

SYNTHESIS, PROPERTIES, APPLICATION OF BIOLOGICALLY ACTIVE COMPOUNDS BASED ON ACETYLENE

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Abstract:	Keywords:
<p>This article explores the synthesis, properties, and diverse applications of acetylene in the realm of biology. Acetylene, a hydrocarbon compound with a triple bond between two carbon atoms, has garnered significant interest in the field of biochemistry due to its unique characteristics. This paper delves into the biologically relevant synthesis pathways of acetylene, shedding light on its natural production within organisms. Furthermore, it discusses the various properties of acetylene that make it valuable in biological contexts, such as its reactivity and ability to serve as a versatile substrate. Additionally, the article highlights the applications of acetylene in the study of biological processes, including its use as a tracer in metabolic studies and its role in the synthesis of bioactive molecules. Lastly, the safety precautions and environmental considerations associated with the handling of acetylene are also addressed.</p>	

Introduction

Acetylene, a hydrocarbon compound with the chemical formula C_2H_2 , has been a subject of significant interest in the field of biology due to its versatile applications and synthesis processes. This article explores the synthesis methods, biological applications, and various uses of acetylene-derived compounds in different fields.

Synthesis of Biological Accumulations:

Biological accumulations based on acetylene are synthesized through several chemical processes, including hydrochlorination, polymerization, and oxidation. These processes yield a wide range of compounds, each with unique properties and applications.

Biochemical Research: Acetylene-derived compounds play a crucial role in biochemical research, especially in the study of enzyme mechanisms and metabolic pathways.

Medicinal Chemistry: Certain acetylene derivatives have shown promising results in drug development, exhibiting potential therapeutic effects in the treatment of various diseases.

Biodegradable Polymers: Acetylene-based polymers are being explored as biodegradable materials, offering eco-friendly alternatives to traditional plastics.

Agricultural Practices: Acetylene is used to stimulate the ripening of fruits, making it an essential component in the agricultural industry.

Welding and Cutting: Acetylene, when mixed with oxygen, is widely used for welding and cutting metals due to its high flame temperature.

Chemical Synthesis: Acetylene-derived compounds serve as intermediates in the synthesis of numerous chemicals, including solvents, plastics, and pharmaceuticals.

Lighting: Acetylene gas was historically used in lamps, providing illumination before the widespread use of electricity.

Analytical Chemistry: Acetylene flame is utilized in atomic absorption spectroscopy for elemental analysis, enabling precise measurement of trace elements in various samples.

Versatile and ubiquitously used synthetic transformations of acetylene involve functionalization of the $C\equiv C$ bond; these processes are considered first (Section 2.1). Next, access to acrylic acid derivatives (Section 2.2) and preparation of substituted alkynes (Section 2.3) are discussed, followed by preparation of heterocyclic molecules (Section 2.4). Selected applications of acetylene in the synthesis of drugs and pharmaceutical substances is highlighted in a separate section (Section 2.5). Synthetic organic and organometallic reactions are also considered (Section 2.6 and Section 2.7), followed by industry-related reactions involving hydrogenation, hydrochlorination reactions and their mechanisms (Section 2.8 and Section 2.9). Finally, useful emerging concepts from the chemistry of alkynes are briefly mentioned (Section 2.10).

Acetylene (C_2H_2) is a highly reactive hydrocarbon molecule that has found diverse applications in both chemistry and biology. In this article, we will explore the synthesis, properties, and various applications of biological accumulations that utilize acetylene as a fundamental building block.

Synthesis:

1. Acetylene can be synthesized by various methods, including the partial combustion of methane, the reaction of calcium carbide with water, or the dehydrogenation of hydrocarbons. These methods yield high-purity acetylene gas, which serves as a starting point for further chemical transformations.
2. Biological accumulations based on acetylene can be synthesized through chemical modification of acetylene molecules, enabling the incorporation of acetylene-derived compounds into biomolecules.

Properties:

1. Acetylene is a linear, unsaturated hydrocarbon with a triple bond between carbon atoms, making it highly reactive. This reactivity is leveraged in various biological processes.
2. Acetylene-based compounds exhibit unique chemical properties, such as their ability to participate in click chemistry reactions, which have become invaluable in bioconjugation and biomolecule labeling.

Applications:

1. Bioorthogonal Labeling:

- Acetylene-based compounds can be incorporated into biomolecules for bioorthogonal labeling, enabling precise tracking and visualization of specific biomolecules in complex biological systems.

2. Drug Delivery:

- Acetylene-functionalized nanoparticles and drug carriers can be used for targeted drug delivery, allowing for controlled release of therapeutic agents in specific tissues or cells.

3. Biomaterials:

- Acetylene-derived compounds can be integrated into the development of biomaterials, including hydrogels and scaffolds, with tunable properties for tissue engineering applications.

4. Chemical Biology:

- Acetylene-based chemistry plays a pivotal role in chemical biology studies, facilitating the investigation of biological processes at the molecular level.

Conclusion:

Acetylene-derived biological accumulations have diverse applications in biochemical research, medicine, agriculture, and various industries. The synthesis methods continue to be refined, leading to the discovery of novel compounds with unique properties. As research in this field progresses, acetylene-based compounds are likely to play an increasingly significant role in addressing various challenges in science and technology.

The synthesis, properties, and applications of biological accumulations based on acetylene offer a wide range of opportunities in the field of biotechnology and chemical biology. These innovative approaches enable researchers to address complex biological questions and develop novel materials and therapies with precision and specificity.

REFERENCES

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