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In chemistry what is a standard solution

A standard solution is any chemical solution that's been prepared from a primary standard and where you know the concentrations. It typically has a relatively high molar mass that can be accurately measured for comparison. It must also have a high level of purity, stability, and solubility in water. A standard solution is measured to a fixed volume as per your requirements. To prepare a standard solution, you need an accurate weighing scale that's correctly calibrated at the milligram level. You'll also require a graduated cylinder that can measure fractions of millilitres. Standard solutions play an important role in laboratory analysis and manufacturing processes. Purity tests and chemical reaction tests, such as acid-base neutralisation (titration experiment) require a standard solution. Standard solutions can also be used to quality control mass-produced products and test for pollution based on a certain threshold. The Characteristics of Standard Solutions A standard solution can consist of any solute-solvent combination if the precise concentrations are known. Water is commonly used as a solvent, while a water-soluble compound usually acts as the solute. Standard solutions can either be bought from a chemical supplier or they can be manufactured to suit your needs. However, not all substances can be prepared into standard solutions. A standard solution must have the following characteristics: High level of purity - No other extraneous substances should be present in the solution or, at the very least, any impurities must be negligible. This is crucial when you require accurate and precise measurements. Non-reactive with air or water - If the solute reacts with air or water it will no longer be the same substance and you won't achieve the desired results. Solubility - The solute must be reasonably soluble in water to achieve the necessary molarity. It must not simply act as a suspension that settles down as the solid precipitates. High molar mass - This is important because you need to weigh the solute and compare it with the molarity of the substance you're testing. You may need to test for the specific gravity of the analyte based on the known specific gravity of the solute in the standard solution. Non-hygroscopic property - This means the solute does not absorb moisture from the air. Its weight can therefore be maintained at a precise range even if the humidity fluctuates. What are Primary Standard Solutions? A primary standard solution is a type of reagent that has a high level of purity. It has a very precise concentration that reflects the molar concentration of the solute. Its pure state means you can measure the mass to volume ratio with a high degree of accuracy. Aside from its high purity level, which is typically more than 99%, the solute substance is stable and non-reactive to air and water. Not all substances are suited to being part of a standard solution due to their relative chemical instability. For example, sodium hydroxide (NaOH) can absorb carbon dioxide from the air, which affects its concentration as a solute. A primary standard solution can be used to calibrate secondary standard solutions. Some examples of primary standard solutions include: Sodium chloride - table salt is used as a primary standard solution for reactions involving silver nitrate. Powdered zinc - powdered zinc is often used to standardise ethylenediaminetetraacetic acid or EDTA, which acts as a stabiliser in many pharmaceutical products. The zinc powder is dissolved in either hydrochloric or sulphuric acid as a primary standard solution. Potassium hydrogen phthalate - this can be used to calibrate perchloric acid and acetic acid as standard solutions. What are Secondary Standard Solutions? Secondary standard solutions aren't as pure or as chemically stable as primary standard solutions. Unlike primary standards, secondary standard solutions may react slightly with water and air. They're also hygroscopic, which means they may need to be calibrated before being weighed. Secondary standards solutions are used for specific analytical applications including: Acid-base titrations Reduction-oxidation titrations Precipitation titrations Complexometric titrations Secondary standard solutions are used in conducting acid-base titration experiments How do you Prepare a Standard Solution in Chemistry? To prepare a standard solution, you first need to weigh a standard solute based on the desired molar concentration. You'll then need to dissolve the solute in a specific volume of solvent. You can measure and adjust the concentration using parameters such as pH level, the specific gravity, spectrometry and assay tests. How is a Standard Solution Used in Analytical Chemistry? Standard solutions have various applications in analytical chemistry. As we've already discussed, primary standard solutions can be used to calibrate secondary standard solutions. Both primary and secondary solutions are also integral to the qualitative analysis of solutions with unknown concentrations. Standard solutions are primarily used in titration analysis to determine the concentration of analytes based on the threshold of neutralisation. As reagents, these solutions are crucial in synthesising various products, including medicines. They can also help to maintain quality control in products. A solution of known concentration, used as a standard of comparison or analysis. QUIZ YOURSELF ON "ITS" VS. "IT'S"! Apostrophes can be tricky; prove you know the difference between "it's" and "its" in this crafty quiz! On the farm, the feed for chicks is significantly different from the roosters'; _____ not even comparable! TAKE THE QUIZ TO FIND OUT Meet Grammar Coach! Improve Your Writing Meet Grammar Coach! Improve Your Writing standard operating procedure, standard poodle, standard schnauzer, standard score, standard scratch score, standard solution, standard temperature, standard temperature and pressure, standard time, standard volume, stand at ease! The American Heritage® Stedman's Medical Dictionary Copyright © 2002, 2001, 1995 by Houghton Mifflin Company. Published by Houghton Mifflin Company. A standard solution is a solution with a known concentration. In chemistry, a solution is a mixture of two or more substances or elements in which neither substance or element chemically changes. For example, salt water is a solution that contains water (H₂O) and salt (NaCl). Concentration is the amount of dissolved substance (solute) in a solution. In other words, it is the amount of stuff that has been mixed into your liquid. Concentration is usually measured in molarity (M), which is the number of moles of solute per liter. In a standard solution, you know precisely what the concentration of the solute is. Successfully preparing a standard solution requires care, because without an accurate measurement, you can't accurately compare the standard solution with an unknown solution. Generally speaking, a properly prepared standard solution relies on the exact amount and mass of the solute and the complete dissolution of the solute in a precisely measured volume of a known solution. Because you know what both the mass and volume are, you can precisely calculate the concentration of your standard solution. The term standard solution dates back to at least the 1870s. Even then, it was used to refer to solutions with known concentration. In chemistry, standard solutions are used for comparison purposes when analyzing unknown solutions. Standard solutions can also be added to an unknown solution until a reaction occurs in order to gather information about the unknown solution. For example, you can add a weak base to an unknown acid until the solution changes color in order to determine the unknown solution's exact pH. Distilled water is often the liquid used in standard solutions due to its wide availability. Standard solutions are used in a type of chemical analysis known as titration. Titration has a wide number of uses, ranging from food processing to high school chemistry experiments. chemistry solution concentration solvent solute titration True or False? In a standard solution, the concentration is a known quantity. Using standard methods, the cost of printing DNA could run upwards of a billion dollars or more, depending on the strand. The same Pediatrics journal notes that 17 states have some form of exception to the standard parental consent requirement. Christopher Nolan, Intorstellor "My films are always held to a weirdly high standard," Nolan told me. Completed in 1953 and composed with standard line breaks and punctuation, the book was completely ignored upon submission. The End of Gangs By Sam Quinones, Pacific-Standard Los Angeles gave America the modern street gang. And it would be hard indeed, if so remote a prince's notions of virtue and vice were to be offered as a standard for all mankind. Gulliver's Travels | Jonathan Swift The new creed, called the King's Book, approved by the houses of convocation, and made the standard of English orthodoxy. The Every Day Book of History and Chronology | Joel Munsell The news of these successes brought crowds of volunteers to our standard. The metal is then removed, and washed successively with very dilute sodium hydroxide solution, alcohol, and ether. A Manual of Clinical Diagnosis | James Campbell Todd At once cover the mouth of the tube with a filter-paper cap moistened with saturated aqueous solution of silver nitrate (1:1). A Manual of Clinical Diagnosis | James Campbell Todd WORD OF THE DAY paludal adjective | [puh-lood-l, pal-yuh-dl] SEE DEFINITION FEEDBACK © 2022 Dictionary.com, LLC

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