Hydrazine And Its Derivatives Preparation Properties Applications

DEAD is an aza-dienophile and an efficient dehydrogenating agent, converting alcohols to aldehydes, thiols to disulfides and hydrazo groups to azo groups; it is also a good electron acceptor. While DEAD is used in numerous chemical reactions it is mostly known as a key component of the Mitsunobu reaction, a common strategy for the preparation of an amine, azide, ether, thioether, or ester from the corresponding alcohol. It is used in the synthesis of various natural products and pharmaceuticals such as zidovudine, an AIDS drug; FdUMP, a potent antitumor agent; and procarbazine, a chemotherapy drug.

Nitromethane is produced industrially by combining propane and nitric acid in the gas phase at 350–450 °C (662–842 °F). This exothermic reaction produces the four industrially significant nitroalkanes: nitromethane, nitroethane, 1-nitropropane, and 2-nitropropane. The reaction involves free radicals, including the alkoxyl radicals of the type CH3CH2CH2O, which arise via homolysis of the corresponding nitrite ester. These alkoxy radicals are susceptible to C—C fragmentation reactions, which explains the formation of a mixture of...

Polysuccinimide

large-volume applications for superabsorbents (e.g. baby diapers). E. Jalalvandi, A. Shavandi (2018), "Polysuccinimide and its derivatives: Degradable and water

Polysuccinimide (PSI), also known as polyanhydroaspartic acid or polyaspartimide, is formed during the thermal polycondensation of aspartic acid and is the simplest polyimide. Polysuccinimide is insoluble in water, but soluble in some aprotic dipolar solvents. Its reactive nature makes polysuccinimide a versatile starting material for functional polymers made from renewable resources.

In its most characteristic reaction, AIBN decomposes, eliminating a molecule of nitrogen gas to form two 2-cyanoprop-2-yl radicals:

== Synthesis and properties ==

The name is derived from the salt of succinic acid, the structurally related succinate.

Azobisisobutyronitrile

Reaction with hydrazine gives the substituted dialkylhydrazine. In the second step, the hydrazine is oxidized to the azo derivative: 2 (CH3)2C(CN)OH

Azobisisobutyronitrile (abbreviated AIBN) is an organic compound with the formula [(CH3)2C(CN)]2N2. This white powder is soluble in alcohols and common organic solvents but is insoluble in water. It is often used as a foamer in plastics and rubber and as a radical initiator.

== Preparation ==

Hydrazine is mainly used as a foaming agent in preparing polymer foams, but applications also include its uses as a precursor to pharmaceuticals and agrochemicals, as well as a long-term storable propellant for in-space spacecraft propulsion. Additionally, hydrazine is used in various rocket fuels and to prepare the gas precursors used in airbags. Hydrazine is used within both nuclear and conventional electrical power plant steam cycles as an oxygen scavenger to control concentrations of dissolved oxygen in an effort to reduce corrosion.

As an azo initiator, radicals resulting from AIBN have multiple benefits over common organic peroxides. For example, they do not have oxygenated byproducts or much yellow discoloration. Additionally, they do not cause too much grafting and therefore are often used when making adhesives, acrylic fibers, detergents, etc.

== Mechanism of decomposition ==

Carbonyl reduction

nitrile, ester). In their handling properties, lithium aluminium hydride and sodium borohydride (and their derivatives) strongly differ. NaBH4 is far easier

In organic chemistry, carbonyl reduction is the conversion of any carbonyl group, usually to an alcohol. It is a common transformation that is practiced in many ways. Ketones, aldehydes, carboxylic acids, esters, amides, and acid halides - some of the most pervasive functional groups, -comprise carbonyl compounds. Carboxylic acids, esters, and acid halides can be reduced to either aldehydes or a step further to primary alcohols, depending on the strength of the reducing agent. Aldehydes and ketones can be reduced respectively to primary and secondary alcohols. In deoxygenation, the alcohol group can be further reduced and removed altogether by replacement with H.

As of 2000, approximately 120,000 tons of hydrazine hydrate (corresponding to a 64% solution of hydrazine in water by weight) were manufactured worldwide per year.

Phenelzine is primarily used in the treatment of major depressive disorder. Patients with atypical depression respond particularly well to phenelzine, but evidence suggests phenelzine can also be effective in melancholic depressions. The medication is also useful in treatment-resistant depression, where patients do not respond favorably to first and second-line treatments for depression. In addition to being a recognized treatment for major depressive disorder, phenelzine is also effective in treating dysthymia, bipolar depression, panic disorder, social anxiety disorder, bulimia nervosa, post-traumatic stress disorder (PTSD), and obsessive–compulsive disorder (OCD).

== Properties ==

Ethyl cyanoacetate may be prepared in various ways:

Hydrazine

Hydrazine and its derivatives: preparation, properties, applications. New York: J. Wiley. ISBN 978-0-471-89170-3. Schmidt EW (2001). Hydrazine and its

Hydrazine is an inorganic compound with the chemical formula N2H4. It is a simple pnictogen hydride, and is a colourless flammable liquid with an ammonia-like odour. Hydrazine is highly hazardous unless handled in solution as, for example, hydrazine hydrate (N2H4·xH2O).

Synthesis of phenelzine was first described by Emil Voto?ek and Otakar Leminger in 1932.

== Medical uses ==

The name "hydrazine" was coined by Emil Fischer in 1875; he was trying...

DEAD is an orange-red liquid which...

Because azobisisobutyronitrile readily gives off free radicals, it is often used as a radical initiator. This happens at temperatures above 40 °C, but in experiments is more commonly done at temperatures between 66 °C and 72 °C. This decomposition has a ?G‡ of 131 kJ/mol and results in two 2-cyano-2-propyl (carbon) radicals and a molecule of nitrogen gas. The release of nitrogen gas pushes this decomposition forward due to the increase...

== Production ==

Nitromethane

needed] A small amount of hydrazine blended in nitromethane can increase the power output even further. With nitromethane, hydrazine forms an explosive salt

Nitromethane, sometimes shortened to simply "nitro", is an organic compound with the chemical formula CH3NO2. It is the simplest organic nitro compound. It is a polar liquid commonly used as a solvent in a variety of industrial applications such as in extractions, as a reaction medium, and as a cleaning solvent. As an intermediate in organic synthesis, it is used widely in the manufacture of pesticides, explosives, fibers, and coatings. Nitromethane is used as a fuel additive in various motorsports and hobbies, e.g. Top Fuel drag racing and miniature internal combustion engines in radio control, control line and free flight model aircraft.

Phenelzine

non-selective and irreversible monoamine oxidase inhibitor (MAOI) of the hydrazine family which is primarily used as an antidepressant and anxiolytic to

Phenelzine, sold under the brand name Nardil among others, is a non-selective and irreversible monoamine oxidase inhibitor (MAOI) of the hydrazine family which is primarily used as an antidepressant and anxiolytic to treat depression and anxiety. Along with tranylcypromine and isocarboxazid, phenelzine is one of the few non-selective and irreversible MAOIs still in widespread clinical use.

It was first discovered and isolated by Scottish physician Daniel Rutherford in 1772 and independently by Carl Wilhelm Scheele and Henry Cavendish at about the same time. The name nitrogène was suggested by French chemist Jean-Antoine-Claude Chaptal in 1790 when it was found that nitrogen was present in nitric acid and nitrates. Antoine Lavoisier suggested instead the name azote, from the Ancient Greek: ???????? "no life", as it is an asphyxiant gas; this name is used in a number of languages, and appears in the English names of some nitrogen compounds such as hydrazine...

== Etymology and history ==

Diethyl azodicarboxylate

corresponding hydrazine derivatives. The substitution of boronic acid esters proceeds similarly: DEAD is an efficient component in Diels-Alder reactions and in click

Diethyl azodicarboxylate, conventionally abbreviated as DEAD and sometimes as DEADCAT, is an organic compound with the structural formula CH3CH2?O?C(=O)?N=N?C(=O)?O?CH2CH3. Its molecular structure consists of a central azo functional group, RN=NR, flanked by two ethyl ester groups. This orange-red liquid is a valuable reagent but also quite dangerous and explodes upon heating. Therefore, commercial shipment of pure diethyl azodicarboxylate is prohibited in the United States and is carried out either in solution or on polystyrene particles.

Benzidine is prepared in a two step process from nitrobenzene. First, the nitrobenzene is converted to 1,2-diphenylhydrazine, usually using iron powder as the reducing agent. Treatment of this hydrazine with mineral acids induces a rearrangement reaction to 4,4'-benzidine. Smaller amounts of other isomers are also formed. The benzidine rearrangement, which proceeds intramolecularly, is a classic mechanistic puzzle in organic chemistry.

Hydrazines are a class of organic substances derived by replacing one or more hydrogen atoms in hydrazine by an organic group.

Nitrogen

structure to ammonia and hydrazine as well. Hydrazine is a fuming, colourless liquid that smells similar to ammonia. Its physical properties are very similar

Nitrogen is a chemical element; it has symbol N and atomic number 7. Nitrogen is a nonmetal and the lightest member of group 15 of the periodic table, often called the pnictogens. It is a common element in the universe, estimated at seventh in total abundance in the Milky Way and the Solar System. At standard temperature and pressure, two atoms of the element bond to form N2, a colourless and odourless diatomic gas. N2 forms about 78% of Earth's atmosphere, making it the most abundant chemical species in air. Because of the volatility of nitrogen compounds, nitrogen is relatively rare in the solid parts of the Earth.

== Production ==

The production of polysuccinimide was reported by Hugo Schiff as early as 1897. When dry aspartic acid was heated for about 20 hours at 190 °C to 200 °C, a colorless product was obtained. Above 200 °C, a weak yellowing occurs, the yield was almost quantitative.

Ethyl cyanoacetate

with hydrazine to give a substituted pyrazole and subsequently with formamide to allopurinol, a substituted pyrazolo-pyrimidine. The purine derivatives theophylline

Ethyl cyanoacetate is an organic compound that contains a carboxylate ester and a nitrile. It is a colourless liquid with a pleasant odor. This material is useful as a starting material for synthesis due to its variety of functional groups and chemical reactivity.

Two broad strategies exist for carbonyl reduction. One method, which is favored in industry, uses hydrogen as the reductant. This approach is called hydrogenation and requires metal catalysts. The other broad approach employs stoichiometric reagents that deliver H? and H+ separately. This article focuses on the use of these reagents. Prominent among these reagents are the alkali metal salts of borohydrides and aluminium hydrides.

Benzidine

values of 9.3 × 10?10 and 5.6 × 10?11. Its solutions react with oxidizing agents to give deeply coloured quinone-related derivatives. Conversion of benzidine

Benzidine (trivial name), also called 1,1'-biphenyl-4,4'-diamine (systematic name), is an organic compound with the formula (C6H4NH2)2. It is an aromatic amine. It is a component of a test for cyanide. Related derivatives are used in the production of dyes. Benzidine has been linked to bladder and pancreatic cancer.

== General considerations ==

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