I'm not a bot

Chloroform is a colorless, volatile liquid with an ether-like odor, represented by the chemical formula CHCl3. It has hydrogen bonding due to the bonded carbon and can be found naturally in seaweed and fungi. American chemist Dr. Samuel Guthrie synthesized chloroform in 1831 through combining whisky with chlorinated lime. The compound is commonly used as an organic solvent and for anesthesia in medical fields. Chloroform is a tetrahedral molecule with sp3 hybridization, adopting the most stable form with minimal repulsion between groups. It can be prepared by chlorination of methane at 400°C or through fractional distillation. Chloroform is also produced in the laboratory through various reactions involving ethanol and acetone with bleaching powder. In one method, a mixture of ethanol, bleaching powder, and water is heated in an R.B. flask to produce chloroform, which is then collected and purified by rinsing it with sodium hydroxide and drying it at temperatures between 60°C to 65°C. Chloroform can also be produced in large quantities through the partial reduction of carbon tetrachloride using iron powder and water vapor. Chloroform is a colorless liquid with a pleasant, non-irritating odor. Its molecular weight is 119.38 g/mole and it has a boiling point of 61°C. Chloroform is insoluble in water but soluble in ether and alcohol, making it a good solvent for oils, fats, waxes, rubber, and other substances. Although not flammable itself, chloroform's vapors can ignite with a green flame. Inhaling enough vapors can cause temporary unconsciousness. However, when exposed to sunlight and air, chloroform oxidizes to form phosgene, a highly poisonous gas. To prevent oxidation, chloroform is stored in blue or brown bottles that absorb sunlight and use stoppers to minimize exposure to air. Adding 1% ethyl alcohol also helps protect the chloroform from oxidation. Chloroform reacts with various substances under different conditions. For example, it forms a salt of formic acid when heated with a strong alkali solution. With silver powder, it produces acetylene (ethyne). When mixed with phenol and a base, it produces salicylaldehyde. With primary amines and a base, it gives isocyanides (carbylamine), which have an offensive smell. Chloroform also reacts with acetone to form 1,1,1-trichloro-2-methylpropane-2-ol (chloretone), a sleep-inducing drug. When heated with concentrated HNO3, it produces chloropicrin, used as an insecticide and tear gas. In the presence of sunlight, chloroform reacts with chlorine to form carbon tetrachloride, a solvent in various industries. Chloroform has many other applications, including use as a reagent, anesthetic, and solvent in various industries such as agriculture, construction, paper, board, pesticide, film manufacturing, and refrigerant production. However, due to its highly poisonous nature when used in excess, the use of chloroform as an anesthetic is discouraged. Chloroform is widely used as a solvent and preservative for various products including dyes, insecticides, dead bodies, and anatomical specimens. It's also used in the pharmaceutical industry and was once utilized as an extraction agent for fats, greases, and oils. Moreover, chloroform serves as an indirect food additive in packaging materials and food contact products. In scientific applications, it's commonly used as a solvent in Nuclear Magnetic Resonance (NMR) spectroscopy. However, its presence in the environment poses health risks due to its generation during water chlorination processes and discharge from chemical plants, paper mills, wastewater treatment facilities, and drinking water with added chlorine. As a result, people exposed to chloroform might experience respiratory problems, cardiac issues, nausea, vomiting, liver damage, kidney effects, depression, irritability, dizziness, fatigue, memory loss, increased dreams, anorexia, and palpitations. Chloroform can also be found in various foods, beverages, and tap water, highlighting the need for further research into its long-term health implications and proper safety measures during handling and storage. **Name and Properties** Chloroform, also known as Trichloride of Methane or Refrigerant-20, is a colorless liquid with a sweet, minty odor. Its chemical formula is CHCl3, and it has a molar mass of 119.37 g/mol. **Physical Properties** * Melting point: -63.5°C * Boiling point: 61.15°C * Density: 1.564 g/cm3 (at -20°C) * Solubility in water: 10.62 g/L (at 0°C) **Chemical Properties** * Highly reactive and decomposes to toxic phosgene and hydrogen chloride in the presence of light * Can be toxic to humans and animals, causing reproductive problems, liver damage, and other health issues **Uses and Hazards** * Used as a refrigerant, anesthetic, and solvent * Main hazards: can cause cancer, reproductive toxicity, and liver damage * Must be handled with caution due to its potential for decomposition and release of toxic gases **Safety Precautions** * Wear protective gear when handling chloroform * Avoid exposure to light, as it can cause decomposition and release of toxic gases * Keep away from open flames and sparks * Follow proper disposal procedures to avoid environmental contamination. Note that I've removed some of the technical details and focused on providing a general overview of the properties and hazards associated with chloroform. Let me know if you'd like me to paraphrase any specific section in more detail! Chloroform has been synthesized independently by several investigators in the early 19th century. It was first obtained by Moldenhawer in 1830, who mixed chlorinated lime with ethanol to produce it, though he mistakenly identified it as Chloräther. Samuel Guthrie also produced chloroform in 1831 through a similar reaction and noted its anaesthetic properties, but believed that he had prepared chloric ether instead. Justus von Liebig carried out the alkaline cleavage of chloral, while Eugène Soubeiran obtained the compound by treating ethanol with chlorine bleach. The chemical formula of chloroform was determined to be CHCl3, and it is an organochloride with a common solvent property. It is a volatile, colorless liquid produced on a large scale as a precursor to refrigerants and PTFE. Chloroform was once used as an inhalational anesthetic between the 19th century and the first half of the 20th century. Many species of seaweed produce chloroform, and fungi are believed to contribute to its production in soil through abiotic processes. The molecule adopts a tetrahedral molecular geometry with C3v symmetry, making it miscible with many solvents but very slightly soluble in water. Today, chloroform is synthesized commercially on a large scale using the Liebig procedure, which was retained until the 1960s. Chloroform has been used extensively in medicine for its anaesthetic properties since its discovery by Scottish obstetrician James Y. Simpson in 1847. In Britain, around 750,000 doses of chloroform were being produced per week by 1895, and it remained an important drug until the mid-20th century. Chloroform is primarily produced on an industrial scale by the reaction of chlorine with either methyl chloride or methane at temperatures ranging from 400°C to 500°C. This process yields a mixture containing four different chloromethanes: chloromethane, methylene chloride (dichloromethane), trichloromethane (chloroform), and tetrachloromethane (carbon tetrachloride). These can be separated through distillation. On a smaller scale, chloroform is also produced via the haloform reaction between acetone and sodium hypochlorite. This process produces deuterated chloroform by incorporating a single deuterium atom into the molecule, which is used as a common solvent in NMR spectroscopy. Deuterochloroform can be prepared through various methods, including the reaction of hexachloroacetone with heavy water and sodium deuteroxide with chloral hydrate. In domestic settings, the haloform reaction can occur inadvertently when sodium hypochlorite solution is mixed with household liquids such as acetone, methyl ethyl ketone, ethanol, or isopropyl alcohol. The most significant industrial use of chloroform involves its reaction with hydrogen fluoride to produce monochlorodifluoromethane (HCFC-22), a precursor in the production of polytetrafluoroethylene (Teflon) and other fluoropolymers. Chloroform is also used as a solvent for various materials, in pesticide formulations, and in fire extinguishers. CDCl3 serves as a common solvent used in NMR spectroscopy due to its hydrogen bonding properties, making it suitable for dissolving many compounds. HCCl3 has been classified as a hard acid with specific acid parameters (EA = 1.56 and CA = 0.44) according to the ECW model. As a reagent, chloroform serves as a source of dichlorocarbene (CCl2), which can be formed when it reacts with aqueous sodium hydroxide in the presence of a phase transfer catalyst. This dichlorocarbene intermediate is responsible for several chemical reactions, including the Reimer-Tiemann reaction, where it effects ortho-formylation of activated aromatic rings to produce aryl aldehydes. Alternatively, the carbene can be trapped by an alkene to form a cyclopropane derivative or participate in the Kharasch addition, forming the •CHCl2 free radical which adds to alkenes. In addition to its role as a chemical reagent, chloroform has been used historically as a powerful general anesthetic when inhaled or ingested. The discovery of its anaesthetic properties is attributed to Robert Mortimer Glover, who first described them in his thesis in 1842. However, James Young Simpson later claimed to have discovered the effects of chloroform on humans independently, sparking a heated debate between the two scientists. Despite some controversy surrounding his claim, Simpson's work contributed significantly to the adoption of chloroform as an anesthetic during medical procedures. The use of chloroform in surgery expanded rapidly in Europe during the 19th century, with notable examples including its use by John Snow during the births of Queen Victoria's last two children. However, its toxicity eventually led to it being replaced by ether as an anesthetic at the beginning of the 20th century. Today, chloroform is no longer used as a general anesthetic due to concerns about its safety and potential for fatal cardiac arrhythmias. Chloroform was used as an anaesthetic from the mid-19th century until the late 20th century. It is thought that chloroform works by increasing potassium ion movement in nerve cells, which can lead to respiratory problems and cardiac issues. An inhaler developed by John Snow in 1848 helped reduce deaths caused by chloroform, but its use was still controversial with some arguing it affected the heart while others believed it was due to respiratory issues. Despite this, chloroform remained widely used until the early 20th century when better alternatives like ether and nitrous oxide became available, leading to a decline in its usage. Chloroform has also been associated with various crimes, including murders and abductions, where it was used to render victims unconscious. Chloroform use in criminal cases often involves co-administration with other substances or victim complicity. Continuous administration is required after loss of consciousness due to inhalation, necessitating anesthesiologist skill. In 1865, The Lancet offered a reputation for anyone demonstrating instantaneous insensibility using chloroform. Chloroform forms during water chlorination and is present in municipal tap water and swimming pools. Exposure to chloroform through drinking water exceeds health standards due to its presence with other trihalomethanes. Studies link chloroform exposure to an increased risk of cancer, particularly bladder or lower GI tract cancer. Chloroform is rapidly absorbed, metabolized, and eliminated by mammals after oral, inhalation, or dermal exposure. Prolonged dermal exposure can cause skin sores due to defatting. Elimination occurs primarily through the lungs. The liver metabolizes chloroform via oxidation and reduction. Other metabolites include hydrochloric acid and diglutathionyl dithiocarbonate. Chloroform causes CNS depression, leading to coma and respiratory center depression. Ingestion of 7.5 g can cause serious illness, with the mean lethal oral dose estimated at 45 g. Anesthetic use of chloroform has been discontinued due to deaths from respiratory failure and cardiac arrhythmias. Chloroform induces nausea, vomiting, hyperthermia, jaundice, and coma in some patients following anesthesia. At autopsy, liver necrosis and degeneration are observed due to hepatotoxicity and nephrotoxicity. Chloroform is a highly toxic gas that releases phosgene in the process. To prevent accidents, commercial chloroform is stabilized with ethanol or amylene, but samples without stabilizers can still contain phosgene and affect analytes. When ethanol is used as a stabilizer, it reacts with phosgene to form a harmless diethyl carbonate ester. Phosgene can be removed from chloroform using saturated aqueous carbonate solutions. Suspicious samples can be tested for phosgene using diphenylamine or mass spectrometry. Chloroform is suspected of causing cancer and is classified as an extremely hazardous substance in the US, subject to strict reporting requirements. Some anaerobic bacteria use chloroform for respiration, converting it to dichloromethane. **Chloroform: History and Chemistry** In August 2018, the Royal Society of Chemistry published its Blue Book, which provides guidelines for organic chemistry nomenclature. The book notes that "bromoform", "chloroform", and "iodoform" are acceptable names for specific compounds. The history of chloroform dates back to 1831 when Justus von Liebig first synthesized it by reacting chlorine with alcohol. However, in his initial description, Liebig incorrectly stated the empirical formula of chloroform as C2Cl5. The use of chloroform has been documented in various sources. For example, a 2003 book on the history of chloroform notes that it was first used as an anesthetic in the mid-19th century. Chloroform is also mentioned in a 2018 article on halocarbon emissions from a degraded forested wetland. From a chemical perspective, chloroform has been studied for its properties and reactions. For example, a 2012 paper examined the microbial degradation of chloroform, while a 2000 review discussed the safety concerns associated with chloroform exposure. The chemistry of chloroform is also mentioned in various online resources, including an illustrated glossary of organic chemistry that provides a detailed description of the compound's structure and properties. In the early 19th century, Eugène Soubeiran and Jean-Baptiste Dumas conducted research on the compounds of chlorine. In his investigations, Dumas discovered that when alcohol was treated with chlorine, it formed chloroform (C2H2Cl6). He noted that the empirical formula of chloroform resembled that of formic acid and that boiling chloroform with potassium hydroxide produced potassium formate. Based on these findings, Dumas coined the term "chloroform" to describe this substance. Later researchers, such as Defalque and Wright, built upon Dumas' work and explored the properties and applications of chloroform. Others, including Gordon and Worling, examined its historical context and significance in the development of anesthetics. In a separate line of research, Paulsen and Cooke developed a method for preparing deuterated solvents, including chloroform-d (deuteriochloroform). Meanwhile, Breuer demonstrated that chloroform could be used to produce chloroform-d, a compound with potential applications in nuclear magnetic resonance spectroscopy. Finally, Kluger proposed an alternative synthesis of chloroform-d, providing a convenient preparation method for this solvent. **General Information** Chloroform, also known as trichloromethane, is a chemical compound with the formula CHCl3. It has been used in various applications, including as an anesthetic and a solvent. **Physical Properties** The thermodynamic properties of chloroform have been studied, particularly its ability to form hydrogen bonds with Lewis bases in cyclohexane. Chloroform's complex behavior between acetone and dimethylsulfoxide has also been investigated using two-dimensional IR chemical exchange spectroscopy. **Toxicology and Poisoning** Chloroform is considered a toxic substance that can cause poisoning if ingested, inhaled, or absorbed through the skin. It has been used as a poison in the past, and its effects on the human body have been studied. **Production and Disposal** The production, import/export, use, and disposal of chloroform are regulated by various authorities. Chloroform is considered a pollutant due to its ability to contaminate water sources and soil. **History and Synthesis** Chloroform has been used in organic synthesis reactions, such as the phase-transfer Hofmann carbylamine reaction. Its history dates back to the early 19th century, when it was first synthesized by Justus von Liebig. **References** The text references various academic sources, including scientific journals and books, that provide further information on chloroform's properties, uses, and effects on human health and the environment. This article discusses chloroform, a type of anesthetic that has been used for medical procedures and other purposes throughout history. The first recorded use of chloroform was by Robert M. Glover in his dissertation on the physiological effects of bromine, chlorine, and iodine compounds. Since then, chloroform has been widely used as an anesthetic, with many notable instances documented throughout the years. For example, Queen Victoria was administered chloroform during childbirth, and it was also used to induce anesthesia for dental procedures. The article highlights various studies and reports on the use of chloroform, including a 1999 study that found it activates certain background potassium channels in the brain. Other notable instances include a case of chloroform poisoning reported in the British Medical Journal in 1886, and a series of articles published in The Lancet in the late 19th century investigating the mortality rates under anesthesia. The article also touches on the darker side of chloroform's history, including its use in criminal cases such as rape and murder. It concludes with a summary of the various uses and applications of chloroform throughout history, highlighting both its medical benefits and its potential for misuse. Chloroform has been linked to various issues, including its use amongst thieves. The chemical compound has also been found to be a byproduct of chlorination disinfection in drinking water, which can lead to exposure and potential health risks. In fact, studies have shown that the uptake of chloroform can vary depending on factors such as the type of treatment used. Additionally, chloroform is known to have carcinogenic properties, making it a significant concern for public health. It has also been linked to other issues, including its use as an anesthetic and its potential for causing respiratory problems. Furthermore, chloroform has been found to react with water to form phosgene, a highly toxic gas that can cause serious health problems if inhaled. This reaction has significant implications for safety protocols and emergency response procedures. In terms of its chemical properties, chloroform is known to be an aliphatic compound that can form hydrogen-bonded aggregates. It also has been found to have a common binding cavity with other general anesthetics within the GABAA receptor. The text also mentions that chloroform has been identified as one of the extremely hazardous substances and its threshold planning quantity is regulated by the Code of Federal Regulations. Chloroform, also known as L-4-Chlorokynurenine (AV-101), is an investigational antidepressant compound that acts as a NMDA receptor antagonist. Its primary mechanism of action is through inhibition of the glycine co-agonist site of NMDA receptors. The compound was discovered at Marion Merrell Dow and underwent initial development at Artemis Neuroscience, which was later acquired by VistaGen in 2003. VistaGen filed an Investigational New Drug application with the FDA for AV-101, but a phase II clinical trial failed to show any significant effect over placebo in alleviating treatment-resistant depression. However, its therapeutic potential is believed to occur via its metabolite, 7-chlorokynurenic acid, which inhibits NMDA receptors. Research on chloroform's mechanism of action revealed that it penetrates the blood-brain barrier and is converted to 7-chlorokynurenic acid by kynurenine aminotransferase in astrocytes. Another metabolite, 4-chloro-3-hydroxy-anthranilic acid, inhibits an enzyme involved in neurodegenerative diseases. The development of chloroform's biological activity was explored at the University of Maryland, and its potential as a rapid-acting antidepressant was investigated. However, further research is needed to confirm its efficacy and safety for treatment-resistant depression. In 2013, researchers explored new NMDA receptor antagonists for depression treatment, including lanicemine, esketamine, and rapastinel, with lanicemine being the most advanced at that time. AV-101 had already completed two Phase I clinical trials by 2013 and was later investigated in a Phase II trial to assess its efficacy in treating major depressive disorder. However, the trial found no significant difference between AV-101 and placebo. Preclinical studies suggested promise for treating neuropathic pain and Huntington's disease. Additionally, research on other compounds like 4-chlorokynurenine showed potential as an NMDA receptor antagonist. Further investigation into glutamate-targeted antidepressants has been ongoing, with a focus on emerging treatment mechanisms, including synaptic plasticity. The discovery of rapid-acting antidepressant effects similar to ketamine in behavioral models of depression has also been explored. AV-101, a potential breakthrough in depression treatment, has been gaining attention. According to VistaGen Therapeutics' YouTube video, this innovation could revolutionize the way we treat depression. The link count for AV-101 is currently at 28,420. The following pages are linked to 4-Chlorokynurenine: * Dehydroepiandrosterone * Glycine * Ketamine * Magnesium * Methadone * Phencyclidine * Sodium thiopental * Toluene * Xenon * Zinc * Nitrous oxide * Proline * Domoic acid * Putrescine * Saffron * Alanine * Aspartic acid * Glutamic acid * Glutamine * Serine * Glutathione * Chloroform * Cytidine * Halothane * Pentamidine * Haloperidol * Nitric oxide * Methylene blue * Minocycline * Tramadol * Topiramate * 1,1,1-Trichloroethane * Trichloroethylene * Isoflurane * Sevoflurane * Acetylcysteine * AMPA * N-Methyl-D-aspartic acid * AMPA receptor * NMDA receptor * Cyclopropane * 1-Aminocyclopropane-1-carboxylic acid * Sarcosine * Furosemide * Hydrochlorothiazide * Pethidine * Atomoxetine * Piracetam * AP5 * Carisoprodol

How chloroform is prepared in laboratory. How is formic acid prepared from chloroform. How is chloroform commercially prepared. How chloroform is prepared from bleaching powder. How chloroform is prepared from ethanol. How is chloroform is prepared give its uses. How is chloroform prepared from acetone. How chloroform is industrial prepared. How is chloroform prepared from ethyl alcohol. How is pure chloroform prepared and how is it stored.