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Example of a chemical energy

 By YourDictionary Staff Updated November 4, 2020 Battery circuit as example of chemical energy Chemical energy is a form of potential energy that will only be observed when it is released in a chemical reaction. Chemical energy is the energy of chemical bonds and is also stored in atoms and ions. Interestingly, when chemical energy is released, the substance from which the energy came is often changed into an entirely new substance. Many everyday items store and release chemical energy. Let's take a look at examples of chemical energy to see just how often we interact with this scientific wonder. Chemical energy is either released (exothermic reaction) or absorbed (endothermic reaction) during a chemical reaction. In an exothermic reaction, heat is released, creating warmth. In an endothermic reaction, the heat is absorbed, creating cooling. Air bags are activated by a chemical reaction inside the bag. A sensor turns on an electrical circuit, and then sodium azide is ignited. The reaction that occurs generates nitrogen gas, which fills the bag at an extremely rapid rate. Ammonia and bleach when mixed create a chemical reaction. Toxic vapors develop into a chemical known as chloramine vapor. This has the potential to form hydrazine which can cause edema, headaches, nausea, and seizures.Baking soda and vinegar produce carbon dioxide gas when mixed. As this gas grows in volume, it puts pressure on whatever container it is in, and will erupt out of an opening in the container, creating a volcano effect. This chemical reaction is safe, making it a great science activity for kids.Batteries have two terminals: the anode and the cathode. They're separated by an electrolyte, a chemical that allows the anode and cathode to transmit a charge. When something's connected to a battery, chemical reactions take place along the electrodes to produce electricity. Of course, you can't see the energy in the battery when the battery is just sitting around; it is when the electricity is produced that the energy is seen.Explosives: when an explosive goes off, chemical energy that was stored in it is changed and transferred into sound energy, kinetic energy, and thermal energy. Just because chemical energy is being released, it doesn't mean an explosion will occur. But, when a solid material quickly changes into a hot, expanding gas, you may be looking at an explosion. Take TNT, for example. Two units of solid TNT can instantly change into 15 units of hot gas, creating a dark and sooty explosion.Food: chemical energy in food is released when the food is digested and the molecules of food are broken down into smaller pieces. Our bodies digest food by mixing it with acids and enzymes in the stomach. This process turns carbohydrates into glucose. The stomach (and small intestine) then release that glucose into the bloodstream, serving as energy for our bodies.Heating packs (used to warm up cold hands or soothe sore muscles) have chemicals inside them. A lot of them function by "cracking" (or bending) them. This is because they're filled with iron. Once you crack the heating pack, the iron is exposed to the air. As the iron reacts to the oxygen, it transforms into iron oxide, a chemical that can produce heat.Petroleum is a combination of oil and natural gas made of hundreds of molecules containing carbon and hydrogen. When petroleum is a vapor, it's considered natural gas. When petroleum is a liquid, it's considered crude oil. We then extract that energy by burning it and using it to fuel cars, heat homes, and more. Wood, when dry, stores chemical energy. This chemical energy is released as the wood burns, and it is converted into heat, or thermal energy. This also produces light energy. As a result of burning, the wood turns into an entirely new substance - ashes. Isn't it interesting to see how many types of chemical energy we interact with every day? The very wood we burn and the airbags we face every time we enter a vehicle are examples of chemical energy. This seems like a nice opportunity for a new hypothesis to form. Looking for more scientific discovery? What do you know about radiant energy? It's energy that travels via waves or particles. These examples of radiant energy will introduce you to the concept. Let the love of science continue! The chemical energy It is the one that can be released in the different chemical reactions to which matter is susceptible, that is, that contained in the different chemical compounds. For instance: photosynthesis, explosions, batteries and cells.Chemical energy it is used daily in various areas of our life in which various chemical reactions take place. It is often said that this form of energy is contained in bodies, and for that very reason it will become apparent to us only when these bodies are subjected to some significant alteration in their matter.In fact, all forms of fuel contain chemical energy that can be translated into a quantity of heat, which can be converted into a certain work. And in that sense, any source of chemical energy can release its energy during the transformation of matter in which it was contained.Examples of chemical energyPhotosynthesis. Plants obtain their energy from the chemical reaction that takes place inside them, between sunlight, CO2 and water, and form glucose (C6H12OR6) and oxygen (O2). This energy product of a chemical reaction is contained in the molecules of the participating substances and is used by plants for their benefit and vital maintenance. The breathing. Animals require oxygen and glucose to release water, CO2 and obtain energy, essential to maintain the cycle of life. This is one of the processes that keeps us alive and that we share with the entire animal kingdom. The combustion. When we start a motor vehicle, the gasoline or the mixture of hydrocarbons that it uses as fuel is subjected to a cycle of controlled combustions and detonations that generates the energy that, in turn, allows movement. This fuel contains this energy in the hydrocarbon molecules that during the reactions are transformed into other compounds and release energy. Butane is one of the hydrocarbons that make up gasoline: The descomposition. Fungi and bacteria that feed on decaying organic matter can obtain the energy necessary for their fermentation processes from sugars and starches, and obtain alcohols or other products as a result of the process that breaks down organic matter molecules. This is similar to what happens in our stomach, where acids break the molecular bonds of the molecules that make up food, generating calories.Space travel. The fuels used by ships that travel to the moon or send satellites into space are not ordinary, like those consumed by an internal combustion engine. Rather, they are the result of highly complex chemical reactions whose release of energy is so great that it can counteract the law of gravity on an object the magnitudes of a rocket long enough to leave the atmosphere.Corrosion. Many of the chemical substances that we handle in our daily lives, such as drain cleaners and others that contain extreme acids or bases, are corrosive materials, capable of wearing down the surface with which they come into contact, in a process that releases heat and consumes all the organic material. Many burns from contact with corrosives are due to the heat produced by the breakdown of lipids in the skin, rather than the effect of the substance itself.Exothermic reactions. Many substances (such as caustic soda) are so drying that when they come into contact with water, they react exothermically, that is, they release heat. These reactions, which are not exclusive to strong bases, release energy into the environment and can be dangerous to living things. Explosions. There are very chemically unstable substances that, when they come into contact with oxygen in the air, react releasing large and sudden amounts of heat energy and generate an explosion.Batteries and batteries. The batteries we use so much (remote controls, cars, cell phones) contain various acids and metals in controlled reaction, the immediate result of which is a usable amount of electricity. When the batteries expire, this electricity is lost and the batteries must be replaced.Other types of energy Scientifically, energy is defined as the ability to do work. While there are many forms of energy, they can be grouped into two categories: potential energy, or stored energy; and kinetic energy, or energy of motion. Chemical energy is a form of potential energy and it is possessed by things such as food, fuels and batteries. Within each category of energy, there are many different forms of energy. Chemical energy is one form of potential energy, along with mechanical energy, gravitational energy, nuclear energy and electrical energy. All of these forms of energy are stored within an object and are converted to forms of kinetic energy when a force or change is applied. The different forms of kinetic energy are radiant energy, which includes light, x-rays and radio waves, heat, motion and sound. As stated by the first law of thermodynamics, energy can neither be created nor destroyed; it can only be converted from one form to another. During chemical reactions, molecules can be created or destroyed. If a product is created, the chemical energy is stored in the bonds that make up the molecules. If something is broken down, the chemical energy is released, usually as heat. If a reaction releases energy, it is called exothermic, and if it absorbs energy, it is called endothermic. One example of chemical energy is that found in the food that we eat. Energy is stored in the bonds of the molecules that make up food. When we eat the food, the large molecules are broken down into smaller molecules that can be used by the cells of the body. In a way, the food we eat serves as our daily power source. This point of view highlights the value of quality nutrition. The process of breaking down and using the food by our cells is called respiration. This is the same process that gives us the energy to perform tasks, work for our next meal, and repeat the process. During respiration, the chemical energy is converted to heat, kinetic energy, and other forms of chemical energy, like that stored in the fat cells in our body. To achieve one's weight loss goals, they should consume less and move more so the body starts tapping the reserves in fat cells. This energy makes staying active possible in humans. Food is just one example of a fuel — it is how animals, including humans, fuel their bodies. Quality food means quality fuel for your day to day activities. Other forms of fuel include wood and chemicals, such as petroleum. When wood is burned, the chemical energy within the cells of the wood break and heat is released. In the engine of a car or truck, the energy in the gasoline is converted to heat and motion, to make the car move. Kinetic energy can also be converted to potential energy. During the process of photosynthesis carried out by plants, radiant energy, or the light from the sun, is converted into chemical energy, which is stored within the plant. When animals eat the plants, the reverse reaction takes place. The bonds are broken, which releases the stored chemical energy for the animals to use. All The Science is dedicated to providing accurate and trustworthy information. We carefully select reputable sources and employ a rigorous fact-checking process to maintain the highest standards. To learn more about our commitment to accuracy, read our editorial process. Chemical energy is a form of potential energy that is stored in the bonds of a compound. It is released through chemical reactions in which old bonds break and new bonds form. The bond that stores the most chemical energy is the double bond. Chemical energy can be converted into other forms, like thermal and mechanical energy. Living beings need chemical energy to survive. Chemical energy sources are coal, petroleum, natural gas, biomass, and food. Wood consists of hydrocarbons that store chemical energy in their bonds. When wood burns and produces fire, the hydrocarbons are converted into carbon dioxide and water vapor while simultaneously releasing heat and light. Chemical energy is converted into thermal energy and radiant energy. Just like wood, coal also burns and releases heat.The food that we eat stores chemical energy. The process of respiration breaks down carbohydrates. It releases chemical energy that keeps us warm and enables us to work. Here, chemical energy is converted into thermal energy and mechanical energy.A battery converts chemical energy into electrical energy. When the two terminals of a battery are connected through a light bulb, chemical reactions occur inside the battery allowing electrons to flow around the circuit and lit the bulb.Explosives store chemical energy. Chemical energy is released as sound and heat when an explosive goes off.Heating packs have chemicals inside them. Most of them contain iron. When a heating pack cracks, the iron reacts with oxygen to produce iron oxide and heat, which keeps us warm.Natural gas and petroleum consist of hydrogen and carbon atoms bonded together, storing chemical energy. These fossil fuels tend to ignite in the presence of oxygen to produce carbon dioxide and water vapor. This process is known as combustion and releases a massive amount of energy. We use natural gas in our homes for cooking and heating. An example of a combustion reaction is that of propane. $C3H8 (g) + 5 O2 (g) \rightarrow 3 CO2 (g) + 4 H2O (g)$ + energy Biofuels are alternatives to fossil fuels and use energy from living or recently living organisms. They store usable chemical energy and are renewable resources.Plants combine energy from the sun with carbon dioxide and water to produce glucose and oxygen, a process known as photosynthesis. When glucose is formed, new bonds are created, and chemical energy is stored. The chloroplast is the organelle that converts sunlight or radiant energy into chemical energy.During respiration, the chemical energy stored in glucose is transferred to adenosine triphosphate (ATP) in the cells. Thus, we get the energy to work and run. Chemical Energy Chemical energy is calculated by simply subtracting the energy of the products from that of the reactants. The difference is either absorbed or released as heat. Heat is absorbed if the product’s energy is greater than that of the reactants. Heat is released if the product’s energy is less than the reactants. Thus, calculating the chemical energy us to predict whether the reaction will be exothermic (heat released) or endothermic (heat absorbed). Chemical Energy = Eproducts – Ereactants Q.1. How does kinetic energy differ from chemical energy? Ans. Kinetic energy is the energy possessed by a molecule when it is in motion. Chemical energy is stored in the molecular bonds, irrespective of whether the molecule is moving or resting. It is a form of potential energy. Q.2. What organisms can manufacture their chemical energy called? Ans. Autotrophs can manufacture their chemical energy. Q.3. What determines the amount of chemical energy a substance has? Ans. The potential energy of the new bonds formed in the products during a chemical reaction determines the chemical energy. Q.4. Which device requires electrical energy to produce a chemical change? Ans. An electrolytic cell converts electrical energy into chemical energy. Article was last reviewed on Thursday, February 2, 2023 Do you realize your body is full of chemical energy? Chemical energy is present in your body, and it is constantly used to perform daily tasks that you might take for granted. Chemical energy is released when chemical bonds form in chemical reactions – that may be an exothermic reaction or an endothermic reaction. In the world of science, chemical energy results from a chemical reaction as a form of potential energy. Chemical energy is stored in the bonds of chemical compounds – the molecules and atoms that make up the world around us. When chemical energy is released from a material, the substance is transformed into an entirely new substance. Chemical changes in the amount of energy may be exothermic when the energy is released or endothermic in which the reaction requires energy to take place. As with all forms of energy transfer, chemical reactions preserve the total energy in our world (following the first law of thermodynamics, also called the law of conservation of energy). According to this property, energy can only change form (as new bonds form or old bonds break), but the total energy of a system is always constant. Your body uses chemical energy in everyday life. Food contains calories and when you digest food, the energy is released. The molecules in food are broken down into smaller pieces. As the bonds between the atoms break or loosen, oxidation occurs. The chemical reaction involved in digestion supplies you with warmth, helps to maintain and repair your body and gives you the energy you need to move around. Plants use chemical energy too. They perform photosynthesis when they use sunlight to make food for themselves. During photosynthesis, solar energy is converted to chemical energy in this process. The chemical energy is stored as hydrocarbons like glucose (or sugar). Photosynthesis occurs in plant's leaves and the process requires sunlight, water and carbon dioxide to occur. This stored chemical potential energy is a vital energy source for plants and animals, as this stored energy is transferred up the food chain through consumption. Life on Earth is inextricably linked to the cycles of chemical energy, solar energy, and heat energy. Plants can also be used as biofuels – a source of combustion energy. Six types of chemical reactions exist: synthesis, combustion, single displacement, double displacement, decomposition and acid-base. Synthesis is when two simple substances combine and make a complex substance. In combustion, heat is released when the oxygen combines with other substances to change into water and carbon dioxide. Single displacement occurs when some atoms from one substance transfer to another substance in the chemical reaction. Double displacement occurs when the atoms in one substance are exchanged with the atoms in another substance. Decomposition occurs when a complex substance breaks down into simpler substances as a result of a chemical reaction. Acid-base is similar to a double replacement chemical reaction and is when an acid and a base are involved. When a fuel source, such as natural gas or biomass burns in a combustion reaction, it releases chemical energy as a form of heat and light energy. After you burn wood, it changes into ashes, as a new substance. This releases energy in the form of thermal energy and radiant energy, as the bond energy in the original material is converted to another type of energy. Cooking food is an example of chemical energy, as you are using gas or electricity to heat or cook your meals. In this case the reactants are natural gas and energy, and the products are compounds like benzene and methane. Heat is only a byproduct of this combustion reaction. When a power plant burns fossil fuels, chemical energy is used to produce mechanical energy (or kinetic energy), which then creates the electrical energy that you use on a daily basis. This electrical power is then expressed as the movement of electrons through circuits. Lougee, Mary. "What Is Chemical Energy?" sciencing.com, . 4 August 2023. APA Lougee, Mary. (2023, August 4). What Is Chemical Energy?. sciencing.com. Retrieved from Chicago Lougee, Mary. What Is Chemical Energy? last modified August 4, 2023.