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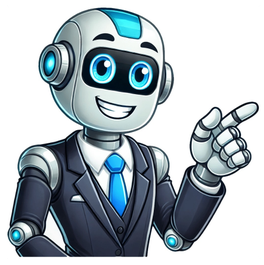

Science is the branch of knowledge that incorporates the organized study of physical and natural phenomena. The chemical sciences encompass the behavioral study of matter present around us with the help of observation and experimentation. The school curriculum of chemical sciences in most countries comprises of two parts: Theory and Practical. While theory provides students with the knowledge in literal form, practicals connect the theory with physical reality. Experimentation is an important part of the chemical sciences, as it helps in understanding the complex interplay of chemicals in more detail. A general facility that provides a controlled environment to conduct these experimentations is famously known by the name Laboratories in schools, institutions, or any other organization. While working in a chemistry lab, one comes across several kinds of apparatus that are required to carry out experiments. It is essential to understand the functioning of these apparatus, as an ineffectiveness not only increases the risk of experimental error but also poses a potential laboratory hazard. The following is a list of commonly used chemistry lab apparatus, along with their uses. Safety GearWorking in a chemistry lab is always exciting and enlightening; however, it comes with the potential dangers of exposure to harmful chemicals. Hence it is always advised to be covered in the proper gear, also known as personal protective equipment (PPE), before entering the chemistry lab. The safety gear to work in the chemistry lab mainly comprises of three things:Safety Goggles:As the name suggests, safety goggles ensure the safety of your eyes. They are one of the most important safety gear, as the eyes are the most vulnerable part of the human body. Several chemicals like acids may cause a severe injury to eyesight, such as eye rash or a permanent loss of vision.Lab Coat:The lab coat is not only a general uniform of medical and chemical professionals but has a very specified purpose to it. The knee-long coat ensures the safety of the body and clothing from accidental spills and splashes of harmful chemicals. Moreover, in case of emergencies like fire or contamination, a lab coat can be easily and quickly removed than the usual clothing.Latex/Nitrile Gloves:Chemicals like acids are very reactive, and physical contact with such chemicals can cause severe burns. Latex or nitrile gloves work as a barrier between human skin and protect them from burns, infections, and contaminations caused by hazardous chemicals.BeakersBeakers are one of the most commonly used laboratory apparatus that one can come across in a chemistry lab. They are cylindrical, have a flat bottom, and a small spout on the top to pour chemicals. Beakers are usually made of borosilicate glass or plastic. While plastic beakers are only used to mix the chemicals, glass beakers have high thermal stability and can be used to heat chemicals also. Moreover, glass beakers provide more clarity for content visibility and measurement than their plastic counterparts. Beakers come in several sizes with volumes ranging from 5 milliliters to 10000 milliliters. Beakers are often used to hold, mix, and heat individual chemicals or chemical mixtures.Reagent BottleReagent bottles, sometimes also referred to as media bottles, are specially designed containers or vessels to hold chemicals in liquid or powder form. They come in a variety of sizes, shapes, and are commonly constructed of glass or plastic. While most are clear glass vessels, some reagent bottles are colored amber (actinic), brown, or red to protect light-sensitive chemical compounds from visible light, ultraviolet, and infrared radiation.FlasksFlask is a category of glassware used in the chemistry lab. They come in a variety of shapes and sizes, with each one having a specific purpose associated with it. Lets take a look at few types of flasks used in chemistry labs.Erlenmeyer FlaskErlenmeyer Flask, also known as a conical flask, is glassware comprising of conical body, flat bottom, and a cylindrical neck. It is one of the most commonly used flasks to carry out various experiments in the chemistry lab, such as titration, filtration, crystallization, etc. It was first patented in 1860 by a German chemist, Emil Erlenmeyer. The slanting sides and wide base of an Erlenmeyer flask make it a perfect conical vessel to mix the chemicals by swirling without any risk of spillage. Additionally, the cylindrical neck of a conical flask can accommodate a glass stopper, and it also provides support to fit funnels. Based on the application, an Erlenmeyer flask can either be graduated or unmarked. Moreover, it can also be used for heating and boiling purposes.Round Bottom Flask As the name suggests, a round bottom flask is a piece of laboratory glassware with a spherical bottom and a cylindrical neck. The round bottom of the flask provides a suitable surface area for the equal distribution of heat around the vessel. Thus, it is often used in experiments that require uniform heating or boiling of the chemical contents. Additionally, the cylindrical neck can support funnels and accommodate glass stoppers. Round Bottom flasks are often used with other heating apparatus such as sand bath, water bath, rotary evaporator, etc. It is widely used to carry out the laboratory-scale synthesis of other chemicals; however, it does not provide mixing as good as conical flask by swirling. A mechanical stirrer or glass rod comes in handy while mixing the contents in a round bottom flask.Volumetric FlaskA volumetric flask is one of the laboratory glassware primarily used to prepare solutions. It is composed of a flat bottom conical-shaped bulb attached to an elongated neck with an engraved ring that serves as a marking that indicates a specific volume. Because its mark specifies a precise volume measurement, the flask is also known as a graduated flask or measuring flask. To prepare a solution, place the solute in the volumetric flask and then add enough solvent to dissolve it. After that, use a pipette or dropper to carefully add the solvent until the solution reaches the etched marking. The marking indicates the required volume of the solution. Its vital to note that volumetric flasks are calibrated for a specific temperature indicated on the flask. Furthermore, the flask has a number on it to determine the size of the suitable glass stopper. Volumetric flasks are usually made of transparent borosilicate glass or plastic; nevertheless, amber-colored volumetric flasks are employed in laboratories for the preparation of light-sensitive solutions.Retort FlaskThe retort flask is an oddly shaped airtight glassware with a curved neck. Although retort flasks are no longer employed in current chemistry labs, they were employed by several famous chemists, including Antoine Lavoisier and Jns Berzelius, to carry out distillation processes. Today, condensers have replaced retort flasks as a more convenient apparatus; nonetheless, retort flasks are still commercially available and can be used for non-complex distillation.Bchner Flask The Bchner Flask is a chemistry lab glassware instrument that looks almost identical to the Erlenmeyer flask but has thicker walls and a hose barb near the mouth. It is commonly used for vacuum filtration or distillation of solutions. The Bchner flasks thick wall makes it strong enough to resist the pressure difference while maintaining a vacuum inside. It is named after its inventor, Ernst Wilhelm Bchner, a German industrial chemist who is also known for the invention of Bchner Funnel. Other names include vacuum flask, filter flask, suction flask, side-arm flask, and Kitasato flask. When used with the Bchner Funnel, it allows for faster filtration under vacuum than traditional methods.Pear-Shaped Flask As the name suggests, a pear-shaped flask is laboratory glassware with V-shaped bottom, like an inverted pear. It is commonly used in organic chemistry for several heating purposes, such as evaporating solutions to dryness post-synthesis using a rotary evaporator and removing concentrated samples.Kjeldahl Flask. A Kjeldahl flask is a chemistry lab glassware that resembles a volumetric flask but has a circular bottom instead of a conical one. This flask was designed in the 19th century by Johan Gustav Christoffer Thorsager Kjeldahl, a notable Danish scientist, to assess the nitrogen concentration in organic compounds using the Kjeldahl digestion, a procedure he also devised. During the digesting stage, the flasks extra-long neck works as an air condenser, reducing the entrapment of vapors.Schlenk FlaskA schlenk flask is a type of laboratory glassware that is used to perform anaerobic reactions. Its a flask with a pear-shaped or spherical bottom and a sidearm near the neck thats used to fill or expel inert gases. Flushing the flask with inert gas is a typical method of changing the flasks environment. This is achieved by flushing the flask through its sidearm or with a wide bore needle attached to a gas line. The contents of the flask exit the flask through the flasks neck part. The needle approach offers the advantage of being able to place the needle towards the bottom of the flask to better flush out the flasks environment.Test Tube In a chemistry lab, the test tube is one of the most widely used glassware apparatus. It is a cylindrical vessel with a round bottom that is used to hold chemicals during the experiments. Due to their high thermal stability, test tubes can be used to heat or boil chemical samples. While heating, its essential to hold the test tube at a 45-degree angle so that the gases formed inside the narrow tube may easily escape without causing the hot liquid to shoot up.Boiling TubeA boiling tube is a glassware apparatus that looks similar to a test tube, although it is 50% larger in size. As the name indicates, boiling tubes are used to boil chemicals. Unlike test tubes, boiling tubes are made of pyrex, a material with superior thermal stability that allows them to be heated to far greater temperatures than borosilicate glass test tubes.Centrifuge TubeA centrifuge tube is a cylindrical vessel with a cap that is used in a centrifuge machine to separate the components of solutions. The centrifuge tubes are small test tubes with curved tips and can be made of glass or plastic. The tips design may vary depending on the types of solids, biomolecules, and insoluble substances in the chemical sample.NMR TubeNMR, an acronym for Nuclear Magnetic Resonance, is an imaging technique used in chemistry as well as physics to observe the magnetic behavior around the atomic nuclei. NMR tubes are specially built cylindrical tubes with a diameter of 5mm that are used to contain nucleus samples during spectroscopy. Theyre usually made of borosilicate glass, and theyre sealed with polyethylene caps or by melting the glass at the open end and twisting it.Thistle Tube.A thistle tube, also known as a thistle funnel, is a piece of laboratory glassware with a long tube shaft and a reservoir bulb with a flared rim on top. These funnels enable the precise placement of small quantities of chemicals in an existing system or apparatus, making it easier to add new materials to burets and narrow neck containers. Thistle tube funnels reduce the possibility of a reaction occurring too quickly and gushing over.Capillary TubeA capillary tube is chemistry lab apparatus commonly used to calculate the melting point temperature of chemical substances. It is a thin pipe that comes in different inner diameters ranging from 0.5 mm to 3 mm and lengths ranging from 1mm to 6 mm. They are used to hold the sample of the chemical substance, whose melting point is to be found, inside the melting point apparatus or thiele tube.Fusion TubeA fusion tube is a laboratory tube that functions similarly to boiling tubes, though it is much smaller and thinner. It is used to conduct experiments such as the sodium fusion test (Lassaignes test) or determine the substances melting/boiling point by heating a small sample excessively. Since fusion tubes are meant to be broken down after heating, they are made of thinner glass.Thiele TubeA Thiele tube is a piece of laboratory glassware used to determine the melting point of organic compounds. It looks like a regular glass test tube attached to a V-shaped handle that forms a triangle. The structure of the Thiele tube provides a convectional flow of heat around the triangular region, which evenly and quickly distribute the heat from the flame throughout the heating oil. The sample is submerged into the oil bath inside a capillary tube closed from one side and then attaching the capillary tube to the thermometer with the help of an elastic band of excellent thermal stability. The melting point is the temperature measured on the thermometer when the sample begins to melt.Test Tube holderA test tube holder is a device used to hold test tubes while heating them. It provides a safe distance between the persons hand and the test tube, protecting the skin from accidental burns caused by the spilling of chemicals.Test Tube RacksA test tube rack is composed of one perforated sheet arranged over a plain sheet of plastic or metal, which holds the test tubes in an upright position. Moreover, some test tube racks also come with the space to hold the test tubes in a slanting position. They are specifically employed in experiments that require the use of several test tubes or when a test tube must be stored undisturbed for an extended period of time.Centrifuge MachineA centrifuge is a laboratory apparatus that separates fluids, gaseous or liquid, according to density. Separation is accomplished by rapidly spinning a centrifuge tube containing the substance. A centrifuge machine is based on the principle of sedimentation, though the process is far more efficient and rapid than natural sedimentation. Substances segregate according to density under the influence of gravitational force (g-force) induced by high-speed spinning. Centrifuge machines can also be used to collect cells, precipitate DNA, purify viral particles, and identify minor changes in molecular conformation. Nowadays, research facilities and labs are equipped with multiple types of centrifuges capable of utilizing a range of rotors.Mechanical ShakerAs the name suggests, a mechanical shaker is a laboratory device used to mix, blend, or stir chemical compounds by shaking them. It contains an oscillating board that holds test tubes or flasks filled with chemical compounds.Magnetic StirrerA magnetic stirrer is a device that stirs chemical solutions by using electromagnetic force. A magnetic stirring bar is inserted into the flask containing the solution, which is then placed over a magnetic stirrers hot plate. The oscillating electromagnetic field created beneath the vessel drives the rotatory motion of the stirring bar. This method of stirring is more efficient, rapid, and sanitary than traditional stirring with a glass rod.Filter PaperA filter paper is a semi-permeable sheet of paper used in chemistry labs to separate solid impurities or components from a liquid solution. They are often made of cellulose whose capillary function comes in handy while separating fine solid impurities.FunnelA funnel is a cone-shaped device used to pour liquids from one vessel to another without the risk of spillage. They are usually made of glass and plastic and comes in a variety of sizes that can be used for any process that requires pouring chemicals solutions in flasks, test tubes, beakers, and other vessels. They can also be used with filter paper to filter out impurities from the solution.Filter FunnelA filter funnel is a piece of laboratory glassware that is used to filter solid impurities from chemical solutions. They are made up of a cone-shaped body coupled to a cylindrical tube with a sieve in the middle. To increase the effectiveness of the filtration process, filter paper can also be incorporated into the process.Separatory FunnelA separatory funnel, or separating funnel, is a piece of laboratory glassware used to separate two immiscible liquids with similar densities. It is a cone-shaped apparatus with a hemispherical head, a cylindrical tube outlet, and a Teflon stopper known as a stopcock. It comes in various sizes with volumes ranging from 30ml to 3Liters. It is well-known in organic chemistry for its application in the solvent extraction technique, commonly known as the liquid-liquid extraction technique. This technique is based on the concept of relative solubilities of chemical compounds. For instance, organic compounds like oils do not mix well with a polar solvent like waterand can thus be separated using a separatory funnel. Water will settle in the separating funnel because it is denser than oil, while oil will float above it. Because the tap in a separating funnel has a thinner cross-section, the two layers are allowed to drip out individually, resulting in their separation.Dropping FunnelA dropping funnel is a piece of laboratory glassware that provides a controlled flow of liquids while transferring them from one vessel to another. It is typically cylindrical in shape and has a stopcock at the bottom, before the opening outlet. Some dropping funnels also comes with an additional pressure-equalizing tube that ensures the flow, especially while handling the air-sensitive chemicals. Dropping funnels are particularly used in performing those chemical reactions in which drop-wise or slow addition of reagent is required.Bchner FunnelA Bchner funnel is a type of filtration equipment used in laboratories. It is typically constructed of porcelain, glass, or plastic. It is frequently used in conjunction with a Bchner flask to carry out the filtration process. Filtering with a bchner funnel is faster than gravity-based filtration. A Bchner funnel is made out of a cylindrical head attached to a conical flask by a filter mesh.Mortar and PestleMortar and pestle are ancient tools used to crush and grind ingredients or substances into a thin paste or powder. They are used in chemistry labs to grind chemical crystals or tablets into powder or paste form.Wash BottleThe wash bottle is a regular plastic bottle attached to a nozzle with a screw-top lid, and it is used to rinse various pieces of laboratory glassware, such as test tubes and round bottom flasks, after or before their use.Watch glassA watch glass is a circular concave piece of glassware used in chemistry labs for a variety of applications. These include a surface to evaporate a liquid, to hold solids while weighing, to heat a small amount of substance, and as a beaker cover. This application is often employed to keep dust and other particles out of the beaker; however, the watch glass does not entirely seal the beaker, allowing gas exchanges to occur.CruciblesA crucible is a ceramic or metal pot-like vessel used to melt metals and other solid chemical compounds. They come in a range of shapes and sizes and are made of materials that can endure intense temperatures. For instance, industrial-grade crucibles are made of materials such as alumina, silicon carbide, quartz, or water-cooled copper, whereas laboratory-grade crucibles are usually made of clay.TongsTongs are scissor-like tools used to grip and lift objects and avoid the risk of getting burnt. They are used to hold crucible after heating, transferring evaporating dishes, or picking small objects out of a reaction container.Ring standsRing Stand is a piece of supporting equipment designed to hold other laboratory apparatus such as beakers, flasks, burets, etc. It is composed of a heavy stamped steel base on which a steel rod is vertically erected. Various holding equipment such as rings and clamps are screwed to the steel rod at desirable heights to hold the target equipment.CondensersA condenser is a piece of laboratory equipment used to cause condensation, i.e., turning vapors into liquid. They are used to carry out several chemical processes ranging from distillation to refluxing solvents. A condenser is often made up of a big glass tube with a smaller glass tube spanning its whole length through which hot vapors pass and condense into a liquid. Lets take a look at some commonly used condensers in the chemistry lab.Liebig CondenserA Liebig condenser is used to cool and condense a gas to a liquid, which is commonly done as part of the chemical distillation process. The condensing column is made up of a straight glass tube, through which the gas flows, surrounded by a water jacket that aids in the cooling of the gas. This condenser is named after the German chemist Justus Baron von Liebig.Graham CondenserA graham condenser is a device that is very similar to a Liebig condenser, except that it contains a spiral coil that surrounds the inner tube through which the vapors flow. The spiral structure provides more surface area to serve as a vapor-liquid condensate path. Although the Graham condenser can be used in a variety of distillation configurations, it is advised to use it in conjunction with a Kjeldahl distillation bulb to enhance distillation efficiency.Dewar CondenserA Dewar condenser is an apparatus that rapidly cools volatile solvents with low-boiling-point, e.g., chloroform, diethylamine, and methylene chloride. Dewar condensers have a big opening on the top that makes it easier to add coolant combinations such as dry ice, liquid nitrogen, and acetone. Dewar condensers are often made of borosilicate glass, which has a stronger thermal shock resistance than normal glass and an extremely high chemical resistance. Dewar condensers also have a bottom inner joint and a hose connection for connecting to flexible tubing.Soxhlet ApparatusThe Soxhlet apparatus is a piece of laboratory equipment used to extract lipids and other desired chemical compounds from solid materials. The apparatus is made up of various pieces, each of which serves a specific purpose in the extraction process. Depending on the chemical nature (e.g. polarity) of the solid sample, a suitable solvent is placed in a round bottom flask, which is subsequently heated to transform the solvent into vapor form. The sample solid is placed inside the soxhlet thimble, which is placed inside the soxhlet extraction chamber. The soxhlet extraction chamber is the main part of the soxhlet apparatus and it is placed in between the round bottom flask and the reflux condenser. The vaporized solvent rises from the round bottom flask, travels through the vapor tube of the soxhlet extraction chamber, and enters the reflux condenser. Inside the reflux condenser, the vapors liquefy and fall on the thimble containing the solid sample. The liquid solvent then penetrates the solid sample and extracts the lipid while returning to the round bottom flask via the siphoning tube. This procedure is repeated until the desired compound has been extracted from the sample. This method of lipid extraction has the added benefit of allowing the solvent to be reused while the extraction is being performed. Food testing, biofuels, and environmental studies are some of the practical applications of soxhlet extraction.Chromatography ColumnChromatography refers to a collection of laboratory techniques used to separate mixtures. It entails passing a dissolved mixture through a stationary phase, which separates the analyte to be measured from other molecules in the mixture based on differential partitioning between the mobile and stationary phases. Column chromatography is a method of purifying chemicals based on their polarity or hydrophobicity. A mixture of molecules is separated in column chromatography based on their differential partitioning between a mobile phase and a stationary phase. The equipment used in this process is known as the chromatography column. It is a long cylindrical tube of glass with a tap at the end of it. The base of the tube is filled with a cotton or glass wool plug, or glass frit to hold the solid phase in place.Gas SyringeA gas syringe is a piece of laboratory glassware used to inject or remove a volume of gas from a closed system, as well as to quantify the volume of gas produced by a chemical reaction. A gas syringe resembles a regular syringe in appearance; however, the interior chamber of the gas syringe is constructed of ground glass, a glass whose surface has been ground to achieve a flat but rough (matte) texture. The syringe barrel has a ground glass surface as well. The barrels ground surface glides easily within the syringe chambers ground glass surface with minimum friction. The close matching of these ground glass surfaces provides a sufficiently gas-tight seal as well.Pasture PipetteA pasture pipette, sometimes known as a dropper, is a device used in chemistry labs to transfer extremely small quantities of liquids. They have a compressible bulb on the top that aids in the flow of the liquid.Graduated CylinderA graduated cylinder, also known as a volumetric cylinder or measuring cylinder, is a long slender vessel used to measure the volume of liquids in the chemistry lab. They come in various sizes with volumes ranging from 5 mL to a few Liters. Large graduated cylinders are typically made of polypropylene because of its excellent chemical resistance or polymethylpentene because of its transparency, which makes them lighter and less fragile than glass. Graduated cylinders contain a strong base or foot for stability and a spout to enable pouring out the contents. Some glass cylinders contain a plastic bumper or ring to help prevent inadvertent breaking if the cylinder falls over due to its unsteadiness.Graduated PipetteA graduated pipette is a long, calibrated tube that is used in the laboratory to measure the volume of liquid being transferred from one container to another. Along the side of the pipette is a volume scale that shows the volume from the tip to that point. Graduated pipets are classified on the basis of their accuracy levels. Pipets with a smaller volume capacity are generally more precise than pipets with larger contents.Volumetric PipetteA volumetric pipette is a device that has been calibrated to transfer a very specific volume of liquid from one container to other. Unlike graduated pipets, volumetric pipets do not have any scale markings engraved on them; however, they do have a ring mark near the top and a bulb expansion in the middle, on which the volume from tip to the ring is usually inscribed.BuretteA burette is a long cylindrical tube with a tap at the bottom, and it is usually mounted on a stand with the help of the clamps. This apparatus is widely used to provide a controlled flow of reagents during their volumetric analysis or titration. Burette has a volume scale engraved along its side which provides the volume readings for normality equations.SpatulasA spatula is a tool used to carry, mix, or spread solid or paste materials in the chemistry lab. They come in various shapes and sizes and are usually made of stainless steel. They are resistant to deterioration from contact with boiling water, acids, bases, and most solvents. For easier handling, some of them have a polyvinyl chloride plastic handle or a fixed hardwood grip.Laboratory ThermometerA laboratory thermometer is a device that is used to precisely measure temperature or temperature changes. A conventional laboratory thermometer consists of a long thin glass tube filled with mercury at the bottom that responds to temperature change; however, in modern laboratories, thermometers such as a bimetallic strip, an electronic thermistor thermometer, or an infrared (IR) device can also be found. A laboratory thermometer can be used for a variety of scientific purposes, including determining the melting and boiling points of substances, as well as determining reaction conditions.Bunsen BurnersA Bunsen burner is a type of gas burner designed to provide a single flame with the desired intensity. The barrel or chimney of the burner is mounted on a flat base that contains a hose barb, a gas valve, and an air window. Bunsen burners usually operate on natural gas (mostly methane) or liquefied petroleum gas.TripodA laboratory tripod is a three-legged platform that is used to support vessels while they are being heated on a bunsen burner. It is made of light metals such as stainless steel or aluminum and is designed to be light and easy to carry.Wire MeshWire mesh, also known as wire gauze, is a metal wire interwoven sheet that sits between the beaker and the tripod stand. Because glassware cannot be heated directly, a wire mesh is utilized to diffuse the heat from the flames. An asbestos ceramic layer is commonly included in the center of wire mesh for its heat-resistant qualities.Evaporating dishEvaporating dish, also known as a china dish, is a bowl-like apparatus that resembles a crucible but is used to evaporate liquid substances. Its utilized in those experiments where one needs to eliminate surplus solvent to get a concentrated solution or a solid precipitate of the dissolved component. Evaporating dishes are typically made of porcelain, and they can range in volume from 3 mL to 10 mL.Petri dishA petri dish is a shallow, transparent cylindrical tube used to carry out biochemical reactions in general. Its typically composed of heat-resistant borosilicate glass and comes with a lid to keep the sample safe from contamination.Water BathA water bath is one of the most essential apparatus in a chemical laboratory. It is a device used for heating flammable chemical samples at a constant temperature. A laboratory water bath is generally composed of a heating assembly, a stainless-steel chamber that holds the water and samples, and a user interface. Some water baths have extra features like circulating water to maintain a consistent temperature or a shaking water bath to keep the samples moving while they are cooked.Kipps ApparatusKipps Apparatus, also known as Kipps generator, is a device used in the chemistry lab to prepare gases such as hydrogen sulfide gas, carbon dioxide gas, and hydrogen gas. It was invented around 1844 by the Dutch pharmacist, Petrus Jacobus Kipp. The device is usually made of glass or polyethylene and consists of three chambers that are layered one on top of the other. The liquid reagent is poured via the top chamber, which is connected to the bottom chamber through a tube that runs through the middle chamber. When the bottom chamber is completely filled, the middle chambers stopcock is opened for a brief moment to expel the air. The liquid reagent then rises to the middle chamber and reacts with the solid reagent to produce the necessary gas, which can then be drawn off through the stopcock.Melting Point ApparatusA melting point apparatus is a device used to determine the melting point of the chemical compounds. The above-discussed thiele tube is one of the melting point apparatus. Other types may include the Fischer-Jhon apparatus, Gallenkamp (Electronic) melting-point apparatus, and automatic melting-point apparatus. Unlike the thiele tube, these apparatus do not require oil or any other chemical to determine the melting point of the given substance, instead, the sample is placed directly inside the apparatus with the help of a capillary tube.Digital BalanceA digital balance is a device used to measure the weight of chemical reagents in the chemistry lab. They are highly sensitive and can even weigh 0.001 gm of a substance. For this reason, they are periodically calibrated and usually kept inside glass walls. When weighing the substances, the walls should be kept close to reduce any error in the measurement.Digital ColorimeterA digital colorimeter is a device used in a chemistry lab to determine the concentration of a known solute by measuring the absorbance of a particular wavelength of light by a given solution. Digital Colorimeter works on the principle of Beer-Lambarts law, which states that the absorbance of light by a solution is directly proportional to the concentration of the solution. This device includes a photoresistor that monitors light transmittance or absorbance through the sample, which is then utilized to calculate concentration. Laboratory apparatus are essential tools that enable scientists to conduct experiments. By using lab tools, they can make measurements, and gather data in a controlled environment. These instruments range from basic items like beakers and test tubes for mixing and storing liquids. But there are also more complex equipment such as distilling flasks, which separate different mixtures. Today, well provide an overview of laboratory apparatus. Each one has a role in the laboratory and contributes to the accuracy of experiments. We can divide laboratory apparatus into 5 categories: Measuring Tools: Instruments like beakers and pipettes for measuring liquids. Heating Devices: Bunsen burners and hot plates for heating substances. Glassware: Flasks and test tubes for mixing and holding chemicals. Protective Gear: Gloves and goggles for safety. Analytical Instruments: Microscopes and spectrophotometers for detailed analysis. Now, lets get into more detail for examples of each of these categories. Below, youll find the 7 most common laboratory apparatuses that scientists use in the lab. The choice of apparatus depends on the type of experiment that the scientist is conducting.Each laboratory apparatus has its own unique purpose to facilitate specific experiments. Remember that all laboratory personnel should be well-versed in safety protocols before using any of these laboratory tools. In summary, laboratory apparatus are the backbone of scientific research. They enable scientists to conduct experiments in fields like chemistry, biology, physics, and Earth Science fields. Each piece of equipment plays a role in different experimental procedures. They range from simple mixing and measuring to complex analysis and observations. Knowing how and when to use these tools not only ensures accurate results. But it also enhances the efficiency and safety of laboratory work.Subscribe to our newsletter:Science is the branch of knowledge that incorporates the organized study of physical and natural phenomena. The chemical sciences encompass the behavioral study of matter present around us with the help of observation and experimentation. The school curriculum of chemical sciences in most countries comprises of two parts: Theory and Practical. While theory provides students with the knowledge in literal form, practicals connect the theory with physical reality. Experimentation is an important part of the chemical sciences, as it helps in understanding the complex interplay of chemicals in more detail. A general facility that provides a controlled environment to conduct these experimentations is famously known by the name Laboratories in schools, institutions, or any other organization. While working in a chemistry lab, one comes across several kinds of apparatus that are required to carry out experiments. It is essential to understand the functioning of these apparatus, as an ineffectiveness not only increases the risk of experimental error but also poses a potential laboratory hazard. 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The knee-long coat ensures the safety of the body and clothing from accidental spills and splashes of harmful chemicals. Moreover, in case of emergencies like fire or contamination, a lab coat can be easily and quickly removed than the usual clothing.Latex/Nitrile Gloves:Chemicals like acids are very reactive, and physical contact with such chemicals can cause severe burns. Latex or nitrile gloves work as a barrier between human skin and protect them from burns, infections, and contaminations caused by hazardous chemicals.BeakersBeakers are one of the most commonly used laboratory apparatus that one can come across in a chemistry lab. They are cylindrical, have a flat bottom, and a small spout on the top to pour chemicals. Beakers are usually made of borosilicate glass or plastic. While plastic beakers are only used to mix the chemicals, glass beakers have high thermal stability and can be used to heat chemicals also. Moreover, glass beakers provide more clarity for content visibility and measurement than their plastic counterparts. Beakers come in several sizes with volumes ranging from 5 milliliters to 10000 milliliters. Beakers are often used to hold, mix, and heat individual chemicals or chemical mixtures.Reagent BottleReagent bottles, sometimes also referred to as media bottles, are specially designed containers or vessels to hold chemicals in liquid or powder form. They come in a variety of sizes, shapes, and are commonly constructed of glass or plastic. While most are clear glass vessels, some reagent bottles are colored amber (actinic), brown, or red to protect light-sensitive chemical compounds from visible light, ultraviolet, and infrared radiation.FlasksFlask is a category of glassware used in the chemistry lab. They come in a variety of shapes and sizes, with each one having a specific purpose associated with it. Lets take a look at few types of flasks used in chemistry labs.Erlenmeyer FlaskErlenmeyer Flask, also known as a conical flask, is glassware comprising of conical body, flat bottom, and a cylindrical neck. It is one of the most commonly used flasks to carry out various experiments in the chemistry lab, such as titration, filtration, crystallization, etc. It was first patented in 1860 by a German chemist, Emil Erlenmeyer. The slanting sides and wide base of an Erlenmeyer flask make it a perfect conical vessel to mix the chemicals by swirling without any risk of spillage. Additionally, the cylindrical neck of a conical flask can accommodate a glass stopper, and it also provides support to fit funnels. Based on the application, an Erlenmeyer flask can either be graduated or unmarked. Moreover, it can also be used for heating and boiling purposes.Round Bottom Flask As the name suggests, a round bottom flask is a piece of laboratory glassware with a spherical bottom and a cylindrical neck. The round bottom of the flask provides a suitable surface area for the equal distribution of heat around the vessel. Thus, it is often used in experiments that require uniform heating or boiling of the chemical contents. Additionally, the cylindrical neck can support funnels and accommodate glass stoppers. Round Bottom flasks are often used with other heating apparatus such as sand bath, water bath, rotary evaporator, etc. It is widely used to carry out the laboratory-scale synthesis of other chemicals; however, it does not provide mixing as good as conical flask by swirling. A mechanical stirrer or glass rod comes in handy while mixing the contents in a round bottom flask.Volumetric FlaskA volumetric flask is one of the laboratory glassware primarily used to prepare solutions. It is composed of a flat bottom conical-shaped bulb attached to an elongated neck with an engraved ring that serves as a marking that indicates a specific volume. Because its mark specifies a precise volume measurement, the flask is also known as a graduated flask or measuring flask. To prepare a solution, place the solute in the volumetric flask and then add enough solvent to dissolve it. After that, use a pipette or dropper to carefully add the solvent until the solution reaches the etched marking. The marking indicates the required volume of the solution. Its vital to note that volumetric flasks are calibrated for a specific temperature indicated on the flask. Furthermore, the flask has a number on it to determine the size of the suitable glass stopper. Volumetric flasks are usually made of transparent borosilicate glass or plastic; nevertheless, amber-colored volumetric flasks are employed in laboratories for the preparation of light-sensitive solutions.Retort FlaskThe retort flask is an oddly shaped airtight glassware with a curved neck. Although retort flasks are no longer employed in current chemistry labs, they were employed by several famous chemists, including Antoine Lavoisier and Jns Berzelius, to carry out distillation processes. Today, condensers have replaced retort flasks as a more convenient apparatus; nonetheless, retort flasks are still commercially available and can be used for non-complex distillation.Bchner Flask The Bchner Flask is a chemistry lab glassware instrument that looks almost identical to the Erlenmeyer flask but has thicker walls and a hose barb near the mouth. It is commonly used for vacuum filtration or distillation of solutions. The Bchner flasks thick wall makes it strong enough to resist the pressure difference while maintaining a vacuum inside. It is named after its inventor, Ernst Wilhelm Bchner, a German industrial chemist who is also known for the invention of Bchner Funnel. Other names include vacuum flask, filter flask, suction flask, side-arm flask, and Kitasato flask. When used with the Bchner Funnel, it allows for faster filtration under vacuum than traditional methods.Pear-Shaped Flask As the name suggests, a pear-shaped flask is laboratory glassware with V-shaped bottom, like an inverted pear. It is commonly used in organic chemistry for several heating purposes, such as evaporating solutions to dryness post-synthesis using a rotary evaporator and removing concentrated samples.Kjeldahl Flask. A Kjeldahl flask is a chemistry lab glassware that resembles a volumetric flask but has a circular bottom instead of a conical one. This flask was designed in the 19th century by Johan Gustav Christoffer Thorsager Kjeldahl, a notable Danish scientist, to assess the nitrogen concentration in organic compounds using the Kjeldahl digestion, a procedure he also devised. During the digesting stage, the flasks extra-long neck works as an air condenser, reducing the entrapment of vapors.Schlenk FlaskA schlenk flask is a type of laboratory glassware that is used to perform anaerobic reactions. Its a flask with a pear-shaped or spherical bottom and a sidearm near the neck thats used to fill or expel inert gases. Flushing the flask with inert gas is a typical method of changing the flasks environment. This is achieved by flushing the flask through its sidearm or with a wide bore needle attached to a gas line. The contents of the flask exit the flask through the flasks neck part. The needle approach offers the advantage of being able to place the needle towards the bottom of the flask to better flush out the flasks environment.Test Tube In a chemistry lab, the test tube is one of the most widely used glassware apparatus. It is a cylindrical vessel with a round bottom that is used to hold chemicals during the experiments. Due to their high thermal stability, test tubes can be used to heat or boil chemical samples. While heating, its essential to hold the test tube at a 45-degree angle so that the gases formed inside the narrow tube may easily escape without causing the hot liquid to shoot up.Boiling TubeA boiling tube is a glassware apparatus that looks similar to a test tube, although it is 50% larger in size. As the name indicates, boiling tubes are used to boil chemicals. Unlike test tubes, boiling tubes are made of pyrex, a material with superior thermal stability that allows them to be heated to far greater temperatures than borosilicate glass test tubes.Centrifuge TubeA centrifuge tube is a cylindrical vessel with a cap that is used in a centrifuge machine to separate the components of solutions. The centrifuge tubes are small test tubes with curved tips and can be made of glass or plastic. The tips design may vary depending on the types of solids, biomolecules, and insoluble substances in the chemical sample.NMR TubeNMR, an acronym for Nuclear Magnetic Resonance, is an imaging technique used in chemistry as well as physics to observe the magnetic behavior around the atomic nuclei. NMR tubes are specially built cylindrical tubes with a diameter of 5mm that are used to contain nucleus samples during spectroscopy. Theyre usually made of borosilicate glass, and theyre sealed with polyethylene caps or by melting the glass at the open end and twisting it.Thistle Tube.A thistle tube, also known as a thistle funnel, is a piece of laboratory glassware with a long tube shaft and a reservoir bulb with a flared rim on top. These funnels enable the precise placement of small quantities of chemicals in an existing system or apparatus, making it easier to add new materials to burets and narrow neck containers. Thistle tube funnels reduce the possibility of a reaction occurring too quickly and gushing over.Capillary TubeA capillary tube is chemistry lab apparatus commonly used to calculate the melting point temperature of chemical substances. It is a thin pipe that comes in different inner diameters ranging from 0.5 mm to 3 mm and lengths ranging from 1mm to 6 mm. They are used to hold the sample of the chemical substance, whose melting point is to be found, inside the melting point apparatus or thiele tube.Fusion TubeA fusion tube is a laboratory tube that functions similarly to boiling tubes, though it is much smaller and thinner. It is used to conduct experiments such as the sodium fusion test (Lassaignes test) or determine the substances melting/boiling point by heating a small sample excessively. Since fusion tubes are meant to be broken down after heating, they are made of thinner glass.Thiele TubeA Thiele tube is a piece of laboratory glassware used to determine the melting point of organic compounds. It looks like a regular glass test tube attached to a V-shaped handle that forms a triangle. The structure of the Thiele tube provides a convectional flow of heat around the triangular region, which evenly and quickly distribute the heat from the flame throughout the heating oil. The sample is submerged into the oil bath inside a capillary tube closed from one side and then attaching the capillary tube to the thermometer with the help of an elastic band of excellent thermal stability. The melting point is the temperature measured on the thermometer when the sample begins to melt.Test Tube holderA test tube holder is a device used to hold test tubes while heating them. It provides a safe distance between the persons hand and the test tube, protecting the skin from accidental burns caused by the spilling of chemicals.Test Tube RacksA test tube rack is composed of one perforated sheet arranged over a plain sheet of plastic or metal, which holds the test tubes in an upright position. Moreover, some test tube racks also come with the space to hold the test tubes in a slanting position. They are specifically employed in experiments that require the use of several test tubes or when a test tube must be stored undisturbed for an extended period of time.Centrifuge MachineA centrifuge is a laboratory apparatus that separates fluids, gaseous or liquid, according to density. Separation is accomplished by rapidly spinning a centrifuge tube containing the substance. A centrifuge machine is based on the principle of sedimentation, though the process is far more efficient and rapid than natural sedimentation. Substances segregate according to density under the influence of gravitational force (g-force) induced by high-speed spinning. Centrifuge machines can also be used to collect cells, precipitate DNA, purify viral particles, and identify minor changes in molecular conformation. Nowadays, research facilities and labs are equipped with multiple types of centrifuges capable of utilizing a range of rotors.Mechanical ShakerAs the name suggests, a mechanical shaker is a laboratory device used to mix, blend, or stir chemical compounds by shaking them. It contains an oscillating board that holds test

tube.Digital BalanceA digital balance is a device used to measure the weight of chemical reagents in the chemistry lab. They are highly sensitive and can even weigh 0.001 gm of a substance. For this reason, they are periodically calibrated and usually kept inside glass walls. When weighing the substances, the walls should be kept close to reduce any error in the measurement.Digital ColorimeterA digital colorimeter is a device used in a chemistry lab to determine the concentration of a known solute by measuring the absorbance of a particular wavelength of light by a given solution. Digital Colorimeter works on the principle of Beer-Lambarts law, which states that the absorbance of light by a solution is directly proportional to the concentration of the solution. This device includes a photoresistor that monitors light transmittance or absorbance through the sample, which is then utilized to calculate concentration. A laboratory is a building or special room specifically designed for conducting experiments, research, and practical demonstrations related to chemical principles and reactions. It is equipped with various equipment (or apparatus) and chemicals necessary for carrying out experiments safely and effectively. Most laboratory apparatuses that are used as containers or reaction vessels are made with transparent glass or plastic. This is to allow correct observation during a reaction or measurement, for instance, to determine the level of liquids held in there. Glass and plastic also dont react with most of the reagents used in the laboratory. Apparatus for Heating: Heating sources in the laboratory are needed to facilitate chemical reactions, evaporate liquids, sterilize equipment, melt solids, dry samples, and perform various other essential tasks. The most common apparatus used for heating in the laboratory are the Bunsen burner, hot plates, and spirit lamp.Apparatus for Measuring Temperature: Temperature is usually measured with thermometers. The most common types of thermometers in chemistry laboratories are maximum and minimum thermometers, clinical thermometers, and general-purpose thermometers. Apparatus for Measuring Mass: Mass is measured using weighing balances. The most common types of weighing balances in chemistry laboratories include beam balances, electronic balances, and top balances.Apparatus for Measuring Volume: Apparatus used for measuring volumes of liquids include graduated beakers, graduated conical flasks, measuring cylinders, volumetric flasks, syringes, pipettes, and burettes. Each apparatus is designed for its specific use and may come in various sizes. Graduated beakers, graduated conical flasks, and measuring cylinders are used to measure approximate volumes of liquids. When fairly accurate volumes are required, volumetric flasks, syringes, pipettes, and burettes are used. Lets now focus on specific laboratory apparatus and their uses. There are many laboratory apparatuses that you will find in modern chemistry laboratories but here is a list of the most common: Used for general laboratory experiments Used for holding water for experiments, especially when collecting gas over water Used to safety hold corrosive or hot solids Used when heating liquid substances because heat is supplied uniformly so that the flask doesnt crack as it expands Used for general laboratory experiments Used for general laboratory experiments and for measuring approximate volumes of liquids Used for delivering liquids carefully into vessels Used to add controlled amounts of liquids into reaction funnels Used for separating immiscible liquids Used for delivering liquid substances in reaction vessels Used for gas collection Used when evaporating liquids Used to hold water for rinsing vessels and for adding water to vessels with narrow necks Used for storing bench reagents Used for scooping solid substances from containers Used to deliver a specified volume of liquid accurately Used for delivering accurate volumes of liquids Used for preparing a specified volume of solution Used for delivering liquids drop-wise Used when heating solid substances that require strong heating Used for drying or keeping substances free from moisture Used for supporting crucibles during heating Source of heat in the laboratory Used for supporting beakers and flasks during heating Used for even distribution of heat when heating substances in beakers or flasks Used for crushing substances Used for holding substances being burned in gas jars Used for holding boiling tubes and test-tubes Used for holding and supporting pieces of apparatus during experiments Used as a surface to evaporate a liquid, as a cover for a beaker, to hold solids while being weighed, and for heating a small amount of substances. Usedto observe color changes in micro quantities of liquids Used to handle air-sensitive reagents without exposing them to oxygen or moisture Used for mixing, heating, storing, and measuring liquids, and for general laboratory tasks. Used to collect and measure the volume of gas evolved during a chemical reaction. Used for vacuum filtration Used to cool and condense vapors, typically during distillation processes. Used during distillation to provide surface area over which vapor condenses before passing into the Liebig condenser. Used to hold the liquid/mixture being distilled. Used to connect the distillation flask to the condenser in a distillation setup. Used to measure volumes of liquids accurately. Used for stirring solutions and suspensions. Used to heat solutions and substances in the laboratory. Used to measure the mass of substances accurately. Used to measure the duration of time intervals in experiments. Used to measure the temperature of substances or solutions. Used to separate solids from liquids through filtration. Used to stir solutions in sealed containers (without the need to open the containers) Used to hold or store small quantities of laboratory samples. Used for determining melting and boiling points of substances accurately. Used to hold samples in spectrophotometry for analysis of light absorption/transmission. Used to measure the volume of gases produced or consumed in a reaction. Used to handle small objects with precision. Used for eye protection against chemical splashes, debris, or other hazards. Used to transfer liquids or gases between apparatus. Used to measure the acidity or basicity of a solution. Usedto examine small samples of substances (crystals, cells, bacteria etc) Used to separate components in a mixture based on density through rapid spinning. Used to clean the inside of test tubes and other narrow glassware A type of conical flaks used invacuum filtration, where liquid is drawn through a filter by suction This list of laboratory apparatus should serve as a useful starting point for any beginner chemistry student and researcher. However, its important to note that the list isnt exhaustive. Depending on the specific experiments or research being conducted, you may encounter numerous other specialized apparatus. Lab Equipment Crossword PuzzleLaboratory Equipment Word SearchBasic Chemistry Laboratory Safety Rules for Students

Label the apparatus. What are laboratory apparatus. What are the common apparatus used in laboratory. Apparatus used in chemistry laboratory. What are the apparatus used in chemistry lab. What are the 10 laboratory apparatus and their uses. What are the equipment used in chemistry laboratory. Chemistry laboratory equipment.