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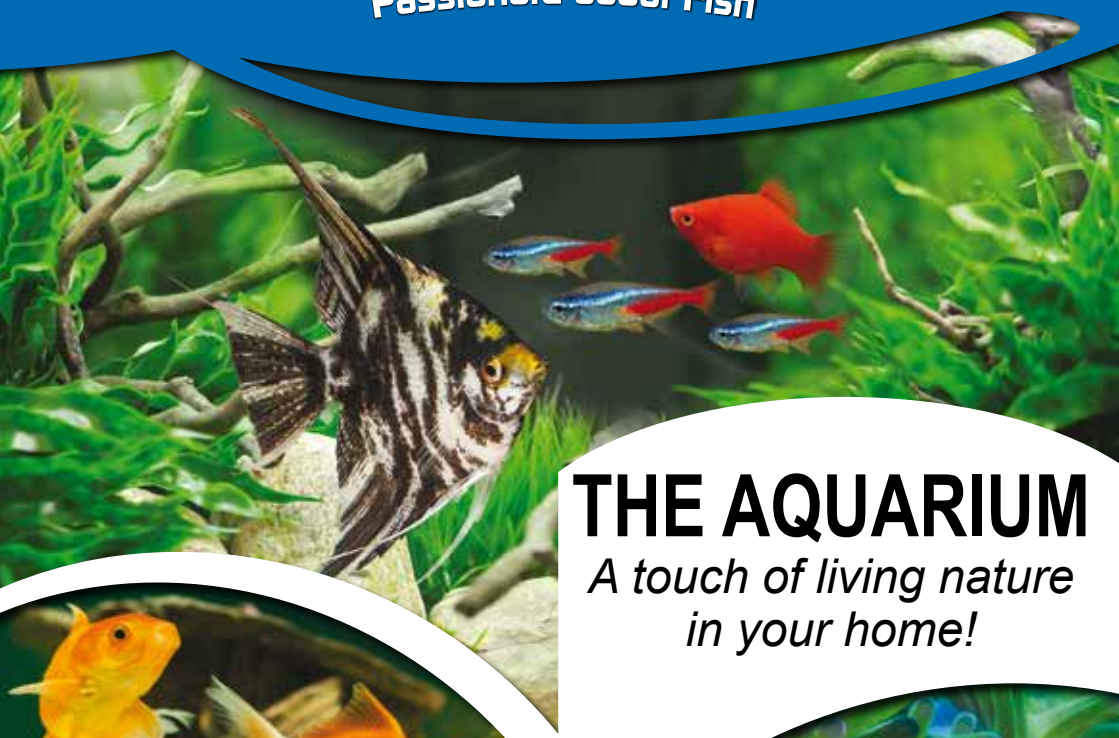
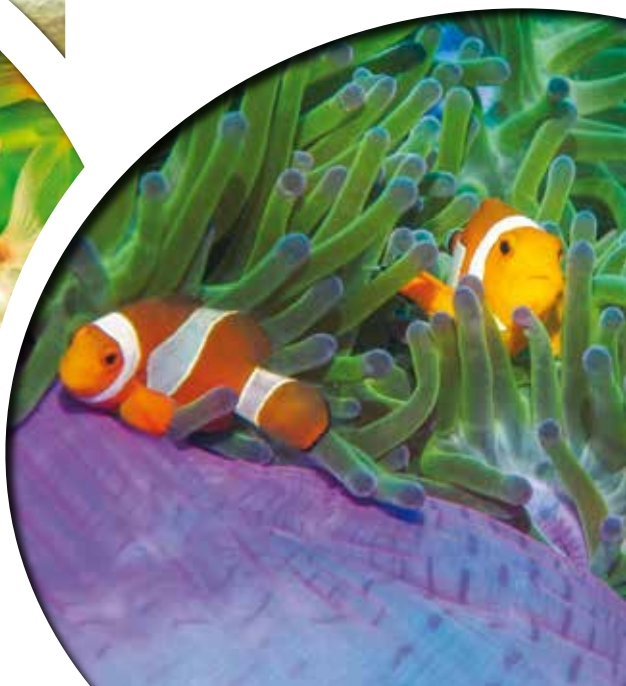
MADE IN ITALY

Passionate about Fish



THE AQUARIUM

A touch of living nature in your home!



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Summary

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STARTING OUT

The aquarium is the only means that enables us to bring “an element of living nature” into even a modern home without causing any particular problems. In an aquarium, the aquarist can breed marine or fresh water fish and amphibians of either domestic or tropical origin, grow plants and keep coral and other invertebrates from tropical seas.

The inhabitants of an aquarium do not make any noise, they do not dirty the house, they do not need to be taken out and they are not taxed....they only require a minimum amount of care and the kind of technical equipment that even a child is able to operate.

There is no other hobby which like the aquarium offers the possibility of living in daily contact with nature - in one’s own home. Furthermore, this small aquatic world is really “intact”, it does not mean that animals have to suffer in a cage or in a living space that is too small for them. In an aquarium that functions properly the hobbyist will be able to see and enjoy the proliferation of both tropical fish and plants.

Like any hobby, keeping an aquarium also requires some basic knowledge.
The following pages give some initial information which is sufficient to guarantee the problem-free functioning of a beautiful aquarium. Hobbyists wishing to learn more and commit themselves to the keeping of special aquariums should consult publications and keep informed through the specialist magazine.

Below: an aquarium rich in plants and stocked with a suitable number of fish not only guarantees perfect functioning, but, above all, adds a magnificent touch of living nature to your home.

WHERE TO PUT THE AQUARIUM

An aquarium can be put anywhere. Thanks to modern equipment, the tank is completely self-sufficient and only needs a socket for the electric current. We nevertheless suggest that the following points be observed:

1. The aquarium is not only a container for fish and plants but generally also serves as a type of household ornament, meaning that is should therefore be put in the sitting-room or entrance hall.

2. The tank should be positioned in such a way to allow for clear inside viewing.
When situated near to armchairs, the base on which it is placed should measure at least 50/70 cm in height; if the tank is going to be mainly observed from a standing position (in the case of a large sitting room), the base can measure 70/90 cm in height.

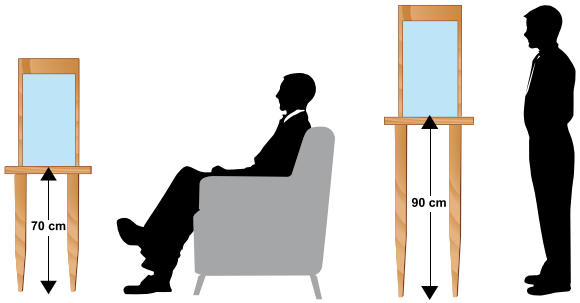
3. The aquarium must have a fixed place right from the beginning. Moving a full or even a half empty aquarium is practically impossible not only because of its weight but also because of the risk of cracking the glass; a move requires total reconstruction of the aquarium.

4. The tank should be positioned in such a way to allow for easy maintenance work.

5. The aquarium should be placed on a stable and perfectly “level” support; neither the floor nor the support should wobble. It is necessary to remember that a final weight of about 1.2 - 1.5 kgs should be calculated for every litre of tank capacity ; in other words, a 50 litre tanks will weigh about 60-70 kgs depending on its type of furnishing. Never place the bottom pane of the tank directly on a rigid surface. It is advisable to interpose a layer of material capable of absorbing small blows or defects of the supporting surface (foam rubber or a sheet of polystyrene are particularly suitable).

6. The aquarium should be exposed as little as possible to direct sunlight. The lighting units of modern aquariums guarantee a perfect dosage of light according to the different requirements of the plants and fish present in the aquarium.

On the right: schematic illustration showing the correction positioning of the aquarium on its base.



SIZE AND SHAPE OF THE TANK

One of the biggest mistakes, committed above all by beginners, is wanting to start with a small tank in order to “acquire experience”. Nothing could be more mistaken: it is much easier to care for a larger rather than a smaller aquarium and there are also fewer problems with the chemical-physical balance of the water. This is not only an advantage for us but also for the inhabitants of the tank! For this reason it is advisable to choose a tank with a capacity of at least 40 litres for freshwater aquariums and a capacity of 100 litres for marine aquariums. Naturally, even smaller aquariums, especially those that have been completely furnished by a competent manufacturer, can operate perfectly even though they are likely to create more problems if certain feeding rules and choice of fish are not rigorously respected.

Some people may ask themselves whether an aquarium has to be rectangular. Although there is no definite answer, experience has taught us that the ideal tank both for a beginner and for normal use should be a parallelepiped; all other shapes involve problems of a technical and ... financial nature. Nowadays, if possible, it is advisable to opt for a factory-made aquarium; this is due to the fact that custom-made aquariums, whatever their shape, are always expensive.

There are, however, some specific rules, dictated by experience, that concern the proportions between the individual sides and height of the tank.

Below:
chart showing three types of aquariums.
1 - the “ideal” proportions for an aquarium;
2 - a tank for “tall” fish;
3 - a tank for rearing frys.

1

2

3

THE ACCESSORIES
LIGHTING UNIT

To transform the tank into a perfectly functioning aquarium, three accessories are basically necessary:

1. a lighting unit
2. autonomous heating (MAGICTHERM)
3. a filter system

Light is one of the most vital elements without which the aquarium cannot operate.
Not only do plants and algae need light for growth, but so do most micro-organisms which although invisible, are nonetheless indispensable for functioning of the aquarium. Finally, the life of the fish, the amphibians and the other aquatic animals present in the tank also depends on light.

For this reason, the lighting unit of an aquarium must conform to some specific requirements which are partly different from that which might be considered valid or sufficient for the human eye.

Schematic illustration of the three main accessories necessary for every aquarium.
1 - The lighting unit,
2 - the heater (MAGICTHERM),
3 - the thermostat (MAGICONTROL),
4 - heating cable (AQUACALOR),
5 - internal filter (MAGICFILTER),
6 - external filter (SERIES DF)
are practically indispensable for the perfect functioning of both freshwater and marine aquariums.

Three factors should be taken into consideration:

1. duration of lighting;
2. colour of the light;
3. amount or intensity of the light.

The lighting in a normal aquarium should last for about 10-12 hours. The light should always be turned on and off at the same time and then left on without interruption.
Any other system has proved to be damaging for aquatic life.

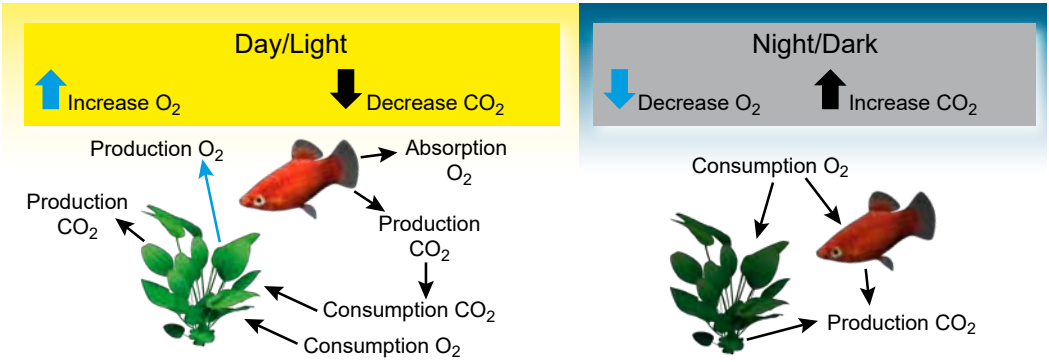
The colour of the light spectrum to be used, measured in Kelvin degrees, varies widely depending on the type of aquarium that we want to maintain.

These days a wide variety of lighting systems are used, from LEDs, very low power and high performance, standard T8 fluorescent tubes, high performance T5 fluorescent tubes, or mercury bulbs and even HQI the latter more suitable for large marine aquariums.

In freshwater aquariums, whether heavily planted or not, we need lighting that provides us with a spectrum between 3500 and 6000 Kelvin. As is well known, warm light is phytostimulant and will develop vegetation correctly.

In seawater aquariums the lighting requirements vary considerably compared to freshwater aquariums, because the spectrum must exceed 8000 degrees Kelvin.
In these aquariums you have to take into account the colour that you always see on the bottom, which is nearly always blue.

Below: schematic illustration of photosynthesis and the production of oxygen in the aquarium.



Each lighting system consumes a certain amount of electrical energy that is indicated in "watts", but the lighting effect does not depend only on this value, but on the spectrum produced by each model, with which we will obtain the "lumen" or intensity.

Another factor we must take into account is the height of the aquarium water level. Depending on the type of light used, the depth of illumination will vary.
Fluorescent tubes do not go deeper than 40-50 centimetres, while LEDs and other lighting systems work up to 100 centimetres.

In freshwater aquariums with vegetation that does not require much light, about 30-40 lumens per litre would be sufficient, while in densely planted aquariums we must guarantee at least 50 lumens per litre. In marine aquariums with invertebrates we would need between 50 and 80 lumens per litre.

To ensure the correct choice of lights, the following parameters should be taken into consideration.

With 1 watt :
Fluorescent phytostimulant tubes produce approx. 90 lumen;
Mercury vapour lamps (HQL) produce between 46 and 52 lumen;
Warm light fluorescent bulbs produce between 55 and 75 lumen;
Halide vapour lamps produce between 68 and 76 lumen (HQI);
Fluorescent sunlight lamps produce between 80 and 96 lumen (Lumilux);
Unlike others, LED lamps are a modular rather than a single system, and can provide between 30 and 100 Lumen / Litre, depending on the type of LED used.

Regulation takes place by means of a switch at the upper end of the tube; a red light shows when the device is on.

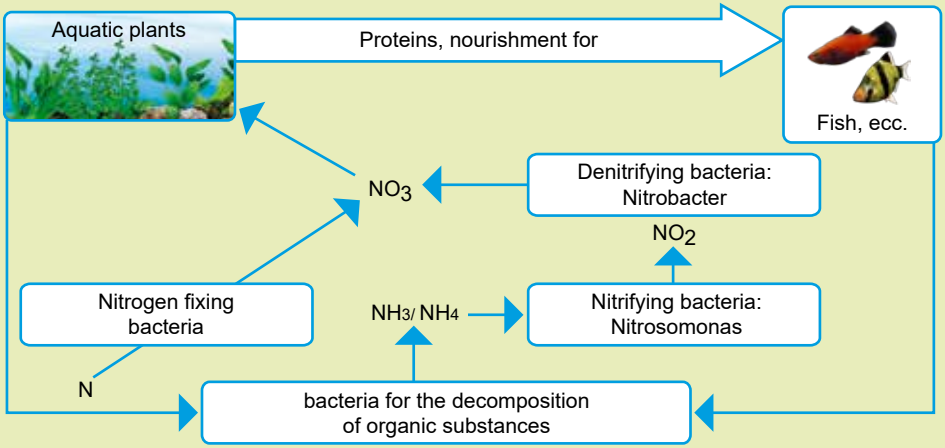
Electronic thermostats are also available on the market. These thermostats are not only more accurate and longer lasting but they are also more economic for large tanks.

To prevent the thermostats from overworking, with negative consequences in terms of duration, it is advisable to select the most suitable wattage for your heater. If the tank is positioned in a normally heated environment, approx. 1 watt can be calculated for 2 litres of water, while in a cold environment, e.g. during the winter months, it is advisable to use 1 watt for every litre of water.

FILTERING

In short, an aquarium cannot function without a filter, a system that eliminates pollutants from the water, i.e. what is generally referred to as organic material. This material derives from food residue, from the dead leaves of plants, from fish excrement, from dust particles present in the air, etc. If these substances are not eliminated, the water will soon become toxic both for fish and plants and turn into a malodorous liquid.
Different filter systems for aquariums are available on the market. Furthermore, it is necessary to bear in mind that many shop-bought aquariums are already equipped with an incorporated filter and consequently hobbyists no longer find themselves having to make a choice from among different models.

Below: simplified diagram of the nitrogen cycle in the aquarium.



However, in order to ensure good maintenance and know what type of “first aid” to perform, it is a good idea to have a basic knowledge about the technical and biological functioning of a filter.

Each filter consists of two parts: a container for the filtering material and a device to transfer the water back into the tank. According to the positioning of the filter, either inside or outside the aquarium, the container is provided with holes for the aspiration of water, hermetically closed or connected to the tank by means of suitable tubes.
The water reaches the container either by trickling down or by taking advantage of the “communicating tank” effect (overflow) while a centrifugal pump or (nowadays rarely) distribution valve connected to an aerator (small electric motor) is used to carry water to the aquarium.

The “heart” of the filter are the filter materials which enable the water to be treated.
There are mainly two types of filter materials: those that suspend the substances (normally visible to the naked eye) and those that are used to eliminate the organic substances and their derivatives, which although usually invisible, are particularly harmful (organic substances and their derivatives) for all aquatic organisms.

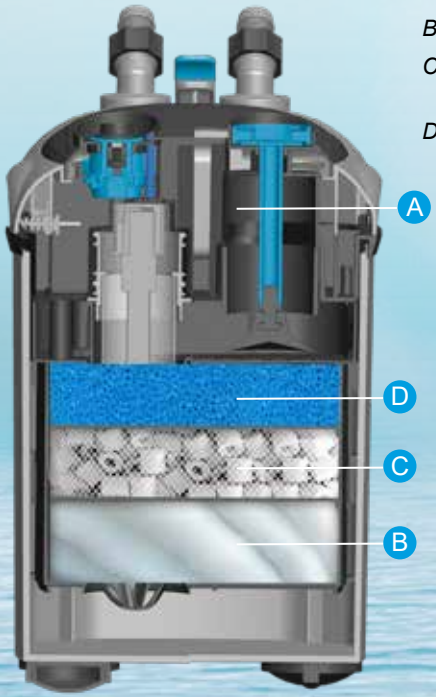
Below: diagrams showing functioning of a external filter with centrifugal pump (on the left) and a filter incorporated into the aquarium (on the right). Loading with filter material can differ slightly from the examples shown in the drawings (the one shown refers to a freshwater aquarium).

A = pump to carry water.

B = pre-filtering with FILTERWATTE (synthetic fibre).

C = biological filtering with AQUACIL, CRYSTALCIL, CLAROCAR.

D = fine, chemical or adsorbent filtering.



Mechanical filtering, which practically “sifts” the water, is used to eliminate fairly large suspended substances. The following materials are particularly suitable for this purpose: CLAROLAN (synthetic wool), resin foam (also known as synthetic foam), FILTERLAV (lava), AQUACIL (ceramic tubes) and CLAROCAR (active carbon).

To eliminate, or more precisely to convert, organic substances and their derivatives, it is necessary to use a filter system called a “biological” system. In this system the filter materials serve as a substratum for bacteria and other micro-organisms and are capable, by means of a complex biological process, of converting organic substances into inorganic substances (mainly nitrates) which in turn mostly serve as nutrients for plants and algae.

Any filter material that allows for the settling and growth of bacteria can be used for this type of filtering.
The most popular materials are AQUACIL (ceramic tubes also called razor shells), sponge, FILTERLAV and CARBOZEO granules consisting of various types of inert materials (ceramics, lava, zeolith, etc.) and inactive carbon.

Prodac offers a complete range of filter materials:
FILTERWATTE (synthetic fibres),
CLAROCAR (super-active carbon),
CRYSTALCIL (sintered glass media),
AQUACIL (ceramic cylinders),
NO NITRATES (resins adsorbing).

In addition to these two types of filters there are also others, such as those with adsorbing (with CLAROCAR active carbon, MUTACAL synthetic resins) or chemical actions.

Finally for marine aquariums, a special filtering system called a “skimmer” and UV lamps with a sterilizing effect are used. However, since these are somewhat complex systems they should only be used by the more expert aquarist.
To conclude, some practical advice: the efficiency of each type of filter depends on the capacity of its container (amount of filter material) and the power (yield in litres) of the centrifugal pump. For a freshwater aquarium, a pump with a hourly yield equal to the capacity of the aquarium (for a 100 litre tank a filter with 100/150 litres per hour) should be chosen.
The container should have a capacity of approx. 10% of the volume of the tank (in closed external filters the container can be smaller). For a marine aquarium, the pump should have a double yield, i.e. for a 100 litre tank it is advisable to use a pump with a 200/300 litre per hour capacity; the container should also be larger, accounting for
about 15% of the volume of the tank.

For further details about filters see the chapters on water and maintenance.

Other filters of the line manufactured by PRODAC:
AKTIVKOHLE PLUS (active carbon and nitrate absorbent resins),
MUTACAL (decalcifying resin).

AERATION

All aquatic animals and plants - within certain limits - require oxygen, an element which is also essential for filter bacteria. Furthermore, we have already mentioned that the oxygen normally present in water is not sufficient to satisfy all these requirements.

What can be done to oxygenate the water?
At one time air diffusers, generally know as “porous pebbles”, were used for this purpose. With the aid of an electric aerator these produce air bubbles. In marine aquariums, this method combined with an intense movement of water through the filter pump or supplementary pumps is still, even today, the most suitable to guarantee a sufficient amount of oxygen. On the other hand, where freshwater tanks are in question, experience and years of research have shown that this system presents certain problems, the most serious of which is the “expulsion” of “carbon dioxide” essential for the photosynthesis of plants. For this reason, porous pebbles are no longer used in freshwater aquariums in which aquarists wish to cultivate plants; this is due to the fact that these are more effective oxygen producers than any other type of air diffuser.
In summary, it can be affirmed that a good freshwater aquarium will receive the necessary amount of oxygen through plant photosynthesis, meaning that porous pebbles are not therefore necessary; on the other hand, where marine aquariums are in question,
it is almost always advisable to use (due to the lack of oxygen produced by plants) air diffusers. The functioning of air diffusers and relative aerator is extremely simple and does not require any technical explanation. The aquarist need only follow the simple instructions provided by the manufacturers of these systems.

NITRIDAC: bacteria based biological activator to encourage the nitrification of ammonical nitrogen.

MAGIC PUMP: recirculation pump for fresh and saltwater aquariums.

AIR PROFESSIONAL: air pump.

AUTOMATIC DEVICES

Over the last few years, the fishkeeping industry has studied different automatic devices to make less work for the aquarist. First and foremost, there is the automatic food distributor. This is a container connected to a timer which distributes dry or liquid food to the fish at fixed intervals established by the aquarist.

Various other automatic devices allow for the regulation of the different chemical values in the water. However, since these are certainly not advisable for beginners, they will not be described in this manual.
Until now we have discussed the accessories that are essential for the correct functioning of an aquarium; however, certain small accessories that are necessary, above all, for maintenance should be purchased. Below you will find a list of the most useful:
1. two nets, one small and one medium-sized one to fish the fish;
2. a window wiper in the form of a scraper or as a magnet;
3. Tweezers for planting and possibly scissors for pruning;
4. a glass or plastic siphon to remove large substances (food residue or similar);
5. a tube, measuring at least 15 mm in diameter and not lesss than 2 m in length, to part-change the water;
6. a thermometer to place inside the aquarium.

In addition to these objects , necessary for the normal maintenance of the aquarium, there are also others which, although useful, are not really essential. These are: an electric residue suction device, baskets and rings to feed the fish, etc.
On the other hand, a carbon dioxide diffuser as well as various products to monitor the chemical values in the water are important for the neo-aquarist. These accessories will be discussed in the chapter on water.

Below: the main accessories necessary for regular care and maintenance of an aquarium.

DECOR

For reasons of space, we cannot here go into too many details about the decorative materials available from aquatic centres. We will simply provide our reader with some general but important guidelines.

1. Each type of material used in the aquarium should be as “natural” as possible and correspond to the vital requirements of the flora and fauna present in the tank.

2. All the materials used should not give off toxic substances or in any way alter the chemical values of the water. Where the freshwater aquarium is in question, this means not using any calcareous materials, which would increase the hardness of the water, and paying particular attention to the use of plastic materials, especially in marine aquariums, because these, sometimes, give off polluting substances.

3. When choosing materials, it is always advisable to consult an expert; collecting material from rivers, lakes or the sea is inadvisable because it requires a lot of experience.

4. The material used for the bottom of the tank is particularly important. This should consist of gravel in freshwater aquariums and, if possible, of coral sand in marine aquariums. In all cases, in order to prevent water stagnation, a material with a suitable granulometry (never too fine) should be chosen.

Below: schematic illustration of the preparation of the bottom of a freshwater aquarium.
A = bottom layer consisting of gravel, FONDOVIVO, HUMUS and HUMUPLUS (according to the type of plants cultivated). FONDOVIVO: clay soil and natural substances containing micronutrients.
HUMUS: nutritional substratum for aquatic plants.
HUMUPLUS: fertilizing compound for delicate plants.

B = Over layer consisting of washed gravel. The entire bottom layer should measure between 5 and 10 cm in height, with a slight inclination towards the back part of the tank for the possible accumulation of residue behind the front pane. this makes it easier to remove when part changing the water.

Furthermore, the material used on the bottom of the aquarium should not be too high, at maximum it should measure 10 cm in height. This means that 25 kgs of material are sufficient for a 100 litre tank.

5. For freshwater aquariums, in order to provide the plants with all the nutritional substances that they require, it is advisable to integrate the gravel with special soil fertilizers.

6. All decorative material, including the gravel but not the soil fertilizer, should be accurately rinsed and possibly cleaned with a hard brush.
Aquariums are usually placed against a wall. To prevent the image of the wall being visible through the glass and consequently disturbing the decorative effect of the aquarium, it is advisable to provide a background for the tank. The best solution is to attach a diorama to the outside of the aquarium using bi-adhesive tape. Many different dioramas are available on the market: the most suitable diorama can be chosen according to the type of decor used.

FURNISHING PROJECT

Numerous suggestions for furnishing different types of aquaria can be found in specialized books and in the magazine “aquarium”. In this chapter we will only summarize a few of the most important aspects:

1. The decor should always keep account of the requirements of the animals to be housed. Many fish need hiding places. It is essential to build suitable supports for live coral and other invertebrates. In any case, it is necessary to leave enough free space for swimming.

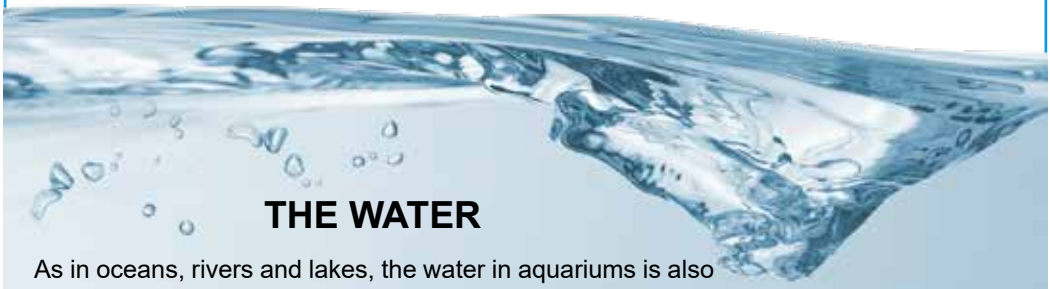
2. Before purchasing any decorative material it is advisable to first make a furnishing plan for the aquarium. This is particularly useful for freshwater tanks in order to establish how many plants are needed and where to position them.

3. In freshwater aquariums, due to their vital role in the perfect functioning of the aquarium, plants should be used as the main decorative elements.

4. Marine aquariums should be furnished with a lot of calcareous material (madrepore, coral sand) to keep the chemical values constant.

5. The hobbyist purchasing a factory-made aquarium, complete with accessories, does not have to worry about placement of the various accessories; if this is not the case, it is advisable to first position these before going ahead with the actual furnishing.

6. Once the aquarium has been furnished and filled with water, it is necessary to allow it to operate for a while without any animals. In any case, it is necessary to add AQUASANA, a bio-conditioner to the water and, in the event of a freshwater aquarium to wait for 3-5 days before introducing the fish; for marine aquariums, it is advisable to wait at least two weeks. Only in this way does the aquarium (especially the filter) have a chance to "mature" thus rendering the aquatic environment inhabitable.



THE WATER

As in oceans, rivers and lakes, the water in aquariums is also the element that determines the survival of all aquatic organisms.
Without a basic knowledge of the various chemical and physical factors that distinguish water types, it is impossible to be a successful aquarist. However, before going into problems of a chemical nature, we feel that it is incumbent to underline an important fact: a freshwater aquarium can function perfectly even by using simple tap water and without taking its chemical values into consideration.

Marine aquariums, on the other hand, require a certain amount of experience.
For this reason, it is advisable to first gain experience with a freshwater aquarium before going on to tackle a marine aquarium .

Water is never chemically pure but contains varying substances in a more or less dissolute state. These substances determine its chemical characteristics, such as hardness, pH, conductivity, etc.

AQUASANA: bio-conditioner to eliminate everything that could be detrimental to the life of the fish and plants in a "new" aquarium.

HARDNESS

The hardness of the water is due to the presence of calcareous substances and derivatives of magnesium, sulphates, chlorides, nitrates and other compounds. These
substances are present in the form of ions and the greater their number, the harder the water. In fishkeeping there is a distinction between “total hardness”, “temporary hardness” and “permanent hardness”.

Total hardness, usually measured in German degrees (° dGh) can be divided into temporary hardness and permanent hardness. The former is that part of hardness that can be removed, for example by boiling the water, and corresponds, in general, to the quantity of bicarbonates present in the water; this is measured in °KH and is also called “carbonatic hardness”. On the contrary, permanent hardness is that part of hardness that remains in the water even after boiling and which is formed, above all, by sulphates, chlorides and nitrates.

Special easy-to-use liquid gauges designed to monitor water hardness levels are available on the market. These enable the hobbyist to determine the total hardness and the carbonatic hardness.

Different types of water hardness are required and depend upon the type of animal that the aquarist wishes to rear. For a freshwater aquarium with ordinary fish, water with a total hardness of between 7 and 15° dGH and a carbonatic hardness of between 4 and 10° KH can be used. The values of potable water normally oscillate within these limits.
For delicate fish, of soft water origin, a reduction in hardness may be necessary. This can be achieved by the addition of distilled water or by treating the water with special resins.

Where marine aquariums are in question, hardness does not play an important role (as long as the water is not soft), owing to the fact that the addition of synthetic marine salt automatically established the right values.

MUTAPHI “D” pH-
to reduce the pH.

MUTAPHI “M” pH+
to increase the.

THE pH VALUE

The pH value is used to indicate whether a substance is acid, neutral or alkaline.
The pH scale is divided up from 0 to 14: pH 7 is neutral, between 0 and 6.9 is an indication of acid values and between 7.1 and 14 alkaline or basic ones. Even this value can be easily monitored in the aquarium by using suitable liquid indicators.

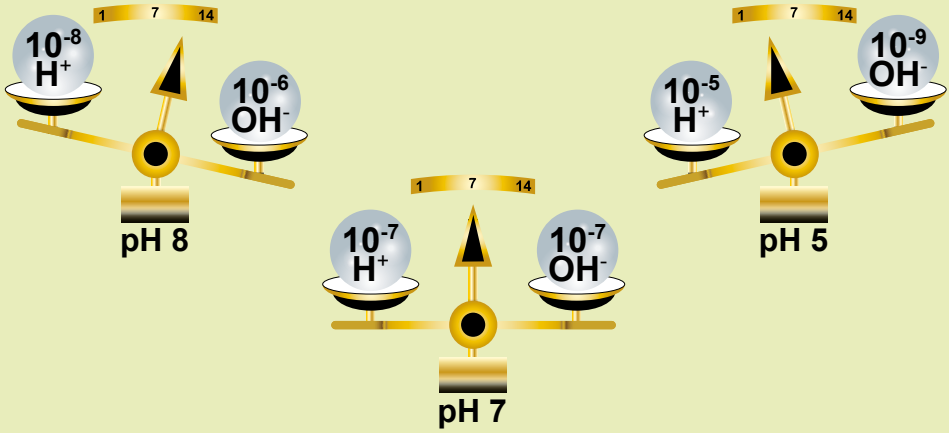
In freshwater aquariums the pH should normally be between 6.5 and 7.5 while more acid values are often necessary for the reproduction of certain fish and for the rearing of soft water fish.

In the marine aquarium the pH value must be between 8.2 and 8.4.
In all cases it is very important that the pH value is as constant as possible and for this reason it is necessary to bear in mind that there is a strict relationship between water hardness, carbon dioxide and pH.

CARBON DIOXIDE

When discussing carbon dioxide or to be more precise CO_2, a distinction must be made between freshwater and marine aquariums.
Carbon dioxide is an acid that is always present in the air and also produced in every aquarium - amongst other things - by fish, bacteria and micro-organisms. This acid acts on the pH and reduces it towards acid values if it is not first consumed or expelled. In freshwater aquariums, the plants consume a large amount of carbon dioxide and often the quantity produced by the aquatic organisms is not enough to satisfy their requirements.

Schematic illustration of the acid or basic reaction of the water.
When the number of OH^- (hydroxide) ions is greater than the number of H^+ ions (hydrogen), the needle of our scale moves to the right in the basic area; when, on the contrary, the number of H^+ ions is greater than the number of OH^- ions, the needle moves to the left in the acid area.



In the marine aquarium, where there are no plants but only algae (which are smaller consumers of carbon dioxide) this substance almost always accumulates.

The strict correlation between hardness (specifically carbonatic hardness), pH and carbon dioxide is a fairly complex chemical process that only the most experienced aquarists need to know. For the less expert aquarist it is sufficient to remember that this correlation exists and that specific tables, that illustrate the interdependence between these three values, can be found in specialized books.

AMMONIA, NITRITES, NITRATES

We have already mentioned that all the organic and nitrogenous substances present in aquaria are converted by bacteria and other micro-organisms. This conversion does not occur all of a sudden, but by degrees.

The first stage is the conversion into ammonia (when the pH exceeds 8) or ammonium (when the pH is lower than 8). While ammonia is toxic for almost all aquatic organisms, this only applies to ammonium in very high concentrations.

Ammonia or ammonium do not however - normally - end up in the aquarium but are instantly converted in the filter, during the second stage of the cycle of nitrogenous substances, into nitrites which in turn, during the third stage, are converted into nitrates. Only the nitrates, which are luckily less harmful to aquatic organisms, can no longer be converted by the bacteria that is generally present in aquarium filters and which accumulates in the water.

PRODACTEST gauges can be used to monitor the presence of ammonium, nitrites and nitrates in the water. In any case, the presence of ammonium (ammonia) or nitrites

in the water of an aquarium means that the filter is not carrying out its function of a biological purifier (too much food, too many fish, too small a filter, immature bacterial flora, etc.) properly. On the contrary, when a high value of nitrates with only a few nitrites is determined, the filter is functioning perfectly and only a partial change of water or the use of a special filtering resin is necessary to re-establish a normal value.

OTHER CHEMICAL VALUES OF WATER

In addition to the chemical values that have been briefly described until now, there are also others that, in certain instances, can be important to establish a healthy aquarium. A propos of this it is necessary not to overlook iron (a necessary element for freshwater plants), phosphates (whose presence encourages the growth of algae; these are harmful both in fresh water as well as marine aquariums) and naturally oxygen.
Nowadays, special kits are available on the market to measure these and varying other substances , thus allowing for a complete and perfect control of the chemism of the water. Since this is a highly specialized subject it will not be dealt with any further in this manual.
On the contrary, a value typical of marine water should be mentioned: density. This value is used to indicate the amount of salts dissolved in the water. A densimeter is used to measure density, i.e. a glass instrument that floats in the water according to the amount of salt dissolved.

MEASUREMENT OF CHEMICAL VALUES

The measuring of chemical values in the water has already been mentioned several times. The aquarist can either use expensive electronic equipment for his analyses or simple liquid indicators. The former have the advantage of giving extremely precise results, while the latter are less expensive.
A good liquid indicator that has been specially designed for use in fishkeeping is sufficiently precise and, therefore, preferable.

Details about the use of different gauges can be found in the packs of the different indicators and can even be used by aquarists who do not have any specific chemical background. Both for the neophyte and for all those who do not intend to rear particularly delicate fish, only the hardness (in fresh water), the density (in marine water), the pH and possibly the nitrates (to establish the right moment for a partial change of the water) need to be measured. the water) need to be measured.

AQUASALZ:
Oxygenating salts which dissolve waste deposited on the bottom of the aquarium.

THE IDEAL WATER

In absolute, there is no such thing as ideal water. This is due to the fact that much depends upon the type of aquatic organisms that the aquarist wants to rear, whose requirements are often likely to vary considerably.

It is necessary to remember that, in general, all freshwater organisms have a fairly high capacity for adaptation, while marine organisms require more stable environments and are generally more sensitive to the chemical-physical variations of water.

Therefore, for freshwater aquariums, a good indication of the “ideal” water for almost all fish and tropical plants, is water with a pH of around 7 and a hardness of between 10-15° dGH and 5-10° KH.

In marine aquariums, on an average, the density (which in a certain sense substitutes the hardness value in freshwater) should be around 1022-1025 and the pH approx. 8.2.

On the right: the pH value is measured as follows.
Add 2 drops from the dropper to 5 ml of aquarium water and then compare the colour of the water with the colour scale.

Generally speaking, in fishkeeping, the other chemical values of the water can also measured according to the same principle.

PRODACTEST: for a perfect control of the chemical values in the water; liquid test kits to check pH, hardness, nitrites, nitrates and ammonia ecc ecc.

THE PLANTS

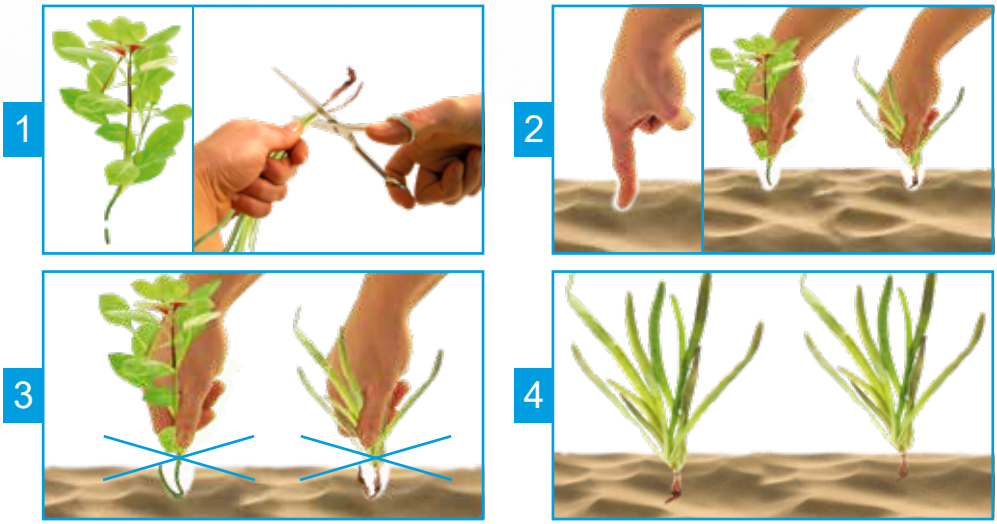
Right from the beginning, we stressed that plants do not live in marine aquariums. This chapter will, therefore, only be of interest to those setting up a freshwater aquarium. The growth of algae in a marine aquarium has nothing whatsoever to do with the cultivation of aquatic plants and will not be dealt with in this manual (we would like to remind you that keeping a marine aquarium should only be considered after first gaining experience in the freshwater section!) And now a quick glance at some of the most important tips for the cultivation of aquarium plants.

1. Although soil is of relative importance for aquarium plants because most of them are nourished through the leaves, it should, nevertheless, not be overlooked. The bottom layer of material not only serves as a substratum to fix the roots of the plants, but also as a deposit for a certain amount of nutritional substances which are subsequently dissolved in the water and then absorbed by the plants.

2. We have already discussed light; no plant can grow without adequate lighting.

3. Nutritional substances are the third factor necessary for plant growth. Besides carbon dioxide for photosynthesis, plants need mineral salts dissolved in water, many of which derive from the decomposition of organic material which takes place in the filter; on the contrary, others must be administered by the aquarist through the use of suitable fertilizers and/or nutritional soils.

Below: how to arrange plants
1) Stemmed plants are shortened, while in those with roots, part of the root system is cut.
2) Use your finger to make a hole in the sand and insert the plant.
3) When using stemmed plants, make sure that the roots are straight and do not protrude from the earth.
4) Never plant plants in earth that is too shallow or too high. Only cover the root attachment lightly.



The table at the side shows a list of “easy” plants that can be found in all good aquatic centres; the easiest species are marked by an x and the slightly more difficult ones by xx. Under the heading height you will find the maximum height that plants can grow to; the measurement indicated in parentheses and marked by a g refers to floating plants. With regard to use, G refers to plants that should only be used in groups while S indicates solitary plants; some species can be used either alone or in groups.

Scientific name	height in cm	degree of difficulty	use
Alternanthera reineckii	40	x	G
Anubias species	15-30	x (xx)	S, G
Aponogeton crispus,	50	x	S, (G)
Bacopa caroliniana (B. amplexicaulis)	40	x (xx)	G
Bacopa monnieri	15-40	x (xx)	G
Ceratopteris sp.	(40) g	x	G
Cryptocoryne affinis	20	x	G
Cryptocoryne wendtii	30	x	G, (S)
Cryptocoryne willisii (C. nevillii)	5-10	x	G
Echinodorus bleheri	50	x	S
Echinodorus cordifolius (E. radicans)	50	x	S
Echinodorus parviflorus	20	x	G
Echinodorus quadricostatus (E. intermedius)	10	x	G
Egeria densa (Elodea densa)	40	x	G
Hydrocotyle leucocephala	40	x (xx)	G
Hygrophila corymbosa (Nomaphila stricta)	40	x	G
Hygrophila polysperma	40	x	G
Hygrophila stricta	40	x	G
Limnophila sessiliflora	30	x	G
Lobelia cardinalis	50	x (xx)	G
Ludwigia sp.	40	x (xx)	G
Lysimachia nummularia	40	x	G
Myriophyllum aquaticum	30	x	G
Nymphaea lotus	20 (50)	x (xx)	S
Riccia fluitans	(5) g	x	G
Sagittaria graminea	20	x	G
Sagittaria plathyphylla	40	x	S
Sagittaria subulata	10	x	G
Samolus parviflorus	10	xx	S, (G)
Vallisneria spiralis	40	x	G

NUTRONFERRO: liquid plant food specially designed to cultivate and strengthen aquarium plants in the best way possible.
NUTRONFLORA: liquid fertilizer rich in mineral substances and growth hormones, to be combined with NUTRONFERRO for the luxuriant growth of aquatic plants.
FONDOVIVO: natural soil.

Anubias congensis

Cryptocoryne affinis

Vallisneria spiralis

Aponogeton longiplumulosus

4. The arrangement of the plants in the tank is another factor that influences vegetation. Each type of plant has a precise need for growing space - a factor which must be taken into consideration when planning the decor of the tank. Experience has shown that although it is advisable to decorate the aquarium with a lot of plants, only a few species should be used.

To begin with it is advisable to only choose plant species that are easy to cultivate and fast growing. Right from the beginning, these will allow for the establishment of what is commonly, but erroneously, called “biological equilibrium”.

If the advice given in this manual is followed carefully, the aquarist should not have any problems cultivating plants. But everyday experience teaches us that often the neophyte complains about the poor growth of plants or an “invasion” of algae which almost always goes hand in hand with the first symptom. We would once again like to point out that although the plants listed on the facing page are easily grown in all aquariums and do not present any problems, it is essential (in addition to the various suggestions given previously) to have a sufficient number of plants in the tank. As opposed to overstocking with fish, there can never be enough plants in an aquarium. One third, if not more, of the space in the tank should be occupied by plants. Only in this way can that environment, which allows for a luxuriant growth of vegetation without algae, be established.

At the risk of repeating ourselves, we would like to remind our readers that fish and other aquatic animals (like invertebrates) should only be placed in the aquarium after this has “matured”.
During this period the water will be completely clear, the gas balance will have been established and an initial colonisation of the filter and substratum with nitrifying bacteria will have taken place. Freshwater plants will have had time to become “acclimatised” and the first green algae will have grown in the marine aquarium.

Within certain limits this entire process can be accelerated both with the use of a bio-conditioner (AQUASANA) and freeze-dried bacteria (NITRIDAC).

FISH AND OTHER AQUATIC ANIMALS

Let us now examine the most important points for the purchase and introduction of fish into our tank; with regard to other aquatic animals - advisable for more expert aquarists - the same rules apply.

1. Never buy sick fish. The fins must be wide open and not have any white marks or corrosions; the body must also be free from any sign of parasites or pathogens, such as white dots, wounds, ulcers, blood spots, etc.; the belly must be full and hollow.
The fish should swim with open fins and not seem to be making any sudden movements; their breathing -recognizable by the movement of the gills - must be regular and calm.
Their eyes must be clear and “lively”. When fish scrape against the bottom or swim with theirs mouths very close to the surface of the water something is usually wrong.
2. If you are in any doubt about the general health of your fish, try to see what happens when you give them food; all fish, even those that have just been fed, will accept food unless they are really ill.
3. In the case of fish about which little is known or delicate species, it is essential to obtain as much information as possible from the shopkeeper about their previous environment . Important factors include: water temperature, pH, hardness or density and the type of food given.
4. For freshwater tanks only one specimen of the same species should never be purchased; always purchase at least one pair, or better still a small group of 4-6 fish, especially when it is a question of fish that live in shoals. The same rule does not apply to marine aquariums, because many species are solitary and cannot stand the presence of other fish of the same species in the tank. If nothing is known about the “nature” of the fish it is advisable to first ask for advice from your shopkeeper before making a purchase or to consult a specialised book.

ALGA CONTROL: solution to control the growth of algae in freshwater.

5. In order to avoid temperature changes, take the fish home as quickly as possible; it is also important not to shake-up the bags used to transport the fish.
6. Before introducing the fish into the tank, first check the temperature of the water in the aquarium and then that in the bag; if there is a difference of more than 3 oC, open the bag used for transport and let it float for about 15 minutes in the aquarium water. In the case of delicate fish (and from this point of view all marine fish are delicate) it is advisable to slowly add (after 10 minutes) the aquarium water to that of the bag. This is aimed at preventing sudden changes in the chemical values. It is always advisable to turn off the light in the aquarium before introducing new fish.
7. When the temperature reaches the same level, carefully introduce the fish into the tank by slowly overturning the bag in the water. Never use your hands to hold the fish and try not to use a net for this operation.
8. Check the behaviour of the fish for about 10 minutes. This is also useful to discover their hiding places so that you will know where to find them during their acclimatisation period.

CHOICE OF FISH

One point remains to be clarified: what criteria should be used to choose a specific species and how many fish, in all, should be chosen.

Giving an answer to this question is not always easy, owing to the fact that this depends on various factors:

1. The type of aquarium that one has in mind (community tank, special tank only for certain species, a tank that recreates a specific bioptope);

2. the nature and behaviour of the fish in the aquarium; each species of fish has different space requirements;

3. the tank capacity and the size that each individual fish will grow to in the future (shops usually sell young fish which are therefore still small).

The following two lists of “easy” fish, particularly suited to beginners or to the aquarist who does not want to spend too much time on rearing difficult species, might be helpful.

FRESHWATER FISH “WITHOUT PROBLEMS”

Barbus conchonius,
Barbus nigrofasciatus,
Barbus “schuberti”,
Barbus tetrazona,
Barbus titteya
Betta splendens
Brachydanio albolineatus,
Brachydanio rerio
Chanda ranga
Colisa fasciata,
Colisa labiosa,
Colisa lalia
Corydoras aeneus,
Corydoras paleatus
Gymnocorymbus ternetzi
Helostoma temminckii
Hemigrammus nanus,
Hemigrammus ocellifer
Hyphessobrycon callistus,
Hyphessobrycon flammeus,
Hyphessobrycon gracilis,
Hyphessobrycon pulchripinnis
Hypostomus plecostomus
Labeo bicolor
Macropodus opercularis
Melanotaenia boesemani
Moenkhausia sanctaefilomenae
Paracheirodon innesi
Poecilia reticulata,
Poecilia latipinna, Poecilia velifera
Pristella maxillaris
Pterophyllum scalare
Rasbora heteromorpha
Tanichthys albonubes
Trichogaster leeri,
Trichogaster trichopterus
Xiphophorus helleri,
Xiphophorus maculatus,
Xiphophorus variatus


Barbus tetrazona


Corydoras aeneus


Betta splendens


Poecilia reticulata


Brachydanio albolineatus


Pterophyllum scalare


Colisa fasciata


Rasbora heteromorpha


Xiphophorus helleri


Paracheirodon innesi

MARINE FISH “WITHOUT PROBLEMS”

Abudefduf (practically all the species)
Amphiprion clarkii,
Amphiprion ephippium,
Amphiprion melanopus
Chromis xanthurus
Dascyllus aruanus,
Dascyllus carneus,
Dascyllus reticulatus,
Dascyllus trimaculatus
Gobidi, (practically all the species)
Labridi, (practically all the species)
Monodactylus argenteus
Pomacentrus, (practically all the species)
Scatophagus argus


Abudefduf saxatilis


Amphiprion clarkii


Amphiprionocellaris


Anampes chysocephalus


Bodianus bilunulatus


Chromis Xanthura


Dascryllus artuanus


Glyphidodontops hemicyaneus


Pomacentrus bankanensis

With regard to the number of fish to be introduced into the tank, it is advisable to initially follow this rule:

1. for freshwater aquariums calculate 1.5 litres of water for each centimetre of length of the fish (caudal fin included);

2. for marine aquariums each centimetre of the fish needs approx. 7-8 litres of water.

WHAT AND HOW DO FISH EAT

Obviously the survival of animals in an aquarium depends to a large extent on the food with which they are fed. An adequate diet not only keeps them alive but also enables them to grow and - in the case of freshwater fish - helps them to reproduce.
The food should approximate, as far as is possible, the food found in nature.
For this reason, the administration of live food used to be suggested, but nowadays, almost all fish sold in specialized shops are used to feeding on “artificial” food.
A wide range of foodstuffs ranging from flakes to granules, from freeze-dried to frozen foods are available on the market.
It is simply a question of choice.... and a bit of good sense.

1. The shape of the food should be suited to the size of the fish, i.e. big pieces for large fish, fine food for small fish. An empirical rule, that is fairly valid, states that each piece of food should be as large as the eye of the fish to which it is given.

2. The type of food given should correspond to the nutritional requirements of the fish; some fish are prevalently phytofagus meaning that they principally feed on organic substances while others should be fed on animal substances because they are “carnivores”.

Below: flakes and freeze-dried fish food, a complete range for all types of freshwater and marine fish.

3. If possible, fish should be fed twice a day; once in the early morning and the second time just before turning out the light.

4. The quantity of food given is very important: only give as much food as fish can manage to eat in 5-10 minutes. You will soon learn what the right amount is.

5. A uniform diet should be avoided at all costs; alternate at least two different types of fish food. Even the best food, given on its own for a long period of time, does not satisfy a fish.

6. A small dose of a good vitamin integrator, specially studied for fish, should be given now and again.

Below: freeze-dried foods, the ideal food to ensure an integrated diet for all types of freshwater and marine fish. Granular foodstuffs complete the range (BIOGRAN), TROPICAL FISH FLAKES (a "mixture" of flakes for freshwater fish) and TARTAFOOD for freshwater turtles.

FISH REPRODUCTION

As already mentioned, freshwater tropical fish also reproduce in domestic aquariums; unfortunately, even nowadays, the reproduction of marine fish in an aquarium only occurs very occasionally.

It is necessary to point out that the reproduction of most freshwater fish does not present any particular problems and, with a bit of fishkeeping experience, can be achieved by anyone. However, it is advisable to first acquire a bit of experience with a "generic" aquarium before dedicating oneself to fish rearing. Before undertaking breeding, it is advisable to first consult a good book on the reproduction of aquarium fish.

Below: the correct use of vitamins. Vitamins should NEVER be added directly to the water; this operation only pollutes the water without in any way benefitting the fish.

Vitamins should be added to the food (preferably freeze-dried or dry food) before feeding the fish.

FISH DISEASES

Contrary to the old saying “as healthy as a fish”, fish can also become ill.
If, however, you have set up your aquarium with “easy” fish and have followed the tips given in this manual, the probabilities of disease are few. In fact, it should not be forgotten that fish have a powerful “self-immunity” against pathogens and, if general rearing conditions are good, it is unlikely that they will be affected by disease.

We cannot and do not want to here publish a treatise on different fish diseases but will leave this job to specialist books on the subject. However, a few basic rules are necessary:

1. If the functioning of our aquarium is kept under strict control and if healthy fish are bought, the auto-immunity of fish is sufficient to prevent the onset of disease.

2. It is absolutely inadvisable to use chemical products for so-called “preventive cures”. They almost always do more harm than good.

3. If strange behaviour or any other symptoms of disease are noticeable, it is advisable to consult either your shopkeeper or a specific book on the subject.

4. Different products designed to cure aquarium fish are available on the market.

5. No fish diseases are contagious for man!

MAINTENANCE

Even though numerous accessories that allow for the “automatic functioning” of the aquarium are available on the market, certain maintenance jobs still have to be carried out. Nevertheless a 100-200 litre aquarium only requires a few hours of work per month ...this means that there is lots of time left to contemplate and enjoy the fabulous underwater world in your house!

Below you will find a short guide to maintenance tasks; as can be seen, in certain cases, these tasks differ slightly according to whether you have a freshwater or marine aquarium. We will start with the tasks that are the same for both types of aquariums.

Every day four basic operations must be carried out. However, if required some of these could be automated:

1. turn on and turn off the light in the aquarium;
2. give food to the fish;
3. control the water temperature
4. eliminate waste substances that have remained on the bottom.

For freshwater tanks

the following operations should be carried out once a week:

1. check the pH, hardness and the nitrates if any;
2. check the carbon dioxide diffuser system;
3. check the state of the plants, potting them if necessary or getting rid of dead leaves;
4. control filter functioning and clean the pre-filter material;
5. top up any water that has evaporated (in order not to alter the chemical values, it is advisable to use distilled water).

Every two weeks approx. 15% of the water should be changed by adding AQUASANA (see box for instructions). When doing this it is a good idea to also check all the aquarium equipment to ensure that it is functioning properly.
It is inadvisable to completely refurbish the aquarium, not even after one year. This drastic step can be avoided by proper initial installation and the maintenance work described in the manual.

For marine aquariums

it is necessary to carry out the following jobs:

1. check the pH, density, nitrites and possibly nitrates;
2. check filter functioning and clean the pre-filter material;
3. top up any water that has evaporated (it is advisable to use tap water) and add MARINE TRACE ELEMENTS.

Every two /three weeks, approx. 15-20% of the water should be changed by adding OCEAN FISH for the preparation of marine water. When doing this, it is also a good idea to check all the equipment in the aquarium to ensure that it is functioning properly.

OCEAN FISH, the complete sea salt for the ideal preparation, with tap water, of synthetic sea water for tropical and Mediterranean fish, invertebrates and algae.

MARINE TRACE ELEMENTS: 70 micronutrients of vital importance to keep the fauna and flora in marine aquariums healthy.

As can be seen, only a few simple rules need to be followed in order to have a touch of "living nature" in your home...

Good luck!

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