

Enter The Common Name For The Following Compound: $\text{CH}_3\text{NCH}_2\text{CH}_3$, With An H Atom Attached To The N Atom.

Enter The Common Name For The Following Compound: $\text{CH}_3\text{NCH}_2\text{CH}_3$, With An H Atom Attached To The N Atom. Understanding the common names of chemical compounds is essential for students, chemists, and anyone involved in chemical research or industry. In this article, we will explore the compound with the molecular structure $\text{CH}_3\text{NCH}_2\text{CH}_3$, which has an additional hydrogen atom attached to the nitrogen atom. We will delve into its systematic and common names, structural features, chemical properties, uses, and related compounds to provide a comprehensive overview suitable for SEO optimization and educational purposes.

Structural Overview of the Compound

Molecular Formula and Basic Structure

The compound in question has the molecular formula $\text{C}_3\text{H}_9\text{N}$. Its structure can be interpreted as a propyl group ($\text{CH}_3\text{CH}_2\text{CH}_3$) with an amino group attached, specifically, a methylamine derivative.

- The core backbone is a propane chain (three carbons).
- One of the hydrogens on the nitrogen atom has been replaced by an additional hydrogen, making it a primary amine.
- The presence of the nitrogen atom attached to the alkyl chain classifies it as an amine.

Structural Representation

The compound's structure can be represented as:

$\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{NH}_2$

or more explicitly:

$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NH}_2$

This structure indicates a primary amine with a propyl chain attached to the amino group, which is typical of alkyl amines.

Common and Systematic Names of the Compound

Systematic Name

The systematic IUPAC name for this compound is propylamine. It is derived from the parent chain "propane" with an amino group replacing one hydrogen, resulting in "amine."

Common Names

The most widely recognized common name for this compound is 1-propylamine or simply propylamine. In everyday chemical communication, "propylamine" is frequently used due to its simplicity and clarity.

Why Is It Called Propylamine?

- The "propyl" part signifies the three-carbon alkyl group attached to the amino group.
- The "amine" suffix indicates the presence of a nitrogen atom bonded to alkyl groups.
- When the amino group is attached at the first carbon, it is called 1-propylamine, but often, the positional number is omitted if there is only one amino group.

Chemical Properties of Propylamine

Physical Properties

- Appearance: Colorless liquid or gas at room temperature.
- Boiling Point: Approximately 49°C (120°F), which is typical for small amines.
- Solubility: Highly soluble in water due to hydrogen bonding; also soluble in organic solvents like ethanol and ether.
- Odor: Has a strong, fishy odor characteristic of many amines.

Chemical Properties and Reactivity

- Basicity: Propylamine is a weak base, capable of accepting protons.
- Reactivity: It readily reacts with acids to form amine salts.
- Nucleophilicity: The nitrogen atom acts as a nucleophile, making it reactive in substitution and addition reactions.
- Oxidation: Can be oxidized to produce corresponding aldehydes, acids, or nitriles under specific conditions.

Applications and Uses of Propylamine

Industrial Applications

- Used as a building block in the synthesis of pharmaceuticals, agrochemicals, and dyes.

- Employed in the manufacture of rubber processing chemicals.
- Serves as an intermediate in the production of pesticides and herbicides.

Laboratory Uses

- Often used as a reagent in organic synthesis.
- Utilized as a base in various chemical reactions, including amination and acylation processes.

Pharmaceutical Importance

- Propylamine derivatives are found in certain drugs and therapeutic agents.
- Its derivatives may serve as intermediates in the synthesis of antidepressants, antihistamines, or other pharmacologically active compounds.

Related Compounds and Variations

Other Alkyl Amines

- Methylamine (CH_3NH_2)
- Ethylamine ($\text{C}_2\text{H}_5\text{NH}_2$)
- Butylamine ($\text{C}_4\text{H}_9\text{NH}_2$)

These compounds share similar properties but differ in chain length and reactivity.

Structural Isomers

- Isopropylamine (2-propylamine): with the amino group attached to the second carbon.
- N-methylpropylamine: with a methyl group attached to the nitrogen atom.

Derivatives of Propylamine

- N-substituted propylamines (e.g., N-methylpropylamine)
- Aromatic derivatives, such as phenylpropylamine.

Safety and Handling of Propylamine

Health Hazards

- Propylamine is irritating to the skin, eyes, and respiratory system.
- Prolonged exposure can cause headaches, dizziness, or nausea.

Safety Precautions

- Use in a well-ventilated area or under a fume hood.
- Wear appropriate personal protective equipment, including gloves and goggles.
- Store in airtight containers away from heat and oxidizing agents.

Summary: The Significance of Propylamine

Propylamine, also known as 1-propylamine, is a fundamental amine in organic chemistry, serving as a building block for numerous chemical syntheses. Its simple structure and versatile reactivity make it valuable in industrial manufacturing, pharmaceutical development, and academic research.

Recognizing its common name and understanding its properties is essential for professionals working in chemistry-related fields.

Conclusion

In summary, the compound with the molecular structure $\text{CH}_3\text{NCH}_2\text{CH}_3$, with an attached hydrogen atom on the nitrogen, is most accurately known as propylamine. Its systematic name, chemical properties, applications, and safety considerations make it a noteworthy compound in organic chemistry. Whether you are a student learning about amines or a professional involved in chemical synthesis, understanding propylamine's characteristics and uses is crucial for advancing your knowledge and ensuring safe handling.

Additional Resources for Learning About Propylamine

- Organic Chemistry Textbooks
- Material Safety Data Sheets (MSDS) for Propylamine
- Chemical Suppliers' Data Sheets
- Online Chemistry Databases and Journals

By understanding the core aspects of propylamine, you can better appreciate its role in both academic and industrial chemistry, aiding in the development of new compounds and materials.

Frequently Asked Questions

What is the common name for the compound $\text{CH}_3\text{NCH}_2\text{CH}_3$ with an H atom attached to the N atom?

Dimethylamine

How do you identify the common name of $\text{CH}_3\text{NCH}_2\text{CH}_3$ when an H atom is attached to the nitrogen?

The compound is called Dimethylamine, a simple secondary amine.

What functional group is present in the compound $\text{CH}_3\text{NCH}_2\text{CH}_3$ with an attached H on N?

An amine group

Is $\text{CH}_3\text{NCH}_2\text{CH}_3$ with an H attached to N considered a primary, secondary, or tertiary amine?

Secondary amine

What are common uses of Dimethylamine in industry?

Dimethylamine is used in the manufacture of pharmaceuticals, pesticides, and rubber chemicals.

What is the IUPAC name for the compound with the structure $\text{CH}_3\text{NCH}_2\text{CH}_3$ and an H attached to N?

N-Methylmethanamine (or N-Methylamine), but commonly known as Dimethylamine.

How can you distinguish Dimethylamine from other similar amines?

By its molecular structure, with two methyl groups attached to nitrogen and a free H, and confirmed through spectroscopic analysis.

Additional Resources

Enter The Common Name For The Following Compound: $\text{CH}_3\text{NCH}_2\text{CH}_3$, With An H Atom Attached To The N Atom

Understanding chemical compounds and their common names is fundamental to the study of chemistry, especially in organic chemistry where nomenclature can often seem complex. In this article, we focus on a specific compound with the molecular formula $\text{CH}_3\text{NCH}_2\text{CH}_3$, which, when an additional hydrogen atom is attached to the nitrogen atom, results in a well-known chemical entity. This compound is commonly recognized by its familiar name, which is widely used in various chemical contexts, from laboratory work to industrial applications. We will explore the structure, nomenclature, properties, uses, and related compounds to provide a comprehensive understanding of this molecule.

Structural Overview of the Compound

Basic Molecular Structure

The molecular formula $\text{CH}_3\text{NCH}_2\text{CH}_3$ suggests a compound composed of a methyl group (CH_3), a nitrogen atom (N), and an ethyl group (CH_2CH_3). When an additional hydrogen atom is attached to the nitrogen atom, it forms a primary amine, which is a fundamental class of organic compounds characterized by the presence of a nitrogen atom attached to carbon groups.

The structure can be visualized as:

- A methyl group (CH_3 -) bonded to a nitrogen atom.
- The nitrogen atom also bonded to a hydrogen atom (H).
- The nitrogen atom is further attached to an ethyl group (CH_2CH_3).

This structural configuration results in a primary amine with an ethyl substituent attached to the nitrogen, often called ethylamine.

Structural Formula

The simplified structural formula is:

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  \ \
H2N-CH2-CH3
  \ \
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or more explicitly:

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  \ \
H
|
CH3 - N - CH2 - CH3
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In this configuration:

- The nitrogen atom is bonded to two carbon groups (a methyl and an ethyl) and one hydrogen atom.
- The molecule exhibits a tetrahedral geometry around the nitrogen atom, with lone pair considerations.

Common Name and Nomenclature

What is the Common Name?

The compound with the structure $\text{H}_2\text{N}-\text{CH}_2-\text{CH}_3$ is most commonly known as ethylamine. This name is the standard common name used in organic chemistry to describe the primary amine with an ethyl group attached to the amino group.

Nomenclature Details

- IUPAC Name: Ethylamine
- Common Name: Ethylamine
- CAS Registry Number: 75-04-7

The name "ethylamine" is derived from the ethyl group (CH_3CH_2-) attached to the amino group ($-\text{NH}_2$), indicating its primary amine nature.

Related Compounds

- Methylamine (CH_3NH_2): A primary amine with a methyl group.
- Propylamine ($\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$): Extends the chain.
- Aniline ($\text{C}_6\text{H}_5\text{NH}_2$): Aromatic amine.

Understanding ethylamine's position among these compounds aids in grasping its chemical behavior and reactivity.

Properties of Ethylamine

Physical Properties

- Appearance: Colorless, with a pungent smell characteristic of amines.
- State: Usually encountered as a gas at room temperature but can be liquefied under pressure.
- Boiling Point: Approximately 16.6°C (61.9°F), which is higher than methylamine due to increased molecular weight and hydrogen bonding.
- Solubility: Highly soluble in water due to hydrogen bonding; also soluble in many organic solvents like ethanol and ether.

Chemical Properties

- Basicity: Ethylamine is a strong base among amines, readily accepting protons.
- Reactivity: Nucleophilic at the nitrogen atom, capable of forming various derivatives such as amides, azo compounds, and more.
- Reactivity with Acids: Forms salts like ethylammonium chloride when reacted with hydrochloric acid.

Features and Uses

Features:

- Acts as a building block in organic synthesis.
- Has a characteristic pungent odor.
- Exhibits typical amine reactivity, making it versatile for chemical modifications.

Uses:

- As an intermediate in the synthesis of pharmaceuticals, dyes, and agrochemicals.
- In the production of ethylamines derivatives.
- As a solvent or reagent in laboratory settings.

Applications of Ethylamine

Industrial Applications

- Used in manufacturing pesticides, such as herbicides and insecticides.
- Key in producing surfactants and detergents.
- Employed in the synthesis of pharmaceuticals, including antihistamines and local anesthetics.
- Utilized in polymer production, such as epoxy resins.

Laboratory and Research Uses

- Serves as a reagent for amination reactions.
- Used in the synthesis of complex organic molecules.
- Acts as a standard compound for studying amine chemistry.

Safety and Handling

- Ethylamine is hazardous; it is flammable and can cause skin and eye irritation.
- Proper protective equipment and ventilation are essential during handling.
- Its pungent smell acts as a warning sign of its presence.

Comparison with Related Compounds

Methylamine vs. Ethylamine

Feature	Methylamine (CH ₃ NH ₂)	Ethylamine (H ₂ N-CH ₂ -CH ₃)
Molecular weight	31.06 g/mol	45.08 g/mol
Boiling point	-6.3°C	16.6°C
Basicity	Stronger	Slightly weaker
Uses	Similar applications, varying in synthesis pathways	Similar, with added utility due to longer chain

Other Alkyl Amines

- Longer chain amines like propylamine and butylamine have higher boiling points and different solubility profiles.
- Aromatic amines like aniline differ significantly in reactivity and properties.

Conclusion and Final Thoughts

In summary, the compound ethylamine (common name for CH₃NHCH₂CH₃ with an attached hydrogen atom to nitrogen) is a fundamental primary amine with significant importance in both industrial and academic chemistry. Its structure, characterized by an ethyl group attached to an amino group, confers unique physical and chemical properties that make it a versatile reagent and building block. Its applications span from the synthesis of pharmaceuticals to industrial chemicals, highlighting its relevance across multiple fields.

Understanding its structure, nomenclature, and reactivity is crucial for chemists who work in organic synthesis, materials science, and chemical manufacturing. While ethylamine is generally straightforward in terms of safety, proper handling and respect for its chemical nature are essential.

This in-depth exploration underscores the importance of mastering chemical nomenclature and properties, which serve as the foundation for further innovations and applications in chemistry. Whether used in the lab or in large-scale production, ethylamine exemplifies the intersection of simplicity and utility in organic molecules.

In essence, the compound referred to as "ethylamine" is a cornerstone in organic chemistry, with a simple yet profound structure that underpins a wide array of chemical processes and products.

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