WHAT IS A CHEMICAL REACTION pdf

1: www.enganchecubano.com: Reactions: Overview

In a chemical reaction, the atomic nucleus is untouched, but electrons may be transferred or shared to break and form chemical bonds. In both physical changes and chemical changes (reactions), the number of atoms of each element are the same both before and after a process occurs.

Definition[edit] Colors of a single chemical Nile red in different solvents, under visible and UV light, showing how the chemical interacts dynamically with its solvent environment. A chemical substance may well be defined as "any material with a definite chemical composition" in an introductory general chemistry textbook. But, there are exceptions to this definition; a pure substance can also be defined as a form of matter that has both definite composition and distinct properties. Broader definitions of chemicals or chemical substances can be found, for example: Many minerals, however, mutually dissolve into solid solutions , such that a single rock is a uniform substance despite being a mixture in stoichiometric terms. Feldspars are a common example: In law, "chemical substances" may include both pure substances and mixtures with a defined composition or manufacturing process. For example, the EU regulation REACH defines "monoconstituent substances", "multiconstituent substances" and "substances of unknown or variable composition". The latter two consist of multiple chemical substances; however, their identity can be established either by direct chemical analysis or reference to a single manufacturing process. For example, charcoal is an extremely complex, partially polymeric mixture that can be defined by its manufacturing process. Therefore, although the exact chemical identity is unknown, identification can be made to a sufficient accuracy. The CAS index also includes mixtures. Polymers almost always appear as mixtures of molecules of multiple molar masses, each of which could be considered a separate chemical substance. However, the polymer may be defined by a known precursor or reaction s and the molar mass distribution. History[edit] The concept of a "chemical substance" became firmly established in the late eighteenth century after work by the chemist Joseph Proust on the composition of some pure chemical compounds such as basic copper carbonate. However, there are some controversies regarding this definition mainly because the large number of chemical substances reported in chemistry literature need to be indexed. Isomerism caused much consternation to early researchers, since isomers have exactly the same composition, but differ in configuration arrangement of the atoms. Likewise, the idea of stereoisomerism - that atoms have rigid three-dimensional structure and can thus form isomers that differ only in their three-dimensional arrangement - was another crucial step in understanding the concept of distinct chemical substances. For example, tartaric acid has three distinct isomers, a pair of diastereomers with one diastereomer forming two enantiomers. Chemical elements[edit] Native sulfur crystals. Sulfur occurs naturally as elemental sulfur, in sulfide and sulfate minerals and in hydrogen sulfide. List of elements An element is a chemical substance made up of a particular kind of atom and hence cannot be broken down or transformed by a chemical reaction into a different element, though it can be transmuted into another element through a nuclear reaction. This is so, because all of the atoms in a sample of an element have the same number of protons, though they may be different isotopes , with differing numbers of neutrons. As of , there are known elements, about 80 of which are stable â€" that is, they do not change by radioactive decay into other elements. Some elements can occur as more than a single chemical substance allotropes. For instance, oxygen exists as both diatomic oxygen O_2 and ozone O_3. The majority of elements are classified as metals. These are elements with a characteristic lustre such as iron , copper , and gold. Metals typically conduct electricity and heat well, and they are malleable and ductile. Non-metals lack the metallic properties described above, they also have a high electronegativity and a tendency to form negative ions. Certain elements such as silicon sometimes resemble metals and sometimes resemble non-metals, and are known as metalloids. Chemical compounds[edit] Potassium ferricyanide is a compound of potassium, iron, carbon and nitrogen; although it contains cyanide anions, it does not release them and is nontoxic. List of organic compounds and List of inorganic compounds A pure chemical compound is a chemical substance that is composed of a particular set of molecules or ions. Two or more elements combined into one substance through a chemical reaction form a chemical compound. All compounds are substances, but not all substances are compounds. A chemical compound can be either atoms bonded together in molecules or crystals in which atoms, molecules or ions form a crystalline lattice. Compounds based primarily on carbon and hydrogen atoms are called organic compounds , and all others are called inorganic compounds. Compounds containing bonds between carbon and a metal are called organometallic compounds. Compounds in which components share electrons are known as covalent compounds. Compounds consisting of oppositely charged ions are known as ionic compounds, or salts. In organic chemistry, there can be more than one chemical compound with the same composition and molecular weight. Generally, these are called isomers. Isomers usually have substantially different chemical properties, and often may be isolated without spontaneously interconverting. A common example is glucose vs. The former is an aldehyde , the latter is a ketone. Their interconversion requires either enzymatic or acid-base catalysis. However, tautomers are an exception: A common example is glucose , which has open-chain and ring forms. One cannot manufacture pure open-chain glucose because glucose spontaneously cyclizes to the hemiacetal form. Substances versus mixtures[edit] Cranberry glass, while it looks homogeneous, is a mixture consisting of glass and gold colloidal particles of ca. Mixture All matter consists of various elements and chemical compounds, but these are often intimately mixed together. Mixtures contain more than one chemical substance, and they do not have a fixed composition. In principle, they can be separated into the component substances by purely mechanical processes. Butter , soil and wood are common examples of mixtures. Grey iron metal and yellow sulfur are both chemical elements, and they can be mixed together in any ratio to form a yellow-grey mixture. No chemical process occurs, and the material can be identified as a mixture by the fact that the sulfur and the iron can be separated by a mechanical process, such as using a magnet to attract the iron away from the sulfur. The resulting compound has all the properties of a chemical substance and is not a mixture. Iron II sulfide has its own distinct properties such as melting point and solubility , and the two elements cannot be separated using normal mechanical processes; a magnet will be unable to recover the iron, since there is no metallic iron present in the compound. Chemicals versus chemical substances[edit] While the term chemical substance is a precise technical term that is synonymous with chemical for chemists, the word chemical is used in general usage in the English speaking world to refer to both pure chemical substances and mixtures often called compounds , [13] and especially when produced or purified in a laboratory or an industrial process. In countries that require a list of ingredients in products, the "chemicals" listed are industrially produced "chemical substances". The word "chemical" is also often used to refer to addictive, narcotic, or mind-altering drugs. Bulk chemicals are produced in very large quantities, usually with highly optimized continuous processes and to a relatively low price. Fine chemicals are produced at a high cost in small quantities for special low-volume applications such as biocides, pharmaceuticals and speciality chemicals for technical applications. Research chemicals are produced individually for research, such as when searching for synthetic routes or screening substances for pharmaceutical activity. In effect, their price per gram is very high, although they are not sold. The cause of the difference in production volume is the complexity of the molecular structure of the chemical. Bulk chemicals are usually much less complex. While fine chemicals may be more complex, many of them are simple enough to be sold as "building blocks" in the synthesis of more complex molecules targeted for single use, as named above. The production of a chemical includes not only its synthesis but also its purification to eliminate by-products and impurities involved in the synthesis. The last step in production should be the analysis of batch lots of chemicals in order to identify and quantify the percentages of impurities for the buyer of the chemicals. The required purity and analysis depends on the application, but higher tolerance of impurities is usually expected in the production of bulk chemicals. Thus, the user of the chemical in the US might choose between the bulk or "technical grade" with higher amounts of impurities or a much purer "pharmaceutical grade" labeled "USP", United States Pharmacopeia. For example, gasoline is not a single chemical compound or even a particular mixture: Naming and indexing[edit] Every chemical substance has one or more systematic names , usually named according to the IUPAC rules for naming. Many compounds are also known by their more common, simpler names, many of which predate the systematic name. For example, the long-known sugar glucose is now systematically named 6-hydroxymethyl oxane-2,3,4,5-tetrol. Chemists frequently refer to chemical compounds using chemical formulae or molecular structure of the compound. There has been a phenomenal growth in the number of chemical compounds being synthesized or isolated , and then reported in the scientific literature by professional chemists around the world. As of May , about sixty million chemical compounds are known. Also it is difficult to keep the track of them in the literature. CAS provides the abstracting services of the chemical literature, and provides a numerical identifier, known as CAS registry number to each chemical substance that has been reported in the chemical literature such as chemistry journals and patents. This information is compiled as a database and is popularly known as the Chemical substances index. Other computer-friendly systems that have been developed for substance information, are: Identification of a typical chemical substance Common name.

2: What is a chemical reaction? definition and meaning - www.enganchecubano.com

A chemical reaction is a process that leads to the chemical transformation of one set of chemical substances to another. Classically, chemical reactions encompass changes that only involve the positions of electrons in the forming and breaking of chemical bonds between atoms, with no change to the nuclei (no change to the elements present), and can often be described by a chemical equation.

Contributors Chemical reactions are the processes by which chemicals interact to form new chemicals with different compositions. Simply stated, a chemical reaction is the process where reactants are transformed into products. How chemicals react is dictated by the chemical properties of the element or compound- the ways in which a compound or element undergoes changes in composition. Describing Reactions Quantitatively Chemical reactions are constantly occurring in the world around us; everything from the rusting of an iron fence to the metabolic pathways of a human cell are all examples of chemical reactions. Chemistry is an attempt to classify and better understand these reactions. The rusting of a chain is an example of a chemical reaction A chemical reaction is typically represented by a chemical equation, which represents the change from reactants to products. The left hand side of the equation represents the reactants, while the right hand side represents the products. A typical chemical reaction is written with stoichiometric coefficients, which show the relative amounts of products and reactants involved in the reaction. The symbol aq is also commonly used in order to represent an aqueous solution, in which compounds are dissolved in water. A reaction might take the following form: To write an accurate chemical equation, two things must occur: Each product and reactant must be written using its chemical formula, e. Coefficients are used in front of the chemical formulas in order to help balance the number of atoms, e. Balancing Reactions Hydrogen and nitrogen react together in order to produce ammonia gas, write the chemical equation of this reaction. Write each product and reactant using its chemical formula. Ensure the number of atoms of each element are equal on both sides of the equation. Stoichiometry The coefficient that used for balancing the equation is called the stoichiometric coefficient. The coefficients tell us the ratio of each element in a chemical equation. When all of the reactants of a reaction are completely consumed, the reaction is in perfect stoichiometric proportions. Often times, however, a reaction is not in perfect stoichiometric proportions, leading to a situation in which the entirety of one reactant is consumed, but there is some of another reactant remaining. The reactant that is entirely consumed is called the limiting reactant , and it determines how much of the products are produced. How many grams of water are produced? Often, reactants do not react completely, resulting in a smaller amount of product formed than anticipated. The amount of product expected to be formed from the chemical equation is called the theoretical yield. The amount of product that is produced during a reaction is the actual yield. To determine the percent yield: In a solution, the solvent is the compound that is dissolved, and the solute is the compound that the solvent is dissolved in. The molarity of a solution is the number of moles of a solvent divided by the number of liters of solution. What is the molarity of the solution? Physical changes usually occur during chemical reactions, but does not change the nature of substances. However, when physical changes occur, chemical reactions may not occur. Types of Chemical Reactions Precipitation, or double-replacement reaction A reaction that occurs when aqueous solutions of anions negatively charged ions and cations positively charged ions combine to form a compound that is insoluble is known as precipitation. The insoluble solid is called the precipitate, and the remaining liquid is called the supernate. The white precipitate formed by acid rain on a marble statue: Precipitation An example of a precipitation reaction is the reaction between silver nitrate and sodium iodide. This reaction is represented by the chemical equation: These ions do not affect the reaction and are removed from both sides of the equation to reveal the net ionic equation, as written below: The formation of a precipitate is one of the many indicators that a chemical reaction has taken place. Acid-base, or neutralization reaction A neutralization reaction occurs when an acid and base are mixed together. A typical acid-base reaction will produce an ionic compound called a salt and water. A typical acid-base reaction is the reaction between hydrochloric acid and sodium hydroxide. This reaction is represented by the equation: Baking soda reacts with vinegar is a neutralization reaction. Vinegar and Baking Soda Reaction with

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Explanation Oxidation-Reduction Redox Reactions A redox reaction occurs when the oxidation number of atoms involved in the reaction are changed. If the oxidation states of any elements in a reaction change, the reaction is an oxidation-reduction reaction. An atom that undergoes oxidation is called the reducing agent, and the atom that undergoes reduction is called the oxidizing agent. An example of a redox reaction is the reaction between hydrogen gas and fluorine gas: Fluorine is reduced from 0 to -1, and is thus the oxidizing agent. The cut surface of an apple turns brownish after exposed to the air for a while. Why Do Apples Turn Brown? Combustion Reaction A combustion reaction is a type of redox reaction during which a fuel reacts with an oxidizing agent, resulting in the release of energy as heat. Such reactions are exothermic, meaning that energy is given off during the reaction. An endothermic reaction is one which absorbs heat. A typical combustion reaction has a hydrocarbon as the fuel source, and oxygen gas as the oxidizing agent. Combustion reactions come in many varieties. An example of such a reaction is the reaction of silver with oxygen gas to form silver oxide: Hydrogen gas is burned in air reacts with oxygen to form water: During a decomposition reaction, a more complex compound breaks down into multiple simpler compounds. A classic example of this type of reaction is the decomposition of hydrogen peroxide into oxygen and hydrogen gas: Electrolysis of water; Carbonic acid in soda. Decomposition Reaction of potassium chlorate and sugar. Single Replacement Reactions A type of oxidation-reduction reaction in which an element in a compound is replaced by another element.

3: What are Chemical Reactions? (with pictures)

A chemical reaction is a process in which one or more substances, also called reactants, are converted to one or more different substances, known as products. Substances are either chemical elements or compounds.

Engage Review what happens during a physical change and introduce the idea of chemical change. Tell students that in previous chapters they have studied different aspects of physical change. When atoms and molecules speed up or slow down, that is a physical change. When they change state from liquid to solid or from gas to liquid, that is a physical change. When a substance is dissolved by water or some other solvent, a new substance has not really been formed. The ions or molecules can still come back together to form the original substance. Let students know that in this chapter they will explore what happens during a chemical change. In a chemical change, the atoms in the reactants rearrange themselves and bond together differently to form one or more new products with different characteristics than the reactants. When a new substance is formed, the change is called a chemical change. As a demonstration, light a candle and explain what is happening using the terms reactants, products, and chemical reaction. Explain that in most chemical reactions, two or more substances, called reactants, interact to create different substances called products. Tell students that burning a candle is an example of a chemical reaction. Materials for the Demonstration Tea light candle or other small stable candle Matches Glass jar, large enough to be placed over the candle Procedure Carefully light a tea light candle or other small candle. Keep the candle burning as you ask students the questions below. You will put the candle out in the second part of the demonstration. Expected Results The wick will catch on fire and the flame will be sustained by the chemical reaction. The following question is not easy and students are not expected to know the answer at this point. However, thinking about a candle burning in terms of a chemical reaction is a good place to start developing what it means when substances react chemically. What do you think are the reactants in this chemical reaction? Wax and oxygen from the air are the reactants. Students often say that the string or wick is burning. Explain that the molecules that make up the wax combine with oxygen from the air to make the products carbon dioxide and water vapor. Point out to students that this is one of the major characteristics of a chemical reaction: In a chemical reaction, atoms in the reactants combine in new and different ways to form the molecules of the products. Students may be surprised that water can be produced from combustion. Since we use water to extinguish a fire, it may seem strange that water is actually produced by combustion. Place a jar over the candle to help students realize that oxygen is a reactant in the burning of a candle. Remind students that air is a mixture of gases. Explain that when something burns, it reacts with the oxygen in the air. Ask students to make a prediction: Will the candle still burn if one of the reactants wax or oxygen is no longer available? Students may guess that the candle will not burn because both reactants are required for the chemical reaction to continue. Procedure Carefully place a glass jar over the lit candle. Expected Results The flame goes out. Why do you think the flame goes out when we put a jar over the candle? Placing a jar over the candle limits the amount of oxygen in the air around the candle. Without enough oxygen to react with the wax, the chemical reaction cannot take place and the candle cannot burn. When a candle burns for a while, it eventually gets smaller and smaller. Where does the candle wax go? It reacts chemically, and the new products go into the air. Some curious students may ask what the flame is made of. This is a great question and not trivial to answer. The flame is burning wax vapor. The light of the flame is caused by a process called chemiluminescence. Energy released in the chemical reaction makes electrons from different molecules move to a higher energy state. When the electrons come back down, energy is released in the form of light. Explain Introduce the chemical equation for the combustion of methane and explain that atoms rearrange to become different molecules. Explain to students that wax is made of long molecules called paraffin and that paraffin is made up of only carbon atoms and hydrogen atoms bonded together. Molecules made of only carbon and hydrogen are called hydrocarbons. Tell students that you will use the simplest hydrocarbon methane as a model to show how the wax, or any other hydrocarbon, burns. Project the image Chemical Reaction between Methane and Oxygen. Show students that there is methane and oxygen on the left side of the chemical equation and carbon dioxide and water on the right side. Explain that the molecules on the left side are the reactants and the ones on the right side are the products. When the candle was burning, the paraffin reacted with oxygen in the air to produce carbon dioxide and water, similar to the chemical reaction between methane and oxygen. Explain to students that the chemical formula for methane is CH_4. This means that methane is made up of one carbon atom and four hydrogen atoms. Show students that the other reactant is two molecules of oxygen gas. Point out that each molecule of oxygen gas is made up of two oxygen atoms bonded together. It can be confusing for students that oxygen the atom, and oxygen the molecule, are both called oxygen. Let students know that when we talk about the oxygen in the air, it is always the molecule of oxygen, which is two oxygen atoms bonded together, or O_2. Where do the atoms come from that make the carbon dioxide and the water on the right side of the equation? The atoms in the products come from the atoms in the reactants. In a chemical reaction, bonds between atoms in the reactants are broken and the atoms rearrange and form new bonds to make the products. Leave this equation projected throughout the activity in the Explore section of this lesson. Students will need to refer to it as they model the chemical reaction. Give Each Student an Activity Sheet. Students will record their observations and answer questions about the activity on the activity sheet. The Explain It with Atoms and Molecules and Take It Further sections of the activity sheet will either be completed as a class, in groups, or individually, depending on your instructions. Look at the teacher version of the activity sheet to find the questions and answers. Explore Have students make a model to show that in a chemical reaction the atoms of the reactants rearrange to form the products. Question to Investigate Where do the atoms in the products of a chemical reaction come from? Materials for Each Student Atom model cut-outs carbon, oxygen, and hydrogen Sheet of colored paper or construction paper Colored pencils.

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4: BBC Bitesize - KS3 Chemistry - Types of reaction - Revision 1

A chemical reaction is a process that is usually characterized by a chemical change in which the starting materials (reactants) are different from the products. Chemical reactions tend to involve the motion of electrons, leading to the formation and breaking of chemical bonds.

Reactions occur when two or more molecules interact and the molecules change. Bonds between atoms are broken and created to form new molecules. What molecules are they? How do they interact? The possibilities are infinite. When you are trying to understand chemical reactions, imagine that you are working with the atoms. Imagine the building blocks are right in front of you on the table. Sometimes we use our chemistry toys to help us visualize the movement of the atoms. We plug and unplug the little connectors that represent chemical bonds. There are a few key points you should know about chemical reactions: A chemical change must occur. You start with one molecule and turn it into another. Chemical bonds are made or broken in order to create a new molecule. One example of a chemical reaction is the rusting of a steel garbage can. That rusting happens because the iron Fe in the metal combines with oxygen O2 in the atmosphere. Chemical bonds are created and destroyed to finally make iron oxide Fe2O3. When a refrigerator or air conditioner cools the air, there is no reaction in the air molecules. The change in temperature is a physical change. When you melt an ice cube, it is a physical change. When you put bleach in the washing machine to clean your clothes, a chemical change breaks up the molecules in your stains. A reaction could include atoms, ions , compounds, or molecules of a single element. You need to remember that a chemical reaction can happen with anything, just as long as a chemical change occurs. If you put pure hydrogen gas H2 and pure oxygen gas in a room, they might be involved in a reaction to form water H2O. However, it will be in very very small amounts. If you were to add a spark, those gases would be involved in a violent chemical reaction that would result in a huge explosion exothermic. If you mix a solution with silver ions with a solution that has chloride Cl- ions, silver chloride AgCl precipitate will form and drop out of solution. Single reactions often happen as part of a larger series of reactions. When a plant makes sugars, there might be as many as a dozen chemical reactions to get through the Calvin cycle and eventually create synthesize glucose C6H12O6 molecules. The rusting example we used earlier only showed you the original reactants and final products of the chemical reaction. There were several intermediate reactions where chemical bonds were created and destroyed. The silver chloride example only focused on the ions. In reality, the two solutions were created when two salts dissociated split into ions in water.

5: What Is â€“ And What Isnâ€™t â€“ A Chemical | I Can Has Science?

chemical reaction A process in which atoms of the same or different elements rearrange themselves to form a new substance. While they do so, they either absorb heat or give it off.

For the previous version, see this page. Chemical reactions happen absolutely everywhere. While we sometimes associate chemical reactions with the sterile environment of the test tube and the laboratory - nothing could be further from the truth. In fact, the colossal number of transformations make for a dizzying, almost incomprehensible array of new substances and energy changes that take place in our world every second of every day. Whether it be a fire raging across a forest Figure 1 , the slow process of iron rusting in the presence of oxygen and water over a period of years, or the delicate way in which fruit ripens on a tree, the process of converting one set of chemical substances the reactants to another set of substances the products is one known as a chemical reaction. A controlled fire in Alberta, Canada, set to create a barrier for future wildfires. Processes like fermentation, in which sugars are chemically converted into alcohol , have been known for centuries; however, the chemical basis of the reaction was not understood. What were these transformations and how were they controlled? These questions could only be answered when the transition from alchemy to chemistry as a quantitative and experimental science took place. Simple stones, such as those that contained sulfur, seemed to magically burn; and otherwise unimpressive minerals were transformed, like the ore cinnabar becoming an enchanting silvery liquid metal mercury when heated. Aristotle believed that everything in the world was composed of four fundamental substances - air, earth, fire, and water. As such, they proposed, and spent generations trying to prove, that less expensive metals like copper and mercury could be turned into gold. Despite their misguided approach, many early alchemists performed foundational chemical experiments - transforming one substance into another, and so it is difficult to point to a specific date or event as the birth of the idea of an ordered, quantifiable chemical reaction. However, there are some important moments in history that have helped to make sense of it. Law of Mass Conservation Antoine Lavoisier was a French nobleman in the s who began to experiment with different chemical reactions. In doing so, Lavoisier championed the idea of conservation of mass during transformations Figure 3. In other words, unlike the alchemists before him who thought that they were creating matter out of nothing, Lavoisier proposed that substances are neither created nor destroyed, but rather change form during reactions. In this example, the reactants zinc and two hydrogen chloride molecules convert into different products zinc chloride and dihydrogen , but no mass is lost or created. Proust performed dozens of chemical reactions , starting with different amounts of various materials. Over time he observed that no matter how he started a certain chemical reaction , the ratio in which the reactants were consumed was always constant. For example, he worked extensively with copper carbonate and no matter how he changed the ratio of starting reactants, the copper, carbon, and oxygen all reacted together in a constant ratio Proust, As a result, in the last few years of the 18th century, Proust formulated the law of constant composition also referred to as the law of definite proportions, Figure 4. He realized that any given chemical substance that we now define as a compound always consisted of the same ratio by mass of its elemental parts regardless of the method of preparation. This was a huge step forward in modern chemistry since it had been previously believed that the substances formed during chemical reactions were random and disordered. Law of Multiple Proportions The English chemist John Dalton helped make sense of the laws of conservation of mass and definite proportions in by proposing that matter was made of atoms of unique substances that could not be created or destroyed see our module Early Ideas about Matter for more information. Dalton Types of chemical reactions There is a staggering array of chemical reactions. Chemical reactions occur constantly within our bodies, within plants and animals, in the air that circulates around us, in the lakes and oceans that we swim in, and even in the soil where we grow crops and build our homes. In fact, there are so many chemical reactions that occur that it would be difficult, if not impossible, to understand them all. However, one method that helps us to understand them is to categorize chemical reactions into a few, general types. While not a perfect system , placing reactions together according to their similarities helps us to identify patterns, which in turn allows predictions to be made about as yet unstudied reactions. In this module, we will consider and provide some context for a few categories of reactions, specifically: No matter the type of reaction , one universal truth applies to all chemical reactions. For a process to be classified as a chemical reaction, i. The formation of a new substance is nearly always accompanied by an energy change, and often with some kind of physical or observable change. The physical change can be of different types, such as the formation of bubbles of a gas , a solid precipitate , or a color change. These changes are clues to the existence of a chemical reaction and are important triggers for further research by chemists. Instead, various gases were commonly mischaracterized as types of "air" or air missing parts â€” for example, terms commonly used were "inflammable air," or "dephlogisticated air. He conducted experiments where he mixed inflammable air with dephlogisticated air and a spark, and he found that the substances combined to produce water. In response, he renamed inflammable air "hydrogen" from the Greek hydro for "water" and genes for "creator. In general, a synthesis reaction is one in which simpler substances combine to form another more complex one. Hydrogen and oxygen which Lavoisier also renamed dephlogisticated air combine in the presence of a spark to form water, summarized by the chemical equation shown below for more on chemical equations see the section called Anatomy of a chemical equation , it represents a simple synthesis reaction. Without realizing it, Priestley had discovered oxygen as a result of a decomposition reaction. Decomposition reactions are often thought of as the opposite of synthesis reactions since they involve a compound being broken down into simpler compounds or even elements. The reaction can be summarized in the following equation. In his cell, Daniell utilized a very common single replacement reaction. His early cells were complicated affairs, with ungainly parts and complicated constructs, but by contrast, the chemistry behind them was really quite simple. In certain chemical reactions , a single constituent can substitute for another one already joined in a chemical compound. The Daniell cell works because zinc can substitute for copper in a solution of copper sulfate, and in so doing exchange electrons that are used in the battery cell. The reaction can be summarized as follows: However, several other types of single replacement reactions exist, such as when a metal can replace hydrogen from an acid or from water, or a halogen can replace another halogen in certain salt compounds. Combustion reactions The controlled use of fire was a crucial development for early civilization. Chemically, combustion is no more than the reaction of a fuel wood, oil, gasoline, etc. For combustion to take place there must be a fuel and oxygen gas. However, these reactions often require activation energy discussed in more detail in the module Chemical Bonding: Fuel, oxygen, and energy are the three things make up what is known as the fire triangle Figure 7 , and any one of them being absent means that combustion will not take place. The fire triangle is made up of three things - fuel, oxygen, and energy. Plants produce hydrocarbons when they grow, and thus make an excellent fuel source, and other hydrocarbons are produced when plants or animals decay over time such as natural gas , oil, and other substances. When these fuels combust, the hydrogen and carbon within them combine with oxygen to produce two very familiar compounds , water, and carbon dioxide. One simple example is the combustion of natural gas, or methane, CH_4: Reduction-oxidation reactions Each of the four types of reaction above are sub-categories of a single type of chemical reaction known as redox reactions. A redox reaction is one where reduction and oxidation take place together, hence the name. The individual processes of oxidation and reduction can be defined in more than one way, but whatever the definition, the two processes are symbiotic, i. In one definition, oxidation is described as the process in which a species loses electrons , and reduction is a process where a species gains electrons. In this way, we can see how the pair must take place together. If a chemical substance is to lose electrons and therefore be oxidized , then it must have another, interdependent chemical substance that it can give those electrons to. In the process, the second substance the one gaining electrons is said to be reduced. Without such an electron acceptor, the original species can never lose the electrons and no oxidation can take place. When the electron acceptor is present, it gets reduced and the redox combination process is complete. Redox reactions of this type can be summarized by a pair of equations â€” one to show the loss of electrons the oxidation , and the other to show the gain of electrons the reduction. Using the example of the Daniell cell above, Equation 5 Oxidation: Together, the reactions can be combined to cancel out the electrons on either side of the reactions, into the overall redox reaction: The loss from one species cannot happen without the other species gaining. Hard water causes all kinds of problems that go beyond just making it difficult to form a lather. Textile manufacturing and the beverage industry rely heavily on water. In those situations, the quality of the water can make a difference to the end product , so controlling the water composition is crucial. Hard water contains magnesium or calcium ions in the form of a dissolved salt such as magnesium chloride or calcium chloride. A double displacement reaction also known as a double replacement reaction occurs when two ionic substances come together and both substances swap partners. In the case of the reaction of soap with calcium chloride, the reaction is: Acid-Base reactions Acid-base reactions happen around, and even inside of us, all the time. From the classic elementary school baking soda volcano to the process of digestion, we encounter acids and bases on a daily basis. This hydrogen ion is the essential component of all acids , and indeed one definition of an acid is that of a hydrogen ion donor. Compounds such as the citric acid in lemon juice, the ethanoic acid in vinegar, or a typical laboratory acid like hydrochloric acid, all give their hydrogen ions away in chemical reactions known as acid-base reactions. The chemical opposites of acids are known as bases , and bases can be defined as hydrogen ion acceptors. Whenever an acid donates a hydrogen ion to a base, an acid-base reaction has taken place, for example, when hydrochloric acid donates a hydrogen ion to a base such as sodium hydroxide: Equation 9c can be re-written to show the individual ions that are found in solution , thus: Comprehension Checkpoint The type of chemical reaction where a single constituent can substitute for another one already joined in a chemical compound is: That fact alone makes equations incredibly important, but equations also have a crucial role to play in describing the quantitative aspect of chemistry, something that we formally call stoichiometry. All chemical reactions take on the same, basic format. The starting substances, or reactants , are listed using their chemical formula to the left-hand side of an arrow, with multiple reactants separated with plus signs. In the case of a reaction between carbon and oxygen: In this case, since carbon dioxide is the result of burning carbon in the presence of oxygen: Common state abbreviations are s for solids , l for liquids , g for gases and aq for any aqueous substances, i. In the case of the formation of carbon dioxide from carbon and oxygen, there is no need for the addition of such numbers called the stoichiometric coefficients , since 1 carbon atom and 2 oxygen atoms appear on each side of the equation. Energy changes In nature, chemical reactions are often driven by exchanges in energy. In this respect, reactions are generally separated into two categories â€” those that release energy and those that absorb energy. Exothermic reactions are those that release energy to the surroundings Figure 8, right. Combustion reactions are an obvious example because the energy released by the reaction is converted into the light and heat seen in the immediate surroundings. By contrast, endothermic reactions are those that absorb energy from the surroundings Figure 8, left. In this situation, one may have to heat up the reaction or add some other form of energy to the system before seeing the reaction proceed.

WHAT IS A CHEMICAL REACTION pdf

6: Chemistry for Kids: Chemical Reactions

The chemical reactions we will explore are a representation of the types of reactions found in each group. There is a general description of the main reaction types and specific examples provided in the selection boxes.

If I were to place an iron block into baltomic acid, what would happen? My diagnosis was I had no allergies. He said chemical reactions can be a whole lot worse to deal with than allergies. Can someone please tell me what chemical reactions are in the human body. What is happening in my body that causes this. I am pretty sure of one thing that takes place, and that is, a large number of medications the doctors give me to try to help medical problems. I end up taking fairly serious reactions to them and have to come right back off them again. One type of medication I have big problems with are antidepressants. I have been having depression on and off since I lost my son from the result of a MVA back in They are still trying to get me on something I can use without having all of these horrible effects. I get them much worse than other people who have side effects. All I know is antidepressants are pretty much all chemicals, if not all chemicals. There are other things I use that have a lot of chemicals and make me not feel well at all. So exactly what or how would a person feel when they are having chemical reactions and what takes place that causes in the human body that process of reaction? She had had surgery that left her with horrible pain, but could not take as much as a tylenol or aspirin for it. She kept insisting to the nurses that if she takes any kind of pain medication at all, her muscles go all out of whack on her. This left her in much worse pain than the pain from the surgery did. They insisted that she take something because they had to get her up out of bed for a bit even if she just sat in her chair for awhile. She finally agreed to take extra strength tylenol, but once more warned them of the condition it would put her muscles in. Well, they got her up in the chair, and when they came back about a half hour or so later to put her back in bed, she could hardly move herself because her muscles went all out of wack and she was in agony. The reason for me telling you her story is I also have a severe muscle disorder that I am in pain with all the time and have to take the strongest of pain medication on a regular basis. I often wonder ever since I met her, if my muscle problem is medication induced. I keep thinking I would like to try coming off the meds that I take sometime, just to see in what way my system would respond to it. Maybe that is what is causing most of my problems and severe muscle pain. Sorry for making this so long to read, but I just had to explain it to you as best as I could. Do you know anything about this medical problem I have? Thank you for your time and I hope you will be able to respond to this to let me know if you have any info about this. Rashmin Post 34 Can we mix hexamine with oxalic acid? What will be reaction on ferrous metal. The requirement is to improve the surface roughness with the help of a tumbling machine, along with ceramic stones. X h2o 5 anon

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Chemical reactions can be classified into a few categories. The simplest is probably synthesis, where two or more molecules or atoms combine into a new molecule. For example, iron plus oxygen forms iron oxide, or rust. The opposite of synthesis is analysis, or chemical decomposition, where a molecule breaks apart into its constituents.

There are many different types of chemical reactions. Chemists have classified the many different reactions into general categories. The chemical reactions we will explore are a representation of the types of reactions found in each group. Synthesis Reaction Combination Reaction In a synthesis reaction, two or more substances combine to form a new compound. This type of reaction is represented by the following equation. The following examples are representative of synthesis reactions. Aluminum and Bromine Formation of Aluminum Bromide: When Al is placed on the surface of liquid Br2 an exothermic reaction occurs. The ionic product, AlBr3, can be observed on the watch glass after the reaction. Sodium and Chlorine Formation of Sodium Chloride: Molten sodium burns when it is put into a container of chlorine gas. In the reaction a sodium ion loses an electron to form a sodium cation and a chlorine atom simultaneously gains an electron to form a chloride anion. The product of the reaction is the ionic compound sodium chloride, which is the white solid observed. Zinc and Oxygen Formation of Zinc Oxide: Oxidation is a loss of electrons and reduction is a gain of electrons. The oxidation of metallic Zn by O2 to form ZnO s is illustrated at the molecular level. The transfer of electrons from Zn to O2 is shown. Atoms can be observed to change as they are oxidized or reduced, respectively to their ionic forms. When a small piece of Na is added to a solution containing an indicator, evidence of the reaction can be observed by the change in the color of the solution as NaOH is formed, by the melting of the Na and by the movement of the Na caused by formation of hydrogen gas. K is more reactive than Na as demonstrated by its reaction with water. This reaction produces enough heat to ignite the H2 produced.

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8: What is a Chemical Reaction? | Chapter 6: Chemical Change | Middle School Chemistry

Another chemical reaction might include silver ions (Ag +). If you mix a solution with silver ions with a solution that has chloride (Cl-) ions, silver chloride (AgCl) precipitate will form and drop out of solution. 3. Single reactions often happen as part of a larger series of reactions.

As students enter the class, they see the goggles, dropper bottles, and well plates on their tables. I tell students to put on the goggles as they enter the room. I also tell them to wait for further instructions before touching the rest of the equipment. I have them take out something to write with and tell them to keep everything else off of the tables bags, etc. I explain that each table will work as a group to determine if a chemical reaction occurs when they combine two of the chemicals. I show them that the well plates should be arranged in the same orientation as the layout of the observation tables and demonstrate combining the first two chemicals in the matching individual well using a document camera attached to an LCD projector so that everyone in the room can see. I emphasize that the chemicals should not be touched and that any spills should be cleaned up immediately with paper towels and water. I tell them the story about how I went to prom with silver nitrate stains on my arm and had to wear make-up to cover the blotch on my face from an AP Chemistry mishap that happened the week before prom when I was in high school. I explain that students should record all observations in the corresponding observation table. I point out that even if nothing happens, that in itself is an observation, and should be recorded. I ask if there are any questions, answer them, and allow students to work independently to complete their investigation. LAB - Observing chemical reactions. This allows us to start in with lab investigation quickly without depending on students to choose groups or to move into lab stations without wasting time. Once pre-lab instruction concludes, I tell students to put on their goggles already provided at the ends of their tables and begin investigating. As students work, I walk around to supervise and catch any glaring mistakes they may be making in their procedure, as well as ask them questions that help me gauge whether they understand what they are doing and what they are looking for in their observations. Questions I ask and anticipated answers from students: Do you think any of these combinations reacted? Students should indicate some obvious combinations like sodium hydroxide and silver nitrate, sodium hydroxide and iron nitrate, copper sulfate and sodium hydroxide, and silver nitrate and hydrochloric acid. How do you know? Students should point to clear changes that they observe, i. Students should indicate that most of the combinations did not result in any noticeable change that might indicate a reaction had taken place. There was no change! We are not measuring temperature changes today and those might be indicative that a chemical reaction is occurring. Here is a short video of one conversation I had with a lab group as they finished the first set of chemical reactions: As students finish up their investigations, I guide them to clean up: Any groups finishing well before the rest are directed to start reading the back side of their lab handout and thoughtfully answering the questions.

WHAT IS A CHEMICAL REACTION pdf

9: CHEMICAL REACTIONS

neutralisation, neutralisation reaction, neutralization reaction, neutralization - a chemical reaction in which an acid and a base interact with the formation of a salt; with strong acids and bases the essential reaction is the combination of hydrogen ions with hydroxyl ions to form water.

Chemistry for Kids Chemical Reactions A chemical reaction is a process where a set of substances undergo a chemical change to form a different substance. Where do chemical reactions occur? You may think that chemical reactions only happen in science labs, but they are actually happening all the time in the everyday world. Every time you eat, your body uses chemical reactions to break down your food into energy. Other examples include metal rusting, wood burning, batteries producing electricity, and photosynthesis in plants. What are reagents, reactants, and products? Reactants and reagents are the substances that are used to bring about the chemical reaction. A reactant is any substance that is consumed or used up during the reaction. The substance that is produced by a chemical reaction is called the product. Reaction Rate Not all chemical reactions occur at the same rate. Some happen very quickly like explosions, while others can take a long time, like metal rusting. The speed that the reactants turn into products is called the reaction rate. The reaction rate can be changed by adding energy such as heat, sunlight, or electricity. Adding energy to a reaction can increase the reaction rate significantly. Also, increasing the concentration or pressure of the reactants can speed up the reaction rate. Types of Reactions There are many types of chemical reactions. Here are a few examples: Synthesis reaction - A synthesis reaction is one where two substances combine to make a new substance. Decomposition reaction - A decomposition reaction is where a complex substance breaks down to form two separate substances. Combustion - A combustion reaction occurs when oxygen combines with another compound to form water and carbon dioxide. Combustion reactions produce energy in the form of heat. Single displacement - A single displacement reaction is also called a substitute reaction. You can think of it as a reaction where one compound takes a substance from another compound. Double displacement - A double displacement reaction is also called a metathesis reaction. You can think of it as two compounds trading substances. Photochemical reaction - A photochemical reaction is one involving photons from light. Photosynthesis is an example of this kind of chemical reaction. Catalyst and Inhibitors Sometimes a third substance is used in a chemical reaction to speed up or slow down the reaction. A catalyst helps to speed up the rate of reaction. Unlike other reagents in the reaction, a catalyst is not consumed by the reaction. An inhibitor is used to slow down the reaction. Interesting Facts about Chemical Reactions When ice melts it undergoes a physical change from solid to liquid. However, this is not a chemical reaction as it remains the same physical substance H2O. Mixtures and solutions are different from chemical reactions as the molecules of the substances stay the same. Most cars get their power from an engine that uses a combustion chemical reaction. Rockets are propelled by the reaction that occurs when liquid hydrogen and liquid oxygen are combined. When one reaction causes a sequence of reactions to occur this is sometimes called a chain reaction. Activities Take a ten question quiz about this page.

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