

Sweetwater-Aquarium

An aquarium is a small ecosystem.

The components of this ecosystem are the water, the plants, the animals, the ground and the technical applications.

1.) Water

We could make a great difference between the temperature and the hardness (chalkiness) of the water.

Temperature:

There are tropical aquariums, which require a temperature of about 25° C, and aquariums for cold-water-fish, which require a temperature of about 18° C. You also can find aquariums for cold-water-fish that need temperatures of about 8 to 18 C° - for example for fish from Europe, such as trouts. In hot summers, it could be a problem to keep the water cold.

One important factor is the relationship between temperature and the oxygen in the water. When the water is too warm, the oxygen will be down, but life in water needs oxygen.

Here you can see a table of the water-temperatures and the possible fish you can keep:

Cold water	8 – 18 C°	European- and North-America
Moderate water	14 – 20 C°	South East Asia
Warm water	20 – 24 C°	Middle America, Tropical Mountains
Tropical water	24 – 30 C°	Tropical Zones

Hardening:

The hardening depends on the calcium in the water, when the water comes from location that has much limestone. Then the water is hard or chalky, for example the water in the European rivers or in the Africans lakes – especially the Victoria lake or the Malawi-lake. The water there is very hard, and when you keep fishes from these lakes, you must remember that they need hard water (about 18-20 dg).

In contrast to these locations, the water from the rivers in South-America or Asia, for example the Amazon's, is very soft.

It is important to check of the hardness of the water, because the fish are very sensitive.

You can universally distinguish between the followings types of water in connection with the hardening:

Soft Water	Below 8° dgH	Black Water Fish (Amazon)
Middle Hard Water	8 – 12° dgH	Advisable for Beginners
Hard Water	Above 18° dgH	African and some European Fish
Very Hard Water	Above 30° dgH	Fish from the Coast

Acidity (Säuregehalt):

Another important factor concerning water and fish is the acidity.

The acidity of water tells about the relationship between hydrogen ions and hydroxide ions (acid / base).

With the ph-scale, you can test and measure the water acidity.

Neutral water has a ph-value of seven; acidic water has a lower value than seven and basic water higher than seven.

The ph-value influences the chemical behaviour of the water in the aquarium.

You also must have a look about the other chemicals substances in the water. Important are also the nitrates and nitrogens. To observe these values, you can buy chemical test-sets.

2.) Plants

Plants are very important for the small ecosystem in an aquarium. As a result of photosynthesis, the plants provide the water with oxygen. But they also have an influence on the chemical elements in the water. For example, plants need the nitrogen in the water and so they would reduce it. There are many other chemical and biologic factors influencing the water, the fish and the plants.

In addition, an important advantage of plants is that they make up a beautiful underwater garden. Japanese and Dutch aquariums are famous for this creativity. Fish and other animals can hide between the plants, this is also important.

Types of water plants:

You can distinguish between swimming plants, underwater plants and swamp plants.

Swimming plants, are in most cases, on the water level.

They are important for fish that likes to jump out of the water (the plants stop them) or for fish that don't like such a bright light in the aquarium.

Underwater plants supply life with oxygen and they are very important for a running ecosystem in the aquarium. The plant filters out harmful substances from the water out and converts the nitrogen in the water.

Swamp plants are, in most cases, just for decoration. Some aquariums have a part with land (so called "Palludarium"). In this type of aquarium, you can also keep amphibians, for example frogs.

For keeping plants you must see to it that they also need specific conditions with regard to the living place (temperature, light, hardness...)

Another important factor with regard to plants are the algae.

There are green- and blue algae, diatoms, beard- and brush-algae.

Sometimes they could be a problem, when they grown too much, for example, but in a good aquarium algae are no problem. Many animals consume algae as food.

And algae also produce oxygen.

3.) Animals

Fish are, most of the time, the most interesting animals in an aquarium, but there are many other possibilities, for example water-snails or prawns.

You can classify fish into cold-water-fish and warm-water-fish, you also can they divide them into the several geni – for example into barbs, perches, carps or catfishes.

Another difference between fish has to do with what they eat- there are predatory fish and fish that eat plants. It is important to know, what your own fish eat, because you can have a surprise... One fish with a fat belly, which has eaten all the other fish – that happens.

Get informed about fish, there many books and internet-sites.

4.) Ground

As a ground, you normally use gravel or sand.

You can gravels or sand of different sizes of the single gravel or grain.

Usually, you use gravel with a diameter of 2-4 mm. For fish that live on the ground or in the ground you use sand with a grain diameter of less than 2 mm. Fine sand is very important for that kind of fish, because they can be hurt by rough gravel.

When you buy the gravel, you must check what kind of minerals it consists of. For example, the gravel from limestone or is quite different to the sand of a beach.

5.) Technology

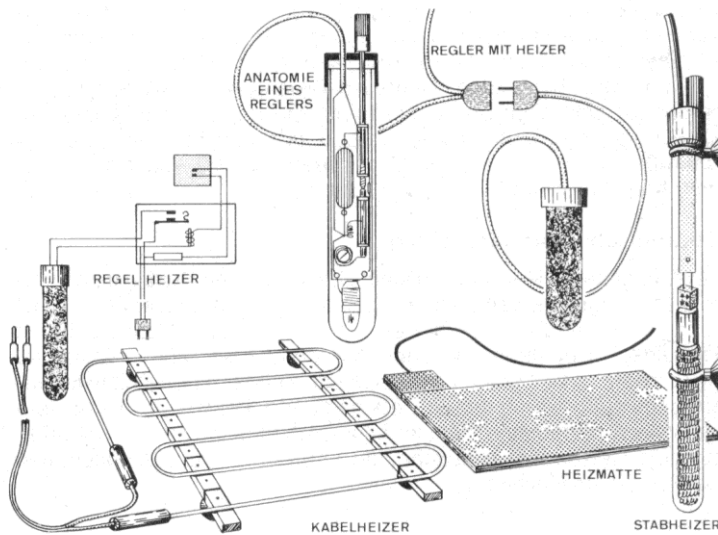
The technical equipment of an aquarium consists of a heater, a water-filter, sometimes an air pump and the illumination.

- The heater has the function of regulating the temperature of the water. You can buy different sorts of heaters, for example under-surface-heaters or heating-bars. A heater consists of a thermostat and an electrical heater. With help of the thermostat, you can control the water temperature.

Under-surface heaters are good for the plants inside, because the under-surface heater system effects water convection in the bottom of the aquarium and this supports the growth of the plants.

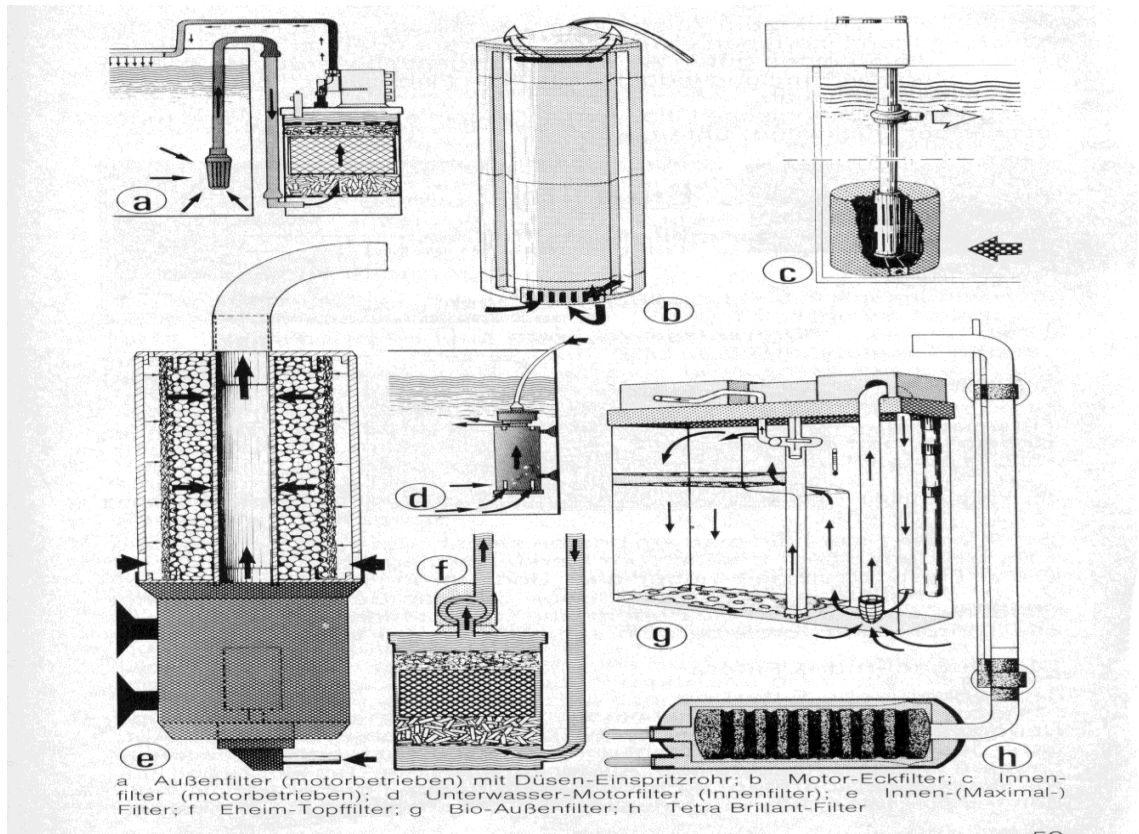
Heating bars are buildt-in in glass; they look like a spiral of a heating wire. You can buy bars with a power from 10 – 500 W. An advantage is that heating bars are mostly cheaper than under-surface systems.

It is also important to be able to exchange a faulty heater. With an under-surface system, you must empty the whole aquarium.



Here you can see the heater systems for aquariums

- A filter is required to remove the dirt from the water. You can use in-water-filters or filters outside the aquarium. Outside-filters are preferred in bigger aquariums, because they are easier to care. Primary filters serve as a mechanic filters, but they also have the function of a biologic filter. A good filter is the heart of a perfect aquarium.



Another effect of a filter is the creation of a current in the aquarium, this current is important for the fish inside. Also the temperature will be distributed more even.

An important rule is: The bigger the filter, the better is it for the aquarium.

- As to illumination, you can differentiate between tubes and light bulbs. In most cases tubes are used. The power of the light depends on the depth of the aquarium and the plants inside. Some plants and animals require much light, other species do not need so much light. For aquariums, there are special tubes and bulbs with a particular light for the water-plants and the animals inside.

In the following table you can see what power of tube light you may need for a special aquarium:

Aquarium Length	Volume Litres	Lamp (Watts)	Number of Lamps
30	12	6	1
40	25	8	1-2
50	35	15	1
60	65	13	2
70	100	16	2
80	110	16	3
100	180	30	3
110	22	25	4
130	325	40	4
160	480	65	4

For small aquariums, you can use ordinary light bulbs. But they are not perfect for the plants inside.

For special effects, you can use spotlights. You must keep an eye at the temperature, because these lights are mostly very hot.

When you have a large aquarium with a big deepness, the best light are HQL-Lamps (Quecksilber-Hochdruckdampflampen). A great disadvantage is the high price for these lamps.

As a rule of thumb, you can calculate one-Watt power per two litres of water.

With all kind of electricity in connection with water, you must take care!

To get informed about fish and all other kinds of wateranimals in respect of aquariums, you can consult the internet and many books. In the pet shops, the shop assistants are very helpful in most cases. You also can ask clubs nearby.

Used books: Aquarien-Atlas, Dr.Rüdiger Riehl, Hans A. Baensch
 Lebensraum Aquarium, Angelo Mojetta, Aquaristik, Dr. J.D.van Ramshorst, Süßwasserfische der Welt, Sterba.