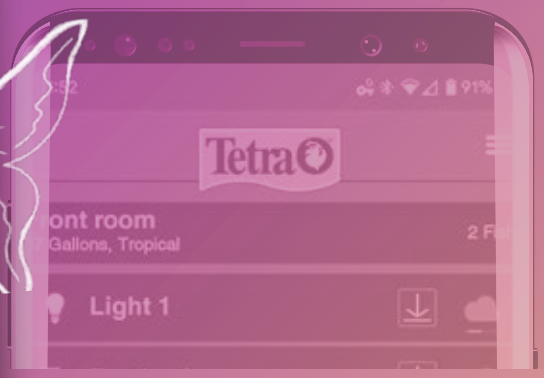
13+

Not intended for children under 13

Tetra

STEM

Kit Activity Guide



French/Spanish instructions are available at www.tetra-fish.com

Pour les directives en français, voir la page www.tetra-fish.com

Las instrucciones en español están disponibles en www.tetra-fish.com

Table of Contents

Keep out of reach of children. Not a toy.

If any parts are damaged or missing, contact us at 1-800-526-0650 and we will send you the part.
If the glass aquarium is broken or damaged, please return it to the retail store for an exchange.

Video guides are available on the Tetra® YouTube channel at www.youtube.com/user/TetraFishProducts

Throughout this book, you'll see QR codes you can scan for videos with more information.

IMPORTANT SAFETY INSTRUCTIONS

WARNING: To guard against injury, basic safety precautions should be observed, including the following:

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

DANGER: To avoid possible electric shock, special care should be taken in the use of aquarium equipment. For each of the following situations, do not attempt repairs yourself. Return the appliance to an authorized service facility for service or discard the appliance.

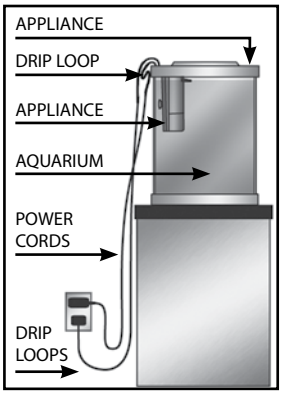
A. If the appliance falls into the water, **DON'T** reach for it. First unplug it and then retrieve it. If electrical components of the appliance get wet, unplug it immediately.

B. If the appliance shows any sign of abnormal water leakage, immediately unplug from the power source.

C. Carefully examine the appliance after installation. It should not be plugged in if there is water on parts not intended to be wet.

D. Do not operate any appliance if it has a damaged cord or plug, or if it is malfunctioning or if it is dropped or damaged in any manner.

E. To avoid the possibility of the appliance plug or receptacle getting wet, position aquarium stand and tank to one side of a wall-mounted receptacle to prevent water from dripping onto the receptacle or plug. A "drip loop," shown in Figure 1, should be arranged by the user for each cord connecting an aquarium appliance to a receptacle. The "drip loop" is that part of the cord below the level of the receptacle or the connector, if an extension cord is used, to prevent water from traveling along the cord and coming in contact with the receptacle. If the plug or receptacle does get wet, **DON'T** unplug the cord. Disconnect the fuse or circuit breaker that supplies power to the appliance. Then unplug and examine for presence of water in the receptacle.



F. To create a drip loop for the LED light, attach the included hanger to the back of the aquarium frame using the double-sided tape. Insert the cord into the hanger, making a drip loop as shown.

1. Close supervision is necessary when any appliance is used by or near children.
2. To avoid injury, do not contact moving parts or hot parts such as heaters, reflectors, lamp bulbs, etc.
3. Always unplug an appliance from an outlet when not in use, before putting on or taking off parts, and before cleaning. Never yank cord to pull plug from outlet. Grasp the plug and pull to disconnect.
4. Do not use an appliance for other than intended use. The use of attachments not recommended or sold by the appliance manufacturer may cause an unsafe condition.
5. Do not install or store the appliance where it will be exposed to the weather or to temperatures below freezing.
6. Make sure an appliance mounted on a tank is securely installed before operating it.
7. Read and observe all the important notices on the appliance.
8. If an extension cord is necessary, a cord with a proper rating should be used. A cord rated for less amperes or watts than the appliance rating may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.
9. This appliance has a polarized plug (one blade is wider than the other). As a safety feature, this plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician. Never use with an extension cord unless plug can be fully inserted. Do not attempt to defeat this safety feature.

SAVE THESE INSTRUCTIONS

Visit http://www.tetra-fish.com/warranty-registration.aspx for warranty information and to register your product. For a free copy of the warranty terms, you can also call us at (800) 526-0650 or mail us a request at Spectrum Brands Pet LLC, Attn: Consumer Relations, 3001 Commerce St., Blacksburg, VA 24060.

This warranty is limited to products that are sold by sellers that are subject to and have agreed to follow Spectrum Brands' quality control standards. Accordingly, the warranty is not available for products purchased from unauthorized sellers because Spectrum Brands cannot oversee or take action to correct the quality of these products. This exclusion includes all products purchased from unauthorized sellers, including unauthorized internet sites and unauthorized storefronts on online marketplaces.

LED Light FCC and ICES-005 Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAN ICES-005(B) / NMB-005(B)

LED Light Stick Model Numbers: **10 Gallon** - AQ-78640; **20 Gallon** - AQ-78641

Welcome to the amazing world of aquatics!

This guide will teach you how to set up an aquarium, care for fish and test your water. You'll learn the science and technology behind aquarium fish, including Biology, Chemistry, Physics and Mechanical Engineering. We'll also teach you how to troubleshoot problems using the scientific method.

There are a lot of steps involved in setting up an aquarium, and the order in which you do them is important. This guide will show you what to expect in the first month.

Three Phases of Tank Setup

- Research
- Setup
- New Tank Cycle

Gather supplies > Decide what fish to buy > Set up aquarium > Buy and add fish > Monitor aquarium > Tank cycles > Begin monthly maintenance

	Complete by	Each ***BOLD*** word represents an important step in scientific research
☐	Day 1	Read through this manual and make a **MATERIALS LIST** for the extra supplies you need, like gravel, décor, food and water care.
☐	Day 1	Research what fish you want. Read page 9 of this guide for suggestions for this size aquarium.
☐	Day 1	Set up your aquarium. Follow the step-by-step guide or **PROCEDURES** for aquarium setup, including adding water, water conditioner and good bacteria, and testing your water parameters to make sure it's safe for your fish.
☐	Day 2	Add fish. Waiting a day before adding fish helps your aquarium reach a stable temperature and gives time for your good bacteria to colonize the gravel and filter.
☐	Day 4	Use a test strip to test the water and use the Testing Log to enter your **RESULTS**. If ammonia is high, perform a small water change and monitor your fish for signs of stress (gasping at the surface).
☐	Day 7	Test your water again and compare the results from day 4. If the ammonia is high, replace about 3 gallons for a 10 gallon tank and 6 gallons for a 20 gallon tank.
☐	Day 7-14	Around this time you might notice your water getting cloudy. This is likely your good bacteria blooming, which is a good thing! The bacteria should settle down into the gravel and filter soon.
☐	Day 10	Test your water again and look closely at your pH. If levels are high, you'll need to do a water change.
☐	Day 14	Continue to monitor your fish. Check your filter cartridge to make sure it doesn't need to be replaced. Begin your growth chart if you haven't started it yet and log your **DATA**.
☐	Day 30	You've made it to day 30! Test your water with a test strip to see if everything looks good. Change your cartridge, replace about 3 gallons for a 10 gallon tank and 6 gallons for a 20 gallon tank of tap water treated with Tetra® AquaSafe®, and add Tetra® EasyBalance® and Tetra® Cleaning Bacteria. Repeat this step monthly.

Get to know your kit

Tetra 10 Gallon Kit

Tetra 20 Gallon Kit

What's in the kit?

1. 10/20 Gallon Glass Aquarium
2. Lid
3. Light
4. Tetra® Whisper® Filter
5. Heater
6. Medium or Large Tetra® Stay Clean™ Filter Cartridge
7. Test Strips
8. Thermometer
9. Fish Net
10. Tetra® TetraMin® Food Sample
11. Tetra® AquaSafe® Sample

Other items needed
(not included)

Gravel
Water
Fish
Décor
Bucket
Siphon
Additional Medium or Large Cartridges
Tetra® Food
Tetra® EasyBalance®
Tetra® SafeStart™
Tetra® Cleaning Bacteria
Tetra® AquaSafe®
Additional Tetra® EasyStrips™

Spare parts available through consumer care

Aquarium Filter
LED

The experiments in this book are designed to teach basic aquarium keeping and the science behind it. Follow directions closely, and ask an adult for help if needed.

Not intended for children under 13. Keep out of reach of children.

Aquarium Setup Instructions

1 Unbox

Please recycle packaging if available in your community.

2 Find a Location

Choose a flat, level, water-resistant surface near an electrical outlet. Do not place on top of electronics or in an entertainment center. Avoid placing next to heat sources, air conditioners and direct sunlight to maintain proper temperature and to prevent excessive algae growth.

Always place aquarium in a location designed to support its total weight.

NOTE: Filled with water and gravel, a 10 gallon aquarium could weigh approximately 100 lb and a 20 gallon aquarium could weigh approximately 200 lb.

Ensure all cords are routed correctly according to the diagram.

3 Add Gravel

Place 1 to 1.5 inches of rinsed gravel in the bottom of the aquarium.

This is typically around 10 lb of gravel for a 10 gallon aquarium and 20 lb of gravel for a 20 gallon aquarium.

TIP: **Slope the gravel bed gradually down from the back to the front to add depth to your aquascaping.**

4 If Desired, Add Heater, Air Stone or Bubble Wand with Air Pump

Route the cords to the back of the aquarium and near your outlet, but do not plug them in yet.

A heater is not needed for goldfish but should be added for tropical fish. A Tetra® HT Heater may be placed below the intake line in the back panel. Route the cord through the cord routing space in the hood.

Air pumps used with air stones or bubble wands add interest to the aquarium and provide additional oxygenation, which is essential to fish health.

Follow all instructions included with the appliances for proper installation.

5 Fill Aquarium

Fill aquarium 2/3 full with room temperature water treated with Tetra® AquaSafe® (5 mL for a 10 gallon aquarium or 10 mL for a 20 gallon aquarium). This extra space will allow fish to be added without overflowing the aquarium.

TIP: **To avoid disturbing the gravel when filling the aquarium, place a small, clean dish on top of the gravel and pour water onto the dish.**

DO NOT PLUG APPLIANCES IN UNTIL THE AQUARIUM IS FILLED.

6 Add Plants and Décor

Add aquatic plants, decorative rocks and ornaments, remembering to rinse them all first.

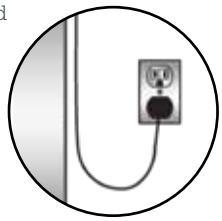
Place taller plants toward the back of the tank and shorter ones toward the front to give an appearance of greater depth.

TIP: **Never use household soaps or chemicals on aquariums, décor or equipment, due to the harm they may cause to fish and equipment.**

Once all equipment is installed, fill the aquarium with room temperature water treated with 1 mL Tetra® AquaSafe® to within 2-3 inches of the top rim. This extra space will allow fish to be added without overflowing the aquarium.

7 Final Setup Tips

Plug the kit and any added equipment into the power outlet, always making a drip loop for safety.



Allow the filter to run to be sure it is functioning properly.

The water temperature should be allowed to stabilize before adding fish.

Ideal Water Temperatures:

Goldfish: **68°F – 72°F**

Tropical Fish: **76°F – 82°F**

STOP – Before Adding Fish:

Be sure to add Tetra® SafeStart™ solution to cycle your new aquarium.

When adding your fish, it is important to create a healthy, biologically active environment. Tetra® SafeStart™ solution contains a bacteria blend that is proven to reduce fish loss due to ammonia and nitrite toxicity.

Test aquarium water with Tetra® EasyStrips™ test strips to ensure adequate water quality, and use with our Tetra My Aquarium Connected app for suggestions on what to do if your water parameters are off.

If all water parameters test in the safe range, the aquarium is then ready for fish.

Adding Fish

Once the aquarium temperature is ideal and you have treated the water with both Tetra® AquaSafe® water conditioner and SafeStart™ solution, fish may be added. Submerge the transport bag with new fish in the aquarium for approximately 30 minutes. This will equalize the water temperature and allow the fish to adjust to any temperature changes. After about 30 minutes, fish may be added to the aquarium.

TIP: **When adding fish, do not pour the water from the transport bag into the aquarium. Instead, gently pour the fish into a fish net, using a bucket to catch the water from the bag. Quickly place the fish from the net into the aquarium. Discard the bag water.**

Top off the aquarium water. Remember to treat all new water with Tetra® AquaSafe® water conditioner prior to adding.

Enjoy Your New Aquarium!

Tips for Success

- To ensure your tank is large enough, know how large your fish will grow before purchasing.
- Don't overcrowd your tank. The general rule is 1 gallon of water for every inch of fish for tropical fish, and 2-3 gallons of water for every inch of common goldfish.
- Stock your fish slowly over time to decrease the chance of ammonia spikes.
- On average, you should leave your aquarium light on for 10 hours or less. If algae growth becomes a problem, reduce that length of time. Light timers can help with this.
- Plants and décor provide hiding places and create a less stressful environment.
- Use appropriate dosage when using water care products and always read the package directions.
- Sign up for reminders and use our water care app for recommendations.

Aquarium Maintenance

Water changes are important to remove impurities in the water like waste, uneaten food and ammonia. With the steps below, it will only take about 30 minutes every 30 days to replace 30% of your water.

Supplies needed

- Bucket
- Siphon
- Clean Cartridge
- Tetra® EasyBalance®
- Tetra® Cleaning Bacteria
- Tetra® AquaSafe®

How to do a water change

Activity

Use the "Water Change Log" at the back of this book or use the Tetra My Aquarium app to set monthly water change reminders and log your results.

1. Unplug all aquarium equipment before beginning maintenance

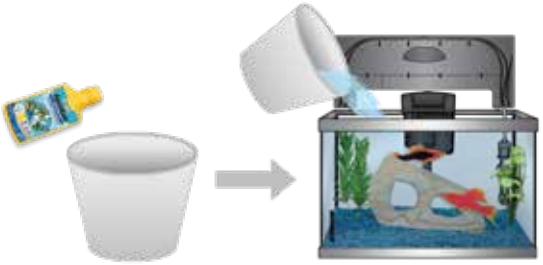
2. Use a siphon to clean your gravel and remove 30% of your water **(APPROXIMATELY 3 GALLONS OF WATER FOR A 10 GALLON AQUARIUM OR 6 GALLONS OF WATER FOR A 20 GALLON AQUARIUM)**

3. Dump the water into a toilet or flower garden

NOTE: NEVER DUMP AQUARIUM WATER INTO A SINK USED FOR FOOD PREPARATION OR INTO A STORM DRAIN OR NATURAL WATERWAY. ASK AN ADULT FOR HELP IF THIS IS TOO HEAVY FOR YOU TO CARRY

4. If needed, rinse plants and décor and return to aquarium

5. Fill your bucket up again with clean, room temperature water and treat with 1 tsp Tetra® AquaSafe® water conditioner (5 mL) for every 10 gallons (38 L) of new water before adding water back into the aquarium



6. Add 1 tsp Tetra® EasyBalance® solution (5 mL) for every 5 gallons of aquarium volume and 1 tsp Tetra® Cleaning Bacteria (5 mL) for every 5 gallons of aquarium volume. Use 10 mL for 10 gallon aquariums or 20 mL for 20 gallon aquariums

GET RECOMMENDATIONS ON YOUR WATER TEST RESULTS ON OUR TETRA MY AQUARIUM CONNECTED APP

7. Change filter media

USE MEDIUM TETRA® STAY CLEAN™ FILTER CARTRIDGES FOR 10 GALLON OR LARGE FOR 20 GALLON

8. Plug aquarium equipment back in

How to choose fish for your aquarium

Information on fish types

Betta Aquarium

Choose 1 male betta or 2 female bettas

Do not put more than 1 male in an aquarium

Community Aquarium

8-10 fish for 10 gallon

15-20 fish for 20 gallon

Goldfish Aquarium

1 common goldfish or up to 2 for 20 gallon

GloFish® Aquarium

8-10 fish for 10 gallon

15-20 fish for 20 gallon

TIP: As your fish grow, be sure you have at least 1 gallon of water per inch of fish. You might need a larger aquarium as your fish mature.

Activity

Use the Growth Log included at the end of this book to complete this activity.

Fish size impacts how large of an aquarium you need and the amount of food your fish require.

Tracking growth is also a great way to make sure your fish are thriving in their environment.

So how do you track your fish's growth?

A scientist in a lab would remove a fish from its aquarium and weigh it, but to ensure the safety of your fish, we'll share two options for tracking growth at home:

Option 1: Locate an object in your aquarium that you know the width of, like a piece of décor, and estimate the size of your fish as it swims past.

Option 2: Take a picture of your aquarium while all of your fish are visible (feeding time is great for this) and measure their length in your photo by comparing them to an object in the aquarium of which you know the width.

You can also look up the average size of your type of fish to see how big it might grow.

Can't tell them apart? It's okay to average the length of your similar-looking fish.

As long as your fish are getting the nutrition they need and are in an appropriately sized aquarium, you should see them grow to their average length.

Some fish grow more than others:

A neon tetra, for example, will be about ½" to ¾" in your pet store and will measure up to 1¼" when full grown.

However, a 1½" common goldfish at your pet store can grow as large as 10 inches!

This is why it's important to know what to expect before you bring your fish home.

If a fish outgrows their aquarium they will need a larger tank to thrive.

Biology

Nutrition

Nutrition varies by type of fish (some need more protein, and some might need more algae, for example), but in general, fish need a balanced diet with a variety of vitamins, minerals, proteins, carbs and fat.

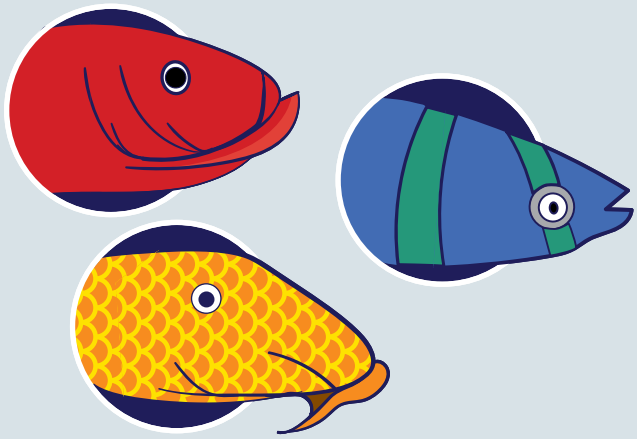
Did you know?

The shape of a fish's mouth determines where in the aquarium it eats its food.

If its mouth is turned upward (like a platy or molly or guppy), the fish eats at the water's surface.

If the fish's mouth faces downward (like a cory or pleco), it eats from the bottom of the tank.

If its mouth is somewhere in the middle (like a goldfish or neon tetra), it often eat its food in the middle of the tank.



Types of food

Getting the right food for your fish means ensuring the food will float or sink to where the fish prefers to eat.

Floating food is great for top-feeders, slow-sinking food is great for mid-feeders, and sinking food is best for bottom-feeders and grazers.

Activity

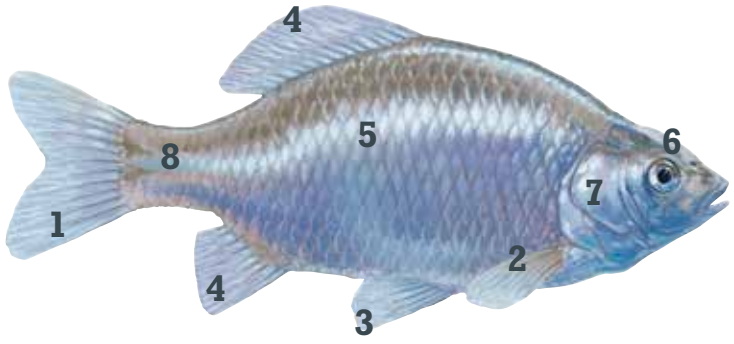
Is your fish an herbivore (eats plants and algae), omnivore (eats a variety of meat and vegetable matter) or carnivore (eats meat)? Look up information about your species of fish to help you determine what type of diet your fish needs.

Slow-sinking food types for mid-feeders

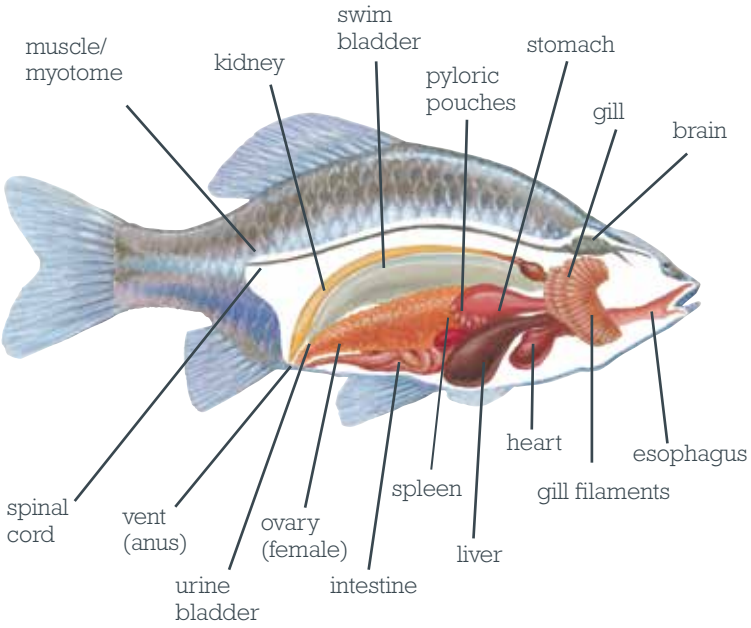
Sinking food types for bottom-feeders

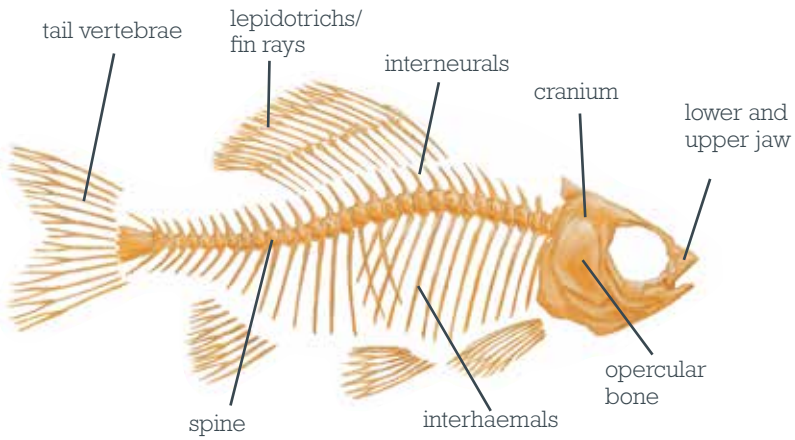
Floating food types for top-feeders

Vacation: if you are planning to be away on vacation, be sure to put a vacation food in your aquarium and remove uneaten food when you return.



1. The **caudal fin** (tail fin) makes the fish go fast and is what it uses if it leaps out of the water.
2. Without **pectoral fins**, a fish would constantly move forward because of the water passing through its gills. Pectoral fins counteract this movement and help keep the fish in place.
3. **Pelvic fins** stabilize the fish from left to right.
4. **Dorsal and anal fins** help stabilize the fish while it swims.
5. **Scales:** Many illnesses such as ick can be seen on a fish's scales.
6. **Eye:** If you've ever seen a fisheye lens on a camera, you'll understand that many fish have excellent eyesight.
7. **Operculum:** This bony gill covering closes to prevent water from escaping.
8. **Lateral line:** A fluid-filled canal running along each side of the body. Vibrations pass through pores into the canal, which shakes tiny, jelly-like lumps inside the fish that help the fish detect movement nearby. This is important for defense against predators and avoiding obstacles, and it also helps schooling fish stay together.





Did you know?

Overfeeding is one of the most common reasons for dirty water and could lead to fish death.

When feeding, only give your fish what they can eat in 2-3 minutes.

If you see food left over after this time, reduce the amount of food you give them at each feeding.

Fish have personalities (some are nicer or more active than others).

Check out fish compatibility charts to understand which fish get along nicely with their fellow tank mates and which are better left alone.

The Nitrogen Cycle

The nitrogen cycle is the natural process that occurs in a closed aquarium system referred to as "biological filtration."

First, food enters the aquarium during feeding.

Digested food is turned into fish waste in the form of ammonia.

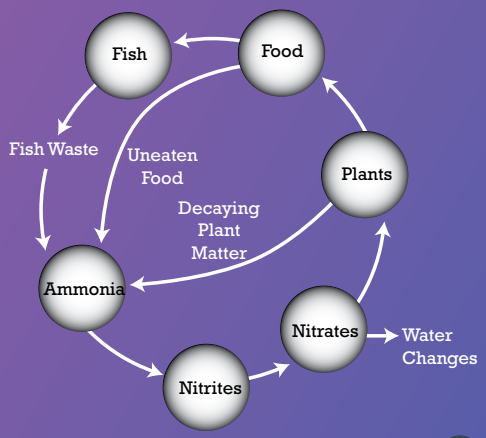
Healthy aquariums have good bacteria (in a similar way that our stomachs have good bacteria) called Nitrosomonas *sp.* that convert the toxic ammonia to nitrite.

Nitrite is still toxic, but in a relative sense, it's better than ammonia.

Then different bacteria called Nitrospira *sp.* convert the toxic nitrite to a less toxic nitrate.

The best way to control nitrate levels in your tank is with regular water changes.

However, if you have live plants in your aquarium, the plants will use the nitrate as food and convert it to oxygen.



Chemistry

Water

Tap water typically has the right mineral content for your aquarium and is treated to remove bacteria and contaminants that can be harmful to humans and fish (we'll teach you how to test this in the next section), but tap water also contains chlorine.

Chlorine is toxic to fish and beneficial bacteria and must be removed from tap water before adding it to the aquarium.

Read dechlorinator instructions carefully before adding the treated water to your aquarium.

Did you know?

While well water doesn't contain chlorine, it might not have the right minerals or pH levels for your fish. You might need to add a chemical to adjust your pH or add freshwater aquarium salt.

The science behind test strips

Checking your water can help maintain a healthy environment for your fish. It takes just 30 minutes every 30 days to replace 30% of your water. During your monthly maintenance routine, be sure to use the Tetra® EasyStrips™ included in this kit to ensure your fish have a healthy and safe environment. Follow up with testing weekly if needed.

Testing water

How to use

1. Remove one test strip and hold at the end with no pads. Be sure to close lid tightly after removing.
2. Dip strip into water for one second and remove.
3. Hold strip level for 60 seconds until colors on pads fully develop.
4. Now compare to the color scale included with the test strip and look at the guide to determine if any values are unsafe for your fish.

How a test strip works

Each test strip is made of litmus paper.

Each pad on the strip is treated with a different chemical that changes color when it is introduced to acids or bases in the aquarium.

Each of the six pads on the test strip tests a different chemical property.

The color charts included with your test strip were created using known levels of each chemical property.

Using a test strip with our water care app

My Aquarium Connected app

Keeping track of water tests and learning what to do with the results has become easier with the Tetra My Aquarium Connected app.

Start by opening your Tetra My Aquarium Connected app and opening the menu. Select Water Test. Here the app will have you select the type of aquarium, type of water and what type of Tetra® test strip you are using. The test strips included in this kit are the Tetra® 6-in-1 EasyStrips™.

Next, follow the instructions for using the test strip.

Once you have dipped your test strip in the water, simply start the Timer on the Tetra My Aquarium Connected app to ensure your strip processes for the full 60 seconds.

Once the 60 seconds is up, enter your results.

The app will then provide any necessary recommendations to help get your tank back to its ideal parameters.

Use this test monthly as part of your monthly maintenance routine, or use as needed.

Activity

A water test log is included in the back of this book, and you can also use the Tetra My Aquarium Connected app to save and chart your test results.

Converting electricity into heat

Most aquarium heaters take electrical current from the outlet to a resistor called a heating coil. As the coil heats up, heat is transferred to the cooler water surrounding it (through a process called convection, which we'll discuss later). An internal thermostat monitors the water temperature and turns on and off automatically to maintain the desired temperature.

What's a watt?

A watt is a unit of power. Power is the measure of energy transfer rate between two systems. Similar to how miles per hour tells us the velocity of a moving object, a watt tells us the rate at which energy flows through a system. A 50 watt aquarium heater consumes energy at the rate of 50 watts.

Types of heat transfer

There are three ways that heat can move: convection, conduction and radiation

Convective heat transfer: *Transfer of heat from one place to another by the movement of fluids*

The heat lost between the inner tank wall and the moving water, the heat lost between the outer tank wall and the air in the room, and the heat transferred from your heater to the water.

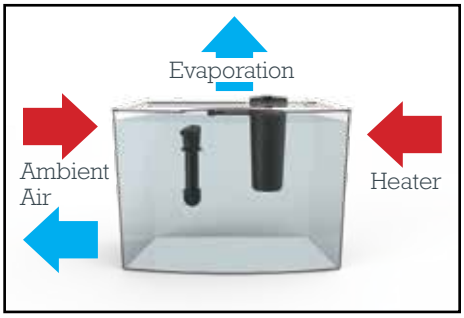
Conductive heat transfer: *Transfer of energy by microscopic collisions of particles between directly touching media and/or bodies*

The heat lost across the aquarium wall

Radiation: *The emission of energy in the form of electromagnetic waves, rays or particles through space or a material medium*

In aquariums with high-intensity lights (like those used to grow coral), heat is added through radiation.

Evaporation: Heat is lost through evaporation.



An aquarium is a great way to study heat transfer because heat is added and lost in a variety of ways. In your aquarium, heat will typically be added by a heater. Heat is lost by water evaporation and by heat transfer to the ambient air in the room (we're assuming your room is cooler than the aquarium).

The first law of thermodynamics deals with conservation of energy and basically states that heat energy can be changed from one form to another, but it can't be created or destroyed.

What goes in is stored as thermal energy (the aquarium gets warmer) and lost to the room. When the input electrical power equals the convective heat transfer to the room, the system is said to be in thermal equilibrium.

Did you know?

Fish can't produce their own body heat, so the temperature of a fish is the same as the aquarium water in which it swims.

The temperature of the room versus the aquarium impacts the wattage you'll need for an aquarium. For example, if your room is usually 72 degrees, 3-5 watts per gallon is typically sufficient. However, if your room is usually 65 degrees, you'll need a heater with a higher wattage to maintain the desired temperature.

Good aquarium circulation helps maintain more uniform water temperatures throughout your aquarium.

At 78°F, your aquarium water will feel cold to the touch. Humans are 98°F, so water cooler than our body temperature will feel cool. It might seem obvious, but this isn't common knowledge even to many adults!

Why maintaining the correct temperature is important

Stable temperatures help strengthen fish immune systems (so they are less likely to get sick).

Water temperature also impacts the following:

Proper nutrition: High temperatures increase metabolic activity – fish eat more and produce more waste. If your fish look sluggish, it could be because the water temperature is too low.

Health of beneficial bacteria: Fluctuating temperatures lead to fluctuating waste levels, which bacteria can't process as quickly.

Toxicity of ammonia: When bacteria can't process all waste, the ammonia levels can increase, leading to fish fatality.

High temperatures can lead to problems as well:

Dissolved oxygen: Higher temperatures reduce the amount of dissolved oxygen in the water. Fish rely on dissolved oxygen to breathe.

Tropical fish need water that's about 78 degrees, which is usually warmer than room temperature. This means adding a heater is usually necessary.

Aquarium heaters are typically sold by gallon size. Don't buy a heater that is smaller than your recommended aquarium size or it may not be able to maintain your desired temperature. The general rule is to have around 5 watts per gallon of water. So a 10 gallon aquarium would require a 50 watt heater and a 20 gallon aquarium would require a 100 watt heater.

ACTIVITY

Check your aquarium temperature using the glass thermometer provided

MECHANICAL ENGINEERING

What is a hertz (Hz)?

A hertz is defined as one cycle/revolution per second. The more common unit of rotational frequency is revolutions per minute (RPM). At 60 Hz, the blades of the impeller spin at 3600 RPM (60 Hz x 60 seconds).

How a filter works

1. Electrical current is driven through coils, which creates a magnetic field
2. When the coils are energized, the north and south poles of a magnet (which is permanently attached to the impeller) attract and repel each other, causing the magnet and impeller to rotate
3. This compresses the water against the leading face of the impeller blade, causing the inside of the impeller housing to build pressure and push the water up through the filter
4. Water flows through the floss, which traps debris and waste
5. Water flows through the carbon, which helps remove odors and discoloration from the water
6. Filtered water exits from the spillway

ACTIVITY

To understand what happens when you have a clogged cartridge, take your filter cartridge out and place a plastic bag around it before placing it back into the aquarium.*

Log what happens to the water flow. Does it flow over the top of the cartridge?

Look at the section on how a filter works. How do you think a clogged cartridge might affect the aquarium if the water is diverted over the top of the cartridge?

Is there a part of the filtration process that no longer functions?

You might have guessed, when water is diverted over the cartridge, it can no longer complete steps 4 and 5 in the process (flowing through the floss and carbon), which means the dirty water is just cycling through the aquarium without being cleaned.

Now remove the bag from the cartridge and replace it into your filter. What happens to the water flow?

*Watch the water flow carefully to ensure it doesn't flow out of the aquarium

Troubleshooting

Troubleshooting your aquarium:

Problem	Solution
If your filter fails to pump water or flow has slowed...	• Lift the cartridge out of the filter body to see if water flow is restored. If so, your cartridge is clogged and must be replaced. • Make sure the water level is adequate. • Make certain the power outlet is functioning properly. Unplug the electrical cord momentarily, then reconnect it to the power source to restart the impeller. • Check the impeller to ensure it is working properly. Check the instruction manual that came with your filter for more details.
If your filter makes noise...	• The pump may be running dry. Make sure you have appropriate water levels. • Lift the cartridge out of the filter to see if water flow is restored. If so, your cartridge is clogged and must be replaced. • The motor might be against a wall. Adjust the positioning of the filter. • Check the impeller for debris. Clean or replace as needed.
If a fish appears sick...	• Isolate fish if disease occurs to prevent other fish in your tank from becoming infected. • When medicating your tank, remove the filter cartridge, as carbon adsorbs most medications.
If water is flowing over the filter...	• Change the cartridge.
If the LED light seems dim...	• Wipe the cover of the LED light with a clean, wet cloth.
If your water appears cloudy...	• About two weeks after setting up your aquarium, the water may appear cloudy. This is your good bacteria blooming. Do not perform a water change at this time. The water should clear up in about a week as the bacteria colonize the aquarium. • If you still see cloudy water after your aquarium has had a chance to cycle, replace the cartridge or perform a water change. • Test your water to detect any water issues.

Using the Scientific Method

While observing your aquarium, you might come across a problem like a fish disease or too much algae. As an example, we'll use fish disease to illustrate how to use the scientific method in this section.

Identify the problem: The most common fish illness is ICH (pronounced "ick"). This shows up as white spots on the fish's scales. Look at images of fish illnesses to determine what your fish might have.

Research the topic: There are books and many resources online on aquarium care -- and your local retailer can be a great help too.

Hypothesis: Based on your research, predict the outcome of your problem (what illness does your fish most likely have?).

Experiment (test the hypothesis): If medication is necessary, be sure to remove the filter cartridge, as carbon can remove the medication before it can be effective. Read all directions that come with the medication.

Analysis: Watch your fish closely and record the results.

Conclusion: Did your fish's illness resolve with medication? If not, begin this process again, beginning with identifying the problem.

Common water issues

How to spot an illness

Aquarium Maintenance Log

Date	Unplug Equipment	Siphon 1 gal Water	Rinse Décor	Add Room Temp Tap Water; Treat With Tetra® AquaSafe®	Pour Water Into Aquarium	Test Water, Add Tetra® EasyBalance® & Cleaning Bacteria	Change Filter Cartridge	Turn Equipment Back On	Notes
example	✓	✓	✓	✓	✓	✓	✓	✓	Nitrates high, will test water tomorrow

Growth Chart

Fish Drawing/ Description						
Week #	Fish 1	Fish 2	Fish 3	Fish 4	Fish 5	Total inches of fish*
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

* Don't forget: If your fish grow too big for their aquarium, it's time for a larger tank.

Water Test Log

Date	Nitrate	Nitrite	Hardness	Chlorine	Alkalinity	pH	Ammonia*
Guide	0-40 Safe	0-0.5 Safe	Check fish guides	0	Check fish guides	Check fish guides	0-0.5 Safe

* Ammonia test strips sold separately. Research ideal hardness, alkalinity and pH for your fish.

Notes

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