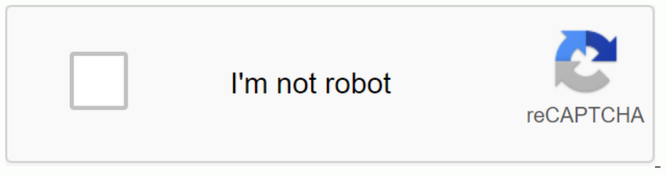

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Cn- molecular geometry

Page ID684 Contributors and attributions AX2E3 Figure: Linear tsterrical number: 5 Lonely pairs: 3 Polar/NonPolar: NonPolar Hybridization: sp3d Example: I3- NOTES: This molecule consists of 5 sp3d hybrid orbitals. Three orbitals are arranged around the equator of the molecule with binding angles of 120o. Two orbitals are arranged along the vertical axis of 90o from equatorial orbitals. The shape of orbitals is trigonal bipyramidal. All three equatorial orbitals contain solitary pairs of electrons. The three atomic molecules have a linear shape. Charles Ophardt (Professor Emeritus, Elmhurst College); Virtual Chembook any chemical compound with cyanide anion This article is about the class of chemical compounds. For other uses, see Cyanide (disambiguation). Cyanide anion name preferred IUPAC name Cyanide Systematic IUPAC name Nitridocarbonate (II) Identifiers CAS Number 57-12-5 3D model (JSmol) Interactive image ChEBI CHEBI:17514 ChemSpider 5755 PubChem CID 5975 UNII OXN4E7L11K Y InChI InChI =5975 1S/CN/c1-2/q-1Key: XFXPMWWXUTWYJX-UHFFFAOYSA-N SMILER [C-]#N Properties Chemical formula CN− Molar mass 26.018 g·mol−1 Conjugate acid Hydrogen cyanide Except where otherwise stated, data are provided for materials in standard state (at 25 °C [77 °F], 100 kPa). Infobox references A cyanide is a chemical compound that contains the group C≡N. This group, known as the cyanogroup, consists of a carbon atom triple-bound to a nitrogen atom. [1] In inorganic cyanides, the cyanide group is present as anion CN−. Salts such as sodium cyanide and potassium cyanide are highly toxic. Hydrocyanic acid, also known as hydrogen cyanide, or HCN, is a highly volatile liquid produced on a large scale industrially. It is achieved by acidification of cyanide salts. Organic cyanides are usually called nitriles. In nitriles, the CN group is linked by a covalent binding to carbon. For example, in acetonitrile, the cyanide group is bound to methyl (CH3). Because they do not release cyanide ions, nitriles are generally far less toxic than cyanide salts. Some nitriles, which occur naturally as cyanohydrins, release hydrogen cyanide. Nomenclature and etymology Cyanideionen, CN−. From the top: 1. Valence-bond structure 2. Space filling model 3. Electrostatic potential surface 4. Carbon lone pair See also: Isocyanide I IUPAC nomenclature is called organic compounds that have a -C≡N function group nitriles. Thus, nitriles are organic compounds. [3] [4] An example of nitrile is CH3CN, acetonitrile, also known as methyl cyanide. Nitriles usually do not release cyanide ions. A functional group of hydroxyl and cyanide bound to the same carbon is called cyanohydrin. Unlike nitriles, cyanohydridines release hydrogen cyanide. In inorganic chemistry, salts containing C≡N-ion are referred to as cyanides. Although the cyanide ion contains a atom, it is usually not considered organic. The word is derived from the Greek kyanos, which means dark blue, as a result of which it was first obtained by the warming of the pigment known as Prussian blue. Gluing Cyanide is isoelectronic with carbon monoxide and molecular nitrogen. [5] [6] Occurrence and reactions In nature Removal of cyanide from cassava in Nigeria. Cyanides are produced by certain bacteria, fungi and algae and are found in a variety of plants. Cyanides are found in significant quantities in certain seeds and fruit stones, such as those of bitter almonds, apricots, apples and peaches. [7] Chemical compounds that can release cyanide are known as cyanogenic compounds. In plants, cyanides are usually bound to sugar molecules in the form of cyanogenic glycosides and defend the plant against herbivores. Cassava roots (also called manioc), an important potato-like food grown in tropical countries (and the base on which tapioca is made), also contains cyanogenic glycosides. [8] Madagascar bamboo Cathariostachys madagascarensis produces cyanide as a deterrent to grazing. In response, the golden bamboo wall, which eats bamboo, has developed a high tolerance to cyanide. Interstellar medium Cyanide radical · CN has been identified in interstellar space. [10] Cyanide radical (called cyanogen) is used to measure the temperature of interstellar gas clouds. [11] Pyrolysis and combustion product Hydrogen cyanide is produced by combustion or pyrolysis of certain materials during oxygen deficiency. For example, it can be detected in the exhaust of internal combustion engines and tobacco smoke. Certain plasters, especially those derived from acrylonitrile, release hydrogen cyanide when heated or burned. [12] Coordination chemistry Main article: Cyanometalate Cyanidanionen is a ligand for many transitional metals. [13] The high affinities of metals for this anion can be attributed to the negative charge, compactness and ability to engage π binding. Known complexes include: hexanuoids [M(CN)6]3− (M = Ten, V, Cr, Mn, Fe, Co), which are octahedral in form. tetracyanides [M(CN)4]2− (M = Ni, Pd, Pt), which are square planar in geometry; dicyanids [M(CN)2]− (M = Cu, Ag, Au, Hg), which are linear in geometry. Among the main cyanide coordination compounds are octogenoctedrally coordinated compounds potassium ferrocyanide and the pigment Prussian blue, both of which are mainly non-toxic due to the dense binding of the cyanides to a central iron atom. [14] Prussian blue was first accidentally made around 1706, of heat substances containing iron and carbon and nitrogen, and other cyanides made later (and named after it). Among the many applications, Prussian blue gives the blue color of blueprints, blues and cyanotypes. The enzymes called hydrogenases contain cyanide ligandes attached to iron their active websites. The biosynthesis of cyanide in the [NiFe] hydrogenases continues from carboamyl phosphate, which converts to cysteinylthiocyanate, CN, donor. [15] Organic derivatives Main article: Nitriles Due to the high nuclear power of cyanidanion, cyanogroups are easily introduced into organic molecules by displacement of a halid group (e.g. chloride on methyl chloride). In general, organic cyanides are called nitriles. Thus, CH3CN can be called methyl cyanide, but more commonly called acetonitrile. In organic synthesis, cyanide is a C-1 synthon; that is, it can be used to extend a carbon chain with one, while retaining the ability to be functionalized. [quote required] RX + CN− → RCN + X− (nucleophilic substitution) followed by RCN + 2 H2O → RCOOH + NH3 (hydrolysis under reflux with mineral acid catalyst), or 2 RCN + LiAlH4 + (second stage) 4 H2O → 2 RCH2NH 2 + LiAl(OH)4 (during regurgitation in dry eter, followed by addition of H2O) Production Main article: Hydrogen cyanide § Production and synthesis The main process used to produce cyanides is the Andrussow process in which gas hydrogen cyanide is produced from methane and ammonia in the presence of oxygen and a platinum catalyst. [16] [17] 2 CH4 + 2 NH3 + 3 O2 → 2 HCN + 6 H2O Sodium cyanide is produced in the treatment of hydrogen cyanide with sodium hydroxide[18] HCN + NaOH → NaCN + H2O Toxicity Main article: Cyanide Many cyanides Many cyanides are highly toxic. Cyanide anion is an inhibitor of the enzyme cytochrome c oxidase (also known as aa3), the fourth complex of the electron transport chain found in the inner membrane of the mitochondria of eukaryotic cells. It attaches to the iron in this protein. The binding of cyanide to this enzyme prevents the transport of electrons from cytochrome c to oxygen. As a result, the electron transport chain is disrupted, which means that the cell can no longer produce ATP for energy. [19] Tissues that rely heavily on aerobic respiration, such as the central nervous system and heart, are particularly affected. This is an example of histotoxic hypoxia. The most dangerous compound is hydrogen cyanide, which is a gas and kills by inhalation. For this reason, an air breath protector supplied by an external oxygen source must be used when working with hydrogen cyanide. [12] Hydrogen cyanide is produced by adding acid to a solution containing a cyanide salt. Alkaline solutions of cyanide are safer to use because they do not develop hydrogen cyanide gas. Hydrogen cyanide can be produced by the combustion of polyurethane; For this reason, polyurethane is not recommended for use in household and aircraft furniture. Oral intake of a small amount of solid cyanide or a cyanide solution as little as 200 mg, or exposure to airborne cyanide of 270 ppm, is sufficient to cause death within minutes. [20] Organic do not easily release cyanide ions, and so have low toxicity. However, compounds such as trimethylsilylcyanide (CH3)3SiCN easily release HCN or cyanide ion upon contact with water. [21] Antidote hydroxocobalamin reacts with cyanide to form cyanocobalamin, which can be safely eliminated by the kidneys. This method has the advantage of avoiding the formation of metemoglobin (see below). This antidote set is sold under the brand name Cyanokit and was approved by the U.S. FDA in 2006. [22] An older cyanide antidote set included administration of three substances: amylgitrite beads (administered by inhalation), sodium nitrite and sodium tosulfate. The goal of the antidote was to generate a large pool of ferric iron (Fe3+) to compete for cyanide with cytochrome a3 (so cyanide will bind to the antidote instead of the enzyme). Nitrites oxidize hemoglobin to methemoglobin, which competes with cytochrome oxidase for cyanide ion. Cyanmethemoglobin is formed and the cytochromoxidase enzyme is restored. The main mechanism of removing cyanide from the body is by enzymatic conversion to thiocyanate of the mitochondrial enzyme rhodanese. Thiocyanate is a relatively non-toxic molecule and is excreted by the kidneys. To accelerate this detoxification, sodium tosulfate is administered to provide a sulfur donor for rhodanese, which is needed to produce thiocyanate. [23] Sensitivity Minimum risk levels (MRLs) cannot protect against delayed health effects or health effects achieved after repeated sublethal exposure, such as hypersensitivity, asthma or bronchitis. MRLs can be revised after sufficient data accumulate. [24] Applications Mining Main article: Gold cyanide cyanide is mainly produced for mining gold and silver: It helps to dissolve these metals and their worms. In the cyanide process, finely-tuned high-grade ore is mixed with cyanide (in the ratio of approximately 1,500 parts NaCN and ore); low-grade worms are stacked in piles and sprayed with a cyanide solution (in a ratio of about 1:1000 parts NaCN and alder). The precious metals are complex of cyanide anions to form soluble derivatives, e.g. [Au(CN)2]− and [Ag(CN)2]−.[18] 4 Au + 8 NaCN + O2 + 2 H2O → 4 Na[Au(CN)2] + 4 NaOH Silver is less noble than gold and often occurs as sulmide, in which case no redox is required (no O2 is required). Instead, a displacement reaction occurs: Ag2S + 4 NaCN + H2O → 2 Na[Ag(CN)2] + NaSH + NaOH The pregnant liquor containing these ions is separated from solids, which are thrown to a tail pond or used pile, the recyclable gold is removed. The metal is recovered from the pregnant solution by reduction with zinc dust or by adsorption on activated carbon. This process can lead to environmental and health problems. A number of environmental disasters have followed the overflow of tailing ponds gold mines. Cyanide contamination of waterways has resulted in many cases of human and aquatic mortality. [quote required] Aqueous cyanide is hydrolysed quickly, especially in sunlight. It can mobilize some heavy metals like mercury if it is present. Gold can also be associated with arsenic opyrite (FeAsS), similar to iron pyrite (fool gold), where half of sulfur atoms are replaced by arsenic. Gold-containing arsenic ores are similarly reactive to inorganic cyanide. [quote required] Cyanide is also used in galvanization, where it stabilizes metal ions in the electrolyte solution before disposal. [quote required] Industrial organic chemistry Some nitriles are produced on a large scale, such as adiponitrile is a precursor to nylon. Such compounds are often generated by combining hydrogen cyanide and alkenes, that is, hydrocyanation: RCH = CH2 + HCN → RCH (CN) CH3. Metal catalysts are required for such reactions. Medical use Cyanide compound sodium nitroprusside is mainly used in clinical chemistry to measure urinary bodies mainly as follow-up to diabetics. Sometimes it is used in emergency medical situations to produce a rapid decrease in blood pressure in humans; it is also used as a vasodilator in vascular research. The cobalt in artificial vitamin B12 contains a cyanide ligand as an artifact of the purification process; this must be removed by the body before the vitamin molecule can be activated for biochemical use. During World War I, a copper cyanide compound was briefly used by Japanese doctors to treat tuberculosis and leprosy. [25] Illegal fishing and poaching Main article: Cyanide fishing Cyanides are used illegally to catch live fish near coral reefs for the aquarium and seafood markets. The practice is controversial, dangerous and harmful, but is run by the lucrative exotic fish market. [26] Poachers in Africa have been known to use cyanide to poison waterholes to kill elephants for their ivory. [27] Pest control M44 cyanide devices are used in the United States to kill coyotes and other canids. [28] Cyanide is also used for pest control in New Zealand, especially for possums, one introduced that threatens the preservation of native species and spreads tuberculosis among cattle. Possums can become bait shy, but the use of pellets containing cyanide reduces bait shyness. Cyanide has been known to kill native birds, including the endangered kiwi. [29] Cyanide is also effective in controlling the lady wallaby, another introduced in New Zealand. [30] A license is required to store, manage and use cyanide in New Zealand. Niche uses Potassium ferrocyanide used to achieve a blue color of cast bronze sculptures during the final final phase of the sculpture. On its own it will produce a very dark shade of blue and is often mixed other chemicals to achieve the desired tint and tint. It is applied with a flashlight and brush while using standard safety equipment used for any patina application: rubber gloves, goggles and a respirator. The actual amount of cyanide in the mixture varies according to the recipes used by each foundry. Cyanide is also used in jewelry-making and certain types of photography such as sepia toning. Cyanides are used as insecticides for fumigating vessels. [31] Cyanide salts are used to kill ants,[32] and have in some places been used as rat poison[33] (the less toxic poison arsenic is more common). [34] Although it is generally thought to be toxic, cyanide and cyanohydrins have been shown to increase germination in various plant species. [35] Human poisoning Deliberate cyanide poisoning of humans has occurred many times throughout history. [37] For notable cyanide deaths, see Cyanide poisoning: History. Most significantly, hydrogen cyanide released from pellets of Zyklon-B was used widely in the systematic mass murders of the Holocaust, especially in extermination camps. Poisoning hydrogen cyanide gas in a gas chamber (as a salt of hydrocyanic acid is dropped into a strong acid, usually sulfuric acid) is a method of executing a convicted prisoner as the convicted prisoner eventually breathes the deadly fumes. Additive Due to the high stability of their skin color with iron, ferrocyanides (Sodium ferrocyanide E535, Potassium ferrocyanid E536, and Calcium ferrocyanide E538[38]) do not break down to lethal levels in the human body and are used in the food industry as, eg, an anticaking agent in table salt. [39] Chemical tests for cyanide Prussian blue iron(II) sulfate have been added to a solution suspected to contain cyanide, such as filtrate from the sodium fusion test. The resulting mixture is acidified with mineral acid. The formation of Prussian blue is a positive result for cyanide. para-Benzoquinone in DMSO A solution of para-benzokinon in DMSO reacts with inorganic cyanide to form a cyanophenol, which is fluorescent. Lighting with UV light gives a green/blue glow if the test is positive. [40] Copper and an aromatic amine Used by fumigators to detect hydrogen cyanide, copper (II) salt and an aromatic amine such as benzidine are added to the sample; as an alternative to benzidine, an alternative aminedi(4,4-bis-dimethylaminophenyl) methane may be used. A positive test gives a blue color. Copper(I) cyanide is poorly soluble. By sequestering copper (I) copper (II) is rendered a stronger oxidant. The copper, in a cyanide facilitated oxidation, converts amine into a colored compound. The Nernst equation explains this process. Another good example of such chemistry is the way the saturated calomel reference electrode (SCE) works. The copper, in a cyanide-facilitated oxidation, converts amine in a colored compound. Pyridine-barbituric color imic

a sample containing inorganic cyanide is cleaned with air from a boiling acid solution to a basic absorber solution. The cyanide salt absorbed in the basic solution is buffered by pH 4.5 and then reacted with chlorine to form cyanogen chloride. Cyanogen chloride formed pairs of pyridine with barbituric acid to form a strongly colored red dye that is proportional to cyanide concentration. This cholimetric method after distillation is the basis of most regulatory methods (such as EPA 335.4) used to analyze cyanide in water, wastewater and contaminated soil. However, distillation followed by cholorimetric methods has been shown to be prone to disorders from thiocyanate, nitrate, thiosulfate, sulphite and sulfide which can result in both positive and negative biases. It has been recommended by USEPA (MUR 12 March 2007) that samples containing these compounds be analyzed by Gas-Diffusion Flow Injection Analysis – amperometry. [quote required] Corrinoids color imetry A solution of aquacyano-corrinoids, such as cobalamin or cobinamide, reacts with free cyanide in an aqueous sample. The binding of cyanide to the choral cobalt center leads to a color change from orange to violet,[41] which allows for semiquantification of naked eyes. Precise quantification of cyanide content is possible by UV-vis spectroscopy. [42] [43] The absorption of corrinoid on a solid phase,[44] makes it possible to detect cyanide even in colored samples, making this method suitable for the analysis of cyanide in water, wastewater, blood and food. [45] [46] Furthermore, this technology is non-toxic and significantly less susceptible to interference than the pyridine-barbituric acid colorimetry method. Gas diffusion injection analysis – amperometry Instead of distillation, the sample is injected into a acidic stream where HCN is formed, sent under a hydrophobic gas diffusion membrane that selectively only allows HCN to pass through. The HCN passing through the membrane is absorbed in a basic carrying solution that transports CN to an amperometric detector that accurately measures cyanide concentration with high sensitivity. Sample processing determined by acid handlers, ligands or preliminary UV irradiation allows cyanide specification of free cyanide, respectively available cyanide and total cyanide. The relative simplicity of these flow injection analysis methods limits the interference experienced by the high distillation, and also proves to be cost effective since time-consuming distillations are not required. References ^ IUPAC Gold Book cyanides ^ Environmental and health effects of cyanide. The International Cyanide Management Institute. 2006. Retrieved 4 August 2006. In 1997 he was elected in 1997. Chemistry of Elements (2nd Edn.), Oxford:Butterworth-Heinemann. In 1999, there were 100,000 people who were discharged in 1990. [page needed] ^ G. L. Miessler and D. A. 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Wikimedia Commons ATSDR Medical Management Guidelines for Cyanide Poisoning (US) HSE Recommendations for First Aid Treatment of Cyanide Poisoning (UK) Hydrogen Cyanide and Cyanide (CICAD 61) IPCS/CEC Evaluation of Antidote Against Poisoning cyanides National Pollutant Inventory –Cyanide Compounds Fact sheet Eating Apple Seeds Is Safe Despite The Small Amount of Cyanide Toxicology Profile for Cyanide, Cyanide U.S. Department of Health and Human Services, July 2006 Safety Data National Institute for Research and Security (1997). I 1999ble det 100,000,000,000,000,000,000,000,000 Toxicological Sheet 4, Paris: INRS, 5 pp. (PDF-fil, (p-fransk)) National Institute of et de sécurité (1997). Cyanure de sodium. Cyanure de potassium. Fiche toxicology n° 111, Paris: INRS, 6 pp. (PDF file, (in French)) Retrieved from α-chlorohydrin; Glycerol α-monochlorohydrin; Chlorodeoxyglycerol; 3-Chloro-1,2-propanediol Identifiers CAS Number 96-24-2 Y 3D model (JSmol) Interactive image ChEBI CHEBI:18721 Y ChemSpider 7018 Y ECHA InfoCard 100.002.267 EC Number 202-492-4 KEGG C18676 N PubChem CID 7290 UNII QGS78A3T6P Y CompTox Dashboard (EPA) DTXSID4020664 InChI InChI=1S/C3H7ClO2/c4-1-3(6)2-5/h3,5-6H,1-2H2 YKey: SSZWWUDQMAHNAQ-UHFFFAOYSA-N YInChI=1/C3H7ClO2/c4-1-3(6)2-5/h3,5-6H,1-2H2Key: SSZWWUDQMAHNAQ-UHFFFAOYAR SMILES ClCC(O)CO Properties Chemical formula C3H7ClO2 Molar mass 110.54 g·mol−1 Appearance Viscous, colorless liquid Density 1.32 g·cm−3 Melting point −40 °C (−40 °F; 233 K) Boiling point 213 °C (415 °F; 486 K) Hazards Safety data sheet External MSDS R-phrases (outdated) R26/27/28-R36/37/38 S-phrases (outdated) S24-S45 Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F] , 100 kPa). N confirm (what is YN ?) Infobox references 3-MCPD (3-monochloropropane-1,2-diol or 3-chloropropan-1,2-diol) is an organic chemical compound with the formula HOCH2CH (OH) CH2Cl. It is a colorless liquid. It is a versatile multifunctional building block. [1] The compound has attracted attention as the most common member of chemical food contaminants known as chloropropanols. [2] It is believed to be carcinogenic in humans. It is produced in foods processed at high temperatures with hydrochloric acid to speed up protein hydrolysis. As a byproduct of this process, chloride can react with glycerol spine in lipids to produce 3-MCPD. 3-MCPD can also occur in foods that have been in contact with materials containing epichlorohydrin-based wet strength resins used in the production of some tea bags and sausage casings. [3] In 2009, 3-MCPD was found in some East Asian and Southeast Asian sauces such as oyster sauce, Hoisin sauce and soy sauce. [4] The use of hydrochloric acid is far faster than traditional slow fermentation. A report from the European Food Safety Authority in 2013 indicated margarine, vegetable oils (excluding walnut oil), preserved meat, bread and fine bakery products as the main sources in Europe. [5] 3-MCPD is also found in many paper products treated with polyamidomin-epichlorohydrin wet strength resins. [6] Absorption and toxicity The International Agency for Cancer classified 3-MCPD as group 2B, possibly carcinogenic to humans. [7] 3-MCPD is carcinogenic in rodents via a non-genotoxic mechanism. [8] It is able to cross the blood-testis barrier and blood-brain Oral LD50 of 3-chlorine-1.2-propandiol is 152 mg/kg body weight in rats. [10] 3-MCPD also has male antifertility effects [10][11] and can be used as a rat chemoplant. [12] Legal limits The Common Food Standards Australia New Zealand (FSANZ) set a limit of 3-MCPD in soy sauce of 0.02 mg/kg, in line with European Commission standards that came into force in the EU in April 2002. History In 2000, a survey of soy sauces and similar products was available in the UK conducted by the Department of Agriculture, Fisheries and Food/Department of Health Food Safety and Standards Group (JFSSG) and reported that more than half of samples collected from outlets contained different levels of 3-MCPD. [13] In 2001, the United Kingdom Food Standards Agency (FSA) found in tests of various oyster sauces and soy sauces that 22% of samples contained 3-MCPD at levels significantly higher than those considered safe by the EU. About two-thirds of these samples also contained a second chloropropanol called 1.3-dichloropropane-2-ol (1.3-DCP) which experts recommend should not be present at any levels in food. Both chemicals have the potential to cause cancer and the agency recommended that the affected products be withdrawn from the shelves and avoided. [14] [15] In 2001, FSA and Food Standards Australia designated New Zealand (FSANZ) brands and products imported from Thailand, China, Hong Kong and Taiwan. Brands named in the British warning include Golden Mountain, King Imperial, Pearl Bridge, Golden, Kimlan, Golden Swan, Sinsin, Tung Chun and Wanjasham soy sauce. Knorr soy sauce was also implicated, as well as Uni-President Enterprises Corporation creamy soy sauce from Taiwan, Silver Swan soy sauce from the Philippines, Ta Tun soybean sauce from Taiwan, Tau Vi Yeu spice sauce and Soybean sauce from Vietnam, Zu Miao Fo Shan soy superior sauce and Mushroom soy sauce from China and Golden Mountain and Lee Kum Kee chicken marinade. [16] Between 2002 and 2004, relatively high levels of 3-MCPD and other chloropropanols in soy sauce and other foods were found in China. In Vietnam in 2007, 3-MCPD was found in toxic levels. In 2004, the HCM City Institute of Hygiene and Public Health found 33 out of 41 sample soy sauce with high prices of 3-MCPD, including six samples with up to 11,000 to 18,000 times more 3-MPCD than allowed, Thanh Nien Daily newspaper commented: Health agencies have known that Vietnamese soy sauce, the country's second most popular sauce after fish sauce, has been full of cancer drugs since at least 2001. In March 2008, carcinogens were found in soy sauces, and Australians were advised to avoid soy sauce. [22] In November 2008, Britain's Food Standards Agency reported a wide range of household names from sliced bread to beef burgers and cheese with 3-MCPD across safe limits. Relatively high levels of the chemical were found in popular brands such as Mother's Pride, Jacobs biscuits, John West, Kraft Dairylea and McVitie's Krackawheat. The same study also found relatively high levels in a number of supermarket own brands, including Tesco char-grilled beefburgers, Sainsbury's Hot 'n Spicy Chicken Drumsticks and digestive biscuits from Asda. The highest levels of 3-MCPD found in a non-soy sauce product, biscuits, were 134 µg per kg. The highest level of 3-MCPD found in soy sauce was 93,000 µg per kg, 700 times higher. The legal limit for 3-MCPD coming in next year[when?] will be 20 µg per kg, but the safety guideline for daily intake is 120 µg for a 60 kg person per day. [quote required] In 2016, the incidence of 3-MCPD in selected paper products (coffee filters, tea bags, disposable paper hot drink cups, milk cardboard containers, paper towels) was sold on the Canadian and German market reported and the transfer of 3-MCPD from these products to beverages was examined. [23] Exposure to 3-MCPD from packaging material is likely to account for only a small percentage of total dietary exposure compared to the intake of processed oils/fats containing 3-MCPD equivalents (in the form of fatty acids) that are often present at levels of approximately 0.2-2 µg/g. References ^ Fernandez-Megia, Eduardo; Correa, Juan; Rodríguez-Meizoso, Irene; In 2006, he became 100,000,000,000,000 people in Norway. In 1999, a number of † macromolecules were †. 39 (6): 2113–2120. Bibcode:2006MaMol.. 39.2113F. doi:10.1021/ma052448w. ^ Howard, Filip H.; In 2010, 100,000 people were released. In 1999, there were 100 billion, and the environmental science and technology. 44 (7): 2277–2285. Bibcode:2010enst... 44.2277H. doi:10.1021/es903383a. In 2017, a map was published ^ IFST issuing statement on 3-MCPD ^ Food Standards Agency - 3-MCPD in soy sauce and related products - Q & As. Archived from the original on 22 February 2010. ^ The European Food Safety Authority (2013). 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