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Synthesis and Analysis of 2,4-Dinitro Phenyl Hydrazine

Ashok Kumar Singh

Department of Chemistry, University of Lucknow, India

EDITORIAL

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***For Correspondence**

Ashok Kumar Singh, Department of Chemistry, University of Lucknow, India

E-mail: singhaks303@rediffmail.com

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2,4-Dinitrophenylhydrazine, commonly known as DNPH, Borche's reagent and Brady's reagent, is a chemical compound with the formula $C_6H_3(NO_2)_2NHNH_2$. Dinitrophenylhydrazine is a solid that ranges in colour from red to orange. The total compound is a substituted hydrazine that is frequently used qualitatively to detect carbonyl groups in ketones and aldehydes. These hydrazone derivatives can also be utilised to determine the identification of the source chemical. The melting point of this derivative is frequently used, in conjunction with a database of values, to determine the identification of a certain carbonyl compound. It is relatively sensitive to friction and stress, as well as being a shock explosive. As a result, due precautions must be taken when using it and it is normally delivered in a wet condition to lessen the risk of explosion. Although hydrazine $H_2N\text{-}NH_2$ is not commonly replaced, we may make a plausible assumption because it is an excellent nucleophile. As a result, the product is used to make 2,4-dinitrophenylhydrazine, which is made by reacting hydrazine with 2,4-dinitrochlorobenzene. This chloride is easily displaced because to the electron-accepting impact of two nitro groups. We should nitrate chlorobenzene since chlorine is ortho, deactivating and para directing. The synthesis is completed since chlorobenzene can easily be made from benzene.

In instructional laboratories on qualitative organic analysis, DNPH is a reagent. Brady's reagent, also known as Borche's reagent, is made by dissolving 2,4-dinitrophenylhydrazine in methanol and concentrated sulfuric acid. Ketones and aldehydes are detected with this solution. The production of a yellow, orange, or red dinitrophenylhydrazone precipitate indicates a positive test. Aromatic carbonyls produce red precipitates, while aliphatic carbonyls produce yellow precipitates. A hydrazone is formed when 2,4-dinitrophenylhydrazine reacts with a generic ketone. Aryl hydrazones are important building blocks for heterocyclic rings like indoles and pyrazoles. Because of their wide variety of applications, including biological, organic, inorganic and analytical chemical purposes, the usage and interest in Schiff bases has grown in recent decades. Pigments, dyes, catalysts, ligands in organometallic complexes and polymer stabilisers are all examples of their use. Antidepressant, analgesic, anti-inflammatory, antiplatelet, antimalarial, antimicrobial, antimycobacterial, anticancer and antioxidant actions are all produced by the biological activity of these substances. The antifungal action of hydrazones, on the other hand, is solely known from publications on acylhydrazones.

The hydrazine derivative 2,4-Dinitrophenylhydrazine (DNPH) is a possible mutagenic agent. The molecular and crystal structures of the substance have been studied. Vibrational spectroscopic research was used to explore the intramolecular and intermolecular hydrogen bonding in DNPH. Differential scanning calorimetry was used to investigate the mechanism of DNPH isothermal degradation (DSC). The carbonyl functionality of ketone or aldehyde functional groups may be identified qualitatively using 2,4-dinitrophenylhydrazine. A positive test results in the development of a yellow, orange, or red precipitate known as dinitrophenylhydrazone. 2,4-Dinitrophenylhydrazones are a safer derivative than phenylhydrazones for a variety of reasons. For starters, these compounds have bigger molecular masses, which increases the volume of stuff to be examined. Derivatives with a higher mass have a higher likelihood of becoming a solid.