DOWNLOAD PDF HOW CAN WATER CHANGE?

Chapter 1 : www.nxgvision.com: Matter: Changing States

Water going from a gas to a solid: Deposition In each phase change there will be either an absorption or release of latent heat. Latent heat absorption cools the surrounding air while latent heat release warms the surrounding air.

Changing your goldfish tank water How often should you change your goldfish tank water? For example, if your tank was not properly cycled before you added your fish, then you may need to change some tank water as often as daily, in order to keep ammonia levels under control. How much water should you change each time? You should not change all of the water at once! Turn off any equipment, such as your filter or air pump. Stick one end of the vacuum into the bucket and the other into the gravel at the bottom of your tank. Switch on the vaccum or manually pump if necessary to remove the water from the tank and transfer it to the bucket. This removes both water and waste from your tank at the same time. Remove your filter and place it into the bucket of tank water â€" note: Put your filter sponges back into your filter and re-install the filter in the tank. Wash any other equipment or decorations in the same way â€" in tank water, not tap water. Fill your bucket with tap water and â€" before adding it to your tank â€" treat the tap water with a product such as Seachem Prime. Follow the instructions on the bottle and do this for every bucket of tap water that you use. Gently and slowly pour the treated tap water into your tank. You should do this one bucket at a time and very slowly. Otherwise, the change in water condition and temperature may shock your fish. The biggest water change mistakes goldfish keepers make There are three major mistakes that new goldfish keepers often make when doing a water change: You should NEVER wash your filter, filter sponges, gravel or decorations in tap water, as it will kill this good bacteria! Adding water too quickly â€" adding tap water too quickly or when it is at a very different temperature to your tank water can shock your fish. This can make your goldfish stressed, which lowers its immune system and increases the chance of it getting ill. Is this how you go about your water changes? Do you have any comments, questions or tips that may help other goldfish keepers? Leave a comment below!

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Chapter 2 : Water Temperature - Environmental Measurement Systems

Water erosion is one of the main causes of change in our land. But it is something that can be difficult for children to understand. So in this lesson, we will be doing an investigation so they can actually see how water can erode the land.

Water Changes by Shelli Wittig Fishgal One of the most important aspects of successful fish keeping is good aquarium maintenance, including routine water changes. If your aquarium looks beautiful and the water is crystal clear, everything is wonderful right? In an established aquarium, bacteria convert ammonia produced mainly by decaying food and fish waste to nitrite, and nitrite to nitrate NO3. Changing a portion of the aquarium water on a regular basis is the easiest way to reduce it. The buildup of nitrates nitric acid can reduce the alkalinity of your water, potentially resulting in a pH drop. Phosphates, pheromones and other chemicals can build up between water changes. Minerals and trace elements are depleted over time, which can result in a GH drop. Poor water quality can lead to infection on a wounded fish. Poor water quality puts stress on fish, which is often the root cause of fungus and parasite problems. It has been said that dirty water holds less oxygen, although I do not have any scientific data to back this statement up. How Much, How Often? There is no standard answer to the question of how much water to exchange, or how often. It depends on several factors including the size of your tank, number of fish, feeding schedule and filtration system. Testing for nitrates is the most effective way to measure your water quality. As you begin to establish your maintenance schedule, perform a nitrate test before and after each water change, as well as once in between. As stated previously, NO3 builds up slowly and your goal is to keep it as low as possible; at the very least it should be less than 40ppm at all times. Once you determine a schedule that works for you, testing can be done less frequently to confirm your routine is adequate. I believe the latter is less desirable since the water chemistry changes more dramatically at once, putting more stress on the fish. Keep in mind as you determine the volume of water you intend to change, that a gallon aquarium does not necessarily hold gallons of water with substrate, rocks and equipment in the tank as well. Many people opt to do this on a rotating schedule; Week-1 water change only, Week-2 water change and gravel vacuum, etc. If you have an undergravel filter system you will likely have to vacuum more frequently to keep nitrates at bay. If you have excessive algae growth on any decorations and wish to remove it, you can soak them in a weak solution of chlorine bleach and water 1 or 2 tablespoons bleach per gallon of water will suffice. Also keep in mind that the green algae is highly nutritious and many fish including Mbuna and Plecostomus will feed on it. If you want to scrape algae off the glass this is a good time to do it. Use a non-scratching brush or sponge used only for your aquarium, and be certain it does not have any detergents or other cleaning agents imbedded in it by the manufacturer. Pre-measure your water conditioners buffers, dechlorinator, ammonia neutralizer, etc. You can do this in a bucket or other clean container used only for aquarium maintenance. See "Water Treatment" for details on making tap water safe, and "Practical Water Chemistry" for information on buffering and other chemistry tips. Unplug aquarium lights, filters and heaters. Some people advise doing this before working in the tank to avoid the possibility of electrical shock if, for example, the heater were accidentally smashed. I prefer to at least leave the filters running to pick up some of the muck stirred up in Steps 1 thru 3. Start the water siphoning. You can measure the volume removed by collecting it in a pre-marked container large bucket or plastic trash can OR by pre-measuring and marking an indicator on the tank to which you consistently bring the water level down. If you use the second method, you may still wish to collect some of the tank water in a container so that you can rinse filter media in it. The chlorine in tap water as well as a fluctuation in temperature can destroy beneficial bacteria. Simply plunge it into the gravel and slowly pull it out. Debris is sucked up with the water, while the gravel falls back to the bottom. It is a common fallacy that vacuuming too thoroughly will remove beneficial bacteria. In truth, bacteria adhere to all the surfaces in your tank including the glass, substrate, rocks, plants and filter media. It is not in the muck you remove from the gravel. You could also use a second tool such as a PVC pipe or your other hand to disturb the sand just before passing over it with your hose. Once you have removed the desired amount of water, replace your rocks and other decorations. If you cleaned them in a bleach solution you must rinse thoroughly, until you can no longer detect the smell of bleach. After that, you

can submerge them in fresh water with a dose of dechlorinator as an additional precaution. Now you can begin refilling. If you are using water straight from the tap, allow it to run for at least 5 minutes to reduce the concentration of copper and heavy metals from household plumbing. You can use this time to adjust the temperature as close as possible to that of your aquarium. A thermometer first placed in the tank then taken to the water source is very helpful. There are claims that warm or hot water from your tap should not be used since it tends to have a higher concentration of copper and heavy metals. Begin by adding water to the container in which you pre-measured the conditioners if any. If this is a small receptacle or bucket, you can dump that into your tank after all the additives have dissolved completely, and add the remainder of the water directly from the tap to the tank. Alternately, you can pre-fill a large container with water a day or two ahead of time and avoid using a dechlorinator, since chlorine naturally dissipates when exposed to open air. You may still need to use a product to neutralize ammonia and chloramines. See "Water Treatment" for more information. If your room temperature differs more than 1 degree from that of your aquarium, you should place a heater in the container as well. Obviously, you can also add your water conditioners to this container, then simply pour or siphon the entire contents into your aquarium. Restore power to your filters, heaters and lights. Record your activity in a maintenance log. Dealing with High Nitrates There are a number of factors that contribute to an ongoing nitrate problem in your aquarium. The heavier the bio-load, the more aggressive your maintenance schedule will need to be. The more you feed, the more nitrates will be produced more food in more waste out. Some tap and well water is high in nitrates, negating the effects of water changes. If your water supply tests high for NO3, you may need to consider a reverse osmosis filter. Undergravel filters can make nitrate control more challenging. Organic matter is drawn deep into the substrate where it is difficult to remove completely. If you struggle with high nitrates and keep African cichlids many of which enjoy excavating , you might consider a different type of filter. Live plants utilize nitrate like fertilizer and can help keep NO3 levels down. Activated carbon adsorbs a minute amount of ammonia, nitrite and nitrate. Remember that nothing can take the place of routine water changes to keep your water clean and your fish healthy.

Chapter 3 : How Water Changes Earth's Surface | www.nxgvision.com

To do a water change, you will need to get the fresh water ready and siphon out the dirty water. You can also take this opportunity to clean up your gravel and remove algae from the tank's walls. Gently adding the water back in makes the process seamless for your fish and can create a sparkling tank.

It may require extreme temperatures or extreme pressures, but it can be done. You have to use all of your tricks when that happens. To create a solid , you might have to decrease the temperature by a huge amount and then add pressure. For example, oxygen O2 will solidify at However, it will freeze at warmer temperatures when the pressure is increased. Some of you know about liquid nitrogen N2. It is nitrogen from the atmosphere in a liquid form and it has to be super cold to stay a liquid. You could increase the pressure in a sealed chamber. Eventually you would reach a point where the liquid became a solid. If you have liquid water H2O at room temperature and you wanted water vapor gas , you could use a combination of high temperatures or low pressures to solve your problem. Points of Change Phase changes happen when you reach certain special points. Sometimes a liquid wants to become a solid. Scientists use something called a freezing point or melting point to measure the temperature at which a liquid turns into a solid. There are physical effects that can change the melting point. Pressure is one of those effects. When the pressure surrounding a substance increases, the freezing point and other special points also go up. It is easier to keep things solid when they are under greater pressure. Generally, solids are more dense than liquids because their molecules are closer together. The freezing process compacts the molecules into a smaller space. There are always exceptions in science. Water is special on many levels. It has more space between its molecules when it is frozen. The molecules organize in a specific arrangement that takes up more space than when they are all loosey-goosey in the liquid state. Because the same number of molecules take up more space, solid water is less dense than liquid water. There are many other types of molecular organizations in solid water than we can talk about here.

Chapter 4 : Can a Routine Water Change Kill Your Fish? | www.nxgvision.com

My recommendation is to change percent of the water each week. If your tank is heavily stocked, bump that up to 20 percent each week. A lightly stocked tank can get by for two weeks, but that should be the maximum length of time between water changes.

Cleaning your aquarium is a simple and straight forward task, and should not take very long Unless you have a particularly small tank or bowl , in which case care can be quite cumbersome and time consuming. The better care you provide for your tank , the healthier your fish will be, the nicer your tank will look and the easier your tank will be to care for in the future. You should not need to take all the stuff plants, decorations , etc. In fact, I would not recommend it. This just produces extra work for you and creates a large and unnecessary mess. Remember, every surface in the tank will grow some beneficial bacteria that are part of the biological filter. By removing and cleaning the decorations you stress and may even kill some of this bacteria, reducing the quality of your filtration until the filter recovers. This, again, is a lot more work on you, and creates an unnecessary mess. In addition, this can be highly stressful to the fish, and is likely to cause physical injuries to your fish. While you are doing this, you should use your siphon to suck up some of the gunk that collects in the gravel and decorations. If you have an under gravel filter , it is very important to clean the gravel when you do your weekly water changes, this will prevent detritus and other decaying organic matter from blocking the passages between the pebbles and restricting water flow. If you have algae growing on the surface of the tank or ornaments, you should get an algae scraper of some sort and scrub the glass before removing water. Many varieties of algae scrapers or scrubbers are available at your local pet store. In fact, algae eaters and catfish, like any other fish, will add to the biological load of your tank and increase maintenance requirements. And even those catfish that will eat some algae will not eat much and are unlikely to keep the tank looking clean. Once you get into this habit, it is not really that much work. Cleaning all the fish tanks in a local pet shop was only a 3 hour job. Doing your weekly water change in your own home aquarium should not take too long. If you have to clean out the filter s do not change all the media cartridges, sponges, carbon packets, etc. Rinse any new filter media in cool running water before introducing it to the system unless the instructions for the filter media specifically state not to. The easiest and neatest way to do this, is to use a siphon to siphon water from a bucket into the tank. This will tend to reduce spilling and messing up the gravel and decorations. Use a bucket that has never had detergents or household chemicals in it I recommend getting a bucket specifically for use for aquarium chores and fill it with water. Use a chlorine or chloramine remover to prepare the water for introduction into the tank. Place the bucket somewhere higher than the top of the fish tank, and get your siphon going again and in just a couple of minutes, you should have a full tank. Be sure to watch the siphon, in case the hose gets bumped out of the tank, or if there is enough water in your bucket to overfill the tank. Remember, there needs to be some space between the top of the water and the aquarium cover, because your fish rely on oxygen exchange at the surface of the water in order to be able to breathe. Do not just "top off the tank" to replace water that "disappears. This means that as you just top off the tank, you are making your water harder until it will eventually no longer be able to support fish. Additionally, if there are even trace amounts of heavy metals or other toxic substances in the water, you are giving your fish more and more of these every time you top off the tank. Most municipal water systems have at trace levels of at least one potentially hazardous substance, but in minuscule amounts these should never be trouble for you or your fish. Furthermore, by not removing water from the tank from time to time, you allow build up of waste products not removed by the filter such as Nitrate , which are potentially hazardous to the fish and encourage algae growth. Usually, if there is significant evaporation between water changes, you are either going far too long between water changes, or there is something wrong with the aquarium setup or equipment that is causing or encouraging evaporation. The Short Version Remember, cleaning your tank is easy. These cleaning tips are intended for tanks that are already cycled and are over about 10 gallons in size. Care requirements may vary for tanks that are still cycling or for small aquariums and fish bowls.

Chapter 5 : How to Change Your Betta Fish Water: 13 Steps (with Pictures)

An informative infographic detailing the many ways access to clean water can change our world. The Water Project is a (c)(3).

Water Temperature and Aquatic Life Coho, or silver, salmon prefer cold rivers and streams. NOAA Photo Library via Flickr Considered alone, water temperature can affect the metabolic rates and biological activity of aquatic organisms As such, it influences the chosen habitats of a variety of aquatic life 8. Some organisms, particularly aquatic plants flourish in warmer temperatures, while some fishes such as trout or salmon prefer colder streams 8. The metabolic rates of aquatic organisms increase as the water temperature increases. Studies have shown a direct relationship between metabolic rates and water temperature. This occurs as many cellular enzymes are more active at higher temperatures This increase in metabolic rate can be handled by some species better than others. Increased metabolic function can be noticed in respiration rates and digestive responses in most species. Increased respiration rates at higher temperatures lead to increased oxygen consumption, which can be detrimental if rates remain raised for an extended period of time. Temperature fluctuations can also affect the behavior choices of aquatic organisms, such as moving to warmer or cooler water after feeding, predator-prey responses and resting or migrating routines Some species of sharks and stingrays will even seek out warmer waters when pregnant Tropical aquatic plants prefer warmer water temperatures. Plants are also affected by water temperature. While some aquatic plants tolerate cooler waters, most prefer warmer temperatures While dormancy is appropriate for surviving a cold winter, warmer temperatures are required for most plants to flourish. Temperature affects the photosynthetic rates of different algae. Temperature can also inhibit plant respiration and photosynthesis In general, algal photosynthesis will increase with temperature, though different species will have different peak temperatures for optimum photosynthetic activity Above and below this temperature, photosynthesis will be reduced. Compound Toxicity and Water Temperature In addition to its effects on aquatic organisms, high water temperatures can increase the solubility and thus toxicity of certain compounds 1. These elements include heavy metals such as cadmium, zinc and lead as well as compounds like ammonia 19, This occurs because tissue permeability, metabolic rate and oxygen consumption all increase with increased water temperature Water temperature can play a role in the shift between ammonium and ammonia in water. Ammonia is known for its toxicity at high pH levels, but temperature can also influence acute and chronic criteria concentrations At low temperatures and a neutral pH, the following equation remains shifted to the left, producing the nontoxic ammonium ion: Dissolved oxygen concentrations are dependent on temperature. The warmer the water, the less oxygen that it can hold. Dissolved Oxygen and Water Temperature The solubility of oxygen and other gases will decrease as temperature increases 9. This means that colder lakes and streams can hold more dissolved oxygen than warmer waters. If water is too warm, it will not hold enough oxygen for aquatic organisms to survive. Conductivity and Water Temperature Water temperature can affect conductivity in two ways. As conductivity is measured by the electrical potential of ions in solution, it is affected by the concentration, charge and mobility of those ions Water temperature affects viscosity, which in turn affects ionic activity and conductivity. Ionic mobility is dependent on viscosity, which is in turn dependent on temperature The more viscous it is, the less fluid it is; molasses and mercury are more viscous than water. The inverse relationship between temperature and viscosity means that an increase in temperature will decrease viscosity A decrease in the viscosity of water increases the mobility of ions in water. As such, an increase in temperature thus increases conductivity Hot springs have high conductivity due to the increased mineral and salt ions. Chris 73 via Wikimedia Commons. The second way that temperature can affect conductivity is through ionic concentration. Many salts are more soluble at higher temperatures As a salt dissolves, it breaks down into its respective ions. As warm water can dissolve several minerals and salts more easily than cold water, the ionic concentration is often higher 9. TDS refers to all ion particles in solution that are smaller than 2 microns These salts and minerals enter the water from rocks and sediment in contact with it. As they dissolve and the ionic concentration increases, so will the conductivity of water. Many salts are more soluble at higher

temperatures. The rate at which conductivity increases is dependent on the salts present in solution In addition, there are a few salts that become less soluble at warmer temperatures, and thus will negatively affect conductivity The effect that temperature has on ORP values depends on the chemical species atoms, molecules and ions present in the solution Temperature-dependence data charts are usually available for calibration solutions, but not for field samples This lack of data is due to the difficulty in identifying and measuring every redoxing species that could be present in any given water source. As these species are difficult to know and quantitatively define in environmental studies, most ORP electrodes will not automatically compensate for temperature. However, temperature can still alter a reading and should be recorded with each measurement considered when analyzing the data At a pH of 7, the hydrogen and hydroxyl ions have equal concentrations, 1 x M, keeping the solution neutral As the temperature increases or decreases, the ion concentrations will also shift, thus shifting the pH value Any change to a system at equilibrium, such as adding a reactant or altering the temperature, will shift the system until it reaches equilibrium again That means if the temperature of water increases, the equation will shift to the left to reach equilibrium again. A shift to the left decreases the ions in water, increasing the pH. Likewise, if the temperature were to decrease, the equation would shift to the right, increasing the ionic concentration and decreasing pH. The pH of pure water varies with temperature while remaining perfectly neutral. Pure water only has a pH of 7. However, that does not mean that temperature changes will make a solution more acidic or basic. Because the ratio of hydrogen and hydroxyl ions remains the same, the acidity of water does not change with temperature Instead, the entire pH range shifts, so that neutral water will have a value other than 7. Density and Water Temperature Water temperature and water density are directly related. As the temperature of water increases or decreases, it will alter the density of water. This is why ice expands and floats on water. Pure water is also unique in that it achieves its maximum density, 1. Icebergs are an extreme example of how ice floats on top of water. Water freezes from the surface down, allowing organisms to survive the winter below the ice cover. The maximum density point is particularly important in freshwater. As surface water temperature approaches the maximum density temperature, it sinks and is replaced by warmer, lighter water This process continues until the water is uniformly cool. Any water that is colder than this point will float on top of the denser water. This process occurs seasonally in holomictic mixing lakes, as the water temperature and thus other parameters reach equilibrium Saltwater Temperature Points Freezing point and maximum density decrease as salinity levels increase. It is important to note that salinity not only affects water density but it can shift the maximum density and freezing points of water. As the salt concentration increases, both maximum density and the freezing point will decrease Average seawater has a salinity level of 35 PPT parts per thousand and has a shifted maximum density of However, this maximum density is never reached Instead, the process on convection simply circulates the cooling water until the entire surface water column reaches the freezing point As the phase boundary between liquid and solid requires the proper pressure as well as temperature, ice only beings to form on the surface The coldest recorded natural seawater temperature was Likewise, the coldest ocean currents recorded were In both cases, hydrostatic pressures allowed water to remain liquid at such cold temperatures Salt water, however, has a lower freezing point. That is why salt is used in winter to de-ice roads and sidewalks. Average seawater has a salinity level of 35 PPT parts per thousand , which shifts the freezing point to Ice floats on top of the denser water. That does not sound like a large difference, but it is enough to keep ice floating on top of water and allows aquatic organisms to survive the winter. This drop in density occurs because the hydrogen bonds in water create an open hexagonal lattice, leaving space between the molecules Ice formed in seawater is even less dense than freshwater ice When saltwater begins to freeze, the water molecules begin to form a crystal lattice just like they do in freshwater. These crystals only include water molecules, not salt ions, and the formation is known as brine exclusion As the ice structure grows, pockets of concentrated saltwater can be trapped inside the ice, but are not incorporated into its structure. The trapped water can eventually drain, leaving a small air bubble in the ice.

Chapter 6 : Goldfish tank water changes

Rather than avoiding water changes altogether and subjecting your fish to poor water quality, take the time to learn how and when to perform water changes correctly. The best thing you can do is to perform small water changes on a frequent basis with a larger water change once in a while.

Planning and carrying out investigations Teacher Notes Activity Description The children experience water erosion in a hands-on investigation. Each partner group makes a sand tower and then observes it eroding as they drop water on the top of it. They take scientific notes on the process. To explain the erosion process they watch a short movie and then explain to their partner about erosion. In order to understand these events and the speed at which they occur, students must understand the processes themselves. In this activity, they will be representing water erosion, which can be either a slow or a quick process. While doing this investigation, they will be manipulating sand with water, which will help them to understand models. In addition, another NGSS standard is for the children to know that both wind and water can shape the land. Advanced prep In advance, I moisten the sand slightly. I moisten it enough that it turns a darker color and is the consistency that you need when you are making a sand castle. This will make it keep its form when the kids gently turn the vial over. You might also to consider preparing your vials of sand for each group, too. In this way, they can just come up and grab a vial to save time. But it is something that can be difficult for children to understand. So in this lesson, we will be doing an investigation so they can actually see how water can erode the land. At the beginning of the lesson I want them to explore the concept that water can move land. Since I want the children to discover the process behind erosion on their own, they will do their own investigation with water and sand. Today we are going to be doing an investigation. Remember, I want the children to "discover" these ideas on their own. Making a prediction about what might happen helps them understand that scientific investigations start with questions that are answered by investigation. Explore Discovery Is the Key I divide the students into partner groups. The partners will each have a turn at gathering materials. I have the partners decide who is going to get the first set of supplies and who will gather the second set. I demonstrate how to use the sand to make a sand stack. For this exploration, I want you to take your vial and gently press your thumb down into the vial. Then gently dump your vial of sand into the box. You might have to tap the vial at the bottom to coax the sand out, just like when you are making a sand castle at the beach. You should have a stack of sand. If your sand falls down, that is OK too. Either way will work for this activity. Then I want you to look carefully at your sand. What could you use to see the sand closer up? How do you think a scientist would record their observations? I want the children to vocalize the idea that a scientist would record their observations by drawing a diagram and also write their observations in words. They would also measure quantitative data by measuring the tower. They have space to do both of these things on their paper. As they are working, I walk around to make sure they are staying on task and observing carefully. The children look like real scientists when they are observing their sand. They took this job very seriously! After the children have had time to record this information, we move on to part 2 and 3. The second material person needs to get water and an eyedropper for the group. I have them bring back their vials and lids that used to have sand in them so I can fill them with water. I have a sink in the room, so as they come up I quickly rinse any remaining sand out and fill the vial back up. Now I would like you to suck up water in the dropper and drop 40 drops of water on your sand. Hold the water up away from the sand when you are dropping it. To be accurate, make sure you counting your drops aloud. Observe what is happening and write it down. Draw a diagram of what you observe. Then you need repeat the process by dropping another 40 drops on the sand. Forty drops will create a change that is noticeable, but not too damaging. I do not specify how the drops are added to the sand. I think either way is fine and this will create a talking point later on in our discussions. As the children are working, I walk around to make sure they are following the procedures. I also stop and ask them about their observations and what they noticed. I want to see that they are making the connection that the water is moving the sand in some way see water shrinking video clip. At this point, I do not give them too much information or guide them since I want them to discover the basic idea of erosion on their own. Experiencing the main concept of erosion on

their own will later help them understand the erosion process later when it is explained. It is important for the children to realize that the world can be discovered through their own investigations. By constructing their own meaning of the activity helps lead them to an understanding that they will remember. My Clock Buddies Student paper and Teacher Directions Clock Buddies Demonstration Erosion Water and Sand recording sheet photo of sand stack writing down observations video clip observing sand with hand lens photo counting drops video clip.

Chapter 7 : Why daily water changes? | Aquarium Nitrogen Cycle

The best thing you can do to keep your fish healthy is to change the water regularly. How to Start Doing Water Changes If you haven't changed your water for months, or possibly years, it is not wise to make a sudden massive change.

Do you know the things to watch out for during this process? Do not worry, we will cover this together. Just read through the steps and tips below and you will safely be changing aquarium water shortly. There are several different methods available for changing aquarium water. Everyone will have their favorite method or they will have little choice in how they do it. Your fish will greatly appreciate it and when you want to show off your aquarium to family and friends, the water will be crystal clear! When changing aquarium water, remember our goal is to get fish waste and pollutants out of the aquarium water. A lot of the waste is usually trapped in the substrate gravel or under fish tank decorations. You must get this waste out of the aquarium along with the dirty water. This requires you to move aquarium decorations and the substrate around during the water change. While removing the dirty water be sure to suck out the solid waste products. This will ensure a healthy aquarium! Below I will discuss several different ways to change aquarium water and the steps involved. Hose and Bucket Method The old fashion way to change aquarium water is to simply use a hose and bucket. Many purchase a cheap clear vinyl hose from the local hardware store along with a 5-gallon plastic bucket. This is the cheapest but not necessarily the easiest way to change aquarium water. This will be a good choice for those with small aquariums such as gallons or less. Completing partial water changes this way is simply draining the water out of the tank and into the empty bucket. Here are the steps: Get a towel and spread it out on the floor before you begin changing aquarium water. Unplug all electrical equipment that comes into contact with the aquarium water. You do not want to get electrocuted! Also the aquarium heater will need to be unplugged so it will run hot outside of the water during the fish tank water change. Start your syphon by placing one end of the hose in the aquarium water and sucking in the other end. Set this end of the hose in the bucket and begin cleaning your aquarium. Now you should have water flowing out of your aquarium and into your 5-gallon bucket. You should now start moving aquarium decorations and gravel around to suck up the solids that are trapped in the aquarium. Carefully lift your now full 5-gallon bucket of dirty aquarium water and go empty it. Be careful lifting this because water is heavy! Now it is time to replace that dirty water with fresh water. Before you add the new water to the aquarium, ensure that match the temperature and water parameters of the existing fish tank water. Slowly add the new water so you do not shock the fish. I usually do this by using a 1-gallon water pitcher. I would pour 1-gallon of water slowly and then repeat until the tank is filled again. Dechlorinate the water with a water conditioner that removes chlorine and chloramine. You can add this additive with each gallon of new water or add it in intervals during the water change. When all of the water is replaced, and you finished working in the aquarium water you may now plug all of your electrical equipment back up. Gravel Vacuum Method This method is very similar with the hose and bucket method but you use a vacuum attachment in this process. There are basically two types of gravel vacuums to help change aquarium water. Manual and mechanical gravel vacuums. This method is an excellent and somewhat easier way to clean the aquarium gravel. During this process you remove the solid waste trapped in the substrate along with the dirty water in the aquarium. Depending upon which type of aquarium gravel vacuum you own, there are two main ways to change water using this method. The steps to use the gravel vacuum method is the same as the hose and bucket method. The only difference would be how you start the siphon. Starting the suction will depend upon which model you purchased. The suction should start automatically. Automatic Siphoning Systems The easiest way to change aquarium water and vacuum aquarium gravel is to use an automatic siphoning system such as the Python No Spill and Fill system. If you have a large tank or multiple fish tanks in your home, you will greatly appreciate how easy this system can make your life! The automatic siphoning water changing system hooks up to a sink faucet and uses the suction created from the water flow out of the faucet to start your siphon. The tank water is then pulled through a vinyl tube and into your sink drain. It is as simple as that. Things to Remember When Performing Aquarium Water Changes No matter how you change your aquarium water, you must remember several key items so you do not kill or injury your

tropical fish. Matching Aquarium Water Temperature When refilling your aquarium with fresh water, please remember to match the aquarium water that is already in the aquarium tank. Even small but sudden temperature changes can shock and kill your tropical fish. Degassing the New Aquarium Water When you add the new water back into your aquarium, you must degass the water. So, what does this mean? What that is cold or cooler in temperature will hold more dissolved gasses. The gasses are released when exposed to oxygen. This is usually more common during winter months when our water is heated by hot-water heaters. When the water is put into our aquariums the gas can be seen in the form of tiny bubbles in the newly added water. These tiny bubbles once absorbed by the tropical fish release and can actually hurt or kill your tropical fish. I see this a lot when I change aquarium water in my fishroom during the winter months. To help degass your new water, you need to circulate the water as much as possible when adding it to the tank. I typically will put my python hose about 2 inches above the surface of the aquarium water directly in the flow of my filter. The surface agitation dissolves most of the tiny bubbles. Using a powerhead to help circulate the water during a water change will help also. Chlorine Removal One of the biggest mistakes new aquarium owners make is not removing chlorine and chloramine from the new water added after an aquarium water change. Many think they are doing a great thing for their fish and end up killing their tropical fish on accident. Chlorine and chloramine are added to most water systems to clean the water and kill bacteria. These two deadly chemicals will actually burn the tissue and gills of your fish resulting in permanent damage or death to your tropical fish. I add chlorine and chloramine remover as the new water is being added to my aquarium tank. Only add the amount that you took out. Do no redose the entire tank. If you do not add this back to the aquarium tank, you may have a pH or Water Hardenss spike. This can also damage or kill your tropical fish. Test Aquarium Water Parameters After your aquarium water has settled 30 minutes â€” 1 hour test your water parameters. Ensure that you do not have a ph or water hardness spike. You should not have any trouble with ammonia, but check ammonia, nitrates and nitrites at this time also. It is better to be safe than sorry. If levels are dangerously high, immediately change aquarium water and retest.

Chapter 8 : Changing State of Water - Ice, Water, Steam - Science Games & Activities for Kids

Play around with ice, water and steam to find out what happens when you heat and cool them. Watch what happens if you try heating the steam to high temperatures, try turning water to gas and back to a liquid again and enjoy all the other challenges in this cool science game for kids.

But what is the reason and how do you prevent it from happening? The routine water change is one of the most simple but also one of the most important maintenance tasks for your aquarium, but what should you do if it starts to kill your fish? In this article you will learn about the importance of water changes including what they are, when and how to do them, and some insight into some underlying problems that could be the real reason why your fish are dying off. Why Are Water Changes Important? If you read the feeding instructions on a container of aquarium fish food they will probably tell you to feed your fish only as much as they will consume in about 2 to 3 minutes. There are several reasons why this is a good idea. Second, the more you feed your fish, the more waste they will secrete and that too will add to the accumulation on the bottom of your tank. All of that waste that collects in the substrate of your aquarium starts to break down at a certain point. With the help of certain bacteria, those wastes start to decompose in a process that produces ammonia. Ammonia is a substance that is highly toxic for fish but, as long as your tank is properly cycled, there are enough beneficial bacteria available to convert that ammonia into nitrite. Nitrite is still toxic to fish in high levels, but it is a little less dangerous than ammonia. Still, those beneficial bacteria take things one step further to convert those nitrites in nitrates. Once the ammonia has been fully converted, however, the only way to remove it from the tank is to do so literally through a water change. In addition to removing harmful wastes and toxins from the water column, routine water changes also help to oxygenate your tank water. Just like you, aquarium fish require oxygen for respiration â€” they do not breathe in the same way that people do but their gills filter oxygen from the tank water. With multiple fish in your tank, the oxygen level can be depleted quickly. Adding live aquarium plants can help to boost the oxygen levels but you still need regular water changes to keep the supply fresh. Water changes are also essential after an outbreak of disease in order to remove the excess medication from the tank water once your fish no longer need it. It is not uncommon in the aquarium trade for fish to die seemingly without warning. You feed your fish one final time then turn out the light and go to bed just to discover one of your favorites floating upside down on the top of the water when you wake up. It is true that water changes can be harmful to fish if you do not do them right but there is more than one reason why this might be the case. One potential problem that can occur with a water change is a sudden change in tank temperature or water chemistry. Beneficial bacteria are essential to maintain the nitrogen cycle the cycle described above in which ammonia is converted into less harmful substances and they live primarily in the substrate, in your tank filter, and on other tank surfaces. Cycling is a process that can be very harsh on fish. It is also possible that the process of performing a water change causes stress to your fish and bacteria or other pathogens that are normally present in the tank take advantage of the fish in its weakened state. Rather than avoiding water changes altogether and subjecting your fish to poor water quality, take the time to learn how and when to perform water changes correctly. The best thing you can do is to perform small water changes on a frequent basis with a larger water change once in a while. In terms of how to go about performing a water change properly, you need to invest in a quality gravel vacuum. Most of these tools work through a siphon effect, pulling water and any solid particles in it up through the tube which you can then collect in a bucket and discard. When vacuuming the gravel in your tank do not forget to clean the areas under and around your tank decorations â€” debris tends to accumulate very heavily in these areas. Siphon a different section of the gravel with each water change to avoid killing off too many beneficial bacteria at once. When it comes to replacing the tank water you removed, be sure to match the temperature as closely as you can to the tank water and treat it with a water conditioner to remove chlorine and heavy metals before adding it to the tank. While there are certain risks involved in changing the water in your home aquarium, it is an important thing to do and it should be done on a regular basis. To keep your fish safe, all you have to do is learn the proper way to perform a water change and then keep up with it as part of your tank maintenance

routine!

Chapter 9 : How to Do a Water Change in a Freshwater Aquarium (with Pictures)

The weekly water change is the most important thing you can do to make sure the fish in your freshwater aquarium remain happy and healthy. Unfortunately, it's also a step that some aquarium owners tend to overlook.

What is not understood widely is why water changes are important and what you are accomplishing when you do one. There was lot of bad information written about water changes in the past and still being written today. With this article I hope to clear up some common misconceptions, and quantify how much and how often a water change should be made. Old Water When drawing water out of the aquarium, remove the water from mid-column. Never gravel vacuum an aquarium that does not use an under gravel filter, as this upsets the ecological balance of the bed and can lead to dangerous ammonia and nitrite levels a few days later. Why is old water a bad thing, and how do you know when your water is old. How fast nitrate accumulates is highly variable. Nitrate is formed by the bacterial action on waste from the animals, and the decomposition of decaying plant matter. The aerobic bacteria known as Nitrosospira and Nitrospira, help break down the waste in an aquarium or pond from ammonia, to nitrite, and then into nitrate. If you have a heavily stocked tank or pond your nitrate level can accumulate very quickly. Aquariums and ponds can be designed to slow down the accumulation of nitrate by having live plants, deep sand beds DSB , refugiums with DSB and Macro Algae , algae scrubbers, or a denitrator filter. If you have none of these nitrate reducing elements in your tank or pond ecosystem, the nitrate can accumulate very quickly. If you have two or more 10 inch 25 cm Oscars Astronotus ocellatus in a 50 gallon l aquarium your nitrate levels will accumulate very quickly. The quantity of nitrate in the system determines when your water is old. The lower your nitrate level the better it is for your fish and invertebrates. All species of fish and invertebrates have a different tolerant level to nitrate. How Much Nitrate is Safe? There are a lot of aquarium products that are produced by many aquarium product manufactures based on this myth for seeding new tanks and ponds with good bacteria. These products do not work because they do not have the right bacteria. The right bacteria is Nitrosospira and Nitrospira, and as of this writing, I only know of one refrigerated product called "Bio-Spira" produced by Marineland that contains the correct bacteria that does work. Myth Buster An aquarium and pond myth that is floating around says not to do a large water change as this removes to much beneficial bacteria that breaks down the ammonia and nitrite. This is not true. That is why many filters on the market today have some sort of biological filter media, like Bio-Wheel filters, trickle filters, sponge filters, canister filters with bio-media. These types of filters have large amounts of surface area for nitrifying bacteria to colonize. Fish that exhibit pH shock will lay on the bottom of the tank, often on their side, and will be breathing abnormally heavy. This condition can be reversed provided you return the fish to pH level it was adapted to. It can take the fish several days to recover, so if you put the fish in a tank that has fish, make sure you isolate the fish either in a plastic critter container or a hang on the tank breeder net. Fish with pH shock are not very mobile and can easily be picked on and killed by other fish in the tank. My current recommendation for maximum nitrate level for fish is ppm. In reef aquariums where Clownfish "Host Anemones" are kept, my recommendation is below 20 ppm nitrate. Quantifying Water Changes How much water to change and on what type of schedule will depend on the bio-load of the aquarium or pond, and any nitrate reducing factors you have implemented, if any. In some well established reef aquariums that have low bio-load and use DSB, refugium, denitrator, and or algae scrubbers it is not all that uncommon for nitrate levels to accumulate very slowly, or not at all. Most aquariums and ponds are not able to maintain low nitrate levels. In general the percentage of water you change is equivalent to the percentage of nitrate reduction. In most cases the larger the water change you can do the better, with one exception. Aquariums with high nitrate levels often have a low pH. A large water change on an aquarium with a low pH can cause fish mortality within 24 hours from condition known as "pH Shock". When large quantities of water are replaced in an aquarium this often results in an increase in pH. In systems that have strong buffering like marine aquariums, the risk of pH shock is not as great as with freshwater. Soft freshwater has a poor buffering capacity, so make sure before you do a large water change, check the pH. You should test your nitrate level after you have done a water change to find out what level the nitrate is at, and make a note of

the date and concentration. One week later check the nitrate level again and subtract the nitrate reading you took after the water change from the nitrate reading you have now. If your nitrate accumulated 20 ppm in that time you have an idea of how fast it accumulates in your tank. When I do a water change on my tanks or pond, I drain the water down to just enough to give the fish enough water to keep them wet, and then I fill it back up with de-chlorinated water. Testing for Nitrate Tip - Word of Warning Aquarium Pharmaceuticals liquid nitrate test kit is a very popular test kit, because it is very easy to use. The instructions that come with the test kit say to shake bottle 2 30 seconds. If you shake bottle 2 only 30 seconds you are likely to get a false low nitrate reading. I recommend you shake the bottle 2 for two minutes before adding it to the test sample to get a true reading of your nitrate content. I have seen a lot of reef hobbyist have problems with their tank because their nitrate was really off the chart when the test following the instructions showed near 0 ppm. The main reason behind water changes is nitrate reduction. Most Freshwater and Saltwater Master Test Kits come with a nitrate test kit, but they can also be purchased separately. I recommend that you check the nitrate at least once a month, and before and after water changes so you can get an idea on how fast nitrate accumulates in your system. Nitrate test kits come in powder, liquid, and test strip forms. My personal preference is the liquid test kits. They are easy to use and are accurate enough to make a good estimate on how often you should make a water change and how much you need to change. If you are testing your nitrate for the first time you may be surprised that your nitrate level is off the scale. To get general reading in this case for freshwater you will need to cut 1 part sample water with 3 parts of tap or distilled water or a known water source that has 0 nitrate , and for saltwater you will need freshly mixed saltwater with a nitrate level of 0 ppm. Once you have completed the test and have a legible reading, multiply the result by 4 to get the true reading. You may have to cut the sample water even more to get a reading. On several occasions sample water I have tested had to be cut by 20 times to get a legible reading. Tip - Gravel Vacuuming Never do a heavy gravel vacuuming on an aquarium that does not use an Under Gravel filter. This can upset the ecological balance of a sand or gravel bed causing an ammonia and nitrite spike a few days later. Water changes are the key to long term health of a closed aquatic environment. Nitrate reduction through water changes is a must for most closed systems. Put your nitrate test kit to work to monitor the overall health of the closed system. When you do your water changes remove the water from the water column, and try not to disturb the sand or gravel bed to much, as this can lead to ammonia and nitrite spikes a few days after.