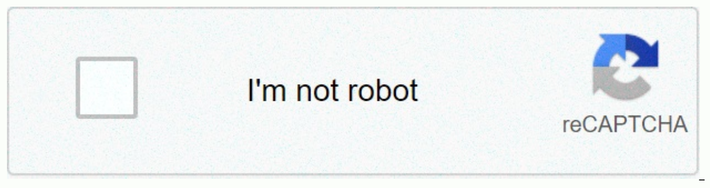

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What is the process of dissolving

Learning goals To describe the dissolution process at the molecular level What is happening at the molecular level that causes the solute to dissolve in the solvent? The answer depends in part on the solute, but there are some similarities common to all the soltes. Remember a rule that kind of dissolves like. This means that substances must have similar intermolecular forces to form solutions. When soluble particles are introduced into the solvent, particles of the dissolved substance may affect the solvent particles. In the case of solid or liquid solute, the interactions between dissolved particles and solvent particles are so strong that individual soluble particles enter into the solution separately and surrounded by solvent molecules. (Gaseous solues are already separated from their constituents by stents, but the term surrounded by solvent particles still applies.) This process is called insult and is illustrated by figure \(\PageIndex{1}\). If the solvent is water, the word hydration is used, not insult. Figure \(\PageIndex{1}\): Insult. When soluble, individual particles of individual particles surround the solvent particles. Finally, the particles are separated from the rest of the solute, which is surrounded by solvent molecules in the solution. Source: Photo © Thinkstock Molecular debugging, such as glucose, are individual molecules in solute particles. However, if the solute is ionic, individual ions are separate from each other and become surrounded by solvent particles. It is the cationic and aions of ionic ions when the dissolved substance dissolves. This process is called dissociation (figure \(\PageIndex{1}\)). The dissociation of soluble ion compounds gives the solutions of these compounds an interesting characteristic: they generate electricity. Because of its characteristic, soluble ion compounds are called electrolytes. Many ion compounds are dissociated completely and therefore called strong electrolytes. Sodium chloride is an example of a strong electrolyte. Some compounds dissolve, but only partially separate, and solutions of such pacifiers can only control electricity slightly. These sols are called weak electrolytes. Acetic acid in vinegar (CH3COOH) is a weak electrolyte. Solutes, which dissolve into individual neutral molecules without dissociation, do not provide additional electrical conductivity for their solutions and are called non-electrolytes. Table sugar (C12H22O11) is an example of non-electrolocytes. The term electrolyte in medicine means any important ion dissolved in a body aqueous solution. Important physiological electrolytes are Na+, K+, Ca2+, Mg2+, and Cl−. Example \(\PageIndex{1}\) The following substances are all soluble to some extent in water. Classify each as electrolyte or non-electrolyte. potassium chloride (KCl) (C6H12O6) isopropyl alcohol [CH3CH(OH)CH3] magnesium hydroxide [Mg(OH)2] Solution Each substance may be classified as ion-sol or non-ionic individual substances. Ion solos are electrolytes and non-ionic solues are non-electrolytes. Potassium chloride is an ion compound; therefore, when it dissolves, its ions are separate, turning it into electrolytes. Fructose is a sugar that is similar to glucose. (In fact, it's the same molecular formula as glucose.) Since it's a molecular compound, we assume it's a non-electrolyte. Isopropyl alcohol is an organic molecule that contains a functional group of alcohol. Bonding compound is all covalent, so when isopropyl alcohol dissolves, it separates individual molecules, but not ions. Thus, the non-electrolyte magnesium hydroxide is an ion compound, so when it dissolves, it dissociates. Thus, magnesium hydroxide is an electrolyte. Exercise \(\PageIndex{1}\) The following substances all dissolve to a certain extent in water. Classify each as electrolyte or non-electrolyte. Acetone (CH3COCH3) iron (III) nitrate [Fe(NO3)3] elemental bromine (Br2) sodium hydroxide (NaOH) Answer a. nonelectrolyte b. electrolyte c. nonelectrolyte d. electrolte Our body fluids are electrolyte solutions and much more. The combination of blood and circulatory system is a river of life because it coordinates all life functions. When the heart stops pumping a heart attack, life ends quickly. Getting the heart back up as soon as possible is important to maintain life. In body fluids, the primary electrolytes are cations (calcium, potassium, sodium and magnesium) and anions (chloride, carbonates, aminoacetamates, phosphates and iodine). They're called nutritional macro minerals. Electrolyte balance is important for many of the body's functions. Here are some extreme examples of what can happen to electrolyte imbalance: elevated potassium levels can cause heart rhythm problems; decreased extracellular potassium causes paralysis; excess extracellular sodium causes fluid retention; and decreased calcium and magnesium may cause muscle spasms in the extremities. If the patient is dehydrated, carefully prepared (commercially) electrolyte solution is necessary to maintain health and well-being. In connection with the child's health, oral electrolyte is given when the child is dehydrated due to diarrhea. The use of oral electrolyte care solutions, which is responsible for saving millions of lives worldwide over the past 25 years, is one of the most important medical advances in protecting children's health in a century, explains Juilus G.K. Goepp, MD, deputy director of the children's center at Johns Hopkins Hospital. If the parent provides oral electrolyte maintenance solution at the beginning of the disease, dehydration should be Avoid. The functionality of electrolyte solutions is related to these characteristics and the interest in electrolyte solutions goes far beyond chemistry. Sports drinks are designed to rehydrate the body after excessive fluid absorption. Electrolytes in particular promote normal rehydration to avoid fatigue during physical exertion. Are they a good choice to achieve the recommended fluid intake? Are they performance and endurance enhancers as they claim? Who's supposed to drink them? Typically, an eight-ounce sports drink offers between fifty to eighty calories and 14 to 17 grams of carbohydrates, mostly in the form of simple sugars. Sodium and potassium are the most commonly added electrolytes in sports drinks, the levels of which in these sports drinks are very different. The American College of Sports Medicine says the sports drink should contain 125 milligrams of sodium in 8 ounces because it is a useful supplement for some sodium lost in sweat and promotes fluid intake in the small intestine, improving hydration. In gatorade summer of 1965, an assistant football coach at the University of Florida Gators asked researchers affiliated with a university study on why the wretched heat in Florida caused so much heat-related illnesses in football players and offer a solution to increase athletic performance and recovery after training or a game. The discovery was that insufficient replenishment of fluids, carbohydrates and electrolytes was the cause of withering in these footballers. Based on their research, the researchers concocted drink football players containing water, carbohydrates and electrolytes and called it Gatorade. The next football season, the Gators were nine and two and won the Orange Bowl. The Gators' success was launched by the sports-drink industry, which is now a multibillion-dollar industry that is still dominated by Gatorade. University of Florida football player Chip Hinton testing Gatorade in 1965, pictured next to the head of his team of inventors, Robert Cade. Concept Review Exercise Explain how the offending process describes dissolved dissolved solution. Answer Each particle of dissolved substance is surrounded by solvent particles, carrying the soluble part of the initial phase. Key Takeaway When the solute dissolves, its individual particles are surrounded by solvent molecules and are separated from each other. Exercises Describe what happens when ionic solute such as Na2SO4 dissolves in a polar solvent. Describe what happens when molecular solute-like sucrose (C12H22O11) dissolves in a polar solvent. Each substance is classified as electrolyte or non-electrolyte. Each substance dissolves to a certain extent in H2O. Each substance is classified as electrolyte or non-electrolyte. Each substance dissolves to a certain extent in H2O. CH3CH2CH2OH Ca(CH3CO2)2 I2 KOH Are solutions dissolved electricity? Do each solute solution pass through when dissolved? CH3COCH3 N(CH3)3 CH3CO2C2H5 FeCl2 Each ion ionic solute is surrounded by particles of solvent that ion the associated crystal. 2. Each sucrose molecule is surrounded by solvent molecules (attract each other by attraction). electrolyte non-electrolyte electrolyte 4. electrolyte level5. 6. a. no b. no c. no d. Yes Describe how ion compounds form solutions. Describe how molecular compounds form solutions. Jon-Isac Lindberg's coffee cup. Many people like to start their day with a cup of coffee (others need coffee all day long to get something done). Drinking coffee is a type of solution, often very complicated. The coffee itself is brewed so that the material from the coffee bean dissolves in hot water. Some people add sugar while others add milk or cream. In some countries, lattés are popular; so that one or more special flavors could be added with milk. No matter what situation, the end result is an enjoyable solution to drink. Water usually dissolves many ion compounds and polar molecules. Non-polar molecules, such as those found in fat or oil, do not dissolve in water. First, we examine the process that occurs when an ionic compound, such as table salt (sodium chloride), dissolves in water. Water molecules move constantly because of their kinetic energy. When the sodium chloride crystal is placed in water, the water molecules collide with the crystal lattice. Remember that the crystal lattice consists of intermittent positive and negative ions. Water is interested in sodium chloride crystal because the water is polar and has both a positive and negative end. Positively charged sodium ions crystal attract oxygen to end water molecules because they are partially negative. Negatively charged chloride ions in the crystal attract hydrogen to end water molecules because they are partially positive. The effect of polar water molecules distinguishes the crystal lattice (see screenshot below). CK-12 Foundation – Christopher Auyeung. After separation from the crystal, individual ions are surrounded by solvent particles in a process called insult. Note that individual Na+ ions are surrounded by water molecules with oxygen atom-oriented near positive ions. Chloride ions also surround water molecules with the opposite orientation. Hydration is a process of solute particles are surrounded by water molecules in this way. Hydration helps to stabilize aqueous solutions by preventing the reuniting of positive and negative ions and forming precipitate. sugar is sucrose (C 12 H 22 O 11) and is an example of a molecular compound. Solid sugar consists of individual sugar molecules, which are held together by intermolecular attractive forces. When water dissolves sugar, it separates individual sugar molecules, disrupting attractive forces, but not breaking covalent bonds between carbon, hydrogen and oxygen atoms. Dissolved sugar molecules are also hydrated, but without the same different orientation of water molecules as in the case of ions. The sugar molecule contains many -OH groups that can form hydrogen bonds with water molecules, helping to form a sucrose solution. Summary The movement of water molecules helps break up interactions between solid ions or molecules. The offending involves surrounding ions with solvent particles. Ionic solute molecules are hydrated (surrounded by solvent molecules in a specific position). Use the link below to answer the following questions: step to break bonds requires energy or energy to release energy? Does the hydration process require energy or release energy? Does the distribution of solvent-solute clusters require energy or energy release? Overview How does the movement of water molecules help to form a solution? What is insult? What is hydration? How does sucrose affect solvent water molecules? Hydration: The process of solute particles is surrounded by water molecules in a different way. offending: Includes surrounding ions with solvent particles. Particles.

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