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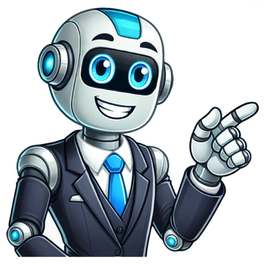

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The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. N2 gas, commonly referred to as nitrogen gas, is a colorless, odorless, and tasteless gas that constitutes approximately 78% of the Earth's atmosphere. It is a diatomic molecule, consisting of two nitrogen atoms (N2), and is the most abundant unreactive gas in the Earth's atmosphere. Nitrogen gas is inert, meaning it does not readily react with other elements, which makes it an ideal component in various industrial and scientific applications. Properties and Uses of N2 GasN2 gas has several unique properties that make it useful in a wide range of applications. It is relatively inert, which means it does not support combustion and is not toxic. Additionally, N2 gas is a good insulator, which makes it useful in applications where high temperatures are involved. Some of the common uses of N2 gas include: Industrial processes: N2 gas is used in various industrial processes, such as the production of steel, where it is used as a shielding gas to prevent oxidation. It is also used in the food industry to preserve packaged foods by displacing oxygen and preventing spoilage. Medical applications: N2 gas is used in medical applications, such as in anesthesia machines, where it is used as a carrier gas to deliver anesthetic agents. It is also used in cryotherapy, where it is used to cool tissues to extremely low temperatures. Scientific research: N2 gas is used in scientific research, such as in the study of superconductors, where it is used to cool materials to extremely low temperatures. It is also used in the study of high-temperature superconductors, where it is used to create a shielding gas atmosphere. Production and Storage of N2 GasN2 gas can be produced through various methods, including the fractional distillation of liquid air, where nitrogen is separated from other components of the air based on its boiling point. It can also be produced through the reaction of ammonia with oxygen, where nitrogen is produced as a byproduct. Once produced, N2 gas can be stored in high-pressure cylinders or tanks, where it is kept under pressure to prevent leakage. PropertyValue Molecular weight28.013 g/mol Boiling point-195.8C Melting point-209.86C Density1.165 g/L As a domain-specific expert, it's worth noting that N2 gas has a wide range of applications, and its properties make it an ideal component in various industrial and scientific processes. However, it's also important to handle N2 gas with care, as it can displace oxygen in the air, leading to asphyxiation. N2 gas is a colorless, odorless, and tasteless gas that constitutes approximately 78% of the Earth's atmosphere. It is inert, meaning it does not readily react with other elements, which makes it an ideal component in various industrial and scientific applications. N2 gas has several unique properties, including being a good insulator and not supporting combustion. It is used in various industrial processes, medical applications, and scientific research. N2 gas can be produced through various methods, including the fractional distillation of liquid air and the reaction of ammonia with oxygen. In conclusion, N2 gas is a unique and versatile gas that has a wide range of applications. Its properties make it an ideal component in various industrial and scientific processes, and it is used in various fields, including medicine, research, and industry. However, it's also important to handle N2 gas with care, as it can displace oxygen in the air, leading to asphyxiation. The most common use of N2 gas is in industrial processes, such as the production of steel, where it is used as a shielding gas to prevent oxidation. No, N2 gas is not toxic. However, it can displace oxygen in the air, leading to asphyxiation if inhaled in large quantities. N2 gas can be produced through various methods, including the fractional distillation of liquid air and the reaction of ammonia with oxygen. Related Resources: thermodynamics Thermodynamics Heat Transfer Thermodynamic Properties of Nitrogen Table, Specific Volume, m3/kg, Internal Energy, kJ/kg, Enthalpy, kJ/kg, and Entropy, kJ/kg-K. Where: v = Specific volume u = Specific internal energy h = Specific enthalpy s = Specific entropy Temp. (K) Press. (kPa) Specific Volume, m3/kg Internal Energy, kJ/kg Sat. Liquid vf Evap. ufg Sat. Vapor vg Sat. Liquid uf Evap. ufg Sat. Vapor ug 63.1 12.5 0.001150 1.48074 1.48189 150.92 196.86 45.94 65 17.4 0.001160 1.09231 1.09347 147.19 194.37 47.17 70 38.6 0.001191 0.52513 0.52632 137.13 187.54 50.40 75 76.1 0.001223 0.28052 0.28174 127.04 180.47 53.43 77.3 101.3 0.001240 0.21515 0.21639 122.27 177.04 54.76 80 137.0 0.001259 0.16249 0.16375 116.86 173.06 56.20 85 229.1 0.001299 0.10018 0.10148 106.55 165.20 58.65 90 360.8 0.001343 0.06477 0.06611 96.06 156.76 60.70 95 541.1 0.001393 0.04337 0.04476 85.35 147.60 62.25 100 779.2 0.001452 0.02975 0.03120 74.33 137.50 63.17 105 1084.6 0.001522 0.02066 0.02218 62.89 126.18 63.29 110 1467.6 0.001610 0.01434 0.01595 50.81 113.11 62.31 115 1939.3 0.001729 0.00971 0.01144 37.66 97.36 59.70 120 2513.0 0.001915 0.00608 0.00799 22.42 76.63 54.21 125 3208.0 0.002355 0.00254 0.00490 0.83 40.73 39.90 126.2 3397.8 0.003194 0 0.00319 18.94 0 18.94 Temp. (K) Press. (kPa) Enthalpy, kJ/kg Entropy, kJ/kg-K Sat. Liquid hf Evap. hfg Sat. Vapor hg Sat. Liquid sf Evap. sfg Sat. Vapor sg 63.1 12.5 150.91 215.39 64.48 2.4234 3.4109 5.8343 65 17.4 147.17 213.38 66.21 2.4816 3.2828 5.7645 70 38.6 137.09 207.79 70.70 2.6307 2.9684 5.5991 75 76.1 126.95 201.82 74.87 2.7700 2.6909 5.4609 77.3 101.3 122.15 198.84 76.69 2.8326 2.5707 5.4033 80 137.0 116.69 195.32 78.63 2.9014 2.4415 5.3429 85 229.1 106.25 188.15 81.90 3.0266 2.2135 5.2401 90 360.8 95.58 180.13 84.55 3.1466 2.0015 5.1480 95 541.1 84.59 171.07 86.47 3.2627 1.8007 5.0634 100 779.2 73.20 160.68 87.48 3.3761 1.6068 4.9829 105 1084.6 61.24 148.59 87.35 3.4883 1.4151 4.9034 110 1467.6 48.45 134.15 85.71 3.6017 1.2196 4.8213 115 1939.3 34.31 116.19 81.88 3.7204 1.0104 4.7307 120 2513.0 17.61 91.91 74.30 3.8536 0.7659 4.6195 125 3 208.0 6.73 48.88 55.60 4.0399 0.3910 4.4309 126.2 3397.8 29.79 0 29.79 4.2193 0 4.2193 Temperature Conversions Pressure Conversions kPa to psi, 0.145038 lbs/in2 = 1kPa / 6.89479 (kPa / psi) or Divide kPa by 6.89479 psi to kPa, 6.89476 kPa = 1 psi (multiply psi by 6.89476) Volume Conversions m3/ kg to in3/lbs, 27679.9 in3/lbs = 1 m3/ kg, (multiply m3/ kg by 27679.9 to get in3/lbs) in3/lbs to m3/ kg, 3.6127 x 10-5 m3/ kg = 1 in3/lbs (divide in3/lbs by 3.6127 x 10-5) Energy Conversions BTU/lbs to kJ/kg, 1 kJ/k = 0.429923 BTU/lbs (multiple BTU/lbs by 0.429923) kJ / kg to Btu / lbs, 1 BTU/lbs = 2.326 kJ/kg (divide kJ/kg by 2.326) Science Chemistry Nitrogen is a colourless, odourless gas, which condenses at 195.8 C to a colourless, mobile liquid. The element exists as N2 molecules, represented as :N:::N:, for which the bond energy of 226 kilocalories per mole is exceeded only by that of carbon monoxide, 256 kilocalories per mole. Because of this high bond energy the activation energy for reaction of molecular nitrogen is usually very high, causing nitrogen to be relatively inert to most reagents under ordinary conditions. Furthermore, the high stability of the nitrogen molecule contributes significantly to the thermodynamic instability of many nitrogen compounds, in which the bonds, although reasonably strong, are far less so than those in molecular nitrogen. For these reasons, elemental nitrogen appears to conceal quite effectively the truly reactive nature of its individual atoms. A relatively recent and unexpected discovery is that nitrogen molecules are able to serve as ligands in complex coordination compounds. The observation that certain solutions of ruthenium complexes can absorb atmospheric nitrogen has led to hope that one day a simpler and better method of nitrogen fixation may be found. An active form of nitrogen, presumably containing free nitrogen atoms, can be created by passage of nitrogen gas at low pressure through a high-tension electrical discharge. The product glows with a yellow light and is much more reactive than ordinary molecular nitrogen, combining with atomic hydrogen and with sulfur, phosphorus, and various metals, and capable of decomposing nitric oxide, NO, to N2 and O2. A nitrogen atom has the electronic structure represented by 1s22s22p3. The five outer shell electrons screen the nuclear charge quite poorly, with the result that the effective nuclear charge felt at the covalent radius distance is relatively high. Thus nitrogen atoms are relatively small in size and high in electronegativity, being intermediate between carbon and oxygen in both of these properties. The electronic configuration includes three half-filled outer orbitals, which give the atom the capacity to form three covalent bonds. The nitrogen atom should therefore be a very reactive species, combining with most other elements to form stable binary compounds, especially when the other element is sufficiently different in electronegativity to impart substantial polarity to the bonds. When the other element is lower in electronegativity than nitrogen, the polarity gives partial negative charge to the nitrogen atom, making its lone-pair electrons available for coordination. When the other element is more electronegative, however, the resulting partial positive charge on nitrogen greatly limits the donor properties of the molecule. When the bond polarity is low (owing to the electronegativity of the other element being similar to that of nitrogen), multiple bonding is greatly favoured over single bonding. If disparity of atomic size prevents such multiple bonding, then the single bond that forms is likely to be relatively weak, and the compound is likely to be unstable with respect to the free elements. All of these bonding characteristics of nitrogen are observable in its general chemistry. Often the percentage of nitrogen in gas mixtures can be determined by measuring the volume after all other components have been absorbed by chemical reagents. Decomposition of nitrates by sulfuric acid in the presence of mercury liberates nitric oxide, which can be measured as a gas. Nitrogen is released from organic compounds when they are burned over copper oxide, and the free nitrogen can be measured as a gas after other combustion products have been absorbed. The well-known Kjeldahl method for determining the nitrogen content of organic compounds involves digestion of the compound with concentrated sulfuric acid (optionally containing mercury, or its oxide, and various salts, depending on the nature of the nitrogen compound). In this way, the nitrogen present is converted to ammonium sulfate. Addition of an excess of sodium hydroxide releases free ammonia, which is collected in standard acid; the amount of residual acid, which has not reacted with ammonia, is then determined by titration. Facts You Should Know: The Periodic Table Quiz Chemical element with atomic number 7 (N)Nitrogen,7NLiquid nitrogen (N2 at below196C)NitrogenAllotropesee AllotropesAppearancecolorless gas, liquid or solidStandard atomic weight Ar(N)[14.00643,14.00728][1]14.0070.001(abridged)[2]Nitrogen in the periodic tableHydrogenHeliumLithiumBerylliumBoronCarbonNitrogenOxygenFluorineNeonSodiumMagnesiumAluminiumSiliconPhosphorusSulfurChlorineArgonPotassiumCalciumScandiumTitaniumVanadiumChromiumManganeseIronCobaltNickelCopperZincGalliumGermaniumArsenicSeleniumBromineKryptonRubidiumStrontiumYttriumZirconiumNiobiumMolybdenumTechnetiumRutheniumRhodiumPalladiumSilverCadmiumIndiumTinAntimonyTelluriumIodineXenonCaesiumBariumLanthanumCeriumPraseodymiumNeodymiumPromethiumSamariumEuropiumGadolinium(element)ThalliumLeadBismuthPoloniumAstatineRadonFranciumRadiumActiniumThoriumProtactiniumUraniumNeptuniumPlutoniumAmericiumCuriumBerkeliumCaliforniumEinsteiniumFermiumMendeleviumNobeliumLawrenciumRutherfordiumDubniumSeaborgiumBohriumHassiumMeitneriumDarmstadtiumRoentgeniumCoperniciumNihoniumFleroviumMoscoviumLivermoriumTennessineOganessonNPcarbon nitrogen oxygenAtomic number (Z)7Groupgroup15 (pnictogens)Periodperiod2Block p-blockElectron configuration[He] 2s2 2p3Electrons per shell2, 5Physical propertiesPhase atSTPgasMelting point(N2) 63.23[3]K (209.86[3]C, 345.75[3]F) Boiling point(N2) 77.355K (195.795C, 320.431F) Density (atSTP)1.2506g/L[4] at 0 C, 1013 mbarwhenliquid (atb.p)0.808g/cm3 Triple point63.151K, 12.52kPa Critical point126.21K, 3.39MPa Heat of fusion(N2) 0.72kJ/mol Heat of vaporisation(N2) 5.57kJ/mol Molar heat capacity(N2) 29.124J/(molK) VapourpressureP(Pa)1101001k10k100katT(K)374146536277Atomic propertiesOxidation statescommon: 3, +3, +52,[5] I,[5] 0,[6] +1,[5] +2,[5] +4[5]ElectronegativityPaulingscale: 3.04 Ionisation energies1st:1402.3kJ/mol 2nd:2856kJ/mol 3rd:4578.1kJ/mol (more) Covalent radius71pm Van der Waals radius155pm Spectral lines of nitrogenOther propertiesNatural occurrenceprimordialCrystal structure hexagonal (hP4)Lattice constantsa=411.6pmc=673.4pm (att.p.)[7]Thermal conductivity25.83103W/(mK) Magnetic orderingdiamagnetic Speed of sound353 m/s (gas, at27C)CAS Number17778-88-0 7727-37-9 (N2)HistoryNamingfrom French nitre (saltpetre) + -gne ("forming")DiscoveryDaniel Rutherford (1772)NamedbyJean-Antoine Chaptal (1790)Isotopes of nitrogenveMain isotopesDecayabundancehalf-life (t1/2)modeproduct13Ntrace9.965min+13C14N99.6%stable15N0.4%stable16Nsynth7.13s16O