapidly changing industry scenarios and to meet the customer's evolving needs. Having acquired quality certifications like ISO9001:2015, FSSC 22000, NABL, HALAL and Kosher, our Research and Development Centre has been recognized by the Department of Scientific and Industrial Research (DSIR).

With real time processes and troubleshooting support, we provide our customized solutions and services to a variety of industrial verticals like:

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MESSAGE FROM THE MANAGING DIRECTOR

Dear Friends,

Welcome to another edition of Catalysts Connect. I wish for the safety and well-being of all our staff members, our esteemed clients, vendors, principals, and their families during these difficult times.

As Catalysts, it has always been our endeavor to keep the interests of our clients at the forefront in all our efforts. During the lockdown period when some of our Sugar and Distillery clients were continuing their operations, our production and logistics team ensured the timely deliveries of our products to them. They had to overcome many challenges in getting required permissions for operating our factory and enabling material movement. I take pride in mentioning that not even a single client located in any part of our country had to shut its operations due to the non-availability of our material. It was the relentless effort of the Catalysts Team backed by excellent support from our vendors that made this possible.

I salute them all!

Today the world is going through an unprecedented crisis. We as Catalysts believe that every crisis is a huge opportunity to transform and develop. We should never waste a crisis. A three-pronged strategy has been evolved to gainfully address this crisis.

Tackle – We need to tackle the fear and uncertainty created by this crisis in everyone's minds. There are many challenges like a decline in market demand and difficulty in client servicing due to travel restrictions and social distancing norms. We are adapting quickly to overcome these and finding new ways to engage with our clients. We have started providing online technical support to our clients and are working every day to further improve our services in all aspects under the changed scenario.

Transform – We plan to use this time to focus on establishing robust systems and processes for scaling up our Organisation to higher levels of operational competence. India will be open to immense opportunities in the post-COVID-19 era and we will make our Organisation ready for this opportunity.

Take off – We are defining a new Vision 2030 for our Organisation and year-wise strategy to achieve the same. Our inherent belief says that there is no barrier big enough to stop us from achieving our dreams. This time will be gainfully utilized to create a stronger launch pad for the next stage of our journey.

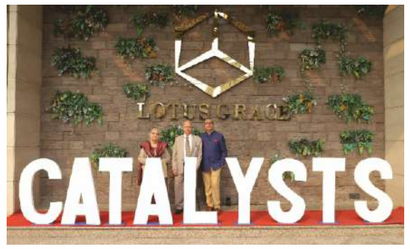
In the end, I once again wish for the well-being of everyone connected to us.

With Best Wishes!

Munish Madaan

COVER STORY

17th Annual Celebration 2020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FEATURES

WHAT'S NEXT IN BIOTECHNOLOGY INDUSTRY?

Contributed by:
Munish Madaan
Managing Director

According to a new report by Grand View Research, the global biotechnology market size is expected to reach USD 727.1 billion by 2025 at a CARG OF 7.4%1.

Biotechnology is the backbone of numerous industrial sectors and makes a substantial contribution to the modernization of the country.

The vast range of advanced applications are increasingly playing a role in enhancing the market competitiveness, raising economic growth, and improving the welfare of citizens. Biotechnology is the guiding force for initiating radical changes and innovations in numerous sectors.

In a nutshell, Biotech is one of the vital and exciting sectors at the moment. From newer drugs that will focus on our medical needs and diseases, to industrial processes that will use renewable energy and crops that will be able to grow in harsh climatic conditions and ensure safe and affordable food, Biotechnology will pay economic, social and environmental share in the coming years.

Expected Growth Segments:

1. The bioethanol market is expected to grow by USD 20.55 billion during 2020-20242, according to the latest market research report by Technavio.
2. Bio pharmacy application is expected to be the largest segment and is estimated to have more than 60% share in 20193.
3. By 2025, the Indian Biotechnology industry is expected to reach $150 bn3.
4. Bio-services accounts for 16%4 of the Biotech industry as India is becoming a leading destination for clinical trials, contract research and manufacturing activities…
5. The global brewing enzymes market is growing at a CAGR of 6.0%5 during the forecast period (2020 - 2025).
6. According to the statistics of the Food and Agriculture Organization (FAO), the global population is likely to reach 10 billion by 20506 and would result in a growth of over 50% in agricultural demand as compared to 2018.
7. The Global Market Insights Inc., report says, yeast market for animal feed application was valued at $1.5 billion in 2019 and is projected to surpass $2 billion by 2026, registering a CAGR of 7% from 2020 to 20267.
8. The global animal feed enzymes market is expected to grow at a CAGR of around 9.71% during the forecast period 2019 to 2026 and reach the market value of around US$ 2,158.1 Mn by 20268.
9. The global enzymes market is expected to grow approximately at the rate of 6.3 percent and reach $9.5 billion by 20229. Industrial enzymes that include enzymes used in detergent manufacturing, food & beverage processing, pharmaceutical industry, etc., occupy major market, in terms of value and volume.
10. Asia Pacific is projected to witness a remarkable growth rate of 8.1% 10 in the near future, owing to increasing consumption of food and beverage products, detergents, and animal feed in the region.
11. In terms of revenue, the carbohydrase product segment is projected to dominate the market while expanding at a CAGR of 7.4%11 over the forecast period.

Source:

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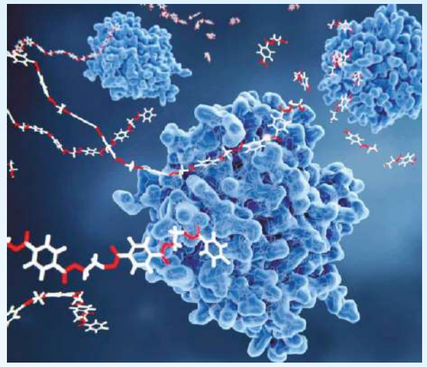
FEATURES

ENZYMES: BRIEF HISTORY AND ADVANCEMENTS

Contributed by:
Yogesh Grover
Industry Sales Manager
Malt & Brewery



Since ages, enzymes have been employed in a variety of applications such as beer and cheese production. In the past and some cases now also, enzymes have been derived from natural sources such as the tissue of plants and animals; the enclosed table summarizes these. But Over the years, with varied tools of the lovely field of biotechnology; it resulted in highly efficient varieties of enzymes. The industrial success of enzymes can be attributed to certain key benefits that enzymes offer in comparison with chemicals. The combination of catalytic function, specificity, and the ability to work under reasonably mild conditions makes enzymes the preferred catalyst in a variety of applications. Industrial enzymes are prepared and commercialized as partly purified or 'bulk' enzymes, as opposed to highly purified enzymes for analytical or diagnostic use. Industrial enzymes may be derived from a wide variety of plant, animal, or microbial sources, although most production processes rely on microbial sources. Microbial enzymes are either extracellular, such as the proteases and carbohydrates, which account for a large proportion of total sales, or intracellular, such as glucose oxidase. Intracellular enzymes usually remain associated with the cell and therefore must be released unless the microorganism itself is used as the catalyst.

Table: Enzymes widely sourced from animals and plants used in food manufacturing technology.

Enzyme	Source	Action in food	Food applications
Alpha Amylase	Cereal seeds, e.g. wheat, barley	Starch hydrolysis to oligosaccharides	Bread making, brewing (malting)
Beta-Amylase	Sweet potato	Starch hydrolysis to maltose	Production of high malt syrups
Papain	Latex of unripe papaya fruit	Food and beverage protein hydrolysis	Meat tenderization, chill haze prevention in beer
Bromelain	Pineapple juice and stem	Muscle and connective tissue protein hydrolysis	Meat tenderization
Ficin	Fig fruit latex	As bromelain	As bromelain and papain but not widely used due to cost
Trypsin	Bovine/porcine	Food protein hydrolysis	Production of hydrolyzates for food flavouring (mostly replaced now by microbial proteinases)

The real breakthrough of enzymes occurred with the introduction of microbial proteases into washing powders. The first commercial bacterial, Bacillus protease was marketed in 1959 and the first major detergent manufacturer started to use it around 1963. The industrial enzyme producers sell enzymes for a wide variety of applications. The estimated value of the world market is presently about US$ 2.2 billion. Detergents (30%), textiles (12%), starch (12%), baking (11%), biofuel (9%), and animal feed (8%) are the main industrial applications, which use about >80% of industrially produced enzymes.

Industrial enzymes represent the heart of biotechnology. Advancements in biotechnology and genomics have aided the discovery of fresh enzyme sources and production strains for commercialization. The operating conditions and performance of enzyme candidates can be tuned to provide the desired performance, Enzymes can be used not only for chemical processes, but also for mechanical and physical processes. An example of a chemical reaction is the use of amylases to replace acid in the hydrolysis of starch. The use of cellulose-degrading or modifying enzymes instead of pumice stone for the abrasion of denim is a perfect example of enzymes replacing a mechanical process. Employing protease enzymes, one can easily perform physical processes such as high-temperature resistance for laundry cleaning. With advances in biotechnology, the horizon of enzyme applications is getting broader day by day. Enzymes are now being used in newer processes that could compete with synthetic processes which were previously not commercially viable. For example, several companies are nowadays developing newer enzymes that could convert cellulosic biomass into ethanol to be blended in fuels. Other examples include the use of enzyme technology when making sugars from starch, which helped turn high fructose corn syrup production into a multi-billion-dollar industry. Most industrial enzymes are produced by modified microorganisms (by recombinant DNA techniques) for the following reasons:

1. Higher expression levels.
2. Higher purity (% enzyme protein vs. % other components).
3. Cheaper production due to the above.
4. Recombinant DNA techniques open the door to engineering the enzyme protein.
5. Enzymes can be expressed which originate from organisms that have low expression levels of which are pathogenic.

Protein engineering (item 4 in the list above) can improve enzymes concerning, for example, oxidation resistance, improved processing tolerance, changed substrate specificity, improved thermostability and improved storage stability, for example, in detergent systems containing bleach agents.

Recombinant DNA techniques may open the door to the application of enzymes from so-called extremophiles. These are microorganisms which can, in contrast to mesophiles, grow under extreme conditions. Such organisms grow under the following conditions:

- Thermophiles (high temperature > 90°C stability)
- Psychrophiles (extreme low temperatures, 0°C or lower)
- Thermoacidophiles (high temperature, low pH)
- Barophiles (high pressure)
- Halophiles (high concentrations of salt)
- Alkaliphiles (high pH)
- Acidophiles (low pH)

It can be imagined that such organisms either produce a different range of enzymes than mesophiles, or produce enzymes with extreme characteristics, such as temperature or stability and activity at extreme pH values.

Source: Enzymes in Food technology

FEATURES

EFFICACY OF VICRAL 6K IN REDUCING AMMONIA LEVEL IN BROILER SHEDS

Contributed by:
Amitabh Pandey
Business Development
Sales Head
Animal Nutrition

Introduction

A high concentration of ammonia in the poultry house has adverse effects on the health and performance of birds. However, it is not easy to measure the magnitude of such adverse effects.

Ammonia in a poultry house comes from the birds themselves. Unused nitrogen is excreted as uric acid (80%), ammonia (10%), and urea (5%).

When ammonia gas is exposed to moisture, it reacts and forms a basic, corrosive solution called ammonium. This aqueous ammonium solution causes harm to birds. The ammonium damages the lining of chickens' respiratory tract and paralyses or even destroys the cilia of the epithelial cells. In such conditions, the mucus on the mucosal surface of the trachea cannot be cleared by the cilia and thus microbes become trapped. When the microbes reach the lungs or the air sacs, they cause infections.

Poor growth rate and performance of birds growing in high atmospheric ammonia concentrations is strongly related to the influence of ammonia on birds' immunity and their intestinal histomorphology. Exposure to high ammonia concentrations negatively affects the development of the birds' immune system as well as intestinal villi

Studies have shown that high concentrations of ammonia can alter the normal organ function of animals, impair energy metabolism, induce cell apoptosis, and cause mitochondrial damage in the mucosa of the gastrointestinal tract

Guideline exposure levels for ammonia is set to 20-25ppm, however, in practice, the concentration of ammonia in some broiler houses may easily exceed 30-70 ppm. Ammonia being denser than air is usually undetectable by averaged height person inside the poultry shed where as at bird's level concentration of ammonia may lead to unforeseen consequences

Field Case Study

A case study was undertaken to evaluate efficacy of VicRAL 6k in reducing ammonia levels in broiler shed.

Two broiler sheds with capacity to house 25,000 broilers each were selected with size of 360 ft x 50ft (18,000 sq. Ft) for the study. The age of broilers was 38 days

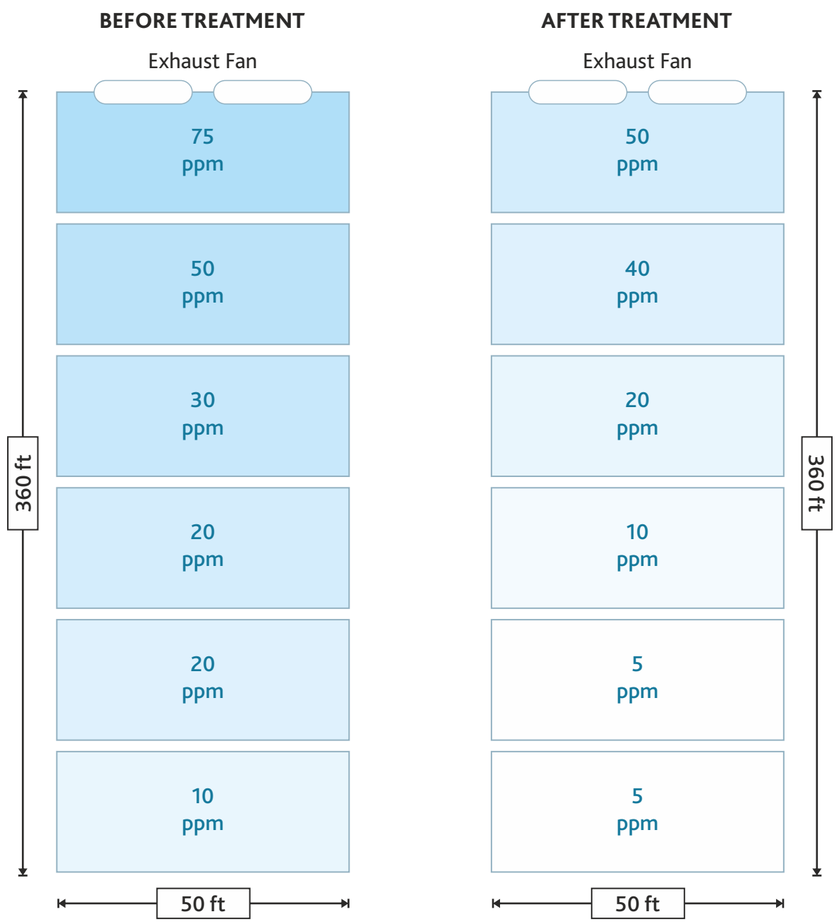
The shed was divided into equidistant five zones for recording of ammonia level. Ammonia level was also measured at exhaust fan outlet.

Vicral 6k was diluted to 50 ppm and spray was done twice a day. Ammonia level was recorded in each zone before and 2 days after the spray.

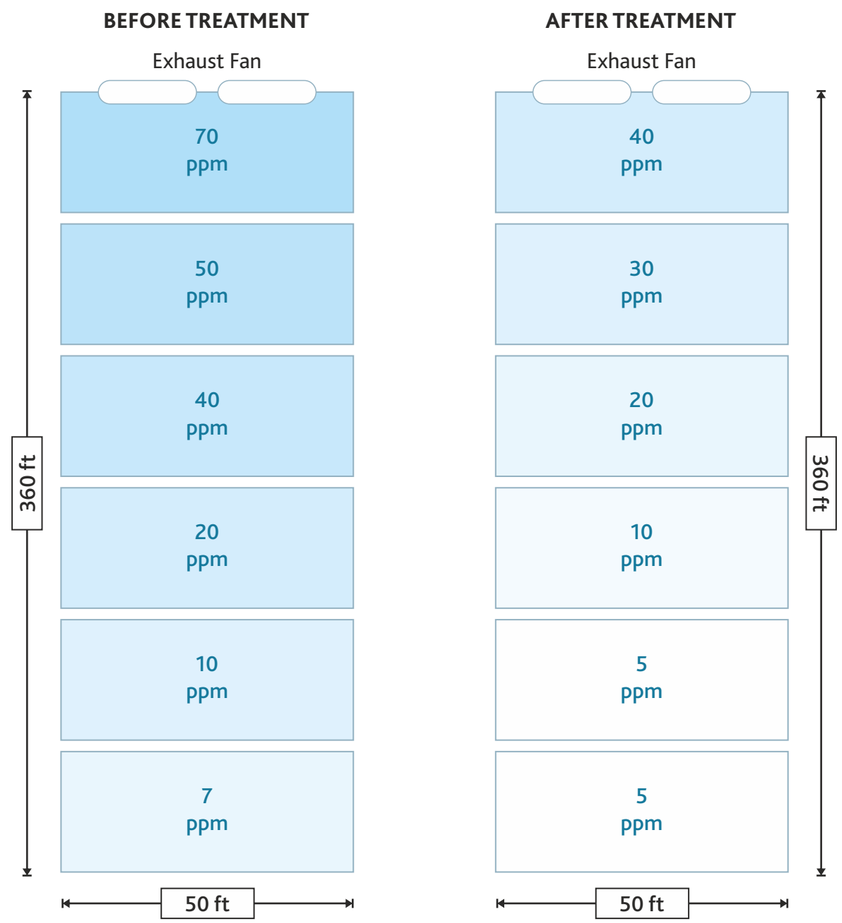
Observations

Following was the observation as shown in illustration below.

Shed 1 - Ground Floor



Shed 2 - First Floor



There was significant reduction in ammonia levels post VicRal 6K spray within the shed in range from 25 to 50% in different marked zones.

Conclusion

Above absorption clearly indicated that VicRal 6k is very effective in significantly reducing ammonia level, thus preventing incidences of respiratory distress which in turn helps to control exposure to respiratory diseases and other infections

FEATURES

ORGANIC ACIDS IN POULTRY FEED

Organic acids properties associated with their Carboxyl group –COOH groupextensively used for decades in feed preservation, protecting feed from microbial as well as fungal destruction. Thus, it may increase the preservation effect of fermented feed. Withdrawal of antibiotics from poultry feeds has generated the need for alternatives that would affect improvement of healthy production traits of broiler chickens and safety for human consuming poultry products. Organic acids such as formic and propionic acids are particularly effective for this purpose and have been used extensively from past 25 years in swine production mostly for feed preservation.

In General, Organic acids are any carboxylic acid including fatty acid& amino acid. Organic acids categorized as weak acid & do not separate completely in water. The formic acid in breeder diet reduces the contamination of tray liners as well some hatchery waste with S. enteritidis. The diet supplemented with lactic acid was found to increase the body weight. The blend of acids is preferred to individual acid in obtaining the desired antimicrobial effect and acidification of diets with weak organic acids such as formic, fumaric, propionic, lactic and sorbic have been reported to improve digestibility of protein, Ca, P, Mg, Zn and served as substrate in the intermediary metabolism. The blend of formic and propionic acids found to be effective in preventing intestinal colonization with Salmonella spp. from naturally or artificially contaminated feed. Relative studies of organic acids showed that the inhibiting effect of the acids was more evident in stomach contents than in content from the small intestine, probably due to the lower pH in the stomach content.

Organic acids play important role as a feed supplement in poultry has a valuable effect on the overall performance of the broiler as well as layer birds. The individual effect of organic acid variable and depends upon several factors. Likewise, different pathogenic bacteria respond variably to various similar organic acids. Organic acids have direct effect on different GIT parameters that may improve the nutrient absorption and digestibility. Effect of bactericidal organic acids is in the following order:

Benzoic acid (C_6H_5COOH)>fumaric acid ($HO_2CCH=CHCO_2H$)> lactic acid ($C_3H_6O_3$)> butyric acid ($C_4H_8O_2$)> formic acid (CH_2O_2)> propionic acid ($C_3H_6O_2$).

Feed Acidifiers showed acidic nature comprised in feeds in order to lower the isoelectric point (pI) of the feed, gut, and microbial cytoplasm thereby inhibiting the growth of pathogenic intestinal microflora. Thus, inhibition reduces the micro flora competitively inhibition for the host nutrients and results in better growth performance of the chicken. They also act as mold inhibitors. Organic acids ions showed antimicrobial effect influence bacterial population is in the upper intestinal tract leads to beneficial effects.

Mode of action of Organic acids

Acidifiers with short chain fatty acids, acetate, propionate and butyrate have contributed expressively to the profitability in poultry and provide people with health and nutritious poultry products.

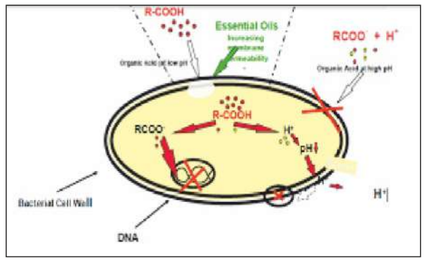


Fig.: Mode of action of organic acids

Un-dissociated form of acid RCOOH could penetrate the bacterial cell wall. Once in the bacterial cell, the higher pH of cytoplasm cause dissociation of the acids, and the resulting reduction in pH due to the release of H+ disrupt the enzymatic reactions &nutrient transport system. This influence destruction of the cytoplasm, as well growth of the bacteria is inhibited. Organic acid ions have capability to attacks on bacteria genome results in its death.

Though there are certain challenges like palatability of the feed, corrosion of the equipment, buffering capacity of dietary ingredients, bacterial resistance due to long term exposure etc. which are manageable with certain preventive measures, the acidifiers are being used due to the larger benefits envisaged. Some of the advantages are listed below

Advantages of feed acidifiers

- Role in maintaining an optimum pH in stomach, allowing correct activation and function of proteolytic enzymes.
- Aids in total protein digestion in the stomach
- Stimulates feed consumption.
- Inhibits the growth of pathogenic bacteria.
- Improvement of protein and energy digestibility by reducing microbial competition with host nutrients and endogenous nitrogen losses.
- Depresses the frequency of sub clinical infections and secretions of immune mediators.
- Reduces the production of ammonia and other growth depressing microbial metabolites.
- Increased pancreatic secretion and trophic effects on gastrointestinal mucosa.

Feed Acidifiers feeding in poultry

Table: Organic acids impacts in Poultry

Sr. No.	Acids	Impacts
1	Fumaric acid	Improvement in weight gain of broilers. Improved feed efficiency in both broilers and layers.
2	Propionic acid	Increase in dressing percentage in female broilers & reduction in abdominal fat for males.
3	Malic acid	Increase in body weight gain.
4	Sorbic acid	Improves feed efficiency ratio.
5	Tartaric acid	Increase in weight gain.
6	Lactic acid	Feed to gain ratio and Body weight gain is improved.
7	Formic acid	Reduction of caecal pI and bactericidal effect on *Salmonella*.
8	Benzoic acid	Positive influence on growth.
9	Butyric acid	Maintain the beneficial micro flora. Increase the Proliferation and maturation of intestinal cells.

FEATURES

CLEANER PRODUCTION IN BREWERY

Contributed by:
Bijay Bahadur
General Manager
Yuksom Breweries

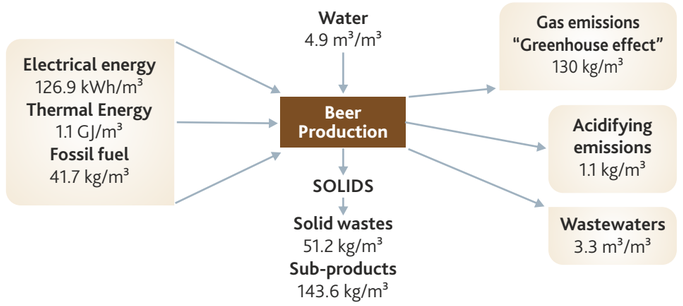


Fig. 1 – Mass balance values per m^3 of beer production

Introduction

Water is a shared resource and essential for everyone on this planet. Without water brewery won't exist as beer is 95% water. As global demand for water continues to rise, it is the responsibilities of all of us to minimize water footprint.

The brewing process is energy intensive and uses large volumes of water. In the process, large quantities of water are used for the production of beer itself, as well as for washing, cleaning and sterilising of various units after each batch are completed. A large amount of this water is discharged to the drains. The main water use areas of a typical brewery are brewhouse, cellars, packaging and general purpose. Water use attributed to these areas includes all water used in the product, tank washing, general washing and cleaning in place (CIP); which are of considerable importance both in terms of water intake and effluent generation.

Similarly, effluent to beer ratio is correlated to beer production. It has been shown that the effluent load is very similar to the water load since none of this water is used to brew beer and most of it ends up as effluent.

A mass balance is depicted in Fig. 1, which represents water and energy inputs and also the outputs with respect to residues and sub-products, liquid effluents and air emissions. Residues similar to urban residues, simple industrial residues, glass, paper, cardboard, plastic, oils, wood, biological sludge, green residues, etc. are classified as solid wastes; surplus yeast and spent grains are considered sub-products. Brewer's spent grains are generally used for the production of low value composts; cattle feed or disposed of in landfill as waste.

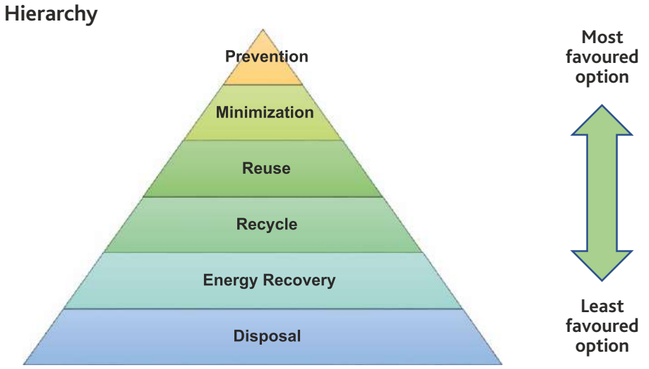
In the brewhouse, where mashing and wort boiling are the main heat consuming processes with high fuel consumption. The conservation of fossil fuel resources will help reduce CO2 emissions from fossil fuel combustion, greenhouse gas emissions, and possible climate changes due to these emissions. Cleaner production (CP) is continuously advocated for in Brewery in order to reduce consumption and emissions.

For an effective CP, brewery should go green by adopting new brewing technology with efficient energy consumption, reduction in odour emission, efficient water consumption for cleaning and cooling purposes, reduction of losses, and the reuse of treated wastewater.

Most technologically advanced equipment and other human activities have extremely damaged the environment and its elements such as water, air, land and others. With this complexity, international organisations have established a system which ensures that all countries are adhering to the need for environmental sustainability. Environmental issues are a critical factor for today's industry competitiveness. Redesigning of the process; recovery of by-products or reuse of effluents are considered as some of the reasonable actions towards an eco-efficient approach. The most significant environmental issues associated with the operation phase of breweries include water consumption, waste water (effluent), solid waste and by-products, energy use and emissions to air. It is need of the hour to critically review the environmental challenges faced by the breweries during brewing process and to provide suggestions on how to reduce the impact of brewing operations on the environment.

The drive to move towards sustainable development has shifted from the environmental to the mainstream political agenda in recent years as it has become quite apparent that some environmental effects of development have global impacts but only localised benefits. Global environmental changes such as ozone depletion and carbon dioxide increase are caused by a relatively small proportion of the earth's population yet affect every society. This awareness was reflected in the significant political concerns expressed at the 1997 Greenhouse Conference in Kyoto, Japan.

Latest Concepts - Waste Management Hierarchy



Cleaner Production – Concept

In brewing industry, there are much scope on energy savings, water usage reductions, packaging minimisation or elimination, process efficiency improvements. Constitution of cleaner production practices are only possible as long as initiatives focus on reducing the consumption of raw materials, or the generation of waste materials. It is only end-of-pipe solutions which generally just shift the pollution from one environmental stream to another that should be differentiated.

For the brewing industry to move towards sustainable operation it will need to do more than incrementally improve existing processes, even though such activities are of great value, both environmentally and economically. It also needs to look at the fundamentals of the process and determine if there are alternate ways of producing the same product which are characteristically "cleaner".

Brewing sustainability, it is clear that several independent breweries are attempting to change industry-wide standards of efficiency. From ideological standards to enforced water regulation, new breweries have clear motivation to increase the efficiency of their operations. By providing reduced production cost, increased economic stimulation, and improved environmental conditions; sustainability auditing is a clearly beneficial investment for any brewery or water related industry looking to improve their operation capacity. The current market-shift seen across the brewing industry is the main motivation for this comparative analysis using these 4 criteria to define the modern sustainable brewery:

1. Water Utilization
2. Energy Efficiency
3. Production Methods
4. Distribution Methods

Reducing the water use intensity across the global breweries has shown a strong commitment to sustainability, inspired by the drought and climate conditions, resulted in a brewery-wide challenge to produce beers with a 4:1 water use to finished beer ratio - meaning that for every 4 liters of water utilized, 1 liter of finished beer is produced. Through the utilization of water sub-metering technology, it is possible to extrapolate the total water use from brewing, compare this to the final volume of production each year, and calculate the water efficiency ratio.

Brewery wastewater is relatively simple and is highly biodegradable. However. a complicating factor is that wastewater volumes, pH, and concentrations of included solids vary constantly.

The suspended solids in the effluent contain organic matter such as grain, trub, yeast, and label pulp as well as inorganic materials such as filter aids and silica gel. Dissolved solids are mainly from beer, wort, and cleaning and sanitizing solutions. The BOD is usually used to index the concentration of biodegradable organics in brewery waste streams. BOD determinations are cumbersome and not very accurate. However, BOD is being used to assess the pollution potential of waste waters and have become the basis for design and operation of wastewater (effluent) treatment plant (ETP).

Wastewater from a brewery may be discharged several ways:

a) Directly into a river;
b) Directly into a municipal sewer system;
c) Into a river or municipal system after pre-treatment;
d) Into the brewery's own waste water treatment plant.

Discharges into public waters are often subject to limitations in organic load, suspended solids, pH, temperature, and chlorine. Now a days, it is mandatory for the breweries to construct a complete wastewater treatment facility to treat the effluent generated. The high costs that are often required for waste treatment offer breweries an additional challenge to eliminate unnecessary wastes and to optimize the reuse of effluents.

Many breweries have made a concerted effort to reduce water usage in order to lower costs for water, water treatment chemicals, and waste water treatment cost based on flow. Not all wastewater requires treatment. For example, non-contact cooling water and rinse water for non-returnable bottles and cans, is relatively clean and may be discharged directly into a river or storm sewer depending on temperature and chlorine limitations.

In the process of brewing and packaging beer, the generation of by-products and waste products is unavoidable. Technological advances and improved microbiological control over the more than 3 decades have enabled the breweries to reduce product losses and to produce valuable by-products from materials that were previously considered waste products.

Opportunities for Upgrading Waste Products

Waste Product	By-Product Type	Waste Product Method of Disposal
Wort	Condensed soluble	Waste treatment
Beer	Fuel ethanol	Waste treatment
Surplus yeast	Feed yeast	Waste treatment
Waste treatment sludge	Fertilizer	Land fill

It reveals that there is significant economic advantage derived from minimizing product losses or upgrading waste products to by-products.

Breweries, especially packaging plants produce large amounts of solid waste materials, much of which can be recycled or used alternatively. These materials include broken pallets, aluminium (canning), cullet (glass bottles), corrugated paper, paper labels, and crown corks.

The alternative to recycling is the disposal of solid waste in landfill sites, which might be costly at times. Recycling, on the other hand, requires labour, sorting equipment, and space. Employee involvement is essential for a successful recycling program.

Even with good waste management, a typical brewery has a waste water volume of 4.5 hl/hl of packed beer.

Energy efficiency is an important component of a brewery's environmental strategy. End-of-pipe solutions can be expensive and inefficient while energy efficiency can often be an inexpensive opportunity to reduce criteria and other pollutant emissions. Energy efficiency can be an effective strategy to work towards the so-called "triple bottom line" that focuses on the social, economic, and environmental aspects of a business.

Cleaner Production – To Sustainability

Every industry should emphasis on the activities and plans of "Cleaner Production" methods, simply because to achieve the goal of "Clean Production" over a time.

Cleaner production has been proven to be economically attractive to the industries which have adopted it. The 3M-3P program (Pollution Prevention Pays) is the most widely known, and Coors Brewing Co. has also achieved recognition and success through its SCRAP program (Save, Conserve, Reduce and Profit). As the costs of environmental effects are increasingly built into the cost of raw materials, pollutant emissions and product ownerships, cleaner production will become an increasingly economic imperative as well as a policy and regulatory requirement.

Thus, a cleaner production policy is just good business for competent and successful manufacturing operations in the world today. While considerable success in:

- Resource utilisation reduction
- Energy minimisation
- Yield improvement
- Product and intermediate substitution

can be expected to occur over the next several decades as a result of cleaner production policies and incentives.

The immense range of ratios of water taken in to beer produced is chiefly due to different efficiencies of water use, although some breweries, e.g., those that bottle a high proportion of their beer in returnable bottles, (which must be cleaned), are at a disadvantage. To control waste, it is necessary to meter the volume and composition of the wastewater from every department and the brewery as a whole, to detect and prevent wasteful practices.

With the implementation of sustainable brewing techniques, small breweries have the potential to improve the overall efficiency of brewing practices. This would provide a significant benefit to businesses and the environment. Based on established benchmarks, one of the most important first steps towards maintaining efficiency standards is to begin auditing and install metering capabilities. There is a strong relationship between metering, which provides the ability to examine resource use intensity, and conscious improvement toward areas of energy or water waste. The ability to examine efficiency within the brewery will provide a better understanding of operations, and determined a baseline ratio to work on improving.

From implementing an audit to assess the efficiency within a brewery and set goals, modifying production and distribution processes will help to achieve overall improvements.

One of the greatest improvements will be achieved within a brewery is the purchase and utilization of high-efficiency equipments specifically designed to eliminate all areas of waste, efficient brewing systems have the ability to reduce impact by a significant percentage. Not only can new technologies provide the ability to reduce waste, the utilization of old-world techniques can create a large impact as well. Efficient practices need to be established in a time where breweries simply could not afford to waste any raw material.

With the utilization of best practices, inspiring efficient practices across the brewing industry can create a massive impact from a financial and environmental perspective. Defining the modern sustainable brewery serves as a guide towards direct improvement of brewing processes. In conclusion, the brewing industry as a single actor has the direct potential to reduce their impact toward human health and the environment by increasing the efficiency of energy demand, improving water utilization, and implementing highly efficient production method.

Conclusions

The brewing industry appears to be going all out for sustainability. The solutions are already available, yet the real opportunity requires us to go beyond simple sustainability and efficiency initiatives, and develop a system-wide approach to industry change.

This level of growth also means that brewery operational footprints will increase the load on local infrastructure, communities and the environment. This can affect the industry's license to operate, as well as the bottom line.

The pathway to expanding sustainable production is based on breweries operating within their local environmental, community and resource limits. This involves sustainable sourcing, as well as closed-loop operations powered by renewable energies, proactive watershed stewardship and responsible by-product management.

There are many benefits to be gained through enhancing the capabilities of individual breweries, the real power comes through developing and nurturing the entire breweries economic ecosystem - the interconnected organizations that build community impact, shared prosperity and long-term resilience for the benefit of all.

While commitments and initiatives from multinational breweries towards their definition of a more sustainable future are commendable, the current agenda simply scratches the surface. Incremental efficiency improvements are necessary, but they are not sufficient.

There are two key strategic sustainability challenges that are often overlooked:

1. Growth has to be sustainable -this means breweries need to deliver absolute decoupling between growth and their operational loading on local infrastructure, communities and the environment.
2. To ensure the economic value generated is more equitably distributed. Warren Buffett summed it up nicely: "The tsunami of wealth didn't trickle down. It surged upward."

Across the brewing industry, there is a clear motive toward sustainable practices which cause a benefit for the environment as well as the business. This is highly pertinent to the industry by providing standards which breweries can strive for.

The brewing industry has the ability to provide benefits on every level from the environment to employees, communities, consumers, and other industries as well.

Brewing techniques from a time where eliminating waste was simply a matter of survival are now seen as an incredibly valuable way to produce more craft beer products while increasing the efficiency of production.

Brewery industries are small and medium enterprises but with a significant social and economic value. Therefore, their sustainability policy requires wastewater treatment systems with the best performance and the fact is that well known processes and technologies are available for such purpose. In order to meet strict constraints with respect to space, odors and minimal sludge production, considerable attention to be prioritize towards the anaerobic–aerobic digestors/reactors.

A sustainable development model is not only an imperative today but is also opening new opportunities for the industrial sector.

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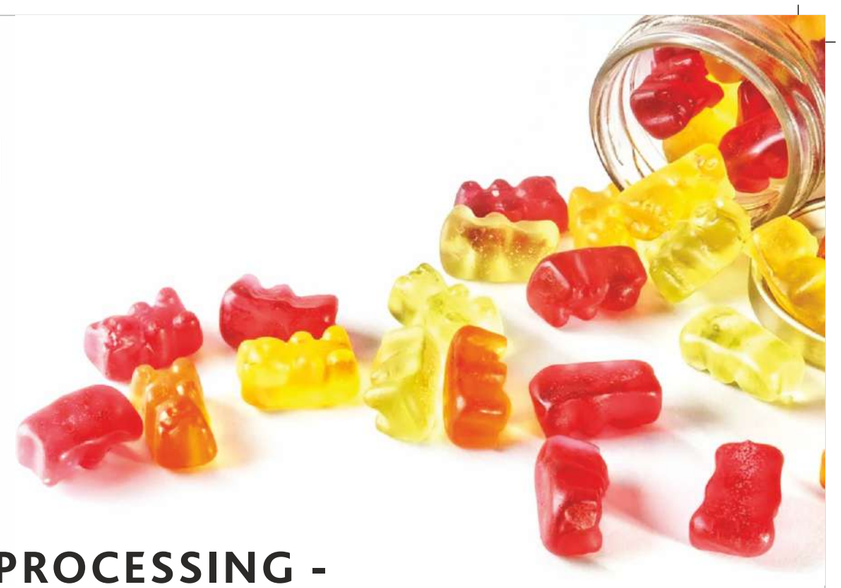
FEATURES



SUGAR PROCESSING - COUPLE OF POINTS

Contributed by:
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About pH

The Chemical journey happens in a zig -zag manner in terms of pH adjustment during sugar processing. Initially the pH of came juice shows around 4.5 and with the help of lime is raised to neutral value i.e. 7.0 pH to arrest the inversion. The pH parameter is crucial for three different types of sugar refinement which includes liming, carbonation and sulfidation.

In the above context pH varies from 4.5 to 11.5 with corresponding temperature variation for the reason of precipitation of dissolved organics, clarification, and finally crystallisation of product. Such ups - down of pH needs sensitive and careful control at different steps, minimizes the potential loss of sugar.

Keeping all such delicate processing, it must bear in mind about various chemical reactions carried out by addition of Regular and Process Chemicals for known clarification and other relevant reasons. So far Regular chemicals like sulphur di-oxide, Phosphoric acid, ammonium bi - fluoride etc. pH of these Chemicals are never being questioned and willingly used for sugar processing purpose. These Chemicals cause pH fluctuations during imperative for their use during processing are like Colour Precipitant, Bio-cide, Viscosity Reducer, Antiscalant etc. These Chemicals are always under the strictness for their essentiality of their pH and Food grade quality.

In summing up the whole processing stages, it may be noted that essentially so-called process chemicals are Parts Per Million (ppm) dosses in use. Such ppm dosses are simply falling under micro quantity and broadly be taken as a drop in ocean. Accordingly, it may be safely assumed that by mixing such Process Chemicals in a bulk material will not change the pH of the bulk material. Whether the pH of such Process Chemicals anywhere 2 - 12 pH cannot be harmful to disturb the pH of the bulk material in any manner or create a pocket of any extreme ph.

In a nutshell, we can derive from above that any Process Chemicals can be accepted irrespective of its body pH and either 2 or 12 pH will not eat up the sugar.

About Food grade quality

This is another issue for sugar Industry which is in a viral form. If simply we assume any Chemical reaction, the reactive Chemical loses its nature after reacting with another Chemical. It can be exemplified as Sodium Hydroxide when reacts with Hydrochloric acid, both loses it's nature by producing the product.

So, considering the use of Food grade process Chemicals during sugar manufacturing, casts doubt about importance of only Food grade chemicals are to be used. However, chemical restrictions can't be ruled out if the product contains any harmful ingredients are found. So, it is proposed to test the product rather than to impose ban Non-Food grade Chemicals. in use by analogy, the use of Regular Chemicals which are not good enough for direct human consumption purpose, however, in reactive system cause safe addition of such Chemicals.

To conclude, it is essential to assure for Process Chemicals the restrictions of pH range and food grade chemicals may not be imposed, rather stress is given on product analysis for its potential loss and harmful ingredients.

FEATURES

SOLUTIONS FOR PROCESS CONDENSATE TREATMENT IN SUGAR MILLS

Contributed by:
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Manager
R&D

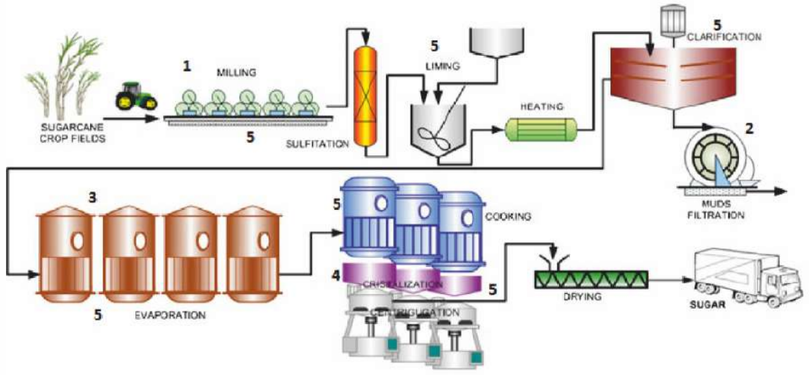
Sugar is one of the important agro-based products and the sugar industry hassignificant impact onIndian economy. Sugar manufacturing process requires huge amount of water and considered to be one of the water intensive industry. Hence, there is a lot of focus on better utilization of fresh water and recycling of process effluent at various locations/ applications. This is also a key requirement to the industry to arrive at Zero Liquid Discharge (ZLD).

Wastewater/ Effluent Generation Points in Sugar Mill

There are various sources of wastewater generating in a sugar industry and the quantity of the effluent depends on the size of the factory. In general, a 5000 TCD sugar mill produces about 1500-2000 KL wastewater per day, from various unit operations. The major locations of wastewater generating points are depicted in Figure 1 and include mill house, cleaning process, cake filtration, syrup boiling and vacuum pan sections of the mill. The combined wastewater from the mill house, cleaning process, cake filtration etc. and has COD (2000 - 4000 ppm), BOD (1000 - 2000 ppm), suspended solids (400 - 700 ppm), pH (5-6) along with inorganic nutrients such as calcium, sulphates, carbonates, nitrates, chlorides, heavy metals, oil and grease in significant concentrations. This combined wastewater is commonly treated in an effluent treatment plant (ETP).

Apart from this, another wastewater stream in sugar mill is the 'process condensate' which is a waste effluent from the syrup boiling and vacuum pan sections of the mill. The condensate consists of volatile organic-inorganic compounds and traces of sugar due to overloading of the evaporators, vacuum pans and extensive boiling of syrup, which further increases the pollutant 'strength' of the condensate. Putrefaction of the condensate increases microbial contamination. Due to these reasons, the condensate as such is not reusable in the mill. Currently many sugar mills face challenges in managing the process condensate due to lack of dedicated treatment solutions.

Figure 1 Wastewater generating locations in a sugar mill



1. Wastewater from mill house consisting of cellulosic fibers, greese, oil, traces of sugars and other components of juice
2. Wastewater from mud filtration process consisting of fibers, clarifying chemicals and sugars
3. Process condensate from evaporation process consisting of volatile organic compounds, sulfides and sugars
4. Process condensate from pan crystallization consisting of volatile organic compounds, sulfides and sugars
5. Cleaning wastewater from various locations consisting of cleaning chemicals, sugars, juice and molasses components etc.

Characteristics of Process Condensate

The COD/ BOD is mostly due to sugars and organic acids, along with traces of other organic compounds such as phenolics. The condensate also consists of significant quantities of sulfides. Other parameters like hardness, alkalinity, chlorides, and total dissolved solids are generally found within the acceptable limits for reuse, as shown in Table 1.

Table 1 Typical characteristics of sugar mill process condensate

Parameter	Value	Desirable value after treatment
COD	100 - 500 mg/L	< 25 mg/L
BOD	50 - 300 mg/L	< 10 mg/L
pH	4 – 6	7-8
TDS	70- 100 mg/L	<100 mg/L
Hardness	< 50 mg/L	< 50 mg/L
Alkalinity	< 50 mg/L	< 50 mg/L
Turbidity	< 10 NTU	< 5 NTU
Sulfide-S	30-50 mg/L	< 10 mg/L
Sulfates-S	< 50 mg/L	< 30 mg/L

Treatment of the Condensate

The general treatment process of sugar mill condensate is based on the following principles and the comparison between these treatments is summarized in table 2.

a. Physical Treatment

Physical Treatment is a process in which the pollutants are mechanically removed from the wastewater. Most common processes under physical treatment are screening, sedimentation, micro-, ultra- and nanofiltration, etc. However, dissolved solids such as sugars and miscible volatile compounds present in the condensate cannot be removed using these processes.

Some other physical processes like adsorption and reverse osmosis can be used to treat the process condensate. Activated carbon and zeolite- based adsorption is widely used in water treatment to remove trace organic –inorganic substances, chemicals, microorganisms, odor and toxins. The ability of an adsorbent to remove certain pollutants from water depends on upon several factors, so the techno-commercial feasibility of the process to treat large volume of condensate with significantly high COD (300-500 ppm) is a question. Some major disadvantages of using adsorption process are-

- Progressive deterioration of the adsorbent capacity as number of cycles increases
- High requirement of steam and vacuum for adsorbent regeneration
- High capital and maintenance cost
- Plugging and clogging of the adsorbent bed causing frequent breakdowns
- Low range of operation temperature (below 40C°)
- Spent adsorbent (which cannot be regenerated further) may be considered a hazardous waste

Possible end uses of condensate

After proper treatment, the condensate may be used for various unit applications and some of these applications are depicted in Figure 2. Major use of the recycled condensate can be as make-up water in cooling tower and for vapor cooling in injection channels. In the mill house, the condensate can be used for moistening the cane fibers for sugar extraction,and to wash the crushing equipment. Additionally, in those units where the sugar mill is integrated with analcohol distillery, the condensate may also be used to dilute the molasses for fermentation. In order to make the condensate fit for these applications, proper treatment process is required.

Reverse Osmosis (RO) is a process which uses a partially permeable membrane and is currently used by many sugar factories and other industries. RO may be used to treat the condensate as the process is effective for the removal of sugars, salts and metal ions. But organic acids present in the condensate may not be removed by RO process. So, it is necessary to neutralize the acids by using alkali before passing though the RO process. By this process, the quality of treated water (permeate) is very good making it fit for almost any application. However, there are some disadvantages of RO process as mentioned below-

- Requirement of caustic soda addition for neutralizing the pH
- Operational challenges due to membrane deterioration and scaling
- Large amount of reject stream generation (typically 30-35%). There arepractically no options for disposal or further treatment of the reject which is a concentrated waste solute stream.
- If recovery of treated water or permeate is increased in industrial operations, effective contaminant removal rates tend to become reduced

b. Biological Treatment

Biological wastewater treatment harnesses the action microorganisms using an effective system to clean water for proper disposal or recycle. Over several decades of history, scientists and engineers have been able to control and refine biological processes to achieve effective and economical removal of organic substances from wastewater.

Sugar mills can adopt aerobic treatment and lagoons for the treatment of process condensate. Lagoons, which use natural microbes from surroundings, typically occupy large area, have high retention time and less efficient. Furthermore, it leads to accumulation of sulfides which turn the water black. Aerobic treatment processes include aeration tanks, oxidation ditches, activated sludge, trickling filters, etc. A good example of an aerobic biological treatment is the 'activated sludge' process, which may be suitable for treating low strength wastewater streams such as process condensate. Moving bed bioreactor (MBR), trickling bed bioreactors and membrane bioreactors can also be explored as other feasible options. An advantage of using biological treatment is that apart from educing COD/BOD levels, it can simultaneously also remove other inorganic pollutants such as sulphates, nitrates, ammonia and chlorides. Using a good bioreactor design and by controlling the desired operating parameters, the quality of biologically treated water can be very good making it fit for almost any application. However, there are some disadvantages of biological treatment as mentioned below-

- Requires further treatment such as flocculation, filtration (sand, activated carbon etc.) to remove the suspended biological matter and disinfection (chemical, UV etc.) which add to the operating cost
- High retention time, overall foot-print and capex of biological treatment process
- The condensate must be neutralized before treatment
- Operation and maintenance of biological treatment requires adequate skills and manpower
- If not disinfected properly, the treated water may have high microbial contamination levels
- Total dissolved solids after treatment can increase significantly.

c. Chemical Treatment

Chemical methods include chemical separation such precipitation, coagulation, flocculation, solvent extraction, ion-exchange process and chemical oxidation, and other chemical reactions which destroy or remove the pollutants from wastewater. Most of the chemical separation process may not be techno-economically suitable for treatment of sugar mill process condensate due its inherent characteristics. Possibly, ion-exchange process can be used to treat the condensate although it is more suitable for water softening and metal ions removal. However, the application of ion-exchange for such application is less studied and large scale application is limited due to high cost. Another disadvantage is the transfer of impurities from the effluent stream to sludge that need to be disposed of because of added resin regeneration chemicals.

Hydroxyl radical-based advanced oxidation processes (AOP) efficiently removes various types of COD causing organic compounds, including difficult, non-biodegradable compounds persistent organic pollutants (POPs) and reduce COD/BOD levels. The selection of oxidizing agents depends on the chemical nature of the pollutants and other factors. Most of the chemical oxidation methods are more suitable when the COD levels are low. Due to its inherent chemical nature, sugar mill process condensate may be directly treated using such chemical oxidation process in combination with other rather inexpensive process such as sand filtration to remove any suspended particles and colloids. The advantages of using advanced chemical oxidation for process condensate include fast process, less retention time and capex requirements, high throughput, simultaneous COD removal and disinfection, ability to remove odor and color etc. However, like any other treatment processes, chemical oxidation also has some disadvantages as mentioned below-

- Required continuous dose of significant amount of oxidizing agents (chemicals)
- Requires regular monitoring of the effluent characteristics since the dose of oxidizing agent depends on the effluent
- Sudden changes in pH and other factors may decrease the process efficiency
- Chemical handling and storage issues
- Rise in TDS depending on the dose and nature of oxidants required

Table 2 - Comparison between different types of processes for treatment of sugar mill process condensate

Issue	Reverse Osmosis	Adsorption	Aerobic Digestion	Lagoons	Ion-Exchange	Chemical Digestion
Retention time	Low	Low	Medium	Very High	Low	Low
Capex	High	Medium	High	High	High	Medium
Opex	Low	Medium	Medium	Low	High	Medium
Skills Requirement	Low	Low	High	Low	Low	Medium
Microbial Contamination	Low	Low	High	High	Low	Low
Working Temperature	25-50 C	25-40 C	25-40 C	30-50 C	20-50 C	20-80 C
TDS Increase	Nil	Nil	High	Low	Low	Low
Waste Generation	Reject Stream	Spent absorbent, backwash water	High Sludge	less Sludge	Spent resins, backwash water	Less sludge
Water recovery	Low	High	High	High	High	High
efficiency	High	Low	High	Low	High	High

Summary

Water conservation is need of the hour and sugar mill process condensate should beconsidered as an important water resource for recycling in order to minimize the use of ground and surface water by the industry. As discussed in this article, many types of treatment processes may be used for the treatment of process condensate but the process should be selected to maximize water recovery and recyclability. Based on the available options the Chemical digestion based treatment can be an effective method for treatment of sugar mill process condensate and can be implemented with minimal infrastructure in short time.

COMMUNICATION

Why your brand needs to embrace

Contributed by:
Purva
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Marketing
Communication

Social Media, New Age Media, Social Communication, Public Networks, Social Networking, Hypermedia, etc. etc. Different names with similar meanings but the purpose is common- connecting people virtually.

Journey began from the 2000s, when a small group of people mostly college students used social media for posting feeds and connecting virtually. People were very skeptical about its future as they did not understand how to monetize social media and turn it into something powerful.

However, if we look now, social media is a huge part of our lives. It is so important that even if we skip our meal, we cannot skip scrolling on our Facebook page or Instagram because it satisfies our curiosity to know about the latest updates.

It has changed the way we function in our lives. It is inevitable, it is formidable, and it is here to stay.

Now for branding, social media acts as the most powerful avenue. Small businesses or MNCs, social media proves to be effective for generating brand awareness, interacting with customers, and creating a meaningful customer experience.

In a nutshell, the more people know about your brand, the more of your products or services will get recognize.

But how to kickstart the process? Let us have a look:

1

Choosing the correct platform- Which one to choose? Facebook, LinkedIn, Twitter, Instagram, Pinterest??? For branding it is important to focus on quality and not quantity. For starters, you can identify your platform by knowing the features of each one of them. However, you also need to understand your target audience. For example, if you are into fashion, your go-to platforms can be Instagram, Pinterest, and Facebook considering the fashionistas and potential customers available on those platforms. Then it will help to decide which one could most help you to build an active community and loyal customers.

2

Creating authentic content- Have you ever came across Amul's ads? The contents are simple yet engaging and powerful. The idea is, in this thriving world, you need to work on producing high quality and engaging content that can stand out from the rest. The topic should be focused and relatable to your brand with fascinating visuals to attract the customers.

3

Making a habit to post regularly- Do you know that 90.4% of Millennials, 77.5% of Generation X, and 48.2% of Baby Boomers are active social media users. This implies that if you are posting regularly on your social media platform, there are chances to higher visibility. Your regular updates will help your audience to remember you for a longer period. Moreover, it will aid to convert the potential audience into loyal customers. However, regular posting does not mean you have to bombard your page with too many posts. One or two per day will do the work.

4

Collaborating with influencers: Social media influencer is most common words these days. Especially after the battle rage of Tiktok Vs Youtubers, we all came across the word "Influencer" in the video multiple times. However, it is more than that. Social media influencers have the power to affect the purchasing decisions of others through his/her authority, knowledge, position, and relationship with the audience. They are the ones who have built connections with the audience basis their knowledge and expertise on specific topics. When brand collaborates with these influencers, it helps to promote the brand, product, services and gives the opportunity to reach more leads, generate new customers, and boost overall conversion rates.

5

Connecting with your audience: When you speak to someone in person, you are either looking for a response or maybe more. Similarly, in the virtual world, when you post something on social media platforms sooner or later you receive feedback on that post. Now what will you do next? You will connect with your audience. You will reply with authentic information. But is the task done? No! You must do more. You must push your boundaries of imagination. Be a storyteller and narrate your brand most creatively. Adding to it, while interacting with your followers you can use emojis, texts, trending popular hashtags. Not only this is fun, but it also impacts your audiences to a great extent.

These are the five tips you can start your brand awareness at ease. But also keep in mind that social media is fun so rather making it a tiresome task, try to have fun while working on your goals. After all that is what it was originally intended for and must continue to be from every business perspective.

HEALTH AND WELLNESS

HEALTH AND WELLNESS

MARVELOUS BENEFITS OF JAGGERY FOR HEALTH

Contributed by:
Dinesh Sharma
Regional Manager
Business Development

Do you know that Gur or jaggery contain lots of healthy Nutrients?

You have seen many of our older people or family members eating a piece of Gur. It is not only because of its taste, but it also has various beneficial properties that fulfill required nutrition to our body.

Here are Benefits of Gur /Jaggery which everyone should know -

1 Prevents constipation

Jaggery stimulates the digestive enzymes in the body, encourages bowel movements and thus helps prevent and relieve constipation. Constipation is a situation in which there is trouble in emptying the bowels, usually related with hardened feces. It also acts as a diuretic that can help stimulate bowel movement. A small piece of jaggery after lunch could initiate digestion, which is key of good health.

2 Detoxes the liver and boost immunity

Jaggary is a natural body cleanser. Jaggery helps cleanse the liver by wash out harmful toxins from the body, which further helps to liver for detoxification. The most renowned benefits of jaggery is its capability to purify the blood. When consumed on a regular basis and in little quantities, it cleanses the blood. Jaggery is the best cleansing manager for the body, on this basis it is advised to eat jaggery to remove useless element from the body. It efficiently dirt free the respiratory system, lungs, intestines, stomach and food pipe. Eating jaggery is highly recommended for people working/living in highly polluted areas.

3 Treats flu

Fight symptoms of a cold and cough with the help of gur. Jaggery generates heat in the body, which is why generally people consume it in winters. This warming effect in jaggery makes it an amazing sweet that can treat cold and flu.

4 Relieves joint pain

"If you bear from aches and joints pain, eating jaggery can provide you with much-needed relief", says Dr. M. K. Ahuja, Sukhda Hospital. You can eat it with a piece of ginger to lighten joint pain, or even drink a glass of milk with jaggery every day to help bones reinforce, thus preventing joint and bone problems such as arthritis.

5 Weight loss

Jaggery is a rich resource of potassium that helps in the balance of electrolytes as well as building muscles and increase metabolism. Potassium in addition helps in the reduction of water retention, which helps in controlling your weight", says Nutritionist from Delhi, Anshul Jaibharat. These feature play an important role in effective weight loss, so if you're looking to lose some unwanted pounds, include this food in your diet.

6 Helps Urinary Problems

Daily uses of jaggery Helps Urinary Problems, Jaggery helps in stimulating urination that is good news for people who have difficulty in passing urine. Jaggery can also help in falling inflammation of the bladder. Experts advise drinking a glass of warm milk with jaggery to treat urinary problems and improving the urine flow.

JAGGERY VS. SUGAR:

A Comparative Study

Let's have a look how Jaggery is different from sugar.

- 1 ton of sugarcane produces 140 kg of jaggery.
- So 40% more production in Jaggery.
- Sugarcane yield is 35 crore tones annually.
- Jaggery units provides 40 times more employment than sugar factories for same capacity.
- Jaggery is full of nutrients & beneficial to body.

- 1 ton of sugarcane produces 100 kg of sugar.
- Sugar factory requires 50 times more capital than jaggery units of same production capacity.
- Sugar industry exploits Rs.25,000 crores from the people.
- Sugar is white poison.
- It has 59 kinds of dangerous side effects.
- It creates diabetes.
- It stimulates heart attack.

NEW JOINERS

Kuldeep Vidyadhar Argade
Assistant Manager
Department:
CS
DOJ: 13/01/2020

Girish Torawane
Area Sales Manager
Department:
BD
DOJ: 28/01/2020

Vijay Pratap
Associate
Department:
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DOJ: 22/01/2020

Abhijeet Sudhir kohok
Assistant Manager
Department:
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DOJ: 20/02/2020

Amitabh Pandey
Sales & Technical Head
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Animal Nutrition
DOJ: 03/01/2020

Maloy Bhattacharya
Assistant Manager
Department:
BD
DOJ: 20/02/2020

Vijashree Meena
Head
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DOJ: 04/02/2020

WOMEN'S DAY CELEBRATION PICTURES

EVENT

Catalysts

2ND INTERNATIONAL CONFERENCE AND EXHIBITION ON SUSTAINABILITY

Innovation and Diversification in Sugar and Allied Industry

Vasantdada Sugar Institute, Pune, Maharashtra, India
Jan 31-Feb -02, 2020

Catalysts

making things happen...

PURSUIT OF EXCELLENCE

Catalysts values are based on belief of collective growth and respect in our internal and external relationships. This value system has facilitated our endeavour to enter into research and scientific collaborations with highly reputed institutes and organizations. We have a well-defined process for developing and launching innovative products based on the collaborative model.

Catalysts continuous striving for quality products and services developed with an innovative mindset has been recognized by various institutions. Our quality journey has been further detailed below:

Catalysts have been certified by ISO 9001:2015 ensuring compliance across multiple criteria including effective Quality Management System, efficient management of our processes and continuous improvement of the system.

Halal Certification Services (HCS) is a world-wide recognized certification providing assessment, auditing, and training services.

It has been established under the Food Safety and Standards Act, 2006 which consolidates various acts & orders that have hitherto handled food related issues. FSSAI has been created for laying down science-based standards for articles of food and to regulate their manufacture, storage, distribution, sale, and import to ensure availability of safe and wholesome food for human consumption.

Kosher certification is a standalone international quality standard which is increasingly prevalent in the food ingredients and retail sector. Catalysts Biotechnologies Pvt Ltd is certified from KLBD Kosher agency. As Europe's largest kosher agency KLBD is respected and accepted by all parties worldwide Kosher products require kosher certified ingredients. Ingredient buyers specify kosher knowing that their supplier's manufacturing process has been independently audited.

The FSSC 22000 Food Safety Management System provides a framework for effectively managing organization's food safety responsibilities. It is fully recognized by the Global Food Safety Initiative (GFSI) and is based on existing ISO Standards. It demonstrates that the company has a robust Food Safety Management System in place that meets the requirements of customers and consumers.

Research has been the backbone of Catalysts Biotechnologies Pvt. Ltd. since its inception. The research and development division located at 3/1/4, Site IV, Industrial Area, Sahibabad, Ghaziabad is recognized by Department of Scientific and Industrial Research (DSIR), Department of Science & Technology (DST), Ministry of Science & Technology, Govt of India. This recognition has created an enabling environment for development and utilization of new innovations benefit thereof for society and environment.