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Imagine a roaring bonfire on a cold winter night. The warmth radiates from the burning wood, drawing people closer. Now picture a cool pack used on a sprained ankle, suddenly chilling upon activation. Both of these everyday occurrences are manifestations of the same fundamental chemical principle: the exchange of energy in chemical reactions.This article will take you deep into the fiery heart and icy edges of chemical changeexploring the fascinating world of endothermic and exothermic reactions. These reactions are more than just textbook topics; they shape the world around us, from the biological processes within our cells to the stars burning in distant galaxies.In this comprehensive journey, we will explore what these reactions are, how they work, how energy moves during chemical changes, and how this knowledge fuels industries, medicine, cooking, engineering, and even the life force in living organisms.Welcome to the elegant dance of heat and matter, where atoms dont just reactthey ignite or chill the world around them.Before diving into the heat of the moment, we need to understand what a chemical reaction actually is.A chemical reaction is a process where one or more substances (called reactants) are transformed into different substances (called products). During this transformation, bonds between atoms are broken and new ones are formed.Breaking bonds requires energy, while forming bonds releases energy. The overall energy change determines whether a reaction is endothermic or exothermic.In short:Endothermic reaction: Absorbs heat (feels cold).Exothermic reaction: Releases heat (feels hot).These energy exchanges are part of a broader field known as thermochemistry, which studies the heat involved in chemical and physical processes.Lets dive deeper into each type.The word endothermic comes from the Greek roots: endo meaning within and thermic meaning heat. So, an endothermic reaction is one that absorbs heat from its surroundings.This results in a drop in temperature around the reaction site. Youve probably felt this if youve ever touched an instant cold packwhen activated, it feels chilly because the reaction inside it is absorbing heat from your skin.At the molecular level, endothermic reactions occur when:The energy required to break bonds in the reactants is greater than the energy released when new bonds are formed in the products.The excess energy needed must come from the environment, usually in the form of heat.This absorbed energy is not lost; it becomes part of the chemical potential of the products.1. Photosynthesis:Arguably the most famous endothermic process is photosynthesis, the miracle at the heart of life on Earth.Plants absorb sunlight (a form of energy) to convert carbon dioxide and water into glucose and oxygen. $6CO_2+6H_2O+lightenergy\rightarrow C_6H_{12}O_6+6O_2$ This reaction absorbs energy from sunlight, storing it in the glucose molecules that animals (including us) later consume.2. Evaporation of Water:When water evaporates, it absorbs heat from the environment to break the bonds holding its molecules together as a liquid. This is why sweating cools you down:evaporation is endothermic.3. Thermal Decomposition:In reactions where a compound breaks down into two or more simpler substances using heat, such as the decomposition of calcium carbonate into calcium oxide and carbon dioxide, heat must be absorbed. $CaCO_3\rightarrow CaO+CO_2$ Instant cold packs for sports injuries: Cooking, Melting, boiling, and baking typically require heat input.Photosynthesis-based biofuels: Capturing and storing solar energy for later use.Industrial processes like metal refining, where ores are broken down at high temperatures.Scientists measure energy absorbed using enthalpy change (H). For endothermic reactions, H is positive, indicating heat is absorbed.Exo means outside: exothermic reactions release heat into their surroundings. These are the reactions that feel hot.From the combustion in your car engine to the warmth from your laptop battery to the detonation of explosives, exothermic reactions power much of modern life.In exothermic reactions:The energy released when new bonds form in the products is greater than the energy needed to break the bonds in the reactants.This excess energy is released, often as heat, light, or even sound.The surrounding environment gets warmer, and sometimes the results are quite explosive.1. Combustion: Burning fuels like wood, coal, gasoline, or natural gas are all exothermic reactions.For instance, the combustion of methane: $CH_4+2O_2\rightarrow CO_2+2H_2O+heat$ $4\ H\ +\ 2\ O_2\ \rightarrow\ 2\ H_2O$ The energy released powers cars, heats homes, and even launches rockets.2. Respiration: Just as photosynthesis stores energy, cellular respiration releases it. $C_6H_{12}O_6+6O_2\rightarrow 6CO_2+6H_2O+energy$ C. $6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{energy}$ This is how your body turns food into usable energy via an exothermic process inside your cells.3. Neutralization Reactions: Mixing an acid and a base (like vinegar and baking soda) produces heat. These acid-base reactions are often exothermic.4. Rusting of Iron: Even slow reactions like oxidation of metals release energy over time. Rusting iron, though less dramatic, is exothermic.Heating: Combustion in fireplaces, stoves, engines.Power generation: Burning fossil fuels in power plants.Explosives: Rapid exothermic reactions release massive energy.Batteries: Chemical energy released during discharge is exothermic.Self-heating cans: Use exothermic reactions to warm food.In exothermic reactions, H is negative, indicating that energy is being lost from the system to the environment.Whether a reaction is exothermic or endothermic, it usually needs a kickstart: a minimum amount of energy to begin. This is called activation energy.Think of it as pushing a boulder over a hill: the boulder wont roll down (release energy) until you get it up to the peak (activation energy).Endothermic reactions often require more activation energy.Exothermic reactions can be self-sustaining once they start.This is why wood doesnt spontaneously combust: it needs the heat of a match to get going.Chemists often visualize energy changes using reaction profile diagrams. In these diagrams: The vertical axis shows energy. The horizontal axis shows progress of reaction.For exothermic reactions, the products are at a lower energy level than reactants.For endothermic reactions, the products are at a higher energy level.The peak between reactants and products represents activation energy.Some reactions are reversible, meaning they can go forward and backward.Example: $NH_4Cl + HCl \rightleftharpoons NH_3 + HCl$ In such cases: The forward reaction might be endothermic. The reverse reaction will be exothermic. Understanding this balance is crucial in chemical engineering, especially in processes like the Haber process for making ammonia.Living organisms use a combination of endothermic and exothermic reactions to survive.Exothermic reactions in the body (like ATP hydrolysis) power muscles, nerves, and cellular machinery.Endothermic reactions are used for synthesis: building DNA, proteins, and new cells.The balance is tightly regulated. If too much energy is released too quickly (like in fever or inflammation), damage occurs. If energy absorption is too great (as in hypothermia), systems shut down.Chemical industries thrive on controlling these energy changes.Exothermic Processes: Cement and concrete curing (releases heat). Steelmaking: Exothermic oxidation of impurities. Power plants: Controlled combustion to produce electricity. Endothermic Processes: Electrolysis: Breaking water into hydrogen and oxygen using electrical energy. Smelting: Requiring heat to extract pure metals. Managing energy flow is critical for safety, efficiency, and environmental impact.Cooking is full of chemical changes. Boiling water is endothermic, while caramelizing sugar is exothermic. Baking soda and vinegar volcanoes produce heat. Glow sticks are a great example of chemiluminescence, often exothermic. Even emotional warmthlike the heat from someone you can be understood through chemical principles. Our bodies are walking chemistry labs, with a perfect blend of reactions happening every moment.Science experiments can make these concepts tangible. Mixing baking soda and citric acid with water creates an endothermic reaction: feels cold. Mixing calcium chloride with water is exothermic: feels warm. These simple reactions are safe and visually demonstrate the principles of thermochemistry. Endothermic and exothermic reactions are the yin and yang of the chemical world. They reflect the fundamental truth that energy cannot be created or destroyed, only transformed in every flame, in every breath, in every cell and star, these reactions shape existence. They are as intimate as the digestion of your breakfast and as grand as a supernova. By understanding them, we dont just understand chemistry; we understand life, technology, energy, and the cosmos. Let this be the spark that ignites your passion for chemistry. Many chemical reactions must absorb energy to proceed. These are endothermic reactions. Endothermic reactions cannot occur spontaneously. Work must be done to give these reactions to occur. When endothermic reactions absorb energy, a temperature drop is measured during the reaction. Endothermic reactions are characterized by positive heat flow (into the reaction) and an increase in enthalpy (+H). Other chemical reactions release energy in the form of heat, light, or sound. These are exothermic reactions. Exothermic reactions may occur spontaneously and result in higher randomness or entropy (S > 0) of the system. They are denoted by a negative heat flow (heat is lost to the surroundings) and a decrease in enthalpy (H < 0). In the lab, exothermic reactions produce heat or may even be explosive. Photosynthesis is an example of an endothermic chemical reaction. In this process, plants use the energy from the sun to convert carbon dioxide and water into glucose and oxygen. This reaction requires 15MJ of energy (sunlight) for every kilogram of glucose produced: $sunlight + 6CO_2(g) + H_2O(l) = C_6H_{12}O_6(aq) + 6O_2(g)$ Other examples of endothermic processes include: Dissolving ammonium chloride in water Cracking alkanes Nucleosynthesis of elements heavier than nickel in stars Evaporating liquid water Melting ice An example of an exothermic reaction is the mixture of sodium and chlorine to yield table salt. This reaction produces 411 kJ of energy for each mole of salt produced: $Na(s) + 0.5Cl_2(g) = NaCl(s)$ Other examples of exothermic processes include: The thermite reaction (a highly exothermic reaction (e.g., mixing an acid and a base to form a salt and water). Most polymerization reactions Combustion of a fuel Respiration Nuclear fission Corrosion of metal (an oxidation reaction) Dissolving an acid in water Many exothermic and exothermic reactions involve toxic chemicals, extreme heat or cold, or messy disposal methods. An example of an easy endothermic reaction is dissolving potassium chloride (sold as a salt substitute) in your hand with water. An example of a quick exothermic reaction is dissolving powdered laundry detergent in your hand with a bit of water. These endothermic and exothermic demonstrations are safe and easy. Here is a quick summary of the differences between endothermic and exothermic reactions: Endothermic: Exothermic: Heat is absorbed (feels cold) Heat is released (feels warm) Energy must be added for reaction to occur Reaction occurs spontaneously Disorder decreases (S < 0) Entropy increases (S > 0) Increase in enthalpy (+H) Decrease in enthalpy (-H) Endothermic and exothermic reactions refer to the absorption or release of heat. Other types of energy may be produced or absorbed by a chemical reaction (examples include light and sound). In general, reactions involving energy may be classified as endergonic or exergonic. An endothermic reaction is an example of an endergonic reaction. An exothermic reaction is an example of an exergonic reaction. Endothermic and exothermic reactions are chemical reactions that absorb and release heat, respectively. Photosynthesis is a good example of an endothermic reaction. Combustion is an example of an exothermic reaction. The categorization of a reaction as endothermic or exothermic depends on the net heat transfer. In any given reaction, heat is both absorbed and released. For example, energy must be input into a combustion reaction to start it (lighting a fire with a match), but then more heat is released than was required. Qian, Y.Z., et al. Diverse Supernova Sources for the r-Process. The Astrophysical Journal, vol. 494, no. 1, 10 Feb. 1998, pp. 285-296, doi:10.1086/305198. Yin, Xi, et al. Self-Heating Approach to the Fast Production of Uniform Metal Nanostructures. Chemistry of Nanomaterials for Energy, Biology and More, vol. 2, no. 1, 26 Aug. 2015, pp. 37-41, doi:10.1002/cnma.201500123. An endothermic reaction where energy is absorbed from the surroundings is the form of heat. Conversely, an exothermic reaction is one in which energy is released from the system into the surroundings. The terms are commonly used in the physical sciences and chemistry. Endothermic versus Exothermic comparison chart Endothermic Exothermic Introduction A process or reaction in which the system absorbs energy from its surroundings in the form of heat. A process or reaction that releases energy from the system, usually in the form of heat. Result Energy is absorbed from the environment into the reaction. Energy is released from the system into the environment. Form of Energy Energy is absorbed as heat. Energy is usually released as heat, but can also be electricity, light or sound. Application Thermodynamics; physics, chemistry. Thermodynamics; physics, chemistry. Etymology Greek words endo (inside) and thermai (to heat). Greek words exo (outside) and thermai (to heat). Examples Melting ice, photosynthesis, evaporation, cooking an egg, splitting a gas molecule. Explosions, making ice, rusting iron, concrete setting, chemical bonds, nuclear fission and fusion. An endothermic reaction or process takes place when the system absorbs heat energy from the surrounding environment. What is an exothermic reaction? In an exothermic reaction or process, energy is released into the environment, usually in the form of heat, but also electricity, sound, or light. Exothermic vs Endothermic Processes in Physics Classifying a physical reaction or process as exothermic or endothermic can often be counterintuitive. Making an ice cube is the same type of reaction as a burning candle both have the same type of reaction: exothermic. When considering whether a reaction is endothermic or exothermic, it is vital to separate the reaction system from the environment. What matters is the change in temperature of the system, not how hot or cold the system is in general. If the system cools down, that means heat is being released, and the reaction taking place is an exothermic reaction. The fire example above is intuitive, as energy is clearly being released into the environment. Making ice, however, might seem like the opposite, but water sitting in a freezer is also releasing energy as the freezer draws the heat out and expels it in the back of the unit. The reaction system to be considered is only the water, and if the water is cooling down, it must be releasing energy in an exothermic process. Sweating (evaporation) is an endothermic reaction. Wet skin feels cool in a breeze because the evaporative reaction of the water absorbs heat from the surroundings (skin and atmosphere). In Chemistry, endothermic and exothermic only consider the change in enthalpy (a measure of the total energy of the system); a full analysis adds additional terms to the equation for entropy and temperature. When chemical bonds are formed, heat is released in an exothermic reaction. There is a loss of kinetic energy in the reacting electrons, and this causes energy to be released in the form of light. This light is equal in energy to the stabilization energy required for the chemical reaction (the bond energy). The light released can be absorbed by other molecules, giving rise to molecular vibrations or rotations, from which comes the classical understanding of heat. The energy needed for the reaction to occur is less than the total energy released. When chemical bonds break, the reaction is always endothermic. In endothermic chemical reactions, energy is absorbed (drawn from outside the reaction) to place an electron in a higher energy state, thus allowing the electron to associate with another atom to form a different chemical complex. The loss of energy from the solution (the environment) is absorbed by reaction in the form of heat. The splitting of an atom (fission), however, should not be confused with the "breaking of a bond." Nuclear fission and nuclear fusion are both exothermic reactions. Everyday Examples Endothermic and exothermic reactions are frequently seen in everyday phenomena. Examples of endothermic reactions: Photosynthesis: As a tree grows, it absorbs energy from the environment to break apart CO2 and H2O. Evaporation: Sweating cools a person down as water draws heat to change into gas form. Cooking an egg: Energy is absorbed from the pan to cook the egg. Examples of exothermic reactions: Formation of rain: The condensation of water vapor into rain heats the air. Concrete: When water is added to concrete, chemical reactions release heat. Combustion: When something burns, however small or big, its always an exothermic reaction. References Share this comparison via: If you read this far, you should follow us: "Endothermic vs Exothermic Reactions." Diffen.com. Diffen LLC, n.d. Web. 16 Jul 2025. < > This topic explains the difference between Endothermic and Exothermic Reactions. There are a number of chemical reactions in Chemistry and they are divided into many sub and main reactions. Similar is the case with the endothermic and exothermic reactions in Chemistry. These release energy in the form of sound, light, cold or heat. Table of Contents In simple terms, the endothermic reactions absorb energy from the surrounding that is in the form of heat. On the other hand, an exothermic reaction releases energy into the surrounding of the system. A popular example of an endothermic chemical reaction is photosynthesis. During this process, plants absorb energy from the Sun and convert it into carbon dioxide and water into glucose and oxygen. An example of an exothermic reaction is the chemical reaction between sodium and chlorine, producing a bright yellow light and a great amount of heat energy. The endothermic process is a term that describes a reaction where the system absorbs the energy from its surrounding in the form of heat. A few examples of the endothermic process are photosynthesis, evaporating liquids, melting ice, dry ice, alkane cracking, thermal decomposition, ammonium chloride in water and much more. As the name implies, endo means to absorb, and thermic means heat. This energy is produced as a result of the reaction of reactants into the product. It occurs as a result of the dissociation of the bonds between the molecules. The energy is then released through the formation of new bonds. Heat is taken up from the surroundings in such reactions, so the temperature of the system where the reaction is taking place remains cooler. Also, at the end of the reaction, the enthalpy, which is the change in heat energy during the conversion of reactants to products, increases. The exothermic reaction is the opposite of an endothermic reaction. It releases energy by light or heat to its surrounding. A few examples are neutralisation, burning a substance, reactions of fuels, deposition of dry ice, respiration, solution of sulphuric acid into water and much more. The term Exo refers to to release, and thermic refers to heat. The energy released is caused by the formation of new bonds (products) at a higher level. While the energy required to break up the bonds (reactants) is lower. At the end of the reaction, the enthalpy change decreases as well. During chemical reactions, a great deal of energy is required. This energy was used to maintain the bond that held the molecules together. As a result of the reactions between molecules and compounds, as well as the breaking of bonds, a tremendous amount of energy is released. Endothermic reactions are chemical reactions in which the reactants absorb heat energy from the surroundings to form products. An exothermic reaction is a reaction in which energy is released in the form of light or heat. The energy is absorbed from the surrounding into the reaction. The energy is released from the system to its environment. Energy in the form of heat. Energy is released as heat, electricity, light or sound. Melting ice, evaporation, cooking, gas molecules, and photosynthesis are a few examples. Rusting iron, settling, chemical bonds, explosions, and nuclear fission are a few examples. Chemical bonds are either broken or formed in any chemical reaction. Heat is released when chemical bonds form, and heat is absorbed when chemical bonds break. Since molecules want to remain together, forming chemical bonds between them requires less energy than breaking them, which requires more energy and results in heat being absorbed from the surroundings. The enthalpy of a reaction is defined as the heat energy change (HH, H) that occurs when reactants become products. H is positive if heat is absorbed during the reaction; if heat is released, H is negative. This is the conversion of kinetic energy to chemical energy. Heat is absorbed and converted into chemical energy during an endothermic reaction. Since energy is released during the process of respiration, it is an exothermic process. The carbon dioxide in the food is broken down to form glucose during the process. This glucose combines with oxygen in our cells, releasing a large amount of energy. The main difference between exothermic and endothermic reactions is that an endothermic reaction absorbs energy in the form of heat from its surroundings, whereas an exothermic reaction releases energy to the surroundings. Put your understanding of this concept to test by answering a few MCQs. Click Start Quiz to begin! Select the correct answer and click on the Finish button. Check your score and answers at the end of the quiz. Visit BJJUS for all Chemistry related queries and study materials out of 0 are wrong 0 out of 0 are correct 0 out of 0 are Unattempted View Quiz Answers and Analysis Chemical reactions on the heat involved are classified into two categories, Endothermic Reactions, and Exothermic Reactions. The difference between these reactions is that the first absorbs heat and the latter releases it. In this article, we will learn about endothermic reactions, exothermic reactions, and their differences in detail. Endothermic Reactions Endothermic reactions are defined as those in which heat is absorbed. When nitrogen and oxygen are heated to around 3000C, they combine to generate nitrogen monoxide, and a significant amount of heat is absorbed in the process. N2 + O2 2NO (Nitrogen) (Oxygen) (Nitrogen monoxide) Since heat is consumed in the reaction between nitrogen and oxygen to generate nitrogen monoxide, it is an endothermic reaction. On the reactants' side of an equation, write "+Heat" and "-Heat energy" or just "+Energy" to indicate an endothermic reaction. The image given below shows the potential energy and rate of reaction curve of the Endothermic Reactions. Here HP and HR are the sums of enthalpies of the products and reactants, respectively, and H is the change in the enthalpy during a reaction, i.e., H = HP - HR. Ea is the activation energy of the reaction. Examples of Endothermic Reactions Various examples of Endothermic reactions are, Heating of Calcium Carbonate When calcium carbonate is heated, for example, it decomposes into calcium oxide and carbon dioxide. CaCO3 + Heat CaO + CO2 (Calcium carbonate) (Calcium oxide) (Carbon dioxide) Since heat energy is absorbed in the decomposition of calcium carbonate, it is an endothermic reaction. Photosynthesis Reaction Photosynthesis is an endothermic reaction, where green plants absorb sunlight in presence of carbon dioxide, and water gives carbohydrates and oxygen as products. 6CO2 + 6H2O + sunlight C6H12O6 + 6O2 The endothermic reaction can be written as follows in a chemical equation: Reactants + Energy Products Endothermic reactions are chemical processes in which the reactants absorb heat from the surroundings, causing a cooling effect by lowering the temperature of the surrounding environment. Endothermic reactions are characterized by the creation of chemical bonds as a result of heat absorption from the environment. Exothermic reactions, on the other hand, involve the release of heat energy generated by the bond breakdown. The Reactants Products + Energy As a result, it's easy to see how the net amount of energy required to start an exothermic reaction is less than the net amount of energy released. The changes in enthalpy for an exothermic reaction will always be negative, i.e., H < 0. Difference between Endothermic and Exothermic Reactions The following table gives the difference between Endothermic and Exothermic Reactions, Exothermic Reaction Endothermic Reaction A reaction that releases heat as a type of energy from the system. A reaction in which the system absorbs energy in the form of heat from its surroundings. The system's energy is released into the environment. The energy from the surroundings is absorbed into the reaction. Heat, electricity, light, and sound are forms of released energy. Energy is absorbed in form of energy. Examples include rusting iron, settling, chemical bonds, explosions, and nuclear fission. Examples include ice melting, evaporation, cooking, gas molecules, and photosynthesis. Read More CBSE Class 10 Chemistry Notes Characteristics of Chemical Reactions Types of Chemical Reactions Reactants and Products Chemical Equations - Definition, Representation, Types How to Balance Chemical Equations? Writing and Balancing Chemical Equations Difference between Endothermic and Exothermic Reactions What are the Conditions required for a Chemical Reaction? Writing and Balancing Chemical Equations Oxidizing and Reducing Agents Decomposition Reaction Effects of Oxidation Reactions in Everyday Life Corrosion and Rancidity What is Rancidity and How to prevent them? Acids, Bases and Salts Chemical Indicators - Definition, Types, Examples Difference between Mineral Acids and Organic Acids Strength of Acids Concentrated and Dilute Acids Properties of Acids - Definition, Examples, Properties, Uses What do all Acids have in Common? Are all compounds that contain hydrogen not an acid? 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Definition, Formation, Properties Properties of Ionic and Covalent Compounds Occurrence of Metals, Minerals and Ores Extraction of Metals from Ores Concentration of Ore - Definition, Methods of Separation, Examples Conversion of Ore into Metal Extraction of Highly Reactive Metals Extraction of Moderately and Less Reactive Metals What is Refining of Metals? What is Corrosion? Corrosion of Metals Platinum - Definition, Occurrence, Properties, Applications Carbon Why does Carbon Always Form Covalent Bonds? Why is Carbon considered Tetravalent? Allotropes of Carbon Diamond and Graphite - Structure, Uses, Properties, Applications What is Catenation and Tetravalency? What are Hydrocarbons? Saturated and Unsaturated Hydrocarbons Alkyl Groups and Cyclic Hydrocarbons Functional Properties of Chemical Properties of Soaps and Detergents Difference Between Soap and Detergent Dobereiners Triads - Definition, Types, Limitations Newlands Law of Octaves Classification of Elements Mendeleevs Periodic Table Merits of Mendeleevs Periodic Table Anomalies of Mendeleevs Periodic Table Modern Periodic Law Periodic Table of Elements Characteristics of the Periods and Groups of the Periodic Table Merits of the Modern Periodic Table Reactions can either generate or consume energy in the form of heat. Read on to learn about how to distinguish endothermic and exothermic reactions, connect them to other chemistry concepts, and see practical examples! What is an endothermic reaction? Endothermic reactions absorb energy from their surroundings, because the products are higher in energy than the reactants. What is an exothermic reaction? Exothermic reactions release energy to their surroundings, because the products are lower in energy than the reactants. You can think about this visually using a reaction energy diagram, as seen below: And endothermic reaction (left) and an exothermic reaction (right) plotted on a plot of energy against the reaction coordinate (a measure of the progress of the reaction). The asterisk indicates the transition state in between the reactants and the products. A reaction of each kind is shown, in which the reactants A and B undergo a transformation into a product C. If the energy of C is greater than the energy of A and B, then the reaction is endothermic, and there is net energy absorbed. If, on the other hand, C has lower energy than A and B, the reaction is exothermic, and there is net energy released. This net change in energy is called the enthalpy of reaction. To make the endothermic reaction occur, we must add heat to the system, otherwise there will not be enough energy available to form the product C. To make the exothermic reaction occur, we must take heat away from the system, otherwise it will be too high in energy to form C. If we perform a reverse reaction, starting with C and doing the reverse reaction back to A and B, then the type of reaction would be opposite. If A + B C is endothermic, its reverse reaction C A + B will be exothermic, and vice versa. Endothermic and exothermic reactions are everywhere, even when we dont notice the change in temperature they create. Below are some examples of each type of reaction. Some kinds of reusable hand warmers contain a supersaturated solution of sodium acetate. When you bend the pack, tiny pieces of metal allow the sodium acetate to nucleate or begin to form crystals. The formation and growth of those crystals is an exothermic process, so it heats up the hand warmers. The oxidation of iron metal to form iron oxide or rust is also an exothermic process! Usually this is difficult to notice, since no one pays attention to the temperature of rusting metal. However, this reaction is used in a disposable version of the hand warmers mentioned above. In this version, taking the warmers out of their packaging exposes iron powder to the air, and the rusting reaction causes them to heat up. This is technically a form of combustion, which you can learn more about in the next section! Combustion reactions are exothermic. This is why burning fuel like wood or gas gives off heat that keeps a house (or a group of campers) warm. What you feel when you sit near a campfire is the heat released by the combustion reaction. Combustion reactions dont always appear with visible flames, but they do always consist of the reaction of a substance with oxygen. Note: A common mistake is to think that because a small amount of heat is required to start a combustion reaction (think of striking a match) that this makes combustion endothermic. It requires heat input to overcome the activation energy of the reaction. Once this small amount of heat is provided, the reaction releases heat overall. This is why you dont need to constantly add heat to your campfire to make it keep burning! Sodium hydroxide, a strong base, and sulfuric acid, a strong acid, both interact strongly with water and release lots of heat when they dissolve. This is the reason why chemists always add concentrated acids and bases to water and never the other way around. If you add water to one of these chemicals, they can release a dangerous amount of heat. Video showing the very exothermic reaction between potassium permanganate and hydrogen peroxide The dissolution of sodium chloride, regular table salt, is an endothermic process. That means that if you dissolve it in water, the water will become slightly colder, due to the energy absorbed by the solvation of the ions. This is true for many other salts, including potassium chloride (KCl) and sodium bicarbonate (NaHCO3 or baking soda). It is not necessarily true for all salts, however. Dissolution can be endothermic and exothermic depending on the substance being dissolved! Hydrolysis is a type of reaction that includes many biochemical and organic reactions. In a hydrolysis reaction, a water molecule reacts with a bond in a molecule to break the molecule into two pieces. This is an endothermic process, so in order to run a reaction like this in the lab, you might have to heat the reaction flask. When you boil an egg or cook meat, you are causing the denaturation or unfolding of the protein molecules in these foods. This means the denaturation process is endothermic, because it must absorb heat energy rather than releasing it. Le Chateliers Principle lets us favor the reactants or products of a reaction using temperature. If we increase the temperature, an endothermic reaction proceeds further towards completion, since it uses up the extra thermal energy we are providing. If the reaction is exothermic, we need to decrease the temperature to favor the products, because the reaction generates heat. Raising temperature for exothermic reactions, or lowering temperature for endothermic reactions, causes the reaction to go backwards, assuming the reactions are reversible.

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What are the exothermic and endothermic reaction give example. What are the example of exothermic and endothermic reaction. Exothermic and endothermic process. What are the similarities between endothermic and exothermic reactions. What are the indicators of exothermic and endothermic reactions. What are the endothermic reaction. What are the difference between exothermic and endothermic reaction.

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