FOLLOWING THE WATER pdf

1: Analysis Finds Toxic Levels of Arsenic in Neuse River Water Following H.F. Lee Coal Ash Spill

Following the Water is actually poetry in prose, science as art, including philosophy and religion without confrontation. Carroll is a naturalist in a tradition of American letters that includes Thoreau, Emerson, Roger Tory Peterson, and Burroughs.

This means that pH of water is not a physical parameter that can be measured as a concentration or in a quantity. The lower the number, the more acidic the water is. The higher the number, the more basic it is. A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. At a pH of 7, this decreases to 0. At a pH of 14, there is only 0. As an operational definition, an acid is a substance that will decrease pH when added to pure water. However, there are some substances that fit the operational definition altering pH , without fitting the Arrhenius definition releasing an ion. This means that acids and bases can cancel each other out, as shown in the water equation to the right. Alkali salts are very common and dissolve easily. Due to the hydroxide ions they produce which increase pH , all alkalis are bases. However, insoluble bases such as copper oxide should only be described as basic, not alkaline. While alkalinity and pH are closely related, there are distinct differences. The alkalinity of water or a solution is the quantitative capacity of that solution to buffer or neutralize an acid. The alkalinity of a stream or other body of water is increased by carbonate-rich soils carbonates and bicarbonates such as limestone, and decreased by sewage outflow and aerobic respiration. Due to the presence of carbonates, alkalinity is more closely related to hardness than to pH though there are still distinct differences. The alkalinity of water also plays an important role in daily pH levels. Likewise, respiration and decomposition can lower pH levels. Depending on the accuracy of the measurement, the pH value can be carried out to one or two decimal places. However, because the pH scale is logarithmic, attempting to average two pH values would be mathematically incorrect. The optimum pH levels for fish are from 6. Outside of optimum ranges, organisms can become stressed or die. If the pH of water is too high or too low, the aquatic organisms living within it will die. The majority of aquatic creatures prefer a pH range of 6. As pH levels move away from this range up or down it can stress animal systems and reduce hatching and survival rates. The further outside of the optimum pH range a value is, the higher the mortality rates. The more sensitive a species, the more affected it is by changes in pH. Aquatic species are not the only ones affected by pH. A pH value below 2. Lower pH levels increase the risk of mobilized toxic metals that can be absorbed, even by humans, and levels above 8. In addition, pH levels outside of 6. An minor increase in pH levels can cause a oligotrophic rich in dissolved oxygen lake to become eutrophic lacking dissolved oxygen. Even minor pH changes can have long-term effects. In an oligotrophic lake, or a lake low in plant nutrients and high in dissolved oxygen levels, this can cause a chain reaction. With more accessible nutrients, aquatic plants and algae thrive, increasing the demand for dissolved oxygen. This creates a eutrophic lake, rich in nutrients and plant life but low in dissolved oxygen concentrations. Factors that Influence the pH of Water There are many factors that can affect pH in water, both natural and man-made. Most natural changes occur due to interactions with surrounding rock particularly carbonate forms and other materials. In addition, CO2 concentrations can influence pH levels. Carbon Dioxide and pH pH levels can fluctuate daily due to photosynthesis and respiration in the water. The degree of change depends on the alkalinity of the water. Photosynthesis, respiration and decomposition all contribute to pH fluctuations due to their influences on CO2 levels. This influence is more measurable in bodies of water with high rates of respiration and decomposition. While carbon dioxide exists in water in a dissolved state like oxygen , it can also react with water to form carbonic acid: However, this equation can operate in both directions depending on the current pH level, working as its own buffering system. However, as CO2 levels increase around the world, the amount of dissolved CO2 also increases, and the equation will be carried out from left to right. This increases H2CO3, which decreases pH. The effect is becoming more evident in oceanic pH studies over time. Total change in annual oceanic pH levels from s to s. World Ocean Atlas ; photo credit: Plumbago; Wikipedia Commons Carbon dioxide in the atmosphere decreases the pH of precipitation. The above equations also explain why rain has a pH of

approximately 5. As raindrops fall through the air, they interact with carbon dioxide molecules in the atmosphere. A pH level of 5. Natural, unpolluted rain or snow is expected to have pH levels near 5. Acid rain requires a pH below 5. Natural pH Influences Carbonate materials and limestone are two elements that can buffer pH changes in water. When carbonate minerals are present in the soil, the buffering capacity alkalinity of water is increased, keeping the pH of water close to neutral even when acids or bases are added. Additional carbonate materials beyond this can make neutral water slightly basic. Limestone quarries have higher pH levels due to the carbonate materials in the stone. Lightning can lower the pH of rain. As mentioned earlier, unpolluted rain is slightly acidic pH of 5. If rain falls on a poorly buffered water source, it can decrease the pH of nearby water through runoff. Decomposing pine needles can decrease pH. Anthropogenic causes of pH fluctuations are usually related to pollution. Acid rain is one of the best known examples of human influence on the pH of water. Any form of precipitation with a pH level less than 5. This precipitation comes from the reaction of water with nitrogen oxides, sulfur oxides and other acidic compounds, lowering its already slightly acidic pH. These chemicals can come from agricultural runoff, wastewater discharge or industrial runoff. Wastewater discharge that contains detergents and soap-based products can cause a water source to become too basic. Typical pH Levels Recommended minimum pH levels for aquatic life. Typical pH levels vary due to environmental influences, particularly alkalinity. The alkalinity of water varies due to the presence of dissolved salts and carbonates, as well as the mineral composition of the surrounding soil. The recommended pH range for most fish is between 6. Oceanic organisms like clownfish and coral require higher pH levels. Sensitive freshwater species such as salmon prefer pH levels between 7. Environmental Considerations Natural precipitation, both rain and snow, has a pH near 5. Most grasses and legumes prefer soils with a pH of 4. The acidity of the surrounding environment can also affect the pH of water. This is most obvious near mining areas, but the effect can also occur naturally. This may be tolerable for some aquatic species such as frogs but not for most fish. Some frogs and other amphibians can often tolerate pH levels as low as 4. That is why angel fish and discus from the Amazon River Basin can thrive quite happily in waters with a pH as low as 5. Seawater has a pH around 8. In deeper lakes where stratification layering occurs, the pH of water is generally higher 7. Some states, such as Alaska, are attempting to maintain a pH standard for water quality. Stratification can cause pH levels within a body of water to differ above and below the cline. These layers are separated by clines, known as thermoclines temperature divides or chemoclines chemistry gradients. Chemoclines can be based on oxygen, salinity, or other chemical factors that do not cross the cline, such as carbon dioxide. Differences in pH levels between water strata are due to increased CO2 from respiration and decomposition below the thermocline. In crater lakes such as Lake Nyos or Lake Monoun, the pH rapidly drops from a surface level around 7 to 5. This significant drop comes from the saturated CO2 that is stored up in the lower strata of the lake. Adaptability While ideal pH levels for fish are fish blood has a pH of 7. A dramatic fluctuation is considered a shift in pH of 1. For saltwater fish, the pH of water should remain between 7. Unusual pH Levels and Consequences Stony corals begin to bleach and deteriorate as carbonate and pH levels fall. Harmful effects become noticeable when the pH of water falls below 5. Ill effects due to acidification are more pronounced in saltwater fish due to their adaptation to a higher pH.

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2: Which of the following is true about water? - A. A water | StudySoup

The pond drains 22 percent of campus and provides water for the nearby Chiller Plant No. 2, which pumps cold water around campus to cool buildings. The pond saves around million gallons of potable water annually - and, on sunny days, it's a prime spot for a stroll.

Lee Coal Ash Spill Published: September 29, Source: Lee Plant found levels of arsenic nearly 18 times higher than the North Carolina standard for drinking water supply and fish consumption. The standard for drinking water supply and fish consumption is 10 micrograms per liter; testing from water sampled from the Neuse near the coal ash spills following Hurricane Florence was micrograms per liter. The city of Goldsboro has a municipal water intake less than ten miles downstream from the plant. The analysis, conducted by Pace Analytical, also found elevated levels of lead and other heavy metals in the water. The sample with the highest arsenic level came from a grey plume of ash in the river, which had poured over an actively eroding dam made of coal ash. The levels of arsenic that Duke has dumped into the Neuse through its continued mismanagement of its coal ash are alarming, and every time that Duke misleads the public about the true impact of its coal ash, they put our environment and communities at risk. Coal ash is a waste product from coal combustion; it contains heavy metals and other toxic compounds. One million tons of the coal ash stored at H. Coal ash, the top source of toxic water pollution in the U. Duke Energy also sampled the waters of the Neuse, but did so far downstream from the spills. Lee following flooding from Hurricane Matthew in That leak dumped a one-inch thick layer of coal ash on the Neuse River. Lee plant came online shortly after World War II. The plant, which had three coal-fired units, was retired in The North Carolina coal ash ponds contained about million tons of toxic coal ash as of August , according to state estimates. There are more than 1, coal ash storage sites around the nation, according to EPA. Even normal rainfalls have led to spills: Another spill from Cliffside in August spilled 15, to 50, gallons into the Broad River from a coal pile. Emigrate While You Still Can!

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3: Which of the following is the source of energy for the water cycle? | Yahoo Answers

Following the Water's profile including the latest music, albums, songs, music videos and more updates.

This point has been used to define the base unit of temperature, the kelvin , since , and is thus set as having a temperature of Kamb and others documented further triple points in the s. Electrical conductivity[edit] Pure water containing no exogenous ions is an excellent insulator , but not even "deionized" water is completely free of ions. Because water is such a good solvent, it almost always has some solute dissolved in it, often a salt. If water has even a tiny amount of such an impurity, then it can conduct electricity far more readily. It is known that the theoretical maximum electrical resistivity for water is approximately In ice, the primary charge carriers are protons see proton conductor. Chemical polarity A diagram showing the partial charges on the atoms in a water molecule An important feature of water is its polar nature. The structure has a bent molecular geometry for the two hydrogens from the oxygen vertex. The oxygen atom also has two lone pairs of electrons. One effect usually ascribed to the lone pairs is that the Hâ€”Oâ€”H gas phase bend angle is The lone pairs are closer to the oxygen atom than the electrons sigma bonded to the hydrogens, so they require more space. The increased repulsion of the lone pairs forces the Oâ€”H bonds closer to each other. Due to the difference in electronegativity , a bond dipole moment points from each H to the O, making the oxygen partially negative and each hydrogen partially positive. A large molecular dipole , points from a region between the two hydrogen atoms to the oxygen atom. The charge differences cause water molecules to aggregate the relatively positive areas being attracted to the relatively negative areas. This attraction, hydrogen bonding , explains many of the properties of water, such as its solvent properties. These properties include its relatively high melting and boiling point temperatures: H 2S is a gas at room temperature , in spite of hydrogen sulfide having nearly twice the molar mass of water. The extra bonding between water molecules also gives liquid water a large specific heat capacity. This high heat capacity makes water a good heat storage medium coolant and heat shield. Cohesion and adhesion[edit] Dew drops adhering to a spider web Water molecules stay close to each other cohesion , due to the collective action of hydrogen bonds between water molecules. These hydrogen bonds are constantly breaking, with new bonds being formed with different water molecules; but at any given time in a sample of liquid water, a large portion of the molecules are held together by such bonds. In biological cells and organelles , water is in contact with membrane and protein surfaces that are hydrophilic ; that is, surfaces that have a strong attraction to water. Irving Langmuir observed a strong repulsive force between hydrophilic surfaces. To dehydrate hydrophilic surfacesâ€”to remove the strongly held layers of water of hydrationâ€”requires doing substantial work against these forces, called hydration forces. These forces are very large but decrease rapidly over a nanometer or less. Surface tension prevents the clip from submerging and the water from overflowing the glass edges. Temperature dependence of the surface tension of pure water Water has an unusually high surface tension of Water is an excellent solvent due to its high dielectric constant. If a substance has properties that do not allow it to overcome these strong intermolecular forces, the molecules are precipitated out from the water. Contrary to the common misconception, water and hydrophobic substances do not "repel", and the hydration of a hydrophobic surface is energetically, but not entropically, favorable. When an ionic or polar compound enters water, it is surrounded by water molecules hydration. The partially negative dipole ends of the water are attracted to positively charged components of the solute, and vice versa for the positive dipole ends. In general, ionic and polar substances such as acids , alcohols , and salts are relatively soluble in water, and non-polar substances such as fats and oils are not. Non-polar molecules stay together in water because it is energetically more favorable for the water molecules to hydrogen bond to each other than to engage in van der Waals interactions with non-polar molecules. The ions are then easily transported away from their crystalline lattice into solution. An example of a nonionic solute is table sugar.

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4: Following the Fresh Water : Woods Hole Oceanographic Institution

The cooler, denser water then sinks to great depths to propel currents around the world and eventually circulate water back up to the Gulf Stream. Influxes of fresh water can disrupt the deep-water system resulting in impacts on climate, such as what occurred around 13, years ago with the Younger Dryas cooling event.

Click image for larger view. Water molecules continuously move from location to location in this cycle. The water cycle is important to weather and climate and, ultimately, to all life on Earth. The water cycle is driven primarily by the energy from the sun. This solar energy drives the cycle by evaporating water from the oceans, lakes, rivers, and even the soil. Other water moves from plants to the atmosphere through the process of transpiration. As liquid water evaporates or transpires, it forms water vapor and clouds, where water droplets eventually gain enough mass to fall back to Earth as precipitation. The water cycle is essentially a closed system, meaning that the volume of water that is in the hydrosphere today is the same amount of water that has always been present in the Earth system. Begin this lab by watching the following short NASA animation demonstrating the path of one water molecule through the water cycle. While watching the animation, make a list and keep track of all the places that the molecule travels. In the NASA animation, the depiction of the water reservoirs, such as underground aquifersaquifers: Click the Water Cycle Animation link to view the animation in a new window. NASA As discussed earlier, the water cycle not only redistributes water around Earth, it also absorbs and redistributes solar energy between locations. This same energy is released from the substance when the change of state is reversed gas to liquid, or liquid to solid. As this occurs, liquid water absorbs energy, causing it to evaporate and form water vapor. The process of evaporation absorbs tremendous amounts of incoming solar energy. Through the process of latent heating, energy is transferred into the atmosphere when the water vapor condenses during the formation of clouds. For example, think of how a puddle, following a rainstorm, keeps a sidewalk cool until it is completely dried by the sunshine. The incoming solar radiation is being used to drive the process of evaporation. Once the water is gone, the sidewalk begins to absorb solar radiation and heat up. If you touch the sidewalk with bare feet you can feel this sensible heatsensible heat: A second mechanism for the redistribution of thermal energy is the process of convectionconvection: Of these three processes, 25 percent of the energy that leaves the surface of the Earth is through evaporation and condensation. An additional five percent, leaves the surface through convection. As you complete the following lab, look for signs of these two important heat transfer processes.

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5: Properties of water - Wikipedia

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There are 4 main stages involved in water cycle i. So, how does this cycle works? When the sun shines, the water from the ocean or lake evaporates due to heat from the sun. When it evaporates, it turns into water vapor and goes up into the atmosphere. This water vapor gets together with other water vapor and turns into a cloud. When clouds get dense, they drop the water back to Earth in some form of precipitation like rain, snow, hail or sleet. When the water falls back down to the Earth, they find their way on the ground surface into puddles, streams and rivers. Again this water will evaporate and the whole cycle will start again. Different Stages of the Water Cycle Water goes through three different states in the water cycle. It can be a liquid water , a gas water vapor or a solid ice. These three states are interchangeable, as water can freeze into ice or evaporate into water vapor, water vapor can condense as water, and ice can melt into water. The water cycle consists of a number of steps which sees water go through each of these states. Water is found in lakes, oceans, swamps, and soil, as well as in all living creatures and plants. When heat is applied from the sun, through exertion, or by artificial means, the water molecules become excited and spread out. Normally, the evaporation of water occurs when the water hits boiling point, around one hundred degrees centigrade. However, in places in which the air pressure and humidity is lower, far less heat energy is needed to evaporate the water because there is less pressure holding the water molecules together. The water that evaporates from the oceans is not salty, as the salt is too dense and heavy to rise with the water vapor, which is why water from rivers and lakes is not salty. Snow and ice can actually turn into water vapor without first turning into water. This usually occurs at the peaks of mountains or other high-up places, as the lower air pressure means that less energy is needed to sublimate the ice into water vapor. Some of the highest peaks on earth, such as Mount Everest, have all of the necessary components for sublimation, namely: A large percentage of the water in the atmosphere is produced by this process due to the large areas covered by plants and trees across the planet. While about ninety per cent of the water vapor in the world comes from lakes, oceans, and streams, the remaining ten per cent is comprised of the various plant life around the world. The water vapor that has risen into the sky cools significantly when it comes into contact with the cooler air found up high. The vapor becomes a cloud, which is pushed around the world by moving air currents and winds. If the water vapor cools to anything above zero degrees centigrade, it will condense as water. Essentially, the water vapor will start to condense on the surface of tiny particles of dust and dirt that rose with the vapor during the process of evaporation. These tiny droplets will start to fall into one another and merge, producing a larger droplet. When a droplet is large enough, gravity will pull it down at a rate that exceeds the updraft in the cloud, leading to the droplet falling out of the cloud and onto the ground below. If precipitation occurs in conditions which are particularly cold or have very low air pressure, then these water droplets can quite often crystallize and freeze. This causes the water to fall as solid ice, known as hail, or as snow. If the conditions are in between those associated with snow and rain, the droplets will fall as icy cold, half frozen water commonly referred to as sleet. Soil and other porous materials can absorb great deals of water this way, while rocks and other harder substances will only retain a small amount of water. This is where the water that does not seep out or evaporate joins up under the ground, saturating the smallest nooks and crannies of rock and soil under the ground. These can often be found in formations of porous or brittle rock, which can crack following slightly acidic rainfall. Should the water be located near a volcano or any source of natural thermal energy, it will form a hot spring. After the water has fallen and the soil has become saturated, or the snow has melted, the water follows gravity and falls down any hills, mountains, or other inclines to form or join rivers. The water falls according to the incline of the place from which it is falling, and when several threads of water meet they form a stream. These streams and rivers will run off eventually to either form lakes or rejoin the ocean, depending on their proximity to the ocean. Due to the amount of water stored in snow or ice, sudden increase in the heat can lead to flooding due to the water

suddenly melting and running off at an alarming rate. This is why flooding can occur so easily during a warm spring following a particularly cold and biting winter. The ice caps and glaciers located in the coldest regions of the world are the biggest collections of ice in the world, and are slowly starting to shrink as the water in which they sit is becoming warmer. This happens in a cyclical manner, with no beginning or end. As precipitation happens in one part of the world evapotranspiration is happening somewhere else. At some point, any water that has infiltrated will be released, any that has joined the ocean will evaporate, and even a large portion of the ice caps may melt, releasing water that has been stored for millions of years back into the water cycle with potentially cataclysmic effects.

6: 2A: Solar Energy and the Water Cycle

But following the water is a critical element of that." The existence of waterâ€”even briny waterâ€”on Mars shifts the scientific investigation from looking for chemical fossils of past life to looking for current examples of life.

7: The Water Cycle and Different Stages of The Water Cycle - Conserve Energy Future

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8: Following the Water to Find Signs of Life | APPEL Knowledge Services

Fulfillment by Amazon (FBA) is a service we offer sellers that lets them store their products in Amazon's fulfillment centers, and we directly pack, ship, and provide customer service for these products.

9: pH of Water - Environmental Measurement Systems

Stored water as part of the water cycle. Large amounts of water are stored in the ground. The water is still moving, possibly very slowly, and it is a part of the water cycle. Most of the water in the ground comes from precipitation that infiltrates downward from the land surface.

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