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Intensive and extensive properties chemistry

Cynthia Navarrete An extended property is a property that changes when the sample size changes. Examples are mass, volume, length, and total charge. An intensive property does not change when you take away part of the example. Examples are temperature, color, hardness, melting point, boiling point, pressure, molecular weight, and density. Since intensive properties are sometimes characteristic of a particular material, they can be useful as clues in the identification of unknown substances. Try this property classification quiz to see if you can distinguish intensive and extended properties. Author: Fred Senese senese@antoine.frostburg.eduPage 2 Chemical change is any change that results in the formation of new chemicals. At the molecular level, chemical change involves the creation or breaking of bonds between atoms. These changes are chemical: rust of iron (forms of iron oxide) combustion of gasoline (water vapor and form of carbon dioxide) eggs that cook (fluid protein molecules unroll and cross to form a network) increase bread (the yeast converts carbohydrates into carbon dioxide gas) soured milk (lactic acid with a sour acid flavor is produced) tanning (vitamin D and melanin is produced) Physical change reorganizes molecules but does not affect their internal structures. Some examples of physical change are: whipping egg whites (air is forced into the fluid, but no new substance is produced) magnetizing a compass needle (there is a realignment of the groups (domains) of iron atoms, but no real change within the iron atoms themselves). boiling water (water molecules are forced to move away from each other when the liquid changes into steam, but the molecules are still H_2O.) by dissolving sugar in water (sugar molecules are dispersed inside the water, but individual sugar molecules are unchanged.) dicing potatoes (cutting usually separates molecules without changing them). The classification of real processes can be complicated. Complex changes can be divided into many simpler steps. Some steps are chemical and others are physical, so the overall process cannot be cleanly placed in both categories. For example, boiling coffee involves chemical changes (the delicate molecules that give coffee its flavor react with air and become new substances with a bitter taste) and physical changes (the water in the coffee is going from liquid to gaseous). Author: Fred Senese senese@antoine.frostburg.eduPage 3 For most of the 20th century, coffee was decaffeinated with dichloromethane, CH_2Cl_2. Dichloromethane dissolves caffeine without taking away sugars, peptides and aromatic ingredients, then removes the hum of coffee without changing its taste. However, it is somewhat toxic and, when evidence has suggested it could be carcinogenic, its use has been drastically reduced. Ethyl acetate was used as a substitute for dichloromethane during the 1980s and early 1990s. Even if it is it is toxic, coffee maker advertised ethyl acetate as natural because it was present in fruit. A non-toxic and more environmentally friendly solvent is now used than dichloromethane or ethyl acetate: carbon dioxide of the supercritical fluid. When a sealed vial containing gaseous and liquid carbon dioxide at high pressure is heated, the density of the liquid decreases as the gas density increases. If the pressure is above 72.8 atm and the temperature exceeds 304.2 K, the liquid density and gas density become identical. The meniscus between the liquid and gas phases vanishes. Carbon dioxide becomes a supercritical fluid that has both gaseous and liquid properties. The fluid fills the container like a gas, but can dissolve substances such as a liquid. Supercritical fluid carbon dioxide is an excellent non-polar solvent for many organic compounds, including caffeine. The extraction process is simple. Supercritical carbon dioxide is forced through green coffee beans. His gaseous behavior allows him to penetrate deep into the beans and dissolves 97-99% of the caffeine present. Caffeine is valuable, and coffee makers usually try to recover it. Caffeine-lading CO_2 is sprayed with high-pressure water, and caffeine is then isolated by a variety of methods, including coal adsorption, distillation, recrystallization, or reverse osmosis. References O'Brien, M.J., Spence, J.E., Skiff, R.H., Vogel, G. J., Prasad, R.: Caffeine Recovery from Supercritical Carbon Dioxide, US Patent 4.996.317, 1991 [an error occurred while drafting this directive] Related resources [an error occurred while drafting this directive] Author: Fred Senese senese@antoine.frostburg.eduPage 4 I'm trying to find information about the technique of paper chromatography and separating pigments in the paint of the commercial artist. If someone could send me information or references, I would appreciate it. It's for a lab project that I'm designing for a quantitative analysis class. Tonya Wright 01/02/98 Tonya, you can find experimental procedures to separate the oil-soluble artist's pigments using paper chromatography in the Journal of the Association of Official Analytical Chemists (JAOAC), 35, 423(1952) and 36, 802(1953). See also the official AOAC methods for colour additives in the official methods of analysis of the Association of Official Analytical Chemists, AOAC, 13a ed., 1980, pp 568-575. Many water-soluble dyes can be easily separated on paper. The artist's watercolor paper works well (make sure the paper is white). Locate the paper by applying the pigment with a capillary tip; if you can let it dry the point and then reapply the pigment in exactly the same place you will get better results. Place a concentrated nacl solution (e.g. 20% w/n) in a glass or beaker and suspend the paper vertically so that the edge below the point absorbs the solution. Keep the top the container has closed so that the paper cannot dry when the front of the solvent is raised. The front of the solvent can be irregular if the chamber is not saturated with solvent steam. If you do not get a good separation try to dilute the salt solution until you do. If the separation is still poor or the point does not move much, try mixing some alcohol with the solution. If you see a lot of tailing, you might try adding some acetic acid or vinegar to the solution. Tails are often caused when the dye is a weak acid or a base present in different ion forms; the addition of vinegar helps to keep the dye a single form (acidic). The following websites contain useful basic information and experimental procedures for paper chromatography. [an error occurred while the directive was being drafted] Author: Fred Senese senese@antoine.frostburg.eduPage 5 I want to know the easiest way to remove sodium chloride from a solution and store the other minerals again. sireno@netonecom.net dissolved salts are usually removed using deonization or reverse osmosis. Deionization passes water on to ion exchange resins, which absorb dissolved ions. Reverse osmosis is what Kevin Costner did in Waterworld's opening scene: force pressurized water through a membrane impervious to dissolved salts. However, neither approach will selectively remove sodium chloride. The simplest approach would probably be deionization, followed by the replacement of dissolved minerals removed in deionization. Determine the concentration of the mineral components that you want to maintain. Pass the water through a deionizer. This is a column full of mixed resins of cation and anion exchange. The cation-swapped resin will remove Na^+ ions, replacing them with H^+ ions. It will also replace calcium and magnesium and other formations. Anion-swapped resin will replace chloride with hydroxide ions. Hydroxide ions will neutralize hydrogen ions produced in the previous phase. The anion-swapped resin will also expel sulfate from water. Replace the mineral components lost in the cation and anion removal processes. The alternative approach, reverse osmosis, is outlined here. Author: Fred Senese senese@antoine.frostburg.edu There are two different categories in which the physical properties of matter can be classified, namely intensive and extensive properties. These terms were introduced in 1917 by Richard C Tolman. In addition, it can be noted that the ratio of two extended properties any will produce an intensive property. For example: the ratio of mass to volume is equal to density. Mass/Volume = Mass density and are extended properties while density is an intensive property. Intensive properties The intensive word was derived from intensives. Intensive properties are independent of the amount of substance present. Or they're mass properties. Feature Feature Change. The size of intensive properties does not change. Density, temperature, pressure, etc. are some examples of intensive properties. Extended properties The extended word was derived from extended. Extended properties depend on the amount of substance present. They can be easily identified. The size of extended properties changes. It can be calculated. Volume, size, mass, length, weight are some examples of extended properties. To make you understand how intensive and extensive the properties are different from each other, here are some important differences between intensive and extended properties: Difference between intensive and extensive properties INTENSIVE EXTENSIVE Independent property The size of the dependent property does not change Size changes Can not be easily identified It can not be easily identified Example: melting point , color, ductility, conductivity, pressure, boiling point, shine, freezing point, smell, density, etc. Example: length, mass, weight, volume These were some important differences between extended and intensive properties. To know the differences between other topics in chemistry you can register at BYJU'S or download our app for simple and interesting content. India's largest K-12 learning app with top-notch teachers from across the nation with excellent teaching skills. Find notes, question articles for other subjects such as mathematics, physics, biology, and various competitive exams. Enjoy learning with a great experience. Learning is no longer tedious with BYJU.S. Recommended video-related links: Subject characteristics Intensive property is a product property that doesn't change as the number of topics increases. It is a mass property, which means that it is a physical property that does not depend on the size or weight of a sample. Mass and weight, for example, are extended properties, but their ratio (density) is an intensive property of the product. Although extended properties are good for describing a sample, they are not very useful for classifying it as they can change depending on sample size or condition. The concentrated property is independent of the amount of mass. The value of a large property varies directly with the volume. Examples of intensive properties are temperature, pressure, total volume, and density. There are two different categories of thermodynamic properties: intensive properties and extended properties. An extended property is any property depending on the size (or extent) of the system being considered. The volume is an example. A large property is a material property that varies as the number of materials increases. What physical properties, without chemical alterations (reaction), an extended property can be detected and measured. Measured. Measured.

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