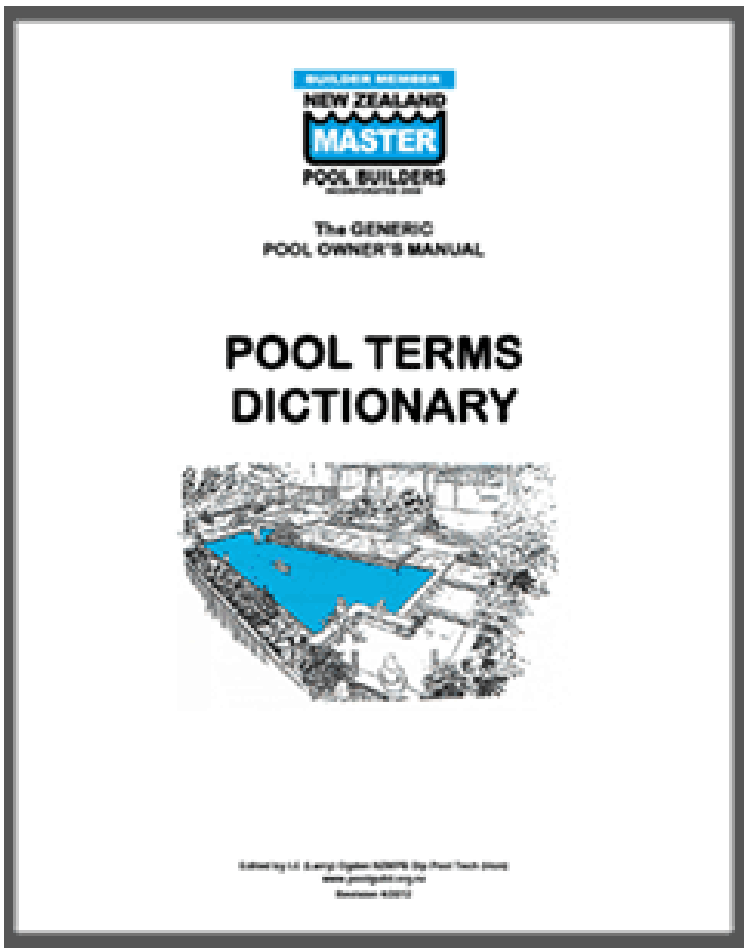
NEW ZEALAND POOL INDUSTRY ASSOCIATION INCORPORATED

# POOL TERMS DICTIONARY




Edited by L.E. (Larry) Ogden - Dip Pool Tech (Hons.) Certified NZPIA Pool Builder #109/1992
Executive Chairman – Honorary Life Member
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pH
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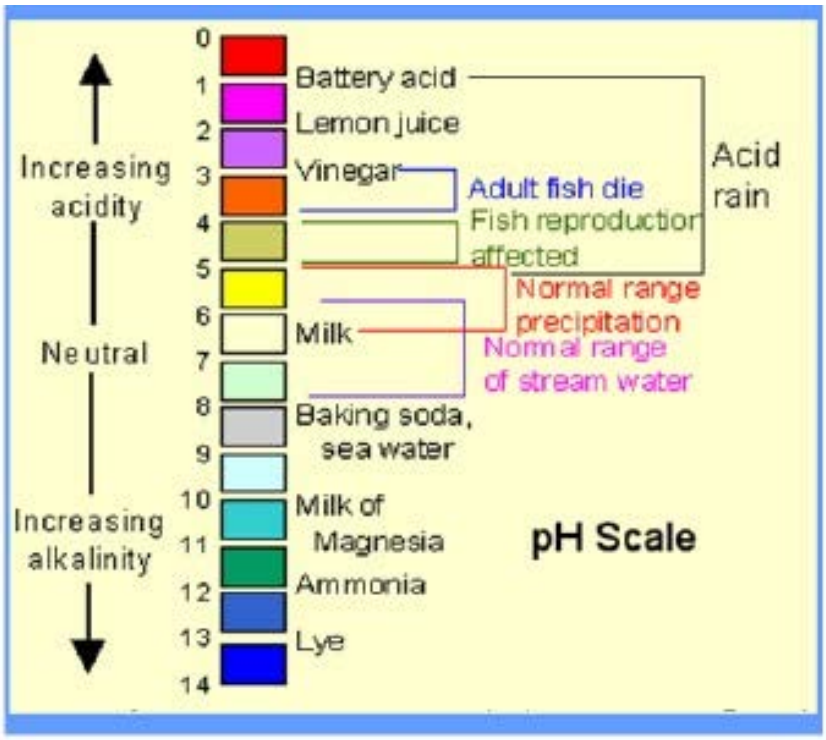


The measure of pH is from 1 (ACID) to 14 (ALKALINE) and keeping within recommended guidelines (7.6) is the most important requirement in keeping your swimming pool water clear and healthy!

**pH is KING!**


## POOL TERMS DICTIONARY - Helping you to understand names and terms used!

The following names and terms (and brief descriptions) throughout this manual are common to the New Zealand swimming pool industry. This summary may prove useful to you in understanding the care and maintenance of your residential swimming pool. NOTE: **aka.** - means "also known as"

**ACID:**
Common acids for pool use include Sodium Bisulphate (pH Decrease a.k.a "DRY ACID") and Hydrochloric Acid and are used to lower pH and for service work such as cleaning salt sells in salt chlorinators.

Adding Acid will also lower the TA and Calcium Hardness, so a further treatment of Water Neutraliser (Bicarbonate) will be needed to restore pool water balance. Acid has a pH of 0 (Zero) on a scale of 0 - 14 (pH 14 being Base or Alkaline) A pH of 7 is Neutral, anything lower is considered Acidic, anything above is considered Base)

**ALKALINITY INCREASE**
A pool chemical (usually sodium bicarbonate) - which will increase the pH and alkalinity of a swimming pool. Pools should be kept in the middle of the range 7.4 - 7.8 (i.e. 7.6) for best use of chlorine and prolonged life of the interior finish. (aka "pH INCREASE")

**ALGAE:**
Pronounced "al-gee" - A microscopic grass-like plant life that thrives in warm swimming pools and multiplies very rapidly especially in warm, un-chlorinated water, doubling in quantity approximately every four hours. By the time you can see it in your pool - you already have a problem! Algae cause green, slimy patches and stains to develop on the bottom and sides of the pool and the water to take on a green hue. There are many strains of algae, but the most common in swimming pools are green, blue-green, reddish-brown and black. Others - known as osteocyte types - are particularly hard to remove and colour the pool water a shade of emerald green. These types are normally associated with salt-water and can occur in pools located near the ocean. Algae are not harmful to humans; they will discolour the pool water.

**ALGAECIDE:**
Pronounced "al-gee-side", this usually comes in liquid form to be dosed into the pool as directed. This product is often recommended as a back-up to the regular sterilisation regime carried out in the pool, often the recommended dose for a home pool over the swimming season is 500 ml initially, then 125 ml each following month for the next three months, the repeat one more time. Algaecide is OK to use with both chlorine and Ozone based swimming pools.

**ALUM** (aka Aluminium Sulphate)
Also referred to as FLOC this product attracts suspended particles in the water together thus used as a flocculent which assists in the removal of suspended detritus in green or cloudy pools. Alum concentrated matter sinks to the bottom of the pool which may then be vacuumed to waste. In small amounts, Alum is also useful in sand filters as a way of “tightening” the sand media in order to trap fine dust.

**AQUAGENIE:**
An American skimmer/chlorine feeder system, the Aquagenie operates on high pressure pool water returning through a horizontal slot in the front of the poolside faceplate. This jet stream of water is directed downwards, keeping the pool floor in the vicinity clean.

A small amount of returning water is siphoned off into a small reservoir, which houses a canister intended for Tri-Chlorio-S-triazine-trione tablets (aka TriSuper 90 or TriChlor) . This drips into the suction line of the filtration system assuring sanitisation of the pool water and filter base.

NOTE: Most proprietary TriChlor Tablets (aka "Tabs") have a pH of 2.8 (very Acidic) - so it is important to check pH levels periodically as acidic water may be detrimental to pool interior finishes and is unpleasant for swimmers. Standard 3" (72 mm) TriChlor tabs should not be substituted for Aquagenie tabs. They will not fit the Aquagenie canister, and are an extreme fire hazardous to break apart into smaller pieces.

**AVAILABLE CHLORINE:**
The measure of active chlorine present in your pool water at any given time to combat germs and algae. a.k.a Free Available Chlorine (FAC)

**BACTERIA:**
Microscopic organisms which cause of fermentation and putrefaction, they also harbour and propagate disease, but can be successfully controlled by treatment with chlorine. Microbacteria entities ARE harmful to humans, and can spread disease amongst swimmers. It is important that they are completely eliminated from the pool by regular pool sterilisation and frequent superchlorination (aka Shock Dosing).

**BACKWASH:**
The process of reversing the pool water flow through the HI RATE SAND FILTER in order to flush contaminants and detritus that has collected during the normal filtration cycle and directing it away from the pool - usually into a handy sewer drain, or soak pit. The process of reversing the flow is generally accomplished by altering the position of a handle on the MULTI PORT VALVE on the top of the filtration tank.

**BALANCED POOL WATER:**
Pool water that is chemically balanced by the addition of buffering compounds that will prevent rapid change of pH; that is to say water that has a pH reading of between 7.4 and 7.8 (ideally 7.6) and contains a proper relationship between calcium hardness(CH), pH and total alkalinity(TA). (See TAYLOR WATERGRAM) This balance is the most important aspect of pool care, and an understanding of the importance will drastically reduce your pool chemical costs (See WATER BALANCE for more comprehensive discussion of this subject)

**BIGUANIDES:**
A generic term used for a class of swimming pool & spa sanitisers whose active ingredient is PHMB (poly hexamethyl biguanide). These sanitisers are usually referred to as being "Non-Chlorine" or "Non-Bromine" or "Chlorine or Bromine-free" and include such trade names as Soft Swim or Baquacil.

**BREAKPOINT CHLORINATION**
Breakpoint chlorination is the term used to describe the exact balance between CHLORINE DEMAND and CHLORINE RESIDUAL, whereby any LESS Residual Chlorine would result in growth activity of any algae present, and any MORE Chlorine present after the action of these features would result in a (small) positive Chlorine Residual. Knowing your pool's "BREAK POINT" allows you to calculate the quantity of chlorine needed to equal the nitrogen based debris in your pool and allow the calculation of the extra amount required to maintain a remaining residual (CHLORINE RESIDUAL) of FAC (FREE AVAILABLE CHLORINE) in your pool.

**BROMINE**
Bromine is one of the four most famous sterile chemicals in the family HALOGENS for the destruction of bacteria, the other three being CHLORINE, IODINE and FLUORINE. Bromine is commonly used in spa pools (rather than swimming pools) in the form of slow-release tablets.

**BUFFER**
Compounds when added to your pool water will prevent the rapid change in pH (which is desired) and include Sodium Bicarbonate (Baking Soda) and Calcium Chloride (a Chalk-like substance) and have no detrimental effect on humans.

**CAL HYPO**
A commonly used (mainly USA) abbreviation for calcium hypochlorite

**CALCIUM HYPOCHLORITE**
The most commonly found chlorine based pool chemical used for routine treatment of home swimming pool water is usually sold in granular form and may vary in strength depending on country of origin. US based chemical companies 65% to 90% yield, Asian based chemical companies' 45% - 65% yield sell for less cost.

**CHLORINE:** (Powder, Liquid)
In Pool Shops, chlorine is usually found as a granular compound aka CAL HYPO (70% - 90% yield) with added stabilisers, Calcium Hypochlorite (a.k.a GRANULAR CHLORINE) and is a powdery substance similar in appearance to granulated chalk. In granular form it will exude a toxic odour when uncapped that is harmful human soft tissue and your health - so do NOT INHALE this odour.

In another form, Chlorine can also be found as a lower yield Sodium Hypochlorite (a.k.a Liquid Chlorine) usually in 10 or 20 litre PVC Carboys.

When added to pool water, "chlorine" chemically alters to form Hypochlorous acid (HOCL) - the chemical that will attack and destroy algae and bacteria in your pool by a process of oxidation, and Hypochlorous Ion (OCL) the salt of hypochlorite which has little use in the pool. Another form of chlorine is found in some common salts, (i.e. Sodium and Magnesium) which is freed by electrolysis into sodium/magnesium hypochlorite (then Hypochlorous Acid once again) (see SALT below)

**CHLORINE DEMAND:**
The actual amount of available chlorine that is consumed in the oxidisation of algae, bacteria and organic or nitrogenous matter in the pool water. If you raise the chlorine level in a swimming pool to 5 parts per million (5mg/Kg) and the pool has an equal quantity of nitrogenous debris (N - leaf matter, urine, skin flakes etc) then the next reading you take the next day may be ZERO residual chlorine, as 100 units Chlorine combating 100 units Nitrogen Matter = 0 residual (See BREAKPOINT CHLORINATION)

**CHLORINE SMELL:**
There is a basic misconception that "too much chlorine" produces an odour referred to as "chlorine smell". In fact the opposite is true. (Chlorine is an odourless yellow/green gas which is toxic at concentrations of 2.5 ppm or more) The "chlorine smell" is actually CHLORAMINES - the by-product of an incomplete chemical reaction between free available chlorine and nitrogenous matter (hair, skin flakes, urine etc.) whereby there was insufficient FAC available to combat in entirety the presence of such matter.

**CHLORAMINES:**
The incomplete reaction of chlorine and nitrogen based detritus produces a substance called chloramines - and they really stink! The remedy to this situation is to add more chlorine! If your children return from school smelling of "chlorine" - write the school Headmaster a note asking her/him to either look after their pool sanitisation better, or excuse your child from swimming class, because a pool that smells this way is a health hazard! 100 units Chlorine combating 200 units Nitrogen Matter = 200 "partially decayed Nitrogenous matter" NOT 100 gone and 100 remaining! This rotting matter (putrefaction & fermentation) is what makes the smell! Chloramines are slightly antiseptic, but in the order of 2,500 times LESS effective than FAC.

**CHLORINE RESIDUAL:**
Active chlorine in the pool that is available for continued control of bacteria/algae after the initial chlorine demand has been met - usually in the range 2.0 to 3.0 ppm (2.0 to 3.0 mg/kg) and is described as Free Available Chlorine or FAC

**CLARIFIER:**
Usually liquid as a proprietary product (one brand: "Shimmer & Shine") or in powder form (ALUMINIUM SULPHATE - or FLOC) this product will consolidate a contaminated pool (see TURBIDITY) causing the contaminates to sink to the pool floor, where they may be vacuumed out to waste

**COMBINED CHLORINE:**
Most DPD Test kits react to the FAC immediately, and then slowly over several minutes develop a misleading colour that is reading the COMBINED CHLORINE in your pool.

Older orthotolidine (aka OTO) kits read FAC then rapidly the sample is contaminated by the effects of combined chlorine, giving a misleading reading. Combined chlorine can also include CHLORAMINES (see "CHLORINE SMELL) so may give you a misleading idea of how much chlorine is actually in your pool. Hint: always use DPD testers - never OTO!

**CONTROL VALVE:** (aka Multi-port Valve or MPV)
The variable port valve usually found mounted on the top of the filter tank to direct water flow from the pool through the filter or to the disposal point. See MULTI PORT VALVE for details.

**COPING:** (aka COPING STONES)
The capstone on top of the bond beam which finishes the edge around a pool or spa. It may be pre-cast concrete or brick. On low cost above ground pools pre-fabricated coping is usually part of an integrated system for the wall, liner, and deck.

**CORONA DISCHARGE:**
An electrical discharge brought on by the ionization of a fluid surrounding a conductor, which occurs when the potential gradient (the strength of the electric field) exceeds a certain value, but conditions are insufficient to cause complete electrical breakdown or arcing. Used in Saline generators and Ozone as an option to a UV lamp

**CORROSION:**
The effects of an acidic pool environment, whereas the pH and/or alkalinity are very low. Corrosion in the form of etching, pitting, or erosion of filtration equipment, pool interior plaster finishes and surfaces are the result.

**CYANURIC ACID:**
Chlorine is susceptible to the sun's ultraviolet rays, so Cyanuric Acid is added to protect chlorine from being destroyed by sunlight. Chlorine tablets and granular chlorine contain some Cyanuric Acid as an ingredient, but just in trace amounts. As chlorine users will have to add Cyanuric Acid periodically, this is generally accomplished by using compounds that include cyanurates. Cyanuric Acid is typically sold as either "Water Conditioner" or "Water Stabiliser," depending on branding by the producer.

The ideal range for Cyanuric Acid is between 30-80 ml/kl, with 40-50 ml/kl being ideal. As cyanuric acid is contained in some pool treatment compounds called CYANURATES, the levels may gradually build up, but may be reduced if there is significant rainfall in your area. Test kits for checking the levels of cyanuric are not common, but may be available from larger Pool Shops, or on-line by Googling the name. There is no chemical way to reduce Cyanuric Acid levels, and dumping water and refilling is the only sure way to lower your levels.

**DIATOMACEOUS EARTH:**
a.k.a "Fullers Earth" this is a natural, very fine filtering agent (generally in the region of 10 microns which is twice as effective as 20 micron sand media) consisting of the shells of tiny coral-like sea creatures called "diatoms" who perished over 50 million years ago! Excavated in only a few places in the world: Vogelsburg (Germany) Clarksville (Colorado USA) being the best sources, it/they have been used as drinking water filtering media for many years.

Not so common in NZ swimming pool applications, however, as the residue (which must be periodically flushed down the sewer) is environmentally unfriendly to waste treatment plants.

**DICHLORIDE:** (aka DICHLOR)
Dichloroisocyanuric Acid (aka dichloro-s-triazinetrione) is a chemically oxidising compound containing cyanuric acid that reacts with water to form Hypochlorous acid, a compound related to the active ingredient in most home pool sterilisation. This colourless solid is the active ingredient in commercial bactericides and algaecides.

**DIP STRIPS**:
A conveniently thin treated strip to dip into a sample of pool water to establish the correct or recommended settings for Cl, Ph, TA and CH. They don't store well, and will become ineffective if left in sunlight. Check the use-by date on the bottom of the container. Not as accurate as the Chemistry Set kits, but they are quick to use and can be kept (out of sunlight) to use as a comparison between periodic tests.

**DISINFECTANTS:**
Chemical processes which destroy nitrogenous based matter, vegetative forms of microorganisms and other contaminants by the addition thereof: such as chlorine, bromine, ozonators and ionizers and copper and silver algaecides.

**DPD:**
Chemical name N,N-diethyl-p-phenylenediamine (Hence the abbreviation) is the predominant chemical used in home water Test Kits to determine the presence ands strength of chlorine in a water sample.

**DRY ACID:**
Sodium Bisulphate (aka pH Decrease) should be used to reduce your pool alkalinity and SODA ASH (pH increase) for neutralizing pool acidity. If the water supply in the area is 'hard' the alkalinity level may be too high. A gradual increase in alkalinity also occurs due to the use of granular chlorine (calcium hypochlorite). If the pH of the water goes above 7.8 precipitation of insoluble components will occur and the water will become cloudy. It is not possible to reduce the pH of inherently hard water suddenly by the use of large quantities of pH decrease and repeated small dosages may be necessary. (see **WATER BALANCE, ACID**)

**ELECTROLYSIS:**
A way of separating chemically bonded elements and compounds by passing an electric current through them, such as passing a 12 volt DC current across a suitably gapped electrode placed in the flow of slightly saline pool water will result in the production of sodium hypochlorite (aka LIQUID CHLORINE).

**EYE BALL:**
This is the traditional way filtered water is returned into the typical swimming pool, thus named due to the similarity of the hollow swivelling centre piece (which can be rotated in a large arc to direct the return water flow) to the human eye. A rotating cap can be tightened to hold the directional flow as desired through this PVC component.

**FILTER SAND:**
Almost all pool builders use a high-rate sand filter on their pools. (See **GLASS FILTER MEDIA**) This is a pressure fed vessel - usually made of a reinforced PVC plastic material - that contains filer sand (washed river sand). Filter sand differs from ordinary sand because it is washed of contaminants and shake-graded for consistency. An old and traditional method of grading filter sand follows: As the graded sand will pass between 1mm thick wire grids of between 14 and 24 to the inch, it is called 14/24 sand.
The sand in your filter will typically last for between 5 and 6 years before the sand granules are smoothed out by the passage of water and lose the ability to trap debris, but frequent backwashing will prolong the time between sand changes, as infrequent backwashing will allow the sand to become clogged with solids and debris and "tracking" lines will develop between the input and output side of the media. Backwash at least monthly "whether it needs it or not" during summer months.

**FILTRATION RATE:**
The rate of reticulated pool water pumped through a sand filter, in litres per minute (l.p.m). A home swimming pool filtration system should have sufficient capacity to pass the total of volume of the swimming pool in four hours (six complete turnovers in 24 hours)

**FLOC:**
An abbreviation for "Flocculation" a scientific term for the consolidation of foreign matter in a pool, causing it to bind together creating more mass which - being less buoyant - sinks to the pool floor for easier removal by vacuuming to waste.

**FOREIGN MATTER:**
Materials such as dust, twigs, grass clippings, algae spores & other detritus etc., carried into the pool by wind, rainfall and bathers who may carry bacteria, which would increase the CHLORINE DEMAND (consumption of chlorine).

**GLASS FILTER MEDIA**
Also referred to as “Electrostatic Glass Media” this may be produced from recycled glass containers - generally in New Zealand from Beer Bottles as they seem to be plentiful (!). The process of manufacturing suitable filter media involves grinding down the input glass into fine spherical granules of approximately 10 microns in diameter - during which process they acquire an electrostatic ‘positive’ charge. This electrical charge attracts dirt & debris thus performing a better job of removing the detritus from the pool water than regular 14/24 (mesh size grading scale) washed river sand.

**HAIR AND LINT POT:**
Unit with clamped or screw on lid (usually clear plastic), mounted onto the front of the pump as a preliminary screen for leaves and hair that got through the skimmer basket. (aka Hair & Lint Strainer)

HEAT PUMP:
An Electrical device similar in operation to a typical home refrigerator or air conditioner with one notable difference: They cool the interior and exhaust the heat into the atmosphere; a Heat Pump heats the pool water by way of an internal heat exchanger, and exhausts cold air.
The efficiency is rated by a **COP** rating: a Coefficient of Performance whereas the input energy i.e. electricity, is rated against the output efficiency of the same product. The average COP of a good quality heat pump is around 4:1 whereas 2.0 Kw of electrical energy consumed creates the equivalent of 8.0 Kw in heat - rated at 15 degrees Celsius starting temperature. Some Heat Pump manufacturers exaggerate the rate of their units by starting at a higher temperature - i.e. 20 Degrees C, so be aware of this difference in performance when evaluating them.

**HIGH RATE SAND FILTER:**
An improvement in swimming pool filtration from 1930’s RAPID SAND FILTRATION, the High-Rate sand filter was developed as pool pump technology improved in the mid twentieth century. Water being drawn from the swimming pool is pumped into a barrel-like container of filter sand. As the flow passes through the filter sand, any contaminants larger in size than the sand grains would be trapped for future disposal. Technically, this was accomplished by passing the water through a slotted dispersal device in the lower part of the filter tank, so that it would rise to and be collected at the top part of the filter to be returned as ‘filtered water’ to the swimming pool. When the tank became clogged with detritus (a simple 0 - 30 Kpa pressure gauge would indicate this) the filter should be BACKWASHED until the discharge flow ran clear and clean, allowing the filtration cycle to be repeated.

**HYDROCHLORIC ACID** (aka Hydrogen Chloride, HCL) DANGER! HAZARDOUS SUBSTANCE!
Usually ranging in liquid form in concentration between 20% - 40%, used to lower the pH or TA in a pool, treat black spot on older fibreglass pools, also to clean the Salt Cell where a saline (Salt) Chlorinator is fitted to the filtration system. Historically called muriatic acid, or spirits of salt, it is the digestive acid all humans have in their stomachs.

***See the section on correct handling procedures for ACIDS***

**IMPELLER**: (Water Pump component)
A spiral-shaped component of the POOL PUMP, connected to the pool pump motor by a rotating shaft, and which action creates suction on the input side of the pump, drawing water from the pool and pressurising the sand filter. This component may get blocked occasionally by leaves and hair that get past the two baskets in the suction line (SKIMMER BASKET and HAIR & LINT POT BASKET) and is serviceable by the pool owner who is handy with tools and some mechanical aptitude, otherwise – call a pool serviceman.

**IONISERS:**
Ionisers will create an ion stream (typically using a Copper or Silver sacrificial electrode) resulting in a form of sterilisation in the swimming pool water. Silver & Copper eating utensils have been in use for thousands of years due to their ability to discourage bacteria, and Ionisers are a development of this idea. Some Ionisers are SOLAR powered and float in the pool, others have the electronics installed in the pool shed, with the pool water flowing through the activated electrode in an enclosure.

**LIQUID CHLORINE:**
Available from most pool shops in 10 and 20 litre carboys, liquid chlorine typically has a 12.5% yield of sodium hypochlorite and is suitable for SUPERCHLORINATION of home swimming pools when a SHOCK DOSE is required, as an alternative to CAL HYPO.

This is particularly handy for fibreglass and other pools fitted with a SALT CHLORINATOR as the Cal Hypo treatment adds calcium to the pool water which eventually ends up on the ELECTRODE of the Salt Chlorinator thus deteriorating its effectiveness in generating chlorine ( as Sodium Hypochlorite or “Liquid Chlorine”).

**MULTI PORT VALVE:** (aka MPV or CONTROL VALVE)
A variable port valve mounted on top of the filter unit to direct water flow from the pool through the filter or to the disposal point. Sometimes referred to as the filter control valve. **DO NOT** operate the MPV while the filter is running! Damage due to "water hammer" may occur! (Water moving at high velocity down a pipe, then stopped by suddenly closing a valve, will exhibit a destructive force that may split the pool pipes)
MPVs usually have several options for the incoming water: FILTER (self-explanatory) WASTE (the pool water bypasses the filter tank and is pumped to the nearest sewer drain) RECIRCULATE which simply returns the water to the pool (i.e. to run a fountain etc.) and BACKWASH (which reverses the flow through the filter tank thus flushing the filter media of detritus and out down the WASTE connection to the nearest sewer drain

**NEUTRALISER:**
Common name for Sodium Bicarbonate (bicarbonates of soda or "baking soda") this chemical has a pH of 8.0 and is used to raise the pH and hardness of pool water.

**OZONE:**
In the United States, Ozone is predominantly known as “Activated Oxygen”: Created by two methods (passive UV Light or active Corona Discharge units) normal oxygen ($O^2$) is split into two atoms of $O^1$ and as this is an un-natural state, the $O^1$’s combine with other $O^2$ to form a short-lived $O^3$ - what we refer to as Ozone.
This is a natural phenomenon that quickly recombines as pure oxygen. A superior microbiological killer, Ozone is superior to Chlorine in killing bacteria by a factor of 100:1 so is used extensively in bacteria-prone areas such as public swimming pools, and private spa pools. It is becoming more popular in home swimming pools (especially the UV version) for the low cost of operation, lack of smell and lack of any residual in the swimming pool.

**CAUTION:** Ozone pools traditionally have NO DISCERNABLE CHLORINE RESIDUAL in the water, so if a sample is taken to a Pool Shop for analysis BE SURE TO TELL THEM your pool is NOT A CHLORINE POOL, or the first thing they will tell you is “there’s no chlorine in the pool” and try to sell you some.

**OXIDISATION:**
The corrosive process by which traditional pool-water treatment chemicals (i.e. chlorine) attack and destroy algae, bacteria, and other nitrogenous based matter that regularly contaminate home swimming pool water. It is essential that sufficient oxidising agent is present in the pool water, as incomplete oxidisation will result in partially rotting fermenting matter which contribute to the foul odour referred to as “CHLORINE SMELL”.

**pH:** pH stands for Potential (aka ‘positive Hydrogen’, ‘power of Hydrogen’ etc. They had to call it something, but disagree what! The “p” is always lower case and the ‘H’ upper case, being the important identity)
**pH** is described by a numeric scale to indicate **Acidic or Base** (alkaline) condition of water in a logarithmic range of 0 - 14. A pH of 7.0 is neutral, a rating over 7.0 is alkaline and under 7.0 is acid. A home swimming pool is required to remain between the pH values 7.4 and 7.8 with 7.6 being “ideal”. A Logarithmic scale indicates that each increase in gradient is equal to ten times the previous value: a pH of 7.8 is ten times more base than 7.7 - and 6.8 is ten times more acid than 6.9 (similar to the Richter Scale for earthquakes)

**pH is KING!** Incorrect pH is responsible for almost all of a home pool’s problems: Green or sad coloured or cloudy water, eye and skin irritation and corrosion of metal parts such as pumps and stainless steel ladders. Readings between 7.8 and 8.0 are tolerable in home pools but the chlorine effectiveness is far reduced, and readings above 8.0 give rise to minimal chlorine effectiveness - as little as 15% remaining effectiveness at pH 8.2. At readings of 8.4, chlorine effectiveness is negligible, scaling will occur and bathers will suffer eye & soft tissue irritation. The ideal pH for a home pool is as close to 7.6 as possible. pH is adjusted by adding a suitable alkali to an acid pool and a suitable acid to a pool yielding an overly high alkaline test (see WATER BALANCE).

**PHENOL RED:**
Phenol Red is the liquid reagent sometimes found in “chemistry Set” style pool water test kits. Red in colour, it reacts to the pH in the sample to create a colour shade ranging from yellow (low pH) to bright red (high pH) and the Test Kit instructions indicating to the user which actions to take to regulate the pH of the pool. They past-date quickly, so check the use-by date, and replace all the reagents each spring.

**PARTS PER MILLION:** (aka ppm)
An abbreviation of "parts per million" which is how concentration of matter in water is usually referred to (See TURBIDITY). It is applied to pool water ratings as the quantity of any residual per million parts of water. In the Metric age, ***PPM is becoming redundant in favour of ml/Kl (millilitres per kilolitre***)

**POOL CAPACITY:**
As it is common in metric times to calculate pool capacity in litres, the calculation is simple: multiply pool length by breadth by average depth for cubic meters (tonnes) of water. One cubic meter is 1,000 litres -or 1 Kl (kilo litre) and weights one Tonne. E.g. a 5 m x 10 m pool with average 1.5m would be ((5 x 10 = 50) x 1.5 = 75) or 75,000 litres (and hence, 75 metric tonnes).

**POOL COVER:**
Covers for residential swimming pools generally come in three varieties:

(1.) Floating Thermal (Bubble-type) covers whose primary function is to trap and retain infrared light-generated heat in the top layer of the pool water and which are often used in conjunction with an external heat source such as a HEAT PUMP or GAS HEATER,

(2.) More substantial multi-layered thermal cover (which generate no added heating benefit from the sun's rays, as at 3 mm or more they are impenetrable by light, but have superior insulation properties), and

(2.) Debris Covers – usually of fine mesh construction - whose main function is to stop leaves and other debris entering the pool. For this purpose, a Debris cover must be firmly attached to the pool surround, and may be considered a "Safety Cover" as they may support the weight of a child walking on them (although the cover may sink into the pool – creating a further hazard for the child).

Some AUTOMATIC COVERS will automatically retract and extend, and man also be considered by Council as a "Safety Cover" but usually this type of cover is quite expensive, and will require the design of the pool amended to support the cover at the outside edges.

**POOL COVER ROLLER:**
As the name implies this device "rolls up" the pool cover for storage when not in use. Various cranking methods are employed to rotate the central aluminium tube (to which the cover is attached) of the roller which is sited at one end of the pool) including "steering wheel" types to "ski pole" crank levers.

A disadvantage of the pool cover roller is the appearance, size, bulk and location (which could become a nuisance at the end of the pool) plus there are some months that the cover is not in use, so it may become an eye-sore sitting there 24/7

**POOL PUMP:**
Commonly a 750 watt (aka "one horsepower") 240 volt electric-motor driven and usually self-priming with a HAIR & LINT POT attached to the front end. The pool pump is traditionally located adjacent to the filter tank, serving to draw water from the swimming pool via a surface skimmer, then pressure-force it through the pool filter media (filter sand) then back to the pool through return nozzles. This is a closed circuit recirculation system, and does not require a Plumber to hook the system up.

**POOL VACUUM SET:**
Most new pools come equipped with a comprehensive pool vacuum cleaning set, consisting of a Vacuum Brush Head, Vacuum hose and extendable vacuum pole, a leaf scoop and leaf brush.

The pool skimmer comes with a dinner-plate sized VACUUM PLATE with a 40mm hole in the centre. This is inserted into the skimmer and the vacuum hose is then inserted - thus extending the suction to the far end of the hose (which is in turn plugged into the Vacuum Head Brush) The hose must be "flooded" before inserting into the Vac Plate, and the brush end must be submerged or the pool pump will deprime (i.e. choke on air in the line).

**RAPID SAND FILTRATION:**
Not in general use for residential swimming pools in the 20th and 21st century, this very basic pool filter was developed in the nineteenth century as a first attempt to filter swimming pool water in public swimming pools. A

large (2.0 m x 2.0 m ) and deep (1.5 m) “Filter Tank” is constructed immediately adjacent to the pool wall, with a 200 mm piped connection between the two at the deepest point of the tank.

Water is drawn from the swimming pool at various levels and pumped into the top of the tank, where gravity ensures that the flow back to the pool is continuous. Not very efficient, hence they are not in general use these days.

**SALT CHLORINATION:**
A good supply of "LIQUID CHLORINE" Sodium Hypochlorite, may be produced by the electrolysis of saline water (usually .02 ppm salinity) into chlorine. This occurs in a "salt cell" which is usually an electrode of stainless steel encased in a clear PVC tube (so that the process may be observed). Many people think "salt" is better than "chlorine" as they imagine that salt is "healthier" and has no odour. This is far from the truth, as the same chemical reaction takes place (i.e. the production of Hypochlorous Acid) whether the initial introduction is via salt, sodium chloride, or calcium hypochlorite. Voltage Leak from electrical devices in the pool water flow require an earthing device to be fitted to avoid any electrical shock issues. (It’s low voltage, but could affect pacemakers)

The process of electrolysis also produces equal amounts of Sodium Hydroxide (aka Caustic Soda - commercially sold as Drain Cleaner) - which has a very high pH of 14 - so if you have a salt chlorinator fitted, you will need to do periodic pH checks (at least every month) to see how much HYDROCHLORIC ACID you need to put in the pool to bring the pH down to correct levels.

A recent addition to machines that use electrolysis of salts is the introduction of magnesium hypochlorite units, but the effects seem similar to saline units, both of which may introduce “voltage leak” into the swimming pool water. As the Magnesium units are a recent development, little is known at this time of any down-sides to the process.

**SKIMMER:**
Aka “Surface Skimmer” or “Wide-Angle Surface Skimmer”: Commonly a plastic “skimmer box” with large rectangle opening to the pool side, attached to, and protruding through, the outside pool wall, connected to the intake or suction line to the pool filter. By breaking the pool water surface tension (via a WEIR), it removes surface debris from the pool water, retaining it by means of a floating weir. (It "skims" the pool surface - hence the name) The weir is hinged back into the skimmer body and stopped from floating to a position more than perpendicular to the flow, thus trapping floating debris within the body of the skimmer for manual removal of the mesh SKIMMER BASKET. (See AQUAGENIE)

**SKIMMER BASKET:**
Usually a 300 mm round X 250 mm deep strainer pot made from white PVC plastic, the purpose of which (when inserted into the main body of the SKIMMER) is to trap leaves and other detritus from being sucked down into the pool suction line and blocking the POOL PUMP from operating. The skimmer basket should be emptied periodically in normal use, and especially after high winds and summer rain which could cause leaves to fall into the swimming pool.

**SODA ASH:**
See pH INCREASE, or sodium bicarbonate - also referred to as Neutraliser, of pH Buffer

**STABILISER:**
A chemical agent (a.k.a Cyanuric Acid) which when applied to outdoor pools in recommended amounts slows the dissipation rate of the chlorine residual by sunlight. Normally the Cyanuric acid level should not exceed 50 ppm or 20 - 30 grams per cubic meter of water as it will render the FAC ineffective.

**SUPERCHLORINATION:**
Superchlorination (a.k.a "shock dose", “shock treatment” or “Shocking” as a verb) is the term used for a massive dose (usually 10 ppm) of liquid chlorine or calcium hypo to “shock” or burn out any stubborn or resistant algae or bacteria. It should be performed at least fortnightly in summer months or if bathing loads are high (or lots of kids have been swimming) at least weekly. Normal pool shop Cal Hypo or Liquid chlorine is sufficient for the purpose. If OZONE is fitted to the pool, switch it off before shock dosing and don’t turn it on again for 24 hours.

**SUSPENDED MATTER:**
Particles that do not settle to the bottom. They give a cloudy or milky appearance to the water (see TURBIDITY).

**TAYLOR WATERGRAM**: (See diagram in your Pool Owner's Manual)
A relationship chart that plots the appropriate levels of hardness and bicarbonates in the pool at given pH levels to create a "Balanced Pool" i.e. Total Alkalinity of 120 and Calcium Hardness of 200 can be cross referenced on the chart with a line drawn between these levels that exactly crosses the central pH value at the 7.6 mark.

**TIME CLOCK:**
Every pool is usually supplied with a time clock to manage filtration cycles. It is essential that you time your pool to filter during daylight hours - if only to keep from annoying your neighbours. In summer months - especially if hot and windy - filter your pool a minimum of 10 to 12 hours daily between 8am to 8pm.

In spring and autumn, this can be reduced to 6 to 8 hours, and during winter 2 to 4 hours should suffice. Do not turn the system off "for winter" as the cost of reviving and rebalancing the pool will outweigh the small amount of power usage during winter.

**TURBIDITY:**
A measure of cloudiness in water due to the presence of contaminates. At levels of 20,000 ppm or more, the pool water "looks cloudy". To remedy this situation, Superchlorinate to 4ppm, filter pool 24/7 until clear. In extreme cases, add Clarifier or FLOC to consolidate matter, then vacuum pool with MPV on WASTE position. See SUSPENDED MATTER above.

**TRI-CHLOR TABLETS:**
The large 3" or 72 mm tri-Chlor tabs are useful for pool chlorination when used in the correct feeder - such as the Rainbow "Water King" model or other in-line feeders. Do NOT however, break them up to use in the Aquagenie Skimmer (they may explode in your face while you try to break them) and NEVER under any circumstances place them either in the skimmer basket, or directly onto the pool floor, as they are highly acidic with a pH of around 4.0 and may cause damage to the pool surface.

If placed into the skimmer basket, when the pump stops at night the highly chlorinated and very low pH mixture in the skimmer body leaches out of the skimmer front and cascades down the pool wall causing potential damage to the pool interior surface.

**ULTRA VIOLET LIGHT:** (aka UV)
A passive light source that will react with oxygen molecules by splitting an $O^2$ into tow $O^1$ molecules. These then combine with other $O^2$ molecules to create OZONE or $O^3$. The resulting molecules are a very potent oxidisation feature that will attach and destroy bacterial and algae, but are immediately recombined into pure oxygen $O^2$ when they come in contact with the atmosphere. For this reason, Ozone should be injected into the pool water at the lowest possible depth, so that it will remain potent for the longest possible time.

**WATER BALANCE:**
Probably the most essential subject you will need to understand is the relatively recently developed concept of WATER BALANCE. It was discovered in the mid 1970's that there is a CRUCIAL relationship between Total Alkalinity, pH, and Calcium Hardness. If your pool is "balanced" the pH will remain stable, and your pool will more economical to operate as you will obtain more effectiveness from your chlorine.

A correct Total Alkalinity will act as a buffer, which will prevent sudden changes in pH if for example there is a sudden downpour of acidic rainfall. Too much Calcium Hardness can cause cloudy water, encrustation of pipes and equipment, and the filter sand in your pool filter can lose effective filtration due to calcification.

There are marginal differences between what is acceptable water balance for each type of swimming pool. For example a fibreglass pool is better off with a lower pH than the other pool types. Another confusing factor is that "Pool Shops" using computerised water analysis equipment must be "generalised" to fit all pool types, so their recommendations may not be correct, and may in fact contradict, the advice given to you by your pool builder.

New Zealand water is mostly generated from rainfall, which natural process "distils" the water thus reducing the dissolved miners etc. to practically nil by the time it reaches your household water supply. This is why we must add "body" to the water by increasing dissolved minerals. These are harmless to humans.

Lowering pool water pH: The quantity of pH decrease (see **DRY ACID, ACID**) used should not exceed 2kg to 20,000 L of pool water at any one time. It is suggested that in hard water areas (where total alkalinity of supply exceeds 300 ppm) half the above maximum quantity, or even a considerably smaller dosage should be tried until the behaviour of the water is established by repeated testing. It should be understood that high pH readings can be obtained from water with high total alkalinity (eg. 200ppm or more) or from water with low total alkalinity of, say, 20ppm. The best range for swimming pools is 120ppm (no more than 160 ppm as the relationship between TA and CH starts being affected).

Identical pH readings may be obtained from pools with widely divergent total alkalinity levels and the pool with a high pH but low total alkalinity from the examples above would require one tenth of the quantity of pH decrease to obtain pH balance than the pool with a high total alkalinity level. Thus, the addition of a large quantity of pH decrease to a pool with a low total alkalinity level could turn the water acid and bring about the unpleasant results mentioned above.

Poolside test kits have included a means of testing total alkalinity but your local water supply authority should be able to tell you the average hardness of the water in your area. This information will serve as a useful guide of the procedure needed for the pool, and confirm the figures you obtain by poolside testing.

Where the water is hard you may well find the pH decrease will bring the reading down to a satisfactory level within an hour or two but within 24 hours the original high reading will recur. This may continue for some days but in due course the readings will tend to stabilize at a lower level and only occasional small dosages will be necessary. The best time to correct pH is in the morning after taking pH and chlorine residual tests.

PH decrease should be dissolved in water in a plastic bucket and poured gradually into the pool skimmer while the pump is running. Strong solutions should be handled with reasonable care and spillage or splashing on clothes should be avoided. PH testing with the test kit is effected in the same manner as described for chlorine residual testing but using the pH reagent supplied with the kit. Remember to make the colour comparison against the pH colour spots within ten seconds of mixing, as a deeper color may develop due to the presence of chloramines.

**WEIR:**
Generally a rectangle and buoyant **WEIR FLAP**, fixed by a hinged connection in the rectangle “throat” of a SKIMMER. As the pool water is drawn through the skimmer, the flow causes the weir to rotate in the direction of flow. Any floating debris - leaves etc. in the flow pass the weir and are thus drawn into the skimmer body, but restricted from being sucked further down into the filter suction line by a large, typically PVC plastic **SKIMMER BASKET.**

When the suction flow stops, either by the **POOL TIMER** or manually by the pool operator, the Weir Flap returns to its vertical position where it is stopped in that position by the skimmer body design. This prevents any trapped detritus from re-entering the swimming pool. The skimmer basket must be emptied periodically, especially if a storm has blown many leaves into the pool.

**WINTERISE:**
The term that describes “shutting down” the swimming pool for Winter: Usually by giving the pool a thorough vacuuming and then backwashing the filter, reducing the filtration time to 2 – 3 hours daily, stowing away the POOL COVER in the garage (don’t leave it on the pool – it will encourage ALGAE to form on the underside of the cover) and giving the pool a final SUPERCHLORINATION for the season.

**ZELBRITE:**
Zelbrite is a high performance filter media. Designed by nature over millions of years, **Zelbrite** Ultimate comes from volcanic rock and is claimed to be a superior alternative to sand filtration media. Sold by **DAVEY**, not dissimilar to GLASS FILTER MEDIA in appearance, produced in Australia where it is more common (and popular) than in New Zealand.

The Taylor Watergram below illustrates the relationship between Total Alkalinity and Calcium Hardness and the effect on pH. A “Balanced Pool” is one that testing indicates that it sits in the darker zone of the Watergram. Accordingly, the “Ideal” pH for a home swimming pool is 7.6 on the logarithmic scale.