LIQUID ENZYMES

A comprehensive information booklet

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Liquid Enzymes Information

Enzyme, any one of many specialised organic substances, composed of polymers of amino acids, that act as catalysts to regulate the speed of the many chemical reactions involved in the metabolism of living organisms. The name enzyme was suggested in 1867 by the German physiologist Wilhelm Kühne (18371900); it is derived from the Greek phrase enzyme, meaning in leaven. Those enzymes identified now number well over 900.

Enzymes are classified into several broad categories, such as hydrolytic, oxidising, and reducing, depending on the type of reaction they control. Hydrolytic enzymes accelerate reactions in which a substance is broken down into simpler compounds through reaction with water molecules. Oxidising enzymes, known as oxidases, accelerate oxidation reactions; reducing enzymes speed up reduction reactions, in which oxygen is removed. Many other enzymes catalyse other types of reactions.

Individual enzymes are named by adding ase to the name of the substrate with which they react. The enzyme that controls urea decomposition is called urease; those that control protein hydrolyses are known as proteinases. Some enzymes, such as the proteinases trypsin and pepsin, retain the names used before this nomenclature was adopted.

Properties of Enzymes

As the Swedish chemist Jöns Jakob Berzelius suggested in 1823, enzymes are typical catalysts: they are capable of increasing the rate of reaction without being consumed in the process. See CATALYSIS below. Some enzymes, such as pepsin and trypsin, which bring about the digestion of meat, control many different reactions, whereas others, such as urease, are extremely specific and may accelerate only one reaction.

Still others release energy to make the heart beat and the lungs expand and contract. Many facilitate the conversion of sugar and foods into the various substances the body requires for tissue building, the replacement of blood cells, and the release of chemical energy to move muscles. Pepsin, trypsin, and some other enzymes possess, in addition, the peculiar property known as autocatalysis, which permits them to cause their own formation from an inert precursor called zymogen. As a consequence, these enzymes may be reproduced in a test tube.

As a class, enzymes are extraordinarily efficient. Minute quantities of an enzyme can accomplish at low temperatures what would require violent reagents and high temperatures by ordinary chemical means. About 30 g (about 1 oz) of pure crystalline pepsin, for example, would be capable of digesting nearly 2 metric tons of egg white in a few hours. The kinetics of enzyme reactions differ somewhat from those of simple inorganic reactions. Each enzyme is selectively specific for the substance in which it causes a reaction and is most effective at a temperature peculiar to it. Although an increase in temperature may accelerate a reaction, enzymes can be unstable when over heated. The catalytic activity of an enzyme is determined primarily by the enzyme's amino acid sequence and by the tertiary structure that is, the three-dimensional folded structure of the macromolecule. Many enzymes require the presence of another ion or a molecule, called a cofactor, in order to function. As a rule, enzymes do not attack living cells. As soon as a cell dies, however, it is rapidly digested by enzymes that break down protein.

The resistance of the living cell is due to the enzyme's inability to pass through the membrane of the cell as long as the cell lives. When the cell dies, its membrane becomes permeable, and the enzyme can then enter the cell and destroy the protein within it. Some cells also contain enzyme inhibitors, known as antienzymes, which prevent the action of an enzyme upon a substrate.

Practical Uses of Enzymes Alcoholic fermentation and other important industrial processes depend on the action of enzymes that are synthesised by the yeasts and bacteria used in the production process. A number of enzymes are used for medical purposes. Some have been useful in treating areas of local inflammation; trypsin is employed in removing foreign matter and dead tissue from wounds and burns.

Historical Review Alcoholic fermentation is undoubtedly the oldest known enzyme reaction. This and similar phenomena were believed to be spontaneous reactions until 1857, when the French chemist Louis Pasteur proved that fermentation occurs only in the presence of living cells. Subsequently, however, the German chemist Eduard Buchner discovered (1897) that a cell free extract of yeast can cause alcoholic

fermentation. The ancient puzzle was then solved; the yeast cell produces the enzyme, and the enzyme brings about the fermentation. As early as 1783 the Italian biologist Lazzaro Spallanzani had observed that meat could be digested by gastric juices extracted from hawks. This experiment was probably the first in which a vital reaction was performed outside the living organism. After Buchner's discovery scientists assumed that fermentations and vital reactions in general were caused by enzymes. Nevertheless, all attempts to isolate and identify their chemical nature were unsuccessful. In 1926, however, the American biochemist James B. Sumner succeeded in isolating and crystallising urease. Four years later pepsin and trypsin were isolated and crystallised by the American biochemist John H. Northrop. Enzymes were found to be proteins and Northrop proved that the protein was actually the enzyme and not simply a carrier for another compound.

Research in enzyme chemistry in recent years has shed new light on some of the most basic functions of life. Ribonuclease, a simple three dimensional enzyme discovered in 1938 by the American bacteriologist René Dubos and isolated in 1946 by the American chemist Moses Kunitz, was synthesised by American researchers in 1969. The synthesis involves hooking together 124 molecules in a very specific sequence to form the macromolecule. Such syntheses led to the probability of identifying those areas of the molecule that carry out its chemical functions, and opened up the possibility of creating specialised enzymes with properties not possessed by the natural substances. This potential has been greatly expanded in recent years by genetic engineering techniques that have made it possible to produce some enzymes in great quantity.

The medical uses of enzymes are illustrated by research into Lasparaginase, which is thought to be a potent weapon for treatment of leukemia; into dextrinases, which may prevent tooth decay; and into the malfunctions of enzymes that may be linked to such diseases as phenylketonuria, diabetes, and anaemia and other blood disorders.

CATALYST

Catalysis, alteration of the speed of a chemical reaction, through the presence of an additional substance, known as a catalyst, that remains chemically unchanged by the reaction. Enzymes, which are among the most powerful catalysts, play an essential role in living organisms, where they accelerate reactions that otherwise would require temperatures that would destroy most of the organic matter.

A catalyst in a solution with or in the same phase as the reactants is called a homogeneous catalyst. The catalyst combines with one of the reactants to form an intermediate compound that reacts more readily with the other reactant. The catalyst, however, does not influence the equilibrium of the reaction, because the decomposition of the products into the reactants is speeded up to a similar degree. An example of homogeneous catalysis is the formation of sulphur trioxide by the reaction of sulphur dioxide with oxygen, in which nitric oxide serves as a catalyst.

The reaction temporarily forms the intermediate compound nitrogen dioxide, which then reacts with oxygen to form sulphur oxide. The same amount of nitric oxide exists at the end as at the start of the reaction.

A catalyst that is in a separate phase from the reactants is said to be a heterogeneous, or contact, catalyst. Contact catalysts are materials with the capability of adsorbing molecules of gases or liquids onto their surfaces. An example of heterogeneous catalysis is the use of finely divided platinum to catalyse the reaction of carbon monoxide with oxygen to form carbon dioxide. This reaction is used in catalytic converters mounted in automobiles to eliminate carbon monoxide from the exhaust gases.

Some substances, called promoters, do not have catalytic ability by themselves but increase the effectiveness of a catalyst. For example, if alumina is added to finely divided iron, it increases the ability of the iron to catalyse the formation of ammonia from a mixture of nitrogen and hydrogen. Materials that reduce the effectiveness of a catalyst, on the other hand, are referred to as poisons. Lead compounds reduce the ability of platinum to act as a catalyst; therefore, an automobile equipped with a catalytic converter for emission control must be fuelled with unleaded petrol.

Catalysts are of major importance in today's industrial world. It has been estimated that about 20 percent of the U.S.A. gross national product is generated through the use of catalytic processes. One current area of active research in catalysis is that of enzymes. Natural enzymes have long been used by a few

industries, but fewer than 30 such enzymes are presently available in industrial amounts. Biotechnologists are seeking ways in which to expand this resource and also to develop semisynthetic enzymes for highly specific tasks. Some tasks under development are mining for coal and gold using Enzymes to do the work.

Liquid Enzymes – About The Product

Waste Treatment Lagoons, Clarifiers, Digesters, and Leach Ponds Liquid Enzymes is a highly concentrated, proprietary blend of selected natural micro-organisms, essential nutrients, and synergists which help degrade the high concentrations of fat, grease, blood, floating matter, and organic matter found in processing wastes from meat plants, (poultry, fish, beef, pork, etc.). It is effective in anaerobic and facultative lagoons, aerated systems, and trickling filters. It degrades materials, which reduce BOD, and COD, improves settling in clarifiers, and reduces suspended solids.
Liquid Enzymes will quickly destroy grease and fat build-up in grease Interceptors, drains, sewer lines and pump and lift stations, and is suitable for use in Meat, Poultry, Piggery's, and Egg Production.
Regular use will also help - -
Reduce overall sludge volume in clarifiers, DAF plants and treatment lagoons through enhanced biodegradation and help cause good settling characteristics.
Provide optimised degradation of organic wastes; including fecal, blood and fats from animal slaughterhouses, meat and poultry produce processors.
Reduce the population of hydrogen sulphide forming bacteria and odours associated with them.
Improve anaerobic digestion and increase production of useful methane gas from indigenous Metho genic bacteria, by providing partially digested substrate for these bacteria to further metabolise.

HOW IT WORKS :
Liquid Enzymes is a high performance, non-toxic and biodegradable multiple enzyme at the forefront of the modern Australian biotechnology industry.
It breaks down oils and greases in septic tanks, sludge treatment ponds, grease traps, holding tanks, floors, drains and pipes making it easier for the bacteria to consume any organic waste matter. At the same time, it rapidly eliminates Odour. Liquid Enzymes is effective over a wide range of pH levels and temperatures. Because it is in a liquid form, bacterial stimulation is immediate and there are no residues. It can also be sprayed and used for a wide range of general purpose cleaning problems.

FEATURES :
Deodorises by destroying the molecular structures which cause odour problems
Reduces levels of Biochemical Oxygen Demand (BOD) by enzymolysis through decomposition or conversion of the contaminants
Fully neutralises contaminants as a bio-degradable cleaner
Removes grease and oils
Improves bonding and adhesion
Safe to use, is non-toxic, non allergenic and non-flammable
Is totally environmentally compatible
Biodegrades the removed organic contaminant
Leaves no residue
Functions equally in fresh or salt water
Function in aerobic and anaerobic systems

ODOUR ELIMINATION:
Liquid Enzymes works to eliminate odour by changing the molecular structure of the host environment. Reaction time is instantaneous When placed into an aqueous system containing certain essential nutrients, Liquid Enzymes cultures become the dominant organisms in the system and bio-convert the organic contaminants into fractions of smaller molecular size. When maintained as the dominant organism in the treatment system through control of environmental conditions and periodic addition of fresh cultures, BOD and COD reductions of over 80% can be anticipated for many organic wastes within a few weeks.
Liquid Enzymes cultures are facultative anaerobes and achieve the bioconversion of organic compounds through both catabolic and metabolic enzyme digestion, under both aerobic and anaerobic conditions. Although Liquid Enzymes cultures function well in both conditions, their efficiency is improved if oxygen is plentiful in the treatment environment. Usually, shallow circulating bodies of water contain adequate levels of DO (dissolved oxygen).
Confined treatment sites such as stagnant lakes, ponds, drainage ditches, and municipal or industrial waste treatment clarifiers, DAF plants and lagoons should be artificially aerated to optimise bio-treatment efficiency.
In addition to carbon and oxygen, the natural bacteria require certain trace elements for successful growth. These include nitrogen, phosphorus, calcium, magnesium, zinc, iron, sodium and sulphur. Liquid Enzymes treatment includes trace elements so that this growth is assured and the environment is natural and effective.

ENVIRONMENTAL SAFETY :
Liquid Enzymes cultures are a blend of facultative anaerobes originally derived from the soil, which utilise non living organic matter as a food source.
The cultures at the correct dose rate are not harmful to either aquatic or land plants or animals and have been released into marine and fresh water treatment areas with ecological safety.

PACKAGING :
Liquid Enzymes is in liquid form and packed in 10Litres, 20Litre, 200Litre and 1000Litre plastic containers

STABILITY :
When stored under normal conditions of temperature and humidity, the cultures are stable for a minimum of 2 years. Freezing has no significant effect on the cultures; however, they must be thawed prior to use. Excessive moisture may cause premature reactivation of cultures and a loss of potency.

PHYSICAL DATA

APPEARANCE:	LIGHT BROWN VISCOUS SOLUTION
ODOUR:	PLEASANT HERBAL
MISCIBILITY WITH WATER	UNLIMITED
MISCIBILITY WITH OTHER SOLVENTS	UNLIMITED
SPECIFIC GRAVITY:	1.02KG/L AT 20°C
ACTIVE PH RANGE:	4.5 TO 8.5
VISCOSITY (20°C) CONCENTRATE:	0.13-0.25 DYNES/CM2 OR 13-25 CPS (BROOKFIELD)
DECOMPOSITION:	82% IN 14 DAYS
FIRE & EXPLOSION HAZARD DATA	
FLASH POINT:	NONE
AUTO IGNITION TEMPERATURE:	NONE
FLAMMABILITY	NON-FLAMMABLE
HEALTH HAZARD DATA	
HEALTH HAZARD	NONE
TOXICITY:	NON TOXIC
EFFECTS OF OVER-EXPOSURE	
EYE CONTACT	MODERATE IRRITANT
SKIN CONTACT	NEGLIGIBLE
SKIN ABSORPTION	NOT LIKELY TO BE ABSORBED IN TOXIC AMOUNTS
ACUTE ORAL LD50:	NONE (.10G/KG)
ACUTE DERMAL TOXICITY	NONE (.2G/KG)

EMERGENCY & FIRST AID PROCEDURES

EYE CONTACT: *FLUSH EYES WITH LOW PRESSURE WATER FOR UP TO 15 MINUTES. IF IRRITATION PERSISTS, SEEK MEDICAL ADVICE.*

SKIN CONTACT: *IF CHRONIC SKIN EXPOSURE, WASH WITH SOAP AND WATER.* INGESTION: *IF SWALLOWED IN LARGE QUANTITIES, INDUCE VOMITING.*

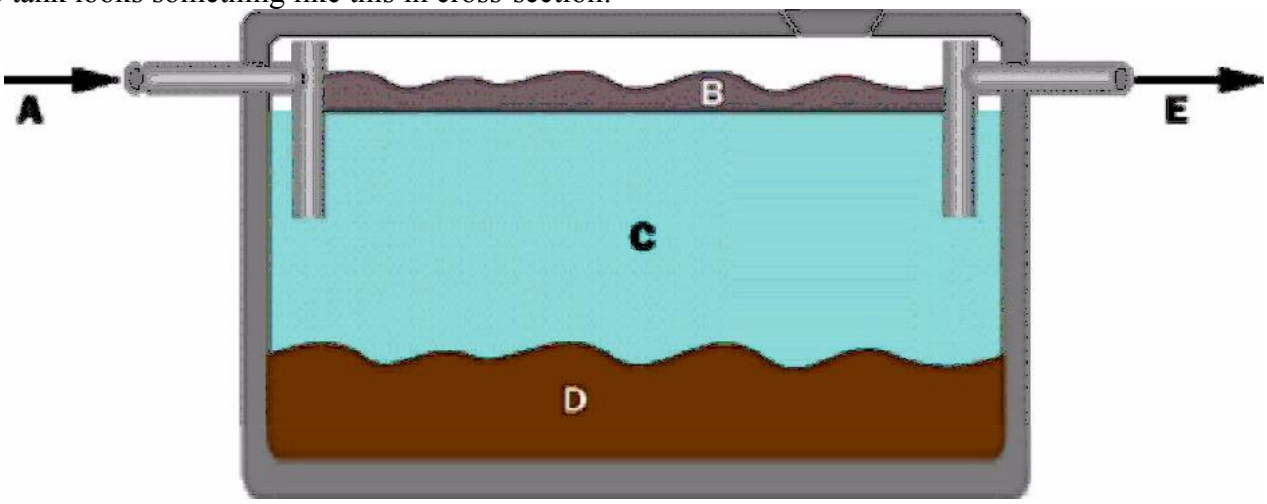
NOTE TO PHYSICIAN: *TREAT SYMPTOMATICALLY*

The effective use of Liquid Enzymes cultures in a bio-treatment program is dependent upon the environmental conditions present at the site.
Adverse conditions such as cold temperatures, oxygen, nitrogen, or phosphorus deficient water, chemical toxic load, highly acidic/alkaline Ph or excessive dilution of biomass through inadequate dosage, may retard or prevent the cultures from becoming dominant in the treatment system.
Under such conditions, a pilot scale application study should be made to determine the organic degradation efficiency and dosage schedules.

Grease Interceptors and Septic Tanks

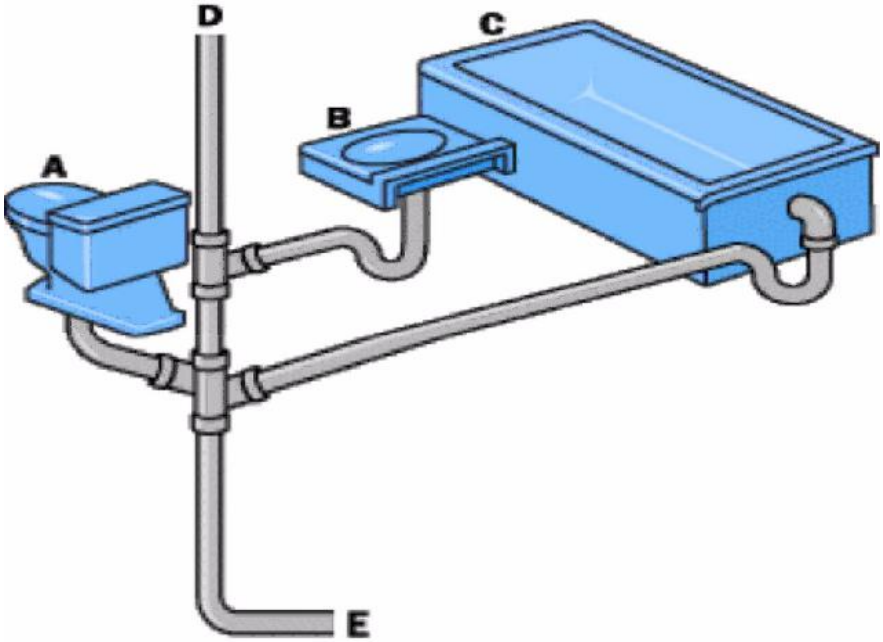
Septics

In rural areas where houses are spaced so far apart that a sewer system would be too expensive to install, people install their own, private sewage treatment plants. These are called septic tanks.
A septic tank is simply a big concrete or steel tank that is buried in the yard. The tank might hold 1,000 gallons (4,000 litres) of water. Waste water flows into the tank at one end and leaves the tank at the other. The tank looks something like this in cross-section:



A From Home
B Scum layer
C Fairly clear water
D Sludge
E Exit to trench or sewer
In this picture, you can see three layers. Anything that floats rises to the top and forms a layer known as the scum layer.
Anything heavier than water sinks to form the sludge layer. In the middle is a fairly clear water layer. This body of water contains bacteria and chemicals like nitrogen and phosphorous that act as fertilisers, but it is largely free of solids.

Waste water comes into the septic tank from the sewer pipes in the house, as shown here:



A septic tank naturally produces gases (caused by bacteria breaking down the organic material in the waste water), and these gases don't smell good. Sinks therefore have loops of pipe called P-traps that hold water in the lower loop and block the gases from flowing back into the house. The gases flow up a vent pipe instead -- if you look at the roof of any house, you will see one or more vent pipes poking through.

Grease Interceptors

Grease traps or interceptors are passive devices required by municipalities to stop grease, fat, oil, wax or debris from entering the city's sanitary sewer system. Such materials cause blockages in the system, which cause backups and overflows. Traps and interceptors are designed to separate greasy materials from waste water so that they can be removed before they enter the sewer system.

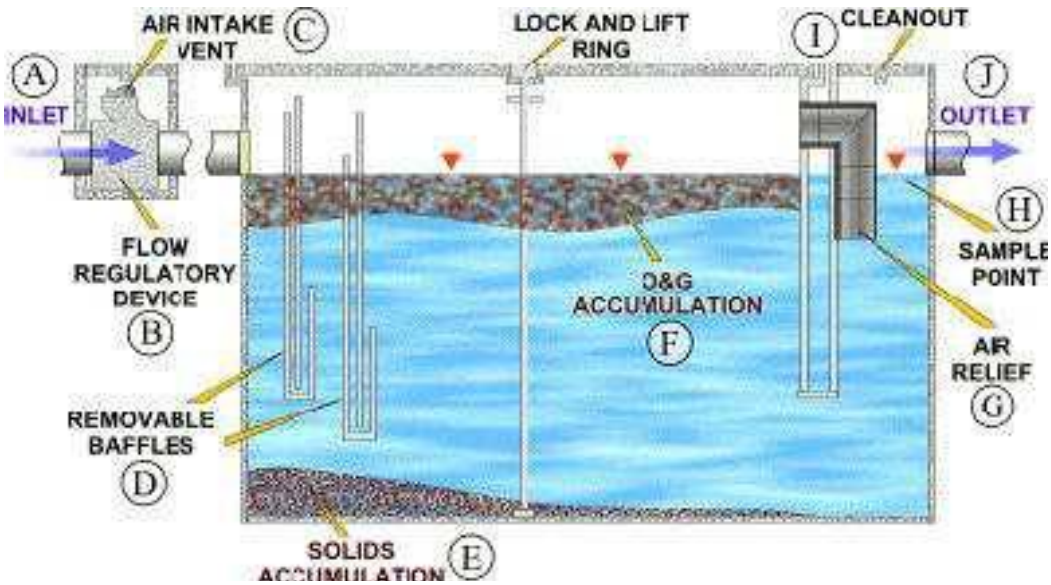
All restaurants, caterers, school cafeterias and other commercial cooking facilities must avoid discharging grease into the municipal sewer system.

Grease interceptors must receive waste water from all contributory sources, such as pot sinks, dishwashers, floor drains and mat washing area drains before draining to the sanitary sewer system.

Typical building codes require all such new or rebuilt facilities to install a grease interceptor to pre-treat grease entering a sewer. All units should be fitted with a standard final-stage sample box. Interceptors must typically be sized for at least a 30 minute peak waste water flow detention time from all contributory sources.

On occasion, a grease trap will be required in place of an interceptor. Traps are typically required to have a rated flow capacity sufficient for the same 30-minute flow time.

The graphic below shows how similar grease traps are to septic systems, grease traps normally have several baffle plates to separate the sections.



Enzymes - How It Works

Liquid Enzymes is a high performance, non-toxic and 100% biodegradable multiple enzyme at the forefront of the modern Australian bio-technology industry. It breaks down oils and greases in septic tanks, sludge treatment ponds, grease traps, floors, drains and pipes making it easier for the bacteria to consume any organic waste matter. At the same time, it rapidly eliminates odours.
Liquid Enzymes is effective over a wide range of pH levels and temperatures. Because it is in a liquid form, bacterial stimulation is immediate and there are no residues. The use of enzymes to improve the biological degradation of organic matter is well known. It has been found especially advantageous to add quantities of a number of enzymes directly into septic tank systems and sludge treatment ponds so that catalytic reactions can digest organic impurities and stimulate and accelerate natural bacterial action.

Odour Elimination
Liquid Enzymes works to eliminate odour by changing the molecular structure of the host environment. Reaction time is instantaneous. Normally present bacteria produce odours while decomposing nutrients. Hydrogen sulphide is the most infamous. Liquid Enzymes does not produce malodorous compounds. Rather, it uses them in its unique metabolic process thus an advantageous synergistic relationship is formed. To control organic odour on tip face and in transfer stations Liquid Enzymes is sprayed in a diluted form to capture the air born sulphides, return them to the ground to continue the digestion of the organic waste.
Liquid Enzymes is not a masking agent; it digests the cause of the odour so it cannot return. Liquid Enzymes is passed by AQIS [DPI] and MAF [NZ] for use in food preparation areas for odour control and surface cleaning.

Grease Traps, Septic Tanks And Sludge Treatment Ponds
Liquid Enzymes emulsifies and digests grease and other organic contaminants that cause expensive pump outs and foul odours. With conditioned use, Liquid Enzymes will keep grease traps, drain lines, garbage disposals, septic tanks, leach drains, and sludge treatment ponds free flowing and odourless. There are many organisms naturally in traps and lines. Few affect animal and vegetable fats and oils. In order to deal effectively with grease biologically, it is necessary to induce a population shift from undesirable to desirable organisms (i.e., to dominate microbial activity). Bioaugumentation with Liquid Enzymes accomplishes this dominance. Grease is digested by Liquid Enzymes and converted to fatty acids, glycerol's, carbon dioxide and water. This process is called solubilisation. It inherently prevents rebinding of the grease recreating the problem further down the line as can happen when using chemicals and solvents. Some of the other byproducts of solubilisation become nutrients for other bacteria present to further reduce accumulation.

Leach Drains & Sullage Pits
Liquid Enzymes will rejuvenate clogged leach drains, sullage pits and restore the absorption field to full capacity eliminating and/or significantly reducing expensive maintenance.

BOD's and Suspended Solids
Reduces levels of Biochemical Oxygen Demand (BOD) by enzymolysis through decomposition or conversion of the contaminants. Liquid Enzymes as reductions in BOD's and suspended solids in the order of 30- 40% are being achieved.

Reconstitution
There are many users of Liquid Enzymes who will testify that previously clogged and dysfunctional grease traps, septic tanks and leach drain systems have begun to operate effectively as a result of continual usage of Enzymatic. This process can take anything from a few weeks to a few months to take effect. It is our firm belief that if reconstruction were occurring then these systems would block up again relatively quickly. The evidence is the opposite with our largest user, Baldivis Poultry Pty Ltd who

have been using the product for approximately for 4.5 years. His leach drain has never worked as well despite a four fold increase in his chicken processing works.

Enzymes Applications

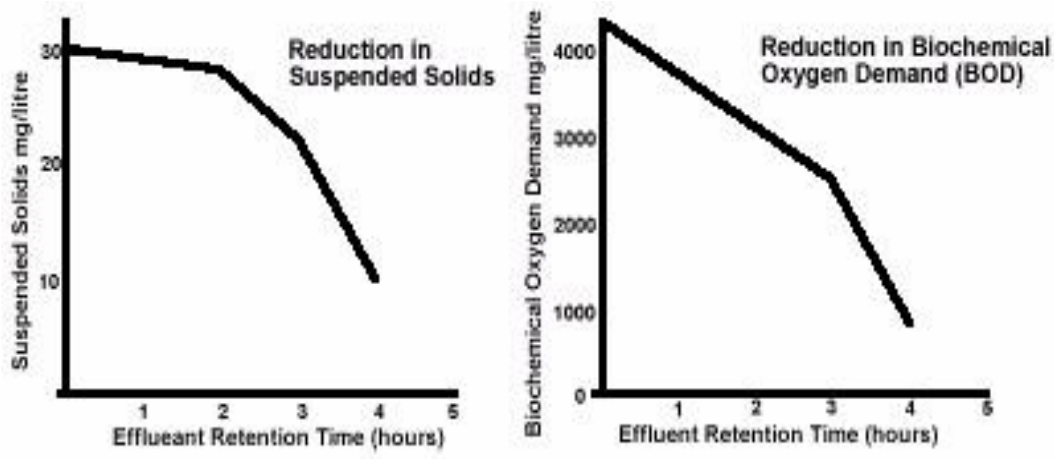
A Guide to some applications

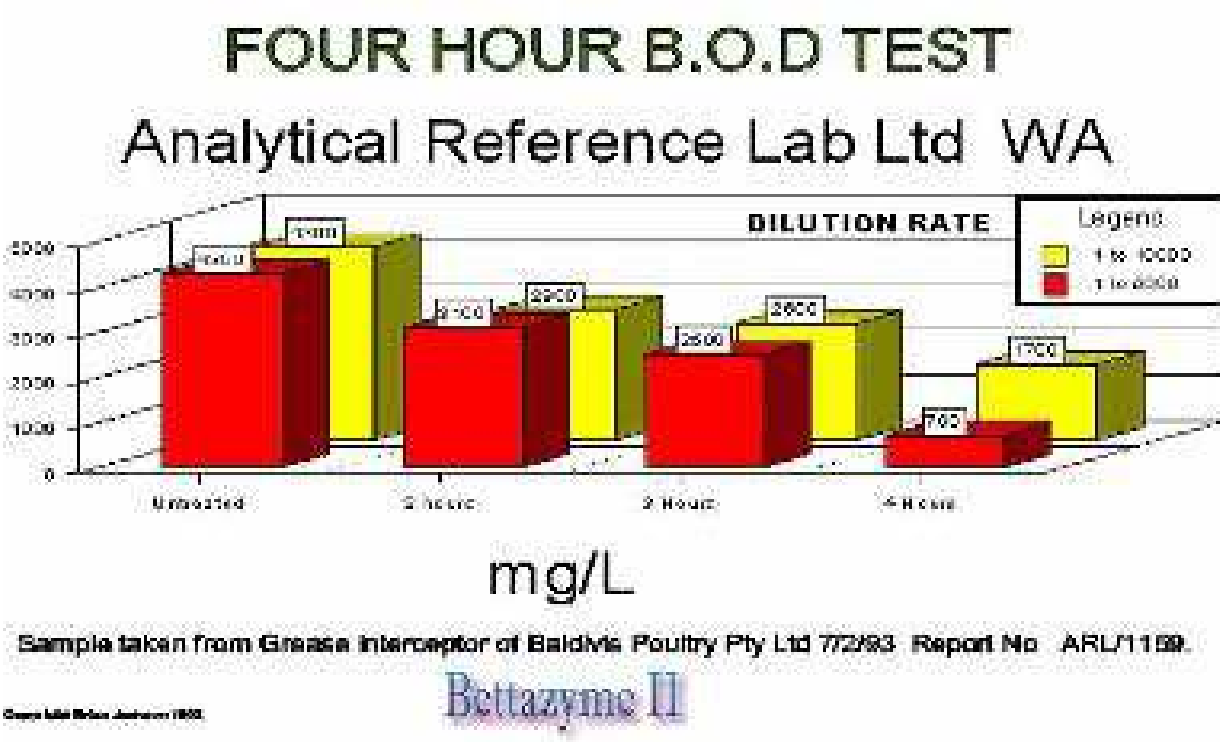
Aircraft
Armed Services
Bakeries
Bars
Boats & Ships
Cafes
Carpet Cleaning
Commercial & Industrial Kitchens
Compost Heaps & Bins
Dairy Farms
Fast Food Outlets
Fish Processing Plants
Garbage Bins & collection Areas
Garbage Tips & trucks
Grease Traps
Horse Stables
Hospitals
Hotels & Motels
Kennels Cats & Dogs
Local Councils
Meat Processing Works
Milk Processing
Nursing Homes
Offshore Rigs
Pig Farms
Poultry Farms & processing
Private Homes
Pump Wells
Railways
Restaurants
Septic Tanks
Sewage processing works
Shopping Centres
Sporting Grounds & clubs
Tip Faces
Transfer Stations
Truck washes
Waste Water Plants

There are many more uses being discovered every day

Enzymes Empirical Evidence

Independent Laboratory analytical results.

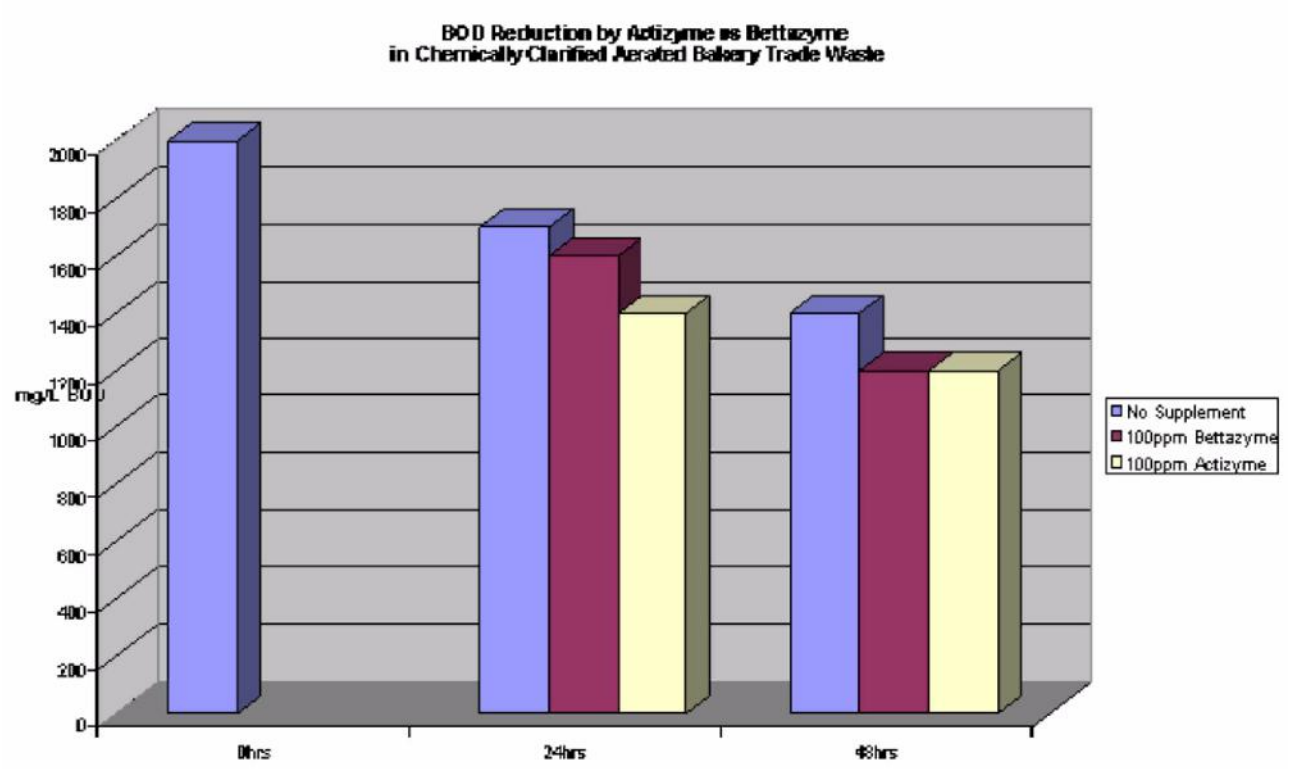




The above figures are 1000 to 10,000 ppm on the left and the dilution rates are yellow **10,000 to 1 and the red is 5000 to 1.**

Enzymes - Actizyme Vs Liquid Enzymes

A report covering the results of side-by-side trial of Actizyme versus Liquid Enzymes for treatment of an effluent sample taken from one of our larger interstate food manufacturing customers (a bakery).
In short, the results are promising.
BODs of aliquots of an aerated, chemically clarified effluent sample (containing an initial BOD level of 2000 ppm) where treated with 100ppm of Actizyme or 100ppm Bettazyme. (I realise that this rate is a lot lower than that suggested, however this was the suggested Actizyme rate, and we wished to compare apples with apples). Aeration was then carried out at ambient temperature (around 17C) over 2 days. A sample without addition of any enzyme source was also treated in exactly the same way (i.e. aerated for 2 days) and served as a Control.
All three samples showed BOD reduction. After 48hrs aerated retention without enzyme addition, BOD was reduced by about 20% (down to 1400 ppm). Samples augmented with the enzyme products permitted a 30% reduction in BOD over the same period (down to 1200 ppm). Although suspended solids were not tested, the enzyme treated waste samples had visibly less suspended solids and oil/grease (This is supportive of the products ability to treat grease-traps)



Both Liquid Enzymes & Actizyme were trailed at 100ppm. Liquid Enzymes gave identical results after 48hrs, but did start off a little slower, and after 24hrs had not reduced BOD quite as well. Possibly at a higher dose rate it may have performed more quickly early on.
The Liquid Enzymes definitely performed as well as the Actizyme which seems to be the ' industry standard enzyme over 2 days.

Enzymes in Lagoons & Ponds

The sketch on below is of the overall layout of a meat and bone rendering factory that we have as a project, the purpose of this is to give some idea of how we would go about the proposal. An idea of the size of this project is given below the sketch.
The areas of concern are the storage slopes, which receive a constant supply of fresh carcasses that leave a massive build-up of body fats and greases and the level of water quality in the wet waste lagoon 3 that exits into the council sewage system.
The suggestions are as follows:

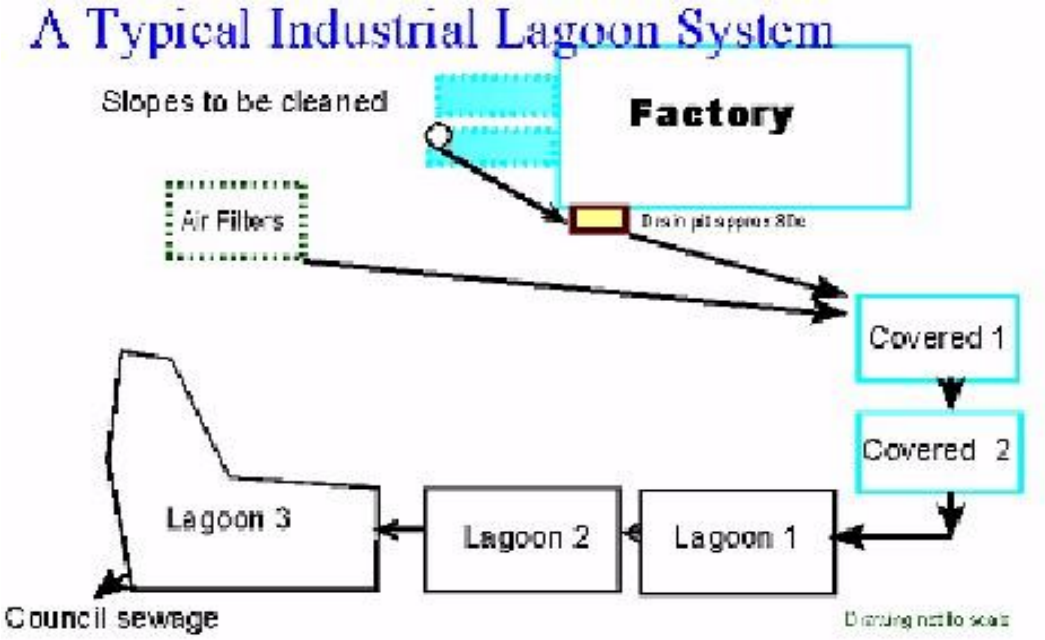
Storage Slopes

After treating with Liquid Enzymes(used as per directions). Spray the slopes with a dilution of 20 to 1 Liquid Enzymes prior to delivery and allow to stay moist, any run off will enter the system via the well and benefit the total system as Liquid Enzymes functions in both anaerobic and aerobic systems. The purpose is to clean up the concrete slopes and control the odour from this effluent.
The temperature at the drain pit is very high (80c) as it comes direct from the cookers, this could be reduced with a cool water return from lagoon 3 at a controlled rate.
This constant use will reduce the amount of sludge build up in the two anaerobic tanks, which will in turn go through the whole system further improving the water quality.

Lagoon 3

The use of a dosing machine to control the application of Liquid Enzymes based on the flow rate of 0.041 ML/day (as in table 20) at a dilution rate of 5000 to 1. This will require only 8.2 Litres per day for the whole system. Though the system is very large, the flow rate is excellent in relation to the volume of the ponds and the total retention time in the system (140 Days). It is recommended that lagoon 3 is treated for four weeks and then the dosing should be made into lagoon 1 to control all three lagoons and reduce the algae in lagoons 1&2.

It is important that Liquid Enzymes is not introduced until the temperature of the waste water is below 55 degrees centigrade. The benefits gained from this will be a rapid change in lagoon 3 to meet council requirements and then the control of all three lagoons in the long term.



The two anaerobic tanks total 1.3ML of capacity and lagoons 2 & 3 have a capacity of 0.86 ML and total of 1.72 ML, Lagoon 3 has 4.6 ML. This system is massively over engineered and has only a 0.004 ML per day flow rate, that's 40,000 Litres per day so the dose rate is on the flow rate not the capacity.

Enzymes Application Rates Grease Traps

GENERAL GUIDELINES	Typical Capacity (litres)	Typical daily flow rate (litres)	Initial dose of Enzymatic	Maintenance dose of Enzymatic
Domestic (small) Domestic (large)	25 50	N/A N/A	150ml 300ml	50 ml weekly 50 ml weekly
Small canteen or deli	200	750	1.2 litres	200 ml weekly
Medium/large canteen, small restaurant or cafeteria	500	2,000	3 litres	75 ml daily
Large restaurant or cafeteria	1,000	5,000	6 litres	150 ml daily

General Cleaning
For general cleaning of floors, walls, equipment and machinery 150 mls in a 9 litre bucket.
For odour control a spray container to suit the size of application at a dilution rate of 20 to 1.

Note:
The application rates above are indicative and are given as guidelines rates. A waste systems' ability to remediate itself is a function of the quality and quantity of the effluent, the operational procedures of the waste generators (i.e. the production unit) and the physical engineering of the system, all of which need to be considered to create an optimal and effective solution.

Enzymes Application Rates Septics

SEPTIC SYSTEMS

GENERAL GUIDELINES	Typical capacity (litres)	Typical daily flow rate (litres)	Initial dose of ENZYMATIC	Maintenance dose of ENZYMATIC
Domestic (small)	1,000	250	1.5 litres	200 ml weekly
Domestic (large)	2,000	500	3 litres	400 ml weekly
Small canteen or dell	2,000	1,000	3 litres	100ml daily
Medium/large canteen, small restaurant or cafeteria	5,000	2,000	7 litres	250 ml daily
Large restaurant or cafeteria or small hotel/ club/motel or caravan park	5,000	5,000	7 litres	400 ml daily
Large hotel/ club/motel/ or caravan park	10.000	20,000	14 litres	2 litres daily

Note:
The application rates above are indicative and are given as guidelines rates.
A waste systems' ability to remediate itself is a function of the quality and quantity of the effluent, the operational procedures of the waste generators (i.e. the production unit) and the physical engineering of the system, all of which need to be considered to create an optimal and effective solution.

Enzymes Application Rates - Effluent Treatment

GENERAL GUIDELINES	Typical capacity (litres)	Typical daily flow rate (litres)	Initial dose	Maintenance dose
Small food processing plant	5,000	20,000	30 litres	4 litres daily
Medium food processing plant	10,000	50,000	60 litres	10 litres daily
Large food processing plant	30,000	100,000	180 litres	20 litres daily
Very large food processing plant	50,000	200,000	300 litres	40 litres daily

Note:
The application rates above are indicative and are given as guidelines rates. A waste systems' ability to remediate itself is a function of the quality and quantity of the effluent, the operational procedures of the waste generators (i.e. the production unit) and the physical engineering of the system, all of which need to be considered to create an optimal and effective solution.

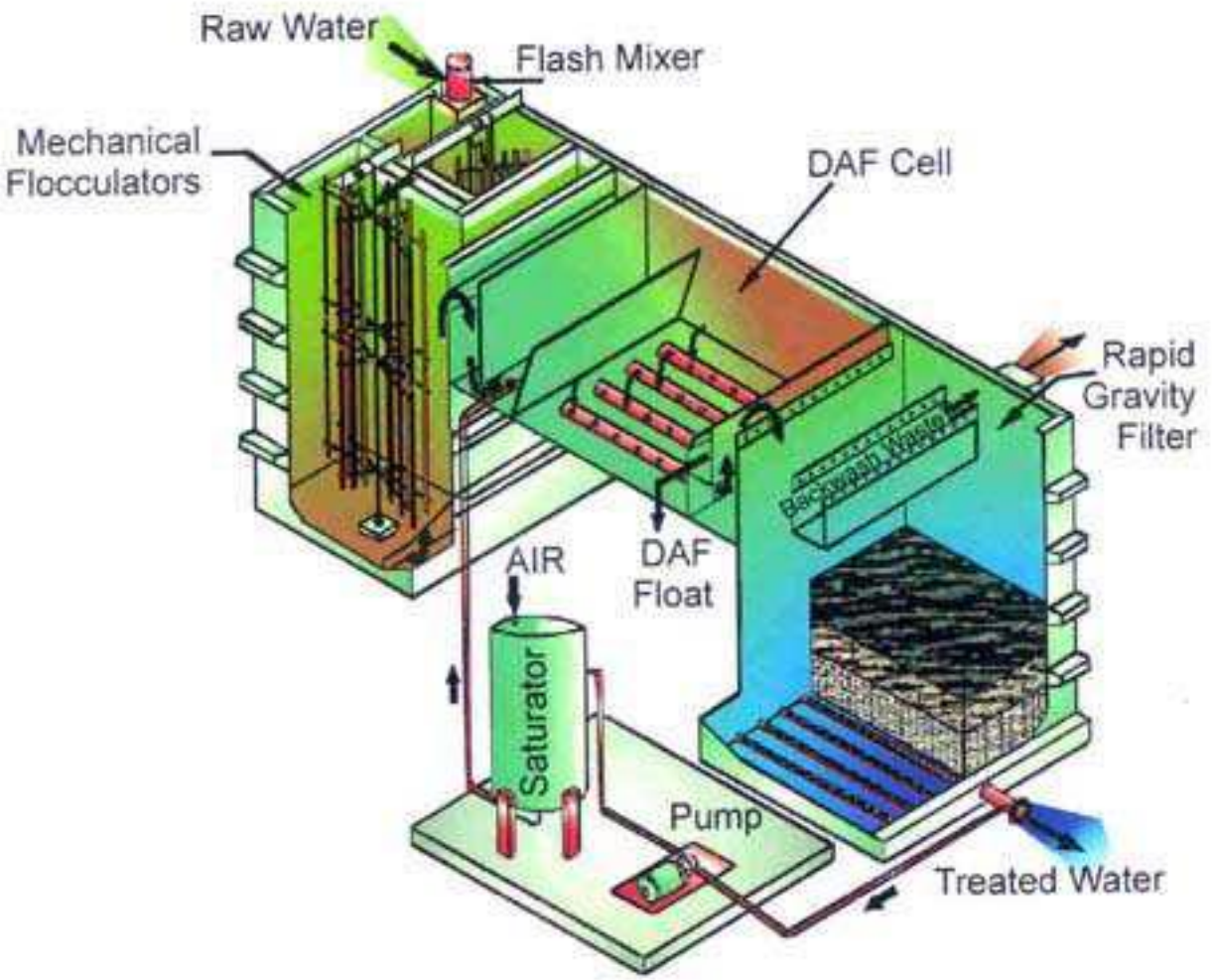
Enzymes in DAF - Plants

DAF and ST Clarifiers
Dissolved Air Floatation

We have treated many of this type of plant with great success in reducing the BOD's, COD's, suspended solids, oils grease and fats, sludge and balance the pH. The best results are the reduction of sludge by 40% to 60%. Prior to the above DAF there is usually a large holding tank, which is were we dose the product.

Illustrated above is a typical DAF plant.
DAF stands for Dissolved Air Floatation

How it Works
A coagulant added to the raw water precipitates dissolved contaminants and encourages particles to form "floc's". Gentle agitation in the flocculator encourages these to grow before they pass into the flotation zone. Here, microscopic air bubbles are injected which rapidly float the floc's to the surface. The accumulated float is skimmed off. Clarified water passes to the filter for final polishing and the filter is periodically cleaned by water or air/water back washing. The 50 micron bubbles used for flotation are formed by recycling a small stream of filtered water through an air-pressuriseded packed tower saturator to specially designed nozzles at the DAF cell inlet. Here, a rapid pressure drop causes the air to come out of solution and the generation of millions of small bubbles.



Plants will differ from company to company but the basic principle is the same.

The whole point of this is to give an idea of were Liquid Enzymes can help as mentioned above.

Liquid Enzymes FAQs

THE NATURAL SOLUTION

Q] How long is Liquid Enzymes active.
A] Liquid Enzymes is active for 7 to 10 days.

Q] Is Liquid Enzymes a biodegradable product.
A] Yes totally! Liquid Enzymesis 82% biodegraded in just 14 days.

Q] Can Liquid Enzymes be used in DAF (dissolved air floatation) Plant treatment.
A] We have treated many of this type of plant with great success in reducing the BOD's, COD's, oils grease and fats and suspended solids. The best results are the reduction of sludge by 40% to 60%. Prior to the above DAF there is usually a large holding tank, which is were we dose the product

Q] Is Liquid Enzymes affected by water quality and condition.
A] No, water quality is not affected by Liquid Enzymes and the product works in all water types including brackish and sea water.

Q] Is Liquid Enzymes is not Toxic or dangerous in any way.
A] No, Liquid Enzymes is non-toxic, non allergenic and non-flammable and has been passed by many Government bodies and come with an environmental impact document.

Q] How does Liquid Enzymes reduce odours.
A] By destroying the molecular structures and sulphides which cause odour problems, it is not a masking agent odour control is instant.

Q] How does Liquid Enzymes effect BOD's.
A] Liquid Enzymes reduces levels of Biochemical Oxygen Demand (BOD) by enzymolysis through decomposition or conversion of the contaminants.

Q] Can Liquid Enzymes work in sea water.
A] Liquid Enzymes functions equally in brackish, fresh or salt water.

Q] Does Liquid Enzymes work in anaerobic systems?
A] Liquid Enzymes functions in both aerobic and anaerobic systems equally well.

Q] Can Liquid Enzymes be used in food preparation and plant areas?
A] Liquid Enzymes has been passed by AQIS [DPI] and MAF [NZ] for use in food preparation areas for odour control and surface cleaning.

Q] What is an Enzyme?
A] Enzymes are large biological molecules responsible for the thousands of chemical interconversions that sustain life. They are highly selective catalysts, greatly accelerating both the rate and specificity of metabolic reactions, from the digestion of food to the synthesis of DNA. Most enzymes are proteins, although some catalytic RNA molecules have been identified. Enzymes adopt a specific three-dimensional structure, and may employ organic (e.g. biotin) and inorganic (e.g. magnesium ion) cofactors to assist in catalysis.