

Amines, Amides and Their Types

Ch Feng*

Department of Chemistry, University of New Mexico, USA

Corresponding author:Ch Feng, Department of Chemistry,
University of New Mexico, USA

✉ fengch23@yahoo.com

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Abstract

Amine is a compound that is derived from Ammonia (NH₃). As they are derived from ammonia, we can say that they are the derivatives of ammonia. There are also natural amines which are found in certain plants as alkaloids, dopamine. They also exist in animals in the form of histamine and chemical mediators. Similar natural amines are amino acids, trimethylamine and aniline. Amide is a functional group that has a carbonyl group attached to a nitrogen atom or any other atom containing the amide group.

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Introduction

Amine is a compound that is derived from Ammonia (NH₃). As they are derived from ammonia, we can say that they are the derivatives of ammonia. They are the functional groups i.e. it is responsible for the chemical reactions of the molecule. They are the organic nitrogen compound which contains the nitrogen atom with a lone pair. In amines, these nitrogen atoms are substituted with an alkyl group. There are also natural amines which are found in certain plants as alkaloids, dopamine. They also exist in animals in the form of histamine and chemical mediators. Similar natural amines are amino acids, trimethylamine and aniline.

When we want to study about the types of amines they are classified based on their nature. They are aliphatic amines which constitutes of a single hydrogen and alkyl substitute and aromatic amines. These are further divided into subcategories based on the presence of carbon atoms connected to the nitrogen or the number of hydrogen atoms substituted.

Primary amines are basically formed when a single hydrogen atom in ammonia is substituted by an alkyl group. The amines that have two organic substituents either alkyl ones or aryl or both then we call them as Secondary amines. In these, the amines are bound to single nitrogen along with hydrogen. If the nitrogen has three organic substituents then those amines are called as Tertiary amines. If the nitrogen consists of four organic substituents then those amines are called as quaternary amines.

Amide is a functional group that has a carbonyl group attached

to a nitrogen atom or any other atom containing the amide group. Amides are derived from carboxylic acid that means they are the derivatives of the carboxylic acids and an amine. Amides are the conjugate base of ammonia. Some of the examples of amides are nylon, paracetamol. The simplest amides are very weak bases. Other drugs such as penicillin, LCD are also amides. These amides are used to form resilient structural materials. Even plants produce amines for a variety of functions. Isobutyl amine, phenylethyl amine, piperidine, pyrrolidine, putrescine, spermidine and tryptamine are some of the natural amides.

Just like amines, amides are also categorized as primary, secondary and tertiary amides. The amides have a widespread nature. If the nitrogen atom is attached to two hydrogen atoms then it is known as primary amide, if the nitrogen is attached to hydrogen and other alkyl or aryl group it is known as secondary amide, in case if all the hydrogen atoms are replaced with alkyl or aryl groups then it is called as tertiary amide. In tertiary amide, the nitrogen links itself to three carbon atoms. Amides undergo sulphuration reaction using sulphuric acid to form carboxylic acid. Amides undergo alkalisation using dilute sodium hydroxide process to form salts of carboxylic acid. Amides undergo reduction process using lithium hydride in dry ether to form amines. Amines undergo neutralisation reaction using dilute sulphuric acid to form ammonium salt. Nucleophilic substitution of primary amines using choloalkane in ethanol to form secondary amine. Amide undergoes condensation using acid chloride at room temperature to form amides.