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Concentration in chemistry is the amount of substance in a specific volume or space.There are different ways to calculate concentration, like molarity, mass concentration, and volume percent.Concentrated solutions have lots of solute, while dilute solutions have more solvent and less solute. In chemistry, the word "concentration" relates to the components of a mixture or solution. Here is the definition of concentration and a look at different methods used to calculate it. In chemistry, concentration refers to the amount of a substance in a defined space. Another definition is that concentration is the ratio of solute in a solution to either solvent or total solution. Concentration is usually expressed in terms of mass per unit volume. However, the solute concentration may also be expressed in moles or units of volume. Instead of volume, concentration may be per unit mass. While usually applied to chemical solutions, concentration may be calculated for any mixture. Unit Examples of Concentration: g/cm3, kg/l, M, m, N, kg/L Concentration is determined mathematically by taking the mass, moles, or volume of solute and dividing it by the mass, moles, or volume of solution (or, less commonly, the solvent). Some examples of concentration units and formulas include: Molarity (M) - moles of solute/liters of solution (not solvent!) Mass Concentration (kg/m3 or g/L) - mass of solute/volume of solution Normality (N) - grams active solute/liters of solution Molality (m) - moles of solute/mass of solvent (not mass of solution!) Mass Percent (%) - mass solute/mass solution x 100% (mass units are the same unit for both solute and solution) Volume Concentration (no unit) - volume of solute/volume of mixture (same units of volume for each) Number Concentration (1/m3) - number of entities (atoms, molecules, etc.) of a component divided by the total volume of the mixture Volume Percent (v/v%) - volume solute/volume solution x 100% (solute and solution volumes are in the same units) Mole Fraction (mol/mol) - moles of solute/total moles of species in the mixture Mole Ratio (mol/mol) - moles of solute/total moles of all other species in the mixture Mass Fraction (kg/kg or parts per) - mass of one fraction (could be multiple solutes)/total mass of the mixture Mass Ratio (kg/kg or parts per) - mass of solute/mass of all other constituents in the mixture PPM (parts per million) - a 100 ppm solution is 0.01%. The "parts per" notation, while still in use, has largely been replaced by mole fraction PPB (parts per billion) - typically used to express contamination of dilute solutions Some units may be converted from one to another. However, it's not always a good idea to convert between units based on the volume of solution to those based on mass of solution (or vice versa) because volume is affected by temperature. In the strictest sense, not all means of expressing the composition of a solution or mixture fall under the simple term "concentration". Some sources only consider mass concentration, molar concentration, number concentration, and volume concentration to be true units of concentration. Two related terms are concentrated and dilute. Concentrated refers to chemical solutions that have high concentrations of a large amount of solute in the solution. If a solution is concentrated to the point where no more solute will dissolve in the solvent, it is said to be saturated. Dilute solutions contain a small amount of solute compared with the amount of solvent. In order to concentrate a solution, either more solute particles must be added or some solvent must be removed. If the solvent is nonvolatile, a solution may be concentrated by evaporating or boiling off solvent. Dilutions are made by adding solvent to a more concentrated solution. It's common practice to prepare a relatively concentrated solution, called a stock solution, and use it to prepare more dilute solutions. This practice results in better precision than simply mixing up a dilute solution because it can be difficult to obtain an accurate measurement of a tiny amount of solute. Serial dilutions are used to prepare extremely dilute solutions. To prepare a dilution, stock solution is added to a volumetric flask and then diluted with solvent to the mark. IUPAC, Compendium of Chemical Terminology, 2nd ed. (the "Gold Book") (1997). Portra Images / Getty Images Chemistry is a logical science that you can teach yourself if you learn some key concepts. You can study these concepts in any order, but it's best to start with the basics since many concepts build on each other. For example, you'll want to begin learning about units, conversion, and how atoms and molecules interact. Then you can progress to studying more complex chemistry concepts. Below are some chemistry basics that you'll want to master before you dive more into the science. While it's completely possible to learn chemistry online, supplementing your textbook study with lab experience is always more fruitful—so find yourself a good chemistry kit and get started! It's possible to learn the basic concepts of chemistry online.Chemistry concepts should be studied in a logical order because concepts build upon each other. Jumping into the middle of the science can lead to confusion.While it's fine to learn chemistry principles online, be aware that the lab component is an important part of the science. It's a good idea to supplement textbook learning with experiments using a chemistry kit. Introduction to Chemistry: Learn about what chemistry is, what chemists do, and why you would want to study this science. Units & Measurements: Get a handle on the metric system and the common units used in chemistry. The Scientific Method: Scientists, including chemists, are systematic about the way they study the world. Find out how to use the scientific method to collect data and design experiments. The Elements: Elements are basic building blocks of matter. Learn what an element is and get facts for them. The Periodic Table: The periodic table is a way elements can be organized based on their similar properties. Find out what that table is, how it was designed, and how you can use it to make your study of chemistry much easier. Atoms and Ions: Atoms are single units of an element. Ions can be made up of one or more types of elements and carry an electrical charge. Learn about the parts of an atom and how to identify the different types of ions. Molecules, Compounds, & Moles: Atoms can be joined together to make molecules and compounds. A mole is a useful way of measuring an amount of atoms or larger components of matter. Define these terms and learn how to perform calculations to express quantities. Chemical Formulas: Atoms and ions don't bond together randomly. Find out how to predict how many of one type of atom or ion will combine with others. Learn to name compounds. Chemical Reactions & Equations: Just as atoms and ions combine in very specific ways, molecules and compounds react with each other in definite quantities. Learn how to tell whether or not a reaction can occur and what the products of a reaction will be. Write balanced chemical equations to describe reactions. Chemical Bonds: The atoms in a molecule or compound are attracted and repelled with respect to each other in ways that determine the types of bonds they can form. Thermochemistry: Chemistry is the study of both matter and energy. Once you learn to balance the atoms and charge in a chemical reaction, you can examine the energy of the reaction as well. Electronic Structure: Electrons are found in regions around the nucleus of an atom. Learning about the structure of the electron shell or electron cloud is important for understanding how atoms and ions will form bonds. Molecular Structure: Once you understand the types of bonds that can be formed between components in a substance, you can begin to predict and understand how molecules are formed and the shapes they take. Valence shell electron pair repulsion (VSEPR) theory helps chemists understand molecular structure. Liquids & Gases: Liquids and gases are phases of matter with properties distinctly different from the solid form. Collectively, liquids and gases are termed fluids. The study of fluids and how they interact is important for understanding the properties of matter and predicting the ways in which that matter can react. Rates of Reaction: Several factors affect how quickly and completely a reaction proceeds. Learn about these factors and how to calculate the speed at which a reaction can occur. Acids & Bases: There are several ways to define acids and bases. One way is to look at hydrogen ion concentration. No matter which method you choose, these categories of chemicals participate in some very important reactions. Learn about acids, bases, and pH. Oxidation & Reduction: Oxidation and reduction reactions go hand in hand, which is why they are also called redox reactions. Acids and bases may be thought of as reactions involving hydrogen or protons, while redox reactions tend to be concerned with electron gain and loss. Nuclear Reactions: Most chemical reactions involve exchanges of electrons or atoms. Nuclear reactions are concerned with what happens inside the nucleus of an atom. This includes radioactive decay, fission, and fusion. Skip to content Sign up for our newsletter We summarize the week's scientific breakthroughs every Thursday. Chemistry happens in the world around you, not just in a lab. Matter interacts to form new products through a process called a chemical reaction or chemical change. Every time you cook or clean, it's chemistry in action. Your body lives and grows thanks to chemical reactions. There are reactions when you take medications, light a match, and draw a breath. These examples of chemical reactions from everyday life are a small sampling of the hundreds of thousands of reactions you experience as you go about your day. Chemical reactions are common in daily life, but you may not recognize them.Look for signs of a reaction. Chemical reactions often involve color changes, temperature changes, gas production, or precipitant formation.Simple examples of everyday reactions include digestion, combustion, and cooking. A chemical change, often called a chemical reaction, occurs when substances transform into new and distinct substances. Essentially, it involves the rearrangement of atoms. Generally, chemical changes can be identified by temperature changes, light emission, bubble formation, precipitate formation, color changes, and odor release. These effects signify a change in composition, but they may not always be immediately apparent. Usually, chemical changes are permanent, so they cannot be undone. Conversely, physical changes do not create new substances and can be reversed. Understanding these distinctions is fundamental to the study of chemistry. Frank Krahmer / Getty Images Plants apply a chemical reaction called photosynthesis to convert carbon dioxide and water into food (glucose) and oxygen. It's one of the most common everyday chemical reactions and also one of the most important because this is how plants produce food for themselves (and animals) and convert carbon dioxide into oxygen. The equation for the reaction is: 6 CO2 + 6 H2O + light → C6H12O6 + 6 O2 Kateryna Kon/Science Photo Library / Getty Images Aerobic cellular respiration is the opposite process of photosynthesis in that energy molecules are combined with the oxygen we breathe to release the energy needed by our cells plus carbon dioxide and water. Energy used by cells is chemical energy in the form of ATP, or adenosine triphosphate. Here is the overall equation for aerobic cellular respiration: C6H12O6 + 6O2 → 6CO2 + 6H2O + energy (36 ATPs) Tastyart Ltd Rob White / Getty Images Anaerobic respiration is a set of chemical reactions that allows cells to gain energy from complex molecules without oxygen. Your muscle cells perform anaerobic respiration whenever you exhaust the oxygen being delivered to them, such as during intense or prolonged exercise. Anaerobic respiration by yeast and bacteria is harnessed for fermentation to produce ethanol, carbon dioxide, and other chemicals that make cheese, wine, beer, yogurt, bread, and many other common products. The overall chemical equation for one form of anaerobic respiration is: C6H12O6 → 2C2H5OH + 2CO2 + energy WIN-Initiative / Getty Images Every time you strike a match, burn a candle, build a fire, or light a grill, you see the combustion reaction. Combustion combines energetic molecules with oxygen to produce carbon dioxide and water. For example, the equation for the combustion reaction of propane, found in gas grills and some fireplaces, is: C3H8 + 5O2 → 4H2O + 3CO2 + energy Alex Dowden/EyeEm / Getty Images Over time, iron develops a red, flaky coating called rust. This is an example of an oxidation reaction. Other everyday examples include the formation of verdigris on copper and the tarnishing of silver. Here is the chemical equation for the rusting of iron: Fe + O2 + H2O → Fe2O3. XH2O Peter Dazeley/Photographer's Choice / Getty Images Thousands of chemical reactions take place during digestion. As soon as you put food in your mouth, an enzyme in your saliva called amylase starts to break down sugars and other carbohydrates into simpler forms your body can absorb. Hydrochloric acid in your stomach reacts with food to further break it down, while enzymes cleave proteins and fats so they can be absorbed into your bloodstream through the walls of the intestines. Lumina Imaging / Getty Images Whenever you combine an acid (e.g., vinegar, lemon juice, sulfuric acid, or muriatic acid) with a base (e.g., baking soda, soap, ammonia, or acetone), you are performing an acid-base reaction. These reactions neutralize the acid and base to yield salt and water. Sodium chloride isn't the only salt that can be formed. For example, here is the chemical equation for an acid-base reaction that produces potassium chloride, a common table salt substitute: HCl + KOH → KCl + H2O JGI/Jamie Grill / Getty Images Soaps and detergents clean by way of chemical reactions. Soap emulsifies grime, which means oily stains bind to the soap so they can be lifted away with water. Detergents act as surfactants, lowering the surface tension of water so it can interact with oils, isolate them, and rinse them away. Dina Belenko Photography / Getty Images Cooking uses heat to cause chemical changes in food. For example, when you hard boil an egg, the hydrogen sulfide produced by heating the egg white can react with iron from the egg yolk to form a grayish-green ring around the yolk. When you brown meat or baked goods, the Maillard reaction between amino acids and sugars produces a brown color and a desirable flavor. Chemical reactions are everywhere, and in a way, chemistry really makes up everything. From the emotions you feel to peculiar questions such as, "Can bottled water go bad?" Here are some examples of chemistry in everyday life. Absolute zero is the coldest temperature where atoms stop moving, marked as 0 Kelvin.An acid releases protons in water and turns litmus paper red, having a pH less than 7.A catalyst speeds up a reaction without being used up, like enzymes in biochemical reactions. Below is a list of important chemistry vocabulary terms and their definitions. Use this list to look up terms or make flashcards from the definitions. absolute zero - Absolute zero is 0K. It is the lowest possible temperature. Theoretically, at absolute zero, atoms stop moving. accuracy - Accuracy is a measure of how close a measured value is to its true value. For example, if an object is exactly a meter long and you measure it as 1.1 meters long, that is more accurate than if you measured it at 1.5 meters long. acid - There are several ways to define an acid, including any chemical that gives off protons or H+ in water. Acids have a pH of less than 7. They turn the pH indicator phenolphthalein colorless and turn litmus paper red. acid anhydride - An acid anhydride is an oxide that forms an acid when it is reacted with water. For example, when SO3- is added to water, it becomes sulfuric acid, H2SO4. actual yield - The actual yield is the amount of product you actually obtain from a chemical reaction, as in the amount you can measure or weigh as opposed to a calculated value. addition reaction - An addition reaction is a chemical reaction in which atoms add to a carbon-carbon multiple bond. alcohol - An alcohol is any organic molecule that has an -OH group. aldehyde - An aldehyde is any organic molecule that has a -COH group. alkali metal - An alkali metal is a metal in Group I of the periodic table. Examples of alkali metals include lithium, sodium, and potassium. alkaline earth metal - An alkaline earth metal is an element belonging to Group II of the periodic table. Examples of alkaline earth metals are magnesium and calcium. alkane - An alkane is an organic molecule that only contains single carbon-carbon bonds. alkene - An alkene is an organic molecule that contains at least one C=C or carbon-carbon double bond. alkyne - An alkyne is an organic molecule that contains at least one carbon-carbon triple bond. allotrope - Allotropes are different forms of a phase of an element. For example, diamond and graphite are allotropes of carbon. alpha particle - An alpha particle is another name for a helium nucleus, which contains two protons and two neutrons. It's called an alpha particle in reference to radioactive (alpha) decay. amine - An amine is an organic molecule in which one or more of the hydrogen atoms in ammonia have been replaced by an organic group. An example of an amine is methylamine. base - A base is a compound that produces OH- ions or electrons in water or accepts protons. An example of a common base is sodium hydroxide, NaOH. beta particle - A beta particle is an electron, although the term is used when the electron is emitted in radioactive decay. binary compound - A binary compound is one made up of two elements. binding energy - Binding energy is the energy that holds protons and neutrons together in the atomic nucleus. bond energy - Bond energy is the amount of energy required to break one mole of chemical bonds. bond length - Bond length is the average distance between the nuclei of two atoms that share a bond. buffer - A liquid that resists change in pH when an acid or base is added. A buffer consists of a weak acid and its conjugate base. An example of a buffer is acetic acid and sodium acetate. calorimetry - Calorimetry is the study of heat flow. Calorimetry may be used to find the heat of the reaction of two compounds or the heat of combustion of a compound, for example. carboxylic acid - A carboxylic acid is an organic molecule containing a -COOH group. An example of a carboxylic acid is acetic acid. catalyst - A catalyst is a substance that lowers the activation energy of a reaction or speeds it up without being consumed by the reaction. Enzymes are proteins that act as catalysts for biochemical reactions. cathode - A cathode is an electrode that gains electrons or is reduced. In other words, it is where reduction occurs in an electrochemical cell. chemical equation - A chemical equation is a description of a chemical reaction, including what reacts, what is produced, and which direction(s) the reaction proceeds. chemical property - A chemical property is a property that can only be observed when a chemical change occurs. Flammability is an example of a chemical property since you can't measure how flammable a substance is without igniting it (making/breaking chemical bonds). covalent bond - A covalent bond is a chemical bond formed when two atoms share two electrons. critical mass - Critical mass is the minimum quantity of radioactive material needed to cause a nuclear chain reaction. critical point - The critical point is the endpoint of the liquid-vapor line in a phase diagram, past which a supercritical liquid forms. At the critical point, the liquid and vapor phases become indistinguishable from one another. crystal - A crystal is an ordered, repeating three-dimensional pattern of ions, atoms, or molecules. Most crystals are ionic solids, although other forms of crystals exist. delocalization - Delocalization is when electrons become free to move all over a molecule, such as when double bonds occur on adjacent atoms in a molecule. denature - There are two common meanings for this in chemistry. First, it can refer to any process used to make ethanol unfit for consumption (denatured alcohol). Second, denaturing can mean breaking down the three-dimensional structure of a molecule, such as a protein that is denatured when exposed to heat. diffusion - Diffusion is the movement of particles from an area of higher concentration to one of lower concentration. dilution - Dilution is when a solvent is added to a solution, making it less concentrated. dissociation - Dissociation is when a chemical reaction breaks a compound into two or more parts. For example, NaCl dissociates into Na+ and Cl- in water. double displacement reaction - A double displacement or double replacement reaction is when cations of two compounds switch places. effusion - Effusion is when a gas moves through an opening into a low-pressure container (e.g., is drawn by a vacuum). Effusion occurs more quickly than diffusion because additional molecules aren't in the way. electrolysis - Electrolysis is using electricity to break the bonds in a compound to break it apart. electrolyte - An electrolyte is an ionic compound that dissolves in water to produce ions, which can conduct electricity. Strong electrolytes completely dissociate in water, while weak electrolytes only partially dissociate or break apart in water. enantiomers - Enantiomers are molecules that are non-superimposable mirror images of each other. endothermic - Endothermic describes a process that absorbs heat. Endothermic reactions feel cold. endpoint - The endpoint is when titration is stopped, typically because an indicator has changed color. The endpoint need not be the same as the equivalence point of a titration. energy level - An energy level is a possible value of energy that an electron can have in an atom. enthalpy - Enthalpy is the amount of energy in a system. entropy - Entropy is the disorder or randomness in a system. enzyme - An enzyme is a protein that acts as a catalyst in a biochemical reaction. equilibrium - Equilibrium occurs in reversible reactions when the forward rate of the reaction is the same as the reverse rate of the reaction. equivalence point - The equivalence point is when the solution in a titration is completely neutralized. It is not the same as the endpoint of a titration because the indicator may not change colors precisely when the solution is neutral. ester - An ester is an organic molecule with an R-CO-OR function group. excess reagent - Excess reagent is what you get when there is leftover reagent in a chemical reaction. excited state - An excited state is a higher energy state for an electron of an atom, ion, or molecule, compared with the energy of its ground state. exothermic - Exothermic describes a process that gives off heat. family - A family is a group of elements sharing similar properties. It is not necessarily the same thing as an element group. For example, the chalcogens or oxygen family consists of different elements from the nonmetal group. Kelvin - Kelvin is a unit of temperature. A Kelvin is equal in size to a degree Celsius, although Kelvin starts from absolute zero. Add 273.15 to a Celsius temperature to get the Kelvin value. Kelvin is not reported with a ° symbol. For example, you would simply write 300K, not 300°K. ketone - A ketone is a molecule that contains a R-CO-R' functional group. An example of a common ketone is acetone (dimethyl ketone). kinetic energy - Kinetic energy is energy of motion. The more an object moves, the more kinetic energy it has. lanthanide contraction - The lanthanide contraction refers to the trend in which lanthanide atoms become smaller as you move left to right across the periodic table, even though they increase in atomic number. lattice energy - Lattice energy is the amount of energy released when one mole of a crystal forms from its gaseous ions. law of conservation of energy - The law of conservation of energy states the energy of the universe may change form, but its amount remains unchanged. ligand - A ligand is a molecule or ion stuck to the central atom in a complex. Examples of common ligands include water, carbon monoxide, and ammonia. mass - Mass is the amount of matter in a substance. It is commonly reported in units of grams. mole - Avogadro's number (6.02 x 1023) of anything. node - A node is a location in an orbital with no probability of containing an electron. nucleon - A nucleon is a particle in the nucleus of an atom (proton or neutron). oxidation number The oxidation number is the apparent charge on an atom. For example, the oxidation number of an oxygen atom is -2. period - A period is a row (left to right) of the periodic table. precision - Precision is how repeatable a measurement is. More precise measurements are reported with more significant figures. pressure - Pressure is force per area. product - A product is something made as a result of a chemical reaction. quantum theory - Quantum theory is the description of energy levels and the predictions about the behavior of atoms at specific energy levels. radioactivity - Radioactivity occurs when the atomic nucleus is unstable and breaks apart, releasing energy or radiation. Raoult's Law - Raoult's Law states that the vapor pressure of a solution is directly proportional to the mole fraction of the solvent. rate determining step - The rate-determining step is the slowest in any chemical reaction. rate law - A rate law is a mathematical expression relating the speed of a chemical reaction as a function of concentration. redox reaction - A redox reaction is a chemical reaction that involves oxidation and reduction. resonance structure - Resonance structures are the set of Lewis structures that can be drawn for a molecule when it has delocalized electrons. reversible reaction - A reversible reaction is a chemical reaction that can go both ways: reactants make products and products make reactants. RMS velocity - The RMS or root mean square velocity is the square root of the average of the squares of individual velocities of gas particles, which is a way of describing the average speed of gas particles. salt - An ionic compound formed from reacting an acid and a base. solute - The solute is the substance that gets dissolved in a solvent. Usually, it refers to a solid that is dissolved in a liquid. If you are mixing two liquids, the solute is the one that is present in a smaller amount. solvent - This is the liquid that dissolves a solute in solution. Technically, you can dissolve gases into liquids or other gases, too. When making a solution where both substances are in the same phase (e.g., liquid-liquid), the solvent is the largest component of the solution. STP - STP means standard temperature and pressure, 273K and 1 atmosphere. strong acid - A strong acid is an acid that completely dissociates in water. An example of a strong acid is hydrochloric acid, HCl, which dissociates into H+ and Cl- in water. strong nuclear force - The strong nuclear force is the force that holds the protons and neutrons in an atomic nucleus together. sublimation - Sublimation is when a solid changes directly into a gas. At atmospheric pressure, dry ice or solid carbon dioxide goes directly into carbon dioxide vapor, never becoming liquid carbon dioxide. synthesis - Synthesis is a larger molecule from two or more atoms or smaller molecules. system - A system includes everything you are evaluating in a situation. temperature - Temperature is a measure of the average kinetic energy of particles. theoretical yield - Theoretical yield is the amount of product that would result if a chemical reaction proceeded perfectly, to completion, with no loss. thermodynamics - Thermodynamics is the study of energy. titration - Titration is a procedure where the concentration of an acid or base is determined by measuring how much base or acid is required to neutralize it. triple point - The triple point is the temperature and pressure at which the solid, liquid, and vapor phases of a substance exist in equilibrium. unit cell - A unit cell is the simplest repeating structure of a crystal. unsaturated - There are two common meanings for unsaturated in chemistry. The first refers to a chemical solution that does not contain all the solute that can be dissolved. Unsaturated also refers to an organic compound with one or more double or triple carbon-carbon bonds. unshared electron pair - An unshared electron pair or lone pair refers to two electrons that aren't participating in chemical bonding. valence electron - The valence electrons are the atom's outermost electrons. volatile - Volatile refers to a substance that has a high vapor pressure. VSEPR - VSEPR stands for Valence Shell Electron Pair Repulsion. This is a theory used that predicts molecular shapes based on the assumption that electrons stay as far as possible from each other. Ionic Compound Names Quiz Element Symbol Quiz There are many branches of chemistry or chemistry disciplines. The five main branches are organic chemistry, inorganic chemistry, analytical chemistry, physical chemistry, and biochemistry. Traditionally, the five main branches of chemistry are organic chemistry, inorganic chemistry, analytical chemistry, physical chemistry, and biochemistry. However, sometimes biochemistry is considered a subdiscipline of organic chemistry. The branches of chemistry overlap those of physics and biology. There is also some overlap with engineering. Within each major discipline, there are many subdivisions. Chemistry, like physics and biology, is a natural science. In fact, there is considerable overlap between chemistry and these other disciplines. Chemistry is a science that studies matter. This includes atoms, compounds, chemical reactions, and chemical bonds. Chemists explore the properties of matter, its structure, and how it interacts with other matter. Organic Chemistry: Organic chemistry is the study of carbon and its compounds. It is the study of the chemistry of life and reactions occurring in living organisms. An organic chemistry student might study organic reactions, the structure and properties of organic molecules, polymers, drugs, or fuels. Inorganic Chemistry: Inorganic chemistry is the study of compounds not covered by organic chemistry. It is the study of inorganic compounds or compounds that don't contain a C-H bond. A few inorganic compounds do contain carbon, but most contain metals. Topics of interest to inorganic chemists include ionic compounds, organometallic compounds, minerals, cluster compounds, and solid-state compounds. Analytical Chemistry: Analytical chemistry is the study of the chemistry of matter and the development of tools to measure the properties of matter. Analytical chemistry includes quantitative and qualitative analysis, separations, extractions, distillation, spectrometry and spectroscopy, chromatography, and electrophoresis. Analytical chemists develop standards, chemical methods, and instrumental methods. Physical Chemistry: Physical chemistry is the branch of chemistry that applies physics to the study of chemistry, which commonly includes the applications of thermodynamics and quantum mechanics to chemistry. Biochemistry: Biochemistry is the study of chemical processes that occur inside living organisms. Examples of key molecules include proteins, nucleic acids, carbohydrates, lipids, drugs, and neurotransmitters. Sometimes this discipline is considered a subdiscipline of organic chemistry. Biochemistry is closely related to molecular biology, cell biology, and genetics. There are other ways chemistry can be divided into categories. Depending on who you ask, other disciplines might be included as a main branch of chemistry. Other examples of branches of chemistry include: Astrochemistry: Astrochemistry examines the abundance of elements and compounds in the universe, their reactions to each other, and the interaction between radiation and matter. Chemical Kinetics: Chemical kinetics (or simply "kinetics") studies the rates of chemical reactions and processes and the factors that affect them. Electrochemistry: Electrochemistry examines the movement of charge in chemical systems. Often, electrons are the charge carriers, but the discipline also investigates the behavior of ions and protons. Green Chemistry: Green chemistry looks at ways of minimizing the environmental impact of chemical processes. This includes remediation as well as ways of improving processes to make them more eco-friendly. Geochemistry: Geochemistry examines the nature and properties of geological materials and processes. Nuclear Chemistry: While most forms of chemistry mainly deal with interactions between electrons in atoms and molecules, nuclear chemistry explores the reactions between protons, neutrons, and subatomic particles. Polymer Chemistry: Polymer chemistry deals with the synthesis and properties of macromolecules and polymers. Quantum Chemistry: Quantum chemistry applies quantum mechanics to model and explore chemical systems. Radiochemistry: Radiochemistry explores the nature of radioisotopes, the effects of radiation on matter, and the synthesis of radioactive elements and compounds. Theoretical Chemistry: Theoretical chemistry is the branch of chemistry that applies mathematics, physics, and computer programming to answer chemistry questions. Greenwood, Norman N.; Earnshaw, Alan (1997). Chemistry of the Elements (2nd ed.). Butterworth-Heinemann. ISBN 978-0-08-037941-8.Laidler, Keith (1993). The World of Physical Chemistry. Oxford: Oxford University Press. ISBN 0-19-855919-4.Skoog, Douglas A.; Holler, F. James; Crouch, Stanley R. (2007). Principles of Instrumental Analysis. Belmont, CA: Brooks/Cole, Thomson. ISBN 978-0-495-01201-6.Sørensen, Torben Smith (1999). Surface Chemistry and Electrochemistry of Membranes. CRC Press. ISBN 0-8247-1922-0.Streitwieser, Andrew; Heathcock, Clayton H.; Kosower, Edward M. (2017). Introduction to Organic Chemistry. New Delhi: Medtech. ISBN 978-93-85998-89-8. Store and/or access information on a device. Use limited data to select advertising. Create profiles for personalised advertising. Use profiles to select personalised advertising. Create profiles to personalise content. Use profiles to select personalised content. Measure advertising performance. Measure content performance. Understand audiences through statistics or combinations of data from different sources. Develop and improve services. Use limited data to select content. General chemistry is the study of matter, energy, and the interactions between the two. The main chemistry topics include acids and bases, atomic structure, the periodic table, chemical bonds, and chemical reactions. Anchalee Phanmaha / Getty Images Acids, bases, and pH are concepts that apply to aqueous solutions (solutions in water). pH refers to the hydrogen ion concentration, or the ability of a species to donate/accept protons or electrons. Acids and bases reflect the relative availability of hydrogen ions or proton/electron donors or acceptors. Acid-base reactions are extremely important in living cells and industrial processes. Hero Images / Getty Images Atoms are composed of protons, neutrons, and electrons. Protons and neutrons form the nucleus of each atom, with electrons moving around this core. The study of atomic structure involves understanding the composition of atoms, isotopes, and ions. Dragan Smiljkovic / Getty Images Electrochemistry is a chemistry topic that's primarily concerned with oxidation-reduction reactions or redox reactions. These reactions produce ions and may be harnessed to produce electrodes and batteries. Electrochemistry is used to predict whether a reaction will occur and in which direction electrons will flow. Chemistry is a science that relies on experimentation, which often involves taking measurements and performing calculations based on those measurements. It is important to be familiar with the units of measurement and the various ways of converting between different units. Thermochemistry is the general chemistry topic that relates to thermodynamics. It is sometimes called physical chemistry. Thermochemistry involves the concepts of entropy, enthalpy, Gibbs free energy, standard state conditions, and energy diagrams. It also includes the study of temperature, calorimetry, endothermic reactions, and exothermic reactions. SDI Productions / Getty Images Atoms and molecules join together through ionic and covalent bonding. Related chemistry topics include electronegativity, oxidation numbers, and Lewis electron dot structure. STEVE HORRELL / SPL / Getty Images The periodic table is a systematic way of organizing the chemical elements. The elements exhibit periodic properties that can be used to predict their characteristics, including the likelihood that they will form compounds and participate in chemical reactions. Witthaya Prasongsin / Getty Images It is important to learn how to balance chemical equations and how different factors affect the rate and yield of chemical reactions. An important part of general chemistry is learning about different types of solutions and mixtures and how to calculate concentrations. This category includes topics such as colloids, suspensions, and dilutions. Chemistry studies matter and its interactions, used in many fields, making it exciting and versatile.Understanding chemistry requires using math, including algebra and geometry, to solve different chemical problems.Chemistry covers many topics, such as atoms, chemical reactions, and the periodic table, helping students learn effectively. Welcome to the world of Chemistry 101! Chemistry is the study of matter. Like physicists, chemists study the fundamental properties of matter and they also explore the interactions between matter and energy. Chemistry is a science, but it is also used in human communication and interaction, cooking, medicine, engineering, and a host of other disciplines. Although people use chemistry every day with no apparent problem, if the time comes to take a course in chemistry in high school or college, many students are filled with dread. Don't be! Chemistry is manageable and even fun. I've compiled some study tips and resources to make your encounter with chemistry easier. Not sure where to start? Try Chemistry Basics. You need a trusty periodic table for practically all aspects of chemistry! There are links to characteristics of elements groups, too. Periodic Table Printable Periodic Tables Groups of Elements Periodic Table Use these resources to look up unfamiliar terms, identify chemical structures, and recognize the elements. Learn about what chemistry is and how the science of chemistry is studied. Math is used in all the sciences, including chemistry. To learn chemistry, you need to understand algebra, geometry, and some trig, as well as be able to work in scientific notation and perform unit conversions. Atoms are the basic building blocks of matter. Atoms join together to form compounds and molecules. Learn about the parts of the atom and how atoms form bonds with other atoms. Stoichiometry describes the proportions between atoms in molecules and reactants/products in chemical reactions. Learn about how matter reacts in predictable ways so that you can balance chemical equations. The states of matter are defined by the structure of matter as well as whether it has a fixed shape and volume. Learn about the different states and how matter transforms itself from one state to another. States of Matter Phase Diagrams Once you have learned about atoms and molecules, you're ready to examine the type of chemical reactions that can occur. Reactions in Water Types of Inorganic Chemical Reactions The properties of the elements exhibit trends based on the structure of their electrons. The trends or periodicity can be used to make predictions about the nature of the elements. Periodic Properties & Trends Element Groups It's important to understand how substance dissolve and how mixtures behave. Solutions, Suspensions, Colloids, Dispersions Calculating Concentration Gases exhibit special properties based on having no fixed size or shape. Acids and bases are concerned with the actions of hydrogen ions or protons in aqueous solutions. Learn about the relationships between matter and energy. Matter is always in motion! Learn about the motion of atoms and molecules, or kinetics. Factors that Affect Reaction Rate Chemical Reaction Order Much of the chemistry that you learn is associated with electronic structure, since electrons can move around much more easily than protons or neutrons. Nuclear chemistry is concerned with the behavior of protons and neutrons in the atomic nucleus. No matter how well you understand the text or the lecture, sometimes you need to see examples of how to approach and solve chemistry problems. Index of Worked Chemistry Problems Printable Chemistry Worksheets Test your understanding of key chemistry concepts. Doing a science fair project? Learn how to use the scientific method to design an experiment and test a hypothesis. Science Fair Project Help Store and/or access information on a device. Use limited data to select advertising. Create profiles for personalised advertising. Use profiles to select personalised advertising. Create profiles to personalise content. Use profiles to select personalised content. Measure advertising performance. Measure content performance. Understand audiences through statistics or combinations of data from different sources. Develop and improve services. Use limited data to select content.

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