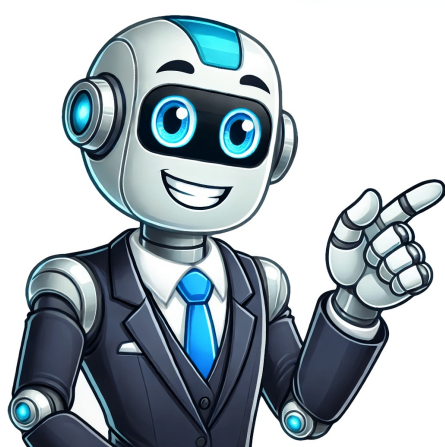


I'm human





Amide is an organic compound characterized by a carbonyl functional group bonded to a nitrogen atom. It's also known as an organic amide or carboxamide. The simplest amide is derived from ammonia, where one hydrogen atom is replaced by an acyl group. In this article, we'll explore Amide's types, structures, and properties. Amides are named by replacing the -oic acid or -ic acid ending of the parent carboxylic acid with -amide. For instance, ethanoic acid becomes ethanamide. The physical appearance of amides varies; they can be white crystalline solids, like ethanamide, which smells like mice. Amides are generally denser than water and have high melting points. The boiling point of amides is also relatively high due to strong hydrogen bonds. They're soluble in water. Amides play a crucial role in organic chemistry and come in various subclasses, such as carboxamides and phosphoramides. In essence, an amide is a compound containing a carbonyl group linked to a nitrogen atom. It can refer to any compound with the amide functional group, represented by R–C(=O)N(R)2. Examples of amides include acetamide, benzamide, and paracetamol. The formula for an amide is RCONH2, which explicitly refers to primary amides. The structure of an amide consists of a carbonyl group bonded to a nitrogen atom, forming a conjugated system that allows hydrogen bonding with water and other protic solvents. Amides can act as both hydrogen bond acceptors and donors. Amides are classified into three types: The classification of amides is determined by the position of the nitrogen atom attached to the carbon atom, resulting in three main types: primary, secondary, and tertiary amides. Primary amides have a nitrogen atom linked to a single carbon atom, with a general formula of RCONH2, where R represents an organic group or hydrogen atom. These are named by modifying the acid name to end in "-amide", such as methanamide or ethanamide. Secondary amides, or 2° amides, have the nitrogen atom attached to two carbon atoms, with a general formula of RCONHR', where R and R' represent organic groups or hydrogen. The naming convention for secondary amides involves using an uppercase N to indicate the alkyl group on the nitrogen. Tertiary amides, or 3° amides, have the nitrogen atom linked to three carbon atoms, with a general formula of RCONRR', where R, R', and R'' represent organic groups or hydrogen atoms, named similarly to secondary amides but with two N's. The amide bond is a specific covalent chemical bond formed through the condensation reaction between a carboxylic acid and an amine, crucial in forming peptide bonds in proteins. Peptide bonds link amino acids in a sequence, essential for protein formation. Amides can be synthesized through various methods, including the direct reaction of a carboxylic acid with an amine using a coupling agent like DCC, or through the reaction of an acidic chloride with ammonia or primary/secondary amines. Amide hydrolysis involves the breakdown of the amide bond with water under acidic or basic conditions, used in applications such as peptide and protein hydrolysis to synthesize amines and carboxylic acids. Additionally, amides can be reduced to amines using strong reducing agents like lithium aluminum hydride (LiAlH4), which adds a hydride to the amide carbonyl and then eliminates it, resulting in the formation of an amine. This reaction is typically carried out in dry solvents due to LiAlH4's violent reaction with water. Amides and Amines are distinct classes of organic compounds characterized by their functional groups and properties. The key differences between them lie in their structure, nomenclature, basicity, reactions, boiling point, and applications. Functional Group: Amides have a carbonyl group (C=O) bonded to an amine group (NH2), whereas Amines have a nitrogen atom bonded with one or more alkyl groups. Nomenclature: Amides are named using the carboxylic acid nomenclature, while Amines are named based on the number of carbon atoms bonded to the nitrogen atom. Basicity: Amides are weak bases due to the carbonyl group, whereas Amines are basic because the nitrogen atom has a lone pair of electrons. Reactions: Amides can undergo hydrolysis with an aqueous acid or base, resulting in the formation of a carboxylic acid and either ammonia or an amine. Amines, on the other hand, can participate in various reactions, including nucleophilic substitution, electrophilic substitution, and redox reactions. Boiling Point: Amides generally have a higher boiling point compared to Amines. Applications: Amides are used in biological molecules such as peptides, proteins, DNA, and RNA. They also find applications in the pharmaceutical industry for various purposes, including the production of drugs like paracetamol. Additionally, amides are utilized in the polymer industry for the synthesis of synthetic fibers and plastics, including nylon. Dimethylformamide (DMF), a common amide, is widely used as a solvent in organic synthesis and industrial processes. Read More Tertiary Amide: Definition and Characteristics A tertiary amide is a type of compound that consists of a nitrogen atom bonded to three organic groups. The term "Amide" refers to a Tertiary Amide, Amides can exhibit both acidic and basic properties, but they are generally considered weak acids and tend to be neutral in general. They are classified as saturated compounds due to the absence of double or triple bonds between carbon and nitrogen atoms. The presence of a carbonyl group and single bonds defines their saturated nature. The polar carbonyl group in Amides allows for hydrogen bonding with water molecules, facilitating their dissolution in water. The pKa value of Amides is typically around 16-18, indicating that they are relatively weak acids and their protons are not readily dissociated under normal conditions. Amides differ from amines due to the presence of a carbonyl group (C=O) bonded to nitrogen, whereas amines have nitrogen bonded to hydrogen atoms. They can also act as nucleophiles under certain conditions, participating in reactions where they donate a pair of electrons. However, their reactivity is generally lower than that of amines due to the presence of the carbonyl group. Amides are carboxylic acid derivatives of amines and have the functional group RCONH2 or RCONR2, where R can be an organic group (alkyl or phenyl) or hydrogen (H). They are commercially important compounds used as solvents, sulfa medicines, and nylons. CH3CON(CH3)C2H5 (N-ethyl-N-methylethanamide) is a type of amide that can be named by replacing the suffix -oic acid in the IUPAC name of its parent carboxylic acid with the suffix -amide. The root name comes from the longest chain containing the carbonyl group. For instance, CH3COOH becomes CH3CONH2. Secondary and tertiary amides have alkyl groups on nitrogen that are treated as substituents. These groups are listed alphabetically after the amide name. To create an amide, a carboxylic acid is first transformed into an ammonium salt, which is then heated to produce the desired compound. The ammonium salt can be formed by adding solid ammonium carbonate to excess acid. For example, ammonium ethanoate is created through the reaction of ammonium carbonate and ethanoic acid. The mixture is then heated, causing the ammonium salt to dehydrate into an amide. Acyl chloride (RCOCl) is often referred to as acid chloride and can be converted into an amide by replacing its chlorine atom with another group or atom. A mixture of solid ammonium chloride and ethanamide undergoes a reaction that produces white smoke, resulting in the formation of hydrogen gas and ammonium chloride. Reactions involved include the formation of ethanamide and hydrogen gas (CH3COCl + NH3 → CH3CONH2 + HCl) as well as the formation of ammonium chloride (NH3 + HCl → NH4Cl). The overall reaction is (CH3COCl + NH3 → CH3CONH2 + NH4Cl). Acid anhydride can also be used to produce amides by reacting with ammonia. This results in the formation of ethanamide and ammonium ethanoate ((CH3CO)2O + 2NH3 → CH3CONH2 + CH3COONH4). Nitriles can be hydrolyzed under acidic or basic conditions to produce primary amides, while carboxylic acids can be coupled with primary and secondary amines using DCC (N,N-Dicyclohexylcarbodiimide) to form amides. Formamide is a liquid, whereas all other amides are colorless and crystalline at room temperature. Lower aliphatic amides with up to six carbons are water-soluble, while those with larger alkyl groups have higher solubility due to their ability to establish hydrogen bonds. amides are most stable carboxylic acid derivatives due to their existence in imidate state, making them less reactive than other derivatives. The reduced reactivity is caused by the decrease in electrophilicity of carbonyl's carbon and the delocalization of nitrogen's lone pair. Polyacrylamide is a versatile compound used extensively in industries such as plastics, rubber, paper production, and even in water treatment processes for both sewage and drinking water. Interestingly, Acetamide plays a crucial role in neutralizing the effects of fluoroacetamide poisoning, which causes cardiac muscle degeneration and necrosis by acting as an antidote. Furthermore, Benzamide medications have been found to stimulate acetylcholine receptors in smooth muscles while inhibiting dopamine and serotonin receptors. Additionally, amides are essential components in proteins like keratin and hormones such as insulin, facilitating the binding of amino acids together through peptide and protein bonds. The chemical's applications extend into the beauty industry for creating soap, hair products, and preshave lotion, highlighting its diverse uses in various sectors.

Secodary amide. What is a secondary amide. Secondary amide naming. Which compound is a secondary amide.