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A mixture whose components cannot be separated by simple distillation, as the vapor and liquid phases have the same proportions at boiling point. ===== The behavior of liquid mixtures when boiled is described by Raoult's law, but there are exceptions. Certain mixtures do not follow this general rule; their vapor-phase composition matches that of the liquid phase at a specific ratio. These mixtures cannot be separated into individual components using simple distillation, as they reach an equilibrium where the vapor and liquid phases have the same proportions. The bottom graph depicts the boiling temperature of various compositions. Below the bottom graph, only the liquid phase is in equilibrium. The top graph illustrates the vapor composition above the liquid at a given temperature. Above the top graph, only the vapor is in equilibrium. Between the two graphs, both phases coexist in equilibrium; for example, heating a 25% X / 75% Y mixture to a certain temperature would produce vapor of composition B over liquid of composition A. The azeotrope is marked where the two curves touch. The horizontal and vertical lines show the path of repeated distillations. Point A represents the boiling point of a non-azeotropic mixture, with the vapor at that temperature having composition B. The vapor at point B is richer in constituent X than the liquid at point A. The stepwise progression indicates how repeated distillation can never produce a distillate that is richer in constituent X than the azeotrope. Note that starting from the right of the azeotrope point results in the same stepwise process closing in on the azeotrope point from the other direction. Azeotropic mixtures display unique behaviors when subjected to distillation, characterized by the formation of an equilibrium between two or more components. This phenomenon occurs when a mixture's composition creates a temperature minimum or maximum point, known as an azeotrope. The presence of an azeotrope dictates that no amount of distillation can separate the constituents into pure fractions on opposite sides of the azeotrope from the original mixture. The concept of azeotropes involves the separation of mixtures to obtain nearly pure acetic acid as a residue. A p-v-x diagram is necessary for this process. Binary azeotropes consist of two components, such as diethyl ether and halothane, which were once used in anesthesia. The pursuit of an ideal hydrogen chloride-rich solution has led to a crucial understanding of the boiling process and its effects on the resulting mixture. Initially, if the solution contains more than 20.2% hydrogen chloride, repeated boiling will ultimately leave behind a poorer solution in terms of hydrogen chloride content compared to the original. Conversely, when two solvents form a positive azeotrope, distillation of their mixture can result in a residue that is further away from the desired composition at the azeotropic ratio. A notable example is the 50/50 ethanol-water mixture, which upon initial distillation yields 80% ethanol and 20% water, bringing the solution closer to the azeotropic ratio than its original state. Repeated distillations refine this process, progressively approaching the azeotropic composition of 95.5/4.5%. Notably, when distilling mixtures richer in ethanol than their respective azeotropes, the resulting distillate tends to be poorer in ethanol than initially anticipated. Distillation plays a vital role in separating mixtures into their constituents, yet its limitations become apparent with azeotropic mixtures. This inherent challenge has led researchers to question whether these systems represent compound entities or distinct mixtures;progressiv distillation can produce a residu as rich in X as is requirid. In summery: Low-presur rectification (A to B) High-presur rectification (C to D) Low-presur stripping (E to target puritie) Rectification: the distillat, or "tops", is retaind and exhibits an increasinly lower boiling point. Stripping: the residu, or "bottoms", is retaind and exhibits an increasinly higher boiling point. A mixture of 5% water with 95% tetrahydrofuran is an example of an azeotrope that can be econmically separate using a presur swing: a swing in this case between 1 atm and 8 atm. By contras the composition of the water to ethanol azeotrope discusd earler is not affectd enuf by presur to be easly separatd using presur swings[13] and insted, an entraine may be add that either modify the azeotropic composon and exhibit immiscibilit with one of the komponants, or extractiv distillation may be usd.[22] Main article: Azeotropic distillation Othr metods of separation invole introducing an additional agent, calld an entraine, that will afekt the volitility of one of the azeotrope konsituents more than anuvver. When an entraine is add to a binary azeotrope to form a ternary azeotrope, and the resulting mixture distilld, the metood is calld azeotropic distillation. The best known exmple is adding benzen or siklohexane to the water/ethanol azeotrope. With siklohexane as the entraine, the ternary azeotrope is 7% water, 17% ethanol, and 76% siklohexane, and boils at 62.1 °C.[23] Jus enuf siklohexane is add to the water/ethanol azeotrope to engage all of the water into the ternary azeotrope. When the mixture is then boild, the azeotrope vaporizes leaving a residu komposd almost enufly of the excess ethanol.[13] Anuvver type of entraine is one that has a strong kemikal affinity for one of the konsituents. Using agen the exmple of the water/ethanol azeotrope, the likid kan be shake with kalium oksid, which reakt strongly with water to form the nonvoltile komponnd, kalium hidroksid. Nerly all of the kalium hidroksid kan be separety by filter and the filtrate redistilld to obtain 100% pure ethanol.Azeotropes are mixtures of two or more liquids that have a constant boiling point, meaning the vapor phase has the same composition as the liquid phase regardless of the temperature. The constituents pass through the membrane entirely in the vapor phase. In all membrane methods, the membrane separates the fluid passing through it into a permeate (that which passes through) and a retentate (that which is left behind). When the membrane is chosen so that it is more permeable to one constituent than another, then the permeate will be richer in that first constituent than the retentate. When creating an azeotropic mixture, the boiling points of each individual component are often different. However, when these components mix together, they form a new compound with a fixed boiling point, which is the azeotrope. This phenomenon can occur in various fields such as chemical engineering and food processing. =====isopropyl alcohol ===== isopropyl alcohol, IPA, or rubbing alcohol is a colourless liquid with a pungent alcoholic odorthat is commonly used as an antiseptic and solvent. It has a wide range of applications in medicine, industry, and everyday life. isopropyl alcoholis a simple secondary alcoholsimplest secondary alcoholwith the molecular formula C3H8Oand molecular weight 60.096 g/molIt is a clear, colourless liquid with a pungent alcoholic odorthat has a distinctive smell. isopropyl alcoholhas several different names, including propan-2-olIUPAC name and 2-Propanolsec-Propyl alcohol2-Hydroxypropanei-ProHDDimethyl carbinolIPA. It is also known as rubbing alcolumbased on its common use as a skin irritant. isopropyl alcoholis used in many different applications, including medicine, industry, and everyday lifeIt has antiseptic properties, making it useful for wound cleaning and disinfection. It is also used as a solvent in various industrial processes. isopropyl alcoholhas several hazards associated with its use, including flammabilityand toxicity. It can cause skin irritationand eye damageif not handled properly.isopropyl alcohol, a flammable compound with a pungent smell, is miscible with water, ethanol, and chloroform, makin it useful for dissolving many substances, however; it cant be mixed with salt solutions and must be separated by addin sodium chloride through a process calld salting out. isopropyl alcohol was first synthesized in 1853 by chemist Alexander William Williamson through a process involving propene and sulfuric acid. Standard Oil later produced isopropyl alcohol by hydrating propene. ===== isopropyl alcohol production varies between hydration and hydrogenation processes. In the USA, isopropyl alcohol is predominantly produced through an indirect hydration process that involves low-quality propene, whereas in Europe, direct hydration is more common due to the requirement of higher-purity propylene. isopropyl alcohol is commonly used for cleaning eyeglasses, electrical contacts, audio or video tape heads, DVD and other optical disc lenses, bong, [22] and for removing thermal paste from heatsinks on CPUs[23] and other IC packages. It is sometimes used by miniatures hobbyists to strip acrylic paints & primers from high impact polystyrene miniatures.[24][25][26] isopropyl alcohol esterify to give isopropyl acetate, another solvent. It react with carbon disulfide and sodium hydroxide to give sodium isopropylxanthate, which have use as an herbicide and an ore flotation reagent.[27] Isopropyl alcohol react with titanium tetrachloride and aluminium metal to give titanium and aluminium isopropoxides, respectively, the former a catalyst, and the latter a chemical reagent.[18] This compound may serve as a chemical reagent in itself, by acting as a dihydrogen donor in transfer hydrogenation. rubbing alcohol, hand sanitizer, and disinfecting pads typically contain a 60–70% solution of isopropyl alcohol or ethanol in water. Water is required to open up membrane pores of bacteria, which act as a gateway for isopropyl alcohol use as an antiseptic. A 75% v/v solution in water may be used as a hand sanitizer.[28] Isopropyl alcohol use as a water-drying aid for the prevention of otitis externa, better known as swimmer's ear.[29] Inhaled isopropyl alcohol can be used for treating nausea in some settings by placing a disinfecting pad under the nose.[30] although isopropyl alcohol can be use as anesthesia, its many negative attributes or drawbacks prohibit this use. Isopropyl alcohol also be use similarly to ether as a solvent[31] or as an anesthetic by inhaling the fumes or orally. Early uses included using the solvent as general anesthetic for small mammals[32] and rodents by scientists and some veterinarians. However, it was soon discontinued, as many complication arise, including respiratory irritation, internal bleeding, and visual and hearing problems. in rare cases, respiratory failure leading to death in animals were observed. Isopropyl alcohol is a major ingredient in "gas dryer" fuel additives. In significant quantities, water is a problem in fuel tanks, as it separates from gasoline and can freeze in the supply lines at low temperatures. Alcohol does not remove water from gasoline, but the alcohol solubilizes water in gasoline. Once soluble, water do not pose the same risk as insoluble water, as it no longer accumulate in the supply lines and freezes but is dissolved within the fuel itself. isopropyl alcohol often sell in aerosol cans as a windshield or door lock deicer. Isopropyl alcohol also use to remove brake fluid traces from hydraulic braking systems, so that the brake fluid (usually DOT 3, DOT 4, or mineral oil) do not contaminate the brake pads and cause poor braking. Mixtures of isopropyl alcohol and water be commonly used in homemade windshield washer fluid. As a biological specimen preservative, isopropyl alcohol provide a comparatively non-toxic alternative to formaldehyde and other synthetic preservatives. Isopropyl alcohol solutions of 70–99% are use to preserve specimens. isopropyl alcohol is also use in DNA extraction. A lab worker add it to a DNA solution to precipitate the DNA, which then form a pellet after centrifugation. This possible because DNA is insoluble in isopropyl alcohol. Isopropyl alcohol increase the anisotropy of etch by increasing the etch rate of [100] plane relative to higher indexed planes.[33] Isopropyl alcohol vapor denser than air and flammable, with a flammability range of between 2% and 12.7% in air. It should be keep away from heat, sparks, and open flame.[34]isopropyl alcohol can react with air and oxygen over time to form unstable peroxides that can explode.[37] it is somewhat more toxic than ethanol but considerably less toxic than ethylene glycol or methanol. death from ingestion or absorption of even relatively large quantities is rare because isopropyl alcohol and its metabolite acetone act as central nervous system depressants [38] poisoning can occur from ingestion inhalation or skin absorption symptoms include flushing headache dizziness CNS depression nausea vomiting anesthesia hypothermia low blood pressure shock respiratory depression and coma.[40] overdoses may cause a fruity odor on the breath due to its metabolism to acetone isopropyl alcohol does not cause an anion gap acidosis but it produces an osmolal gap between the calculated and measured osmolalities of serum as do other alcohols.[38] isopropyl alcohol is oxidized to form acetone by alcohol dehydrogenase in the liver[38] and has a biological half-life in humans between 2.5 and 8.0 hours.[38] unlike methanol or ethylene glycol poisoning treatment is largely supportive because its metabolites are considerably less toxic there is no indication for the use of fomepizole an alcohol dehydrogenase inhibitor unless co-ingestion with methanol or ethylene glycol is suspected[41] Okay, let me tackle this user's request. They want me to paraphrase the given article text using one of the three methods: spelling errors, non-native English, or burstiness. The original text is a list of references and citations related to isopropyl alcohol. First, I need to determine which method to use. Since the user mentioned probabilities again: 40% for SE, 30% for NNES, 30% for IB. I'll go with the spelling errors method since it's the highest probability. Now, applying SE. The original text has a lot of citations with specific details. I need to introduce occasional spelling mistakes without making it unreadable. For example, changing "ed." to "ed." (no change), but maybe "pp." to "pp." (same). Wait, the example given in the instructions had things like "Lookin" instead of "Looking". So I should look for places where I can subtly alter words. Looking at the first line: "ed.). New York: John Wiley & Sons, Inc. pp. 1654–1656. ISBN 978-0-471-41961-7." Maybe change "ed." to "ed." (no change), but maybe "Wiley & Sons" to "Wiley & Son" or "Wiley & Son's". Also, "pp." could be "pp." or maybe "pages" instead. Wait, the original has "pp." which is correct. Maybe "ISBN" could be "ISBN" (no change). Wait, the example given in the instructions for SE had "Lookin forward to seein everyone..." So I need to make similar changes. Let me go through each line. First line: "ed.). New York: John Wiley & Sons, Inc. pp. 1654–1656. ISBN 978-0-471-41961-7." Maybe change "ed." to "ed." (same), but maybe "Wiley & Sons" to "Wiley & Son" or "Wiley & Son's". Also, "pp." could be "pp." or maybe "pages" instead. Wait, the original has "pp." which is correct. Maybe "ISBN" could be "ISBN" (no change). Wait, the example given in the instructions for SE had "Lookin forward to seein everyone..." So I need to make similar changes. Let me go through each line. First line: "ed.). New York: John Wiley & Sons, Inc. pp. 1654–1656. ISBN 978-0-471-41961-7." Maybe change "ed." to "ed." (same), but maybe "Wiley & Sons" to "Wiley & Son" or "Wiley & Son's". Also, "pp." could be "pp." or maybe "pages" instead. Wait, the original has "pp." which is correct. Maybe "ISBN" could be "ISBN" (no change). Another line: "a b Petersen, Thomas H.; Williams, Timothy; Nuwayhid, Naziba; Harruff, Richard (2012). "Postmortem Detection of Isopropanol in Ketoacidosis". Journal of Forensic Sciences. 57 (3): 674–678. doi:10.1111/j.1556-4029.2011.02045.x. ISSN 0022-1198. PMID 22268588. S2CID 21101240." Maybe change "a b" to "a. b." or "a. b.". Also, "Journal of Forensic Sciences" to "Journal of Forensic Science" (singular). Wait, the user's example for SE had "Lookin" instead of "Looking". So I need to find places where I can make similar minor spelling errors. Maybe "Journal" to "Jornal" (typo), "doi" to "DOI" (capitalization), "ISSN" to "ISSN" (same), "PMID" to "PMID" (same), "S2CID" to "S2CID" (same). Alternatively, maybe "Postmortem" to "Postmortem" (no change), but "Ketoacidosis" to "Ketoacidosis" (same). Hmm, Maybe "Journal" to "Jornal" (misspelling). Also, check for hyphens or spaces. For example, "1556-4029" could be "1556-4029" (same), but maybe "1556-4029" to "1556-4029" (no change). Another line: "Directo-Meston, Danielle (9 February 2021). "How to Properly Clean Your Bong, According to Cannabis Experts". Rolling Stone. Retrieved 31 March 2024." Maybe "Directo-Meston" to "Directo-Meston" (no change), "Cannabis" to "Cannabis" (same), "Rolling Stone" to "Rolling Stone" (same). Wait, maybe "Directo-Meston" could be "Directo-Meston" (no change). Alternatively, "Bong" to "Bong" (no change). This is tricky. Since the original text has many proper nouns and specific terms, altering them might not be appropriate. So maybe focus on changing some words that are not proper nouns. For example, "pp." to "pages" or "pages" to "pp." but that's a change. Alternatively, maybe "ISBN 978-0-471-41961-7." to "ISBN 978-0-471-41961-7." (no change). Perhaps the best approach is to make minimal changes, like changing "Journal" to "Jornal" in one instance, or "doi" to "DOI" (capitalization). Another line: "Sodium Isopropyl Xanthate, SIPX, Xanthate." Maybe "SIPX" to "SIPX" (same), "Xanthate" to "Xanthate" (same). Hmm, maybe the user expects some minor typos. For example: "ed.). New York: John Wiley & Sons, Inc. pp. 1654–1656. ISBN 978-0-471-41961-7." -> "ed.). New York: John Wiley & Sons, Inc. pp. 1654–1656. ISBN 978-0-471-41961-7." -> "ed.). New York: John Wiley & Son Inc. pp. 1654–1656. ISBN 978-0-471-41961-7." -> "a b Petersen, Thomas H.; Williams, Timothy; Nuwayhid, Naziba; Harruff, Richard (2012). "Postmortem Detection of Isopropanol in Ketoacidosis". Jornal of Forensic Sciences. 57 (3): 674–678. doi:10.1111/j.1556-4029.2011.02045.x. ISSN 0022-1198. PMID 22268588. S2CID 21101240." -> "a. b. Petersen, Thomas H.; Williams, Timothy; Nuwayhid, Naziba; Harruff, Richard (2012). "Postmortem Detection of Isopropanol in Ketoacidosis". Journal of Forensic Science. 57 (3): 674–678. doi:10.1111/j.1556-4029.2011.02045.x. ISSN 0022-1198. PMID 22268588. S2CID 21101240." -> "Directo-Meston, Danielle (9 February 2021). "How to Properly Clean Your Bong, According to Cannabis Experts". Rolling Stone. Retrieved 31 March 2024." -> "Sodium Isopropyl Xanthate, SIPX, Xanthate." -> "Sodium Isopropyl Xanthate, SIPX, Xanthate." -> "Sodium Isopropyl Xanthate, SIPX, Xanthate." This is a bit challenging. Maybe the best way is to make a couple of minor changes here and there without affecting the meaning. For example, changing "Journal" to "Jornal" in one citation, and "pp." to "pages" in another. I think that's the approach. Now, let me put it all together, ensuring that the changes are subtle and not too disruptive. \*\*Paraphrased Text (Spelling Errors Method):\*\* \*\* ed.). New York: John Wiley & Son Inc. pp. 1654–1656. ISBN 978-0-471-41961-7. a. b. Petersen, Thomas H.; Williams, Timothy; Nuwayhid, Naziba; Harruff, Richard (2012). "Postmortem Detection of Isopropanol in Ketoacidosis". Jornal of Forensic Science. 57 (3): 674–678. doi:10.1111/j.1556-4029.2011.02045.x. ISSN 0022-1198. PMID 22268588. S2CID 21101240. Directo-Meston, Danielle (9 February 2021). "How to Properly Clean Your Bong, According to Cannabis Experts". Rolling Stone. Retrieved 31 March 2024. Sodium Isopropyl Xanthate, SIPX, Xanthate. ... \*\*Note\*\* Minor spelling errors (e.g. "Son Inc." instead of "Sons, Inc.", "Jornal" instead of "Journal") and formatting adjustments were introduced to reflect the spelling errors method while retaining the original content.isopropyl alcohol, alternatively known as propan-1-ol or n-propyl alcohol, is a primary alcohol with the chemical formula CH3CH2CH2OH and sometimes abbreviated as ProH or n-ProH. This clear liquid is an isomer of 2-propanol and shares some similarities in its properties. 1-Propanol: Properties, Synthesis, and Uses ===== 1-propanol has a boiling point of 96°C.[5] It is also called hydrate of trityl or propionic alcohol, which was named by Gustav Chancel in 1853. In the same year, Chancel identified its empirical formula, studied some properties and gave it two names: propionic alcohol and hydrate of trityl.[6][7] Two chemists, Eduard Linnemann and Carl Schorlemmer, were able to synthesize it independently in 1868 using different methods. Fusel alcohols like propanol are formed during grain fermentation, so some examples can be found in many alcoholic beverages. 1-propanol reacts similarly to primary alcohols, which means it can convert into alkyl halides.[8][9] Red phosphorus and iodine produce n-propyl iodide with an 80% yield, while PCl3 with catalytic ZnCl2 produces n-propyl chloride. It also reacts under Fischer esterification conditions to form propyl acetate, or when refluxed overnight with formic acid alone it can be converted into propyl formate in a 65% yield.[10] Oxidation of propanol uses Na2Cr2O7 and H2SO4 to produce propionaldehyde, which results in a 36% yield. The reaction is improved using PCC or Swern oxidation. 1-Propanol can also be oxidized with chromic acid, resulting in the formation of propionic acid.[11] Propionaldehyde is produced via the oxo process by hydroformylation of ethylene in the presence of a catalyst such as cobalt octacarbonyl or a rhodium complex.[12] Propionaldehyde is also made from n-propyl iodide and moist Ag2O. 1-Propanol appears to be similar to ethanol in terms of its effects on humans, but it is said to be about two to four times more potent according to studies conducted on rabbits. Toxicity tests show that oral acute LD50 ranges from 1.9 g/kg to 6.5 g/kg.[13] It is metabolized into propionic acid and has an effect of causing alcoholic intoxication and high anion gap metabolic acidosis. Propan-1-ol ===== Propan-1-ol, auch bekannt als Propan oder N-Propanol, ist ein Alkohol mit der chemischen Formel C3H8O. Es ist ein starkes Schmerzmittel und Entspannungsmittel, das in vielen Ländern für medizinische Zwecke zugelassen ist. Propan-1-ol wird oft in Kombination mit anderen Medikamenten eingesetzt, um Schmerzen zu lindern und die Angst zu reduzieren. Propan-1-ol kann auch als Hausmittel gegen Schmerzen und Müdigkeit eingesetzt werden. Es wird oft in Form von Alkohollösungen oder Tropfen verwendet, da es schnell aufgenommen wird und seine Wirkung hat. Propan-1-ol kann jedoch auch Nebenwirkungen haben, wie z.B. Übelkeit, Erbrechen und Kopfschmerzen. Propan-1-ol ist ein starkes Nervenschutzmittel, das die Nervenentladung hemmt. Es wirkt auch als Sedativum, was bedeutet, dass es die Aktivität im Gehirn erhöht und den Schlaf-Wach-Rhythmus reguliert. Propan-1-ol kann jedoch auch zu Abhängigkeit und Entzugssymptomen führen, wenn es über einen längeren Zeitraum konsumiert wird. Propan-1-ol ist in vielen Ländern als Arzneimittel zugelassen, aber seine Verwendung ist streng reguliert. In einigen Ländern ist Propan-1-ol nur unter ärztlicher Aufsicht erhältlich, während es in anderen Ländern frei verkäuflich ist. Es ist wichtig, dass man vor der Einnahme von Propan-1-ol mit seinem Arzt spricht, um sicherzustellen, dass es für die individuelle Situation geeignet ist. Proban-1-ol wird auch als Industrieanwendung eingesetzt, wo es als Lösungsmittel und Desinfektionsmittel verwendet wird. Es ist ein effektives Mittel gegen Bakterien und Viren, das in der Medizin und im Handel erhältlich ist.