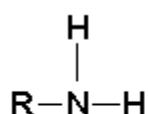


1.7 Amides and Amines

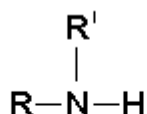
Amines

An amine may be considered to be an ammonia molecule in which one or more hydrogen atoms are replaced by alkyl groups.

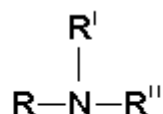
Amines may have one, two, or three alkyl groups attached to the nitrogen atom. These amines are called primary, secondary, and tertiary amines, respectively.



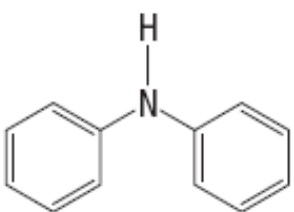
primary amine



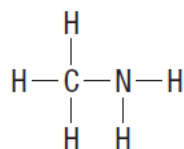
secondary amine



tertiary amine

Formula	Systematic IUPAC name	Common name	Type
CH ₃ NH ₂	methanamine	methylamine	primary
CH ₃ CH ₂ NH ₂	ethanamine	ethylamine	primary
(CH ₃) ₂ NH	<i>N</i> -methylethanamine	dimethylamine	secondary
(CH ₃) ₃ N	<i>N,N</i> -dimethylethanamine	trimethylamine	tertiary
C ₆ H ₅ NH ₂	aniline	aniline	primary
	<i>N</i> -phenylaniline	diphenylamine	secondary

Using the IUPAC naming system, a primary amine would be named by adding the **-amine** suffix to the name of the chain or ring to which it is attached. The **-e** is removed from this name, giving the name alkylchain**amine**

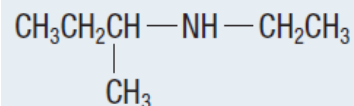
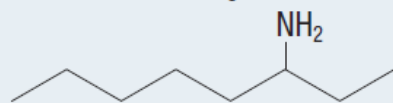
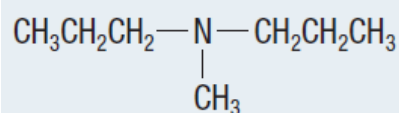
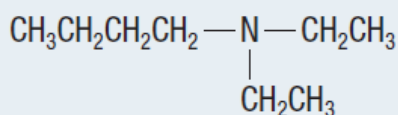
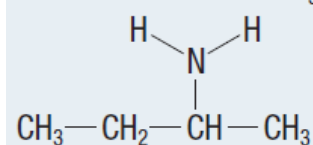
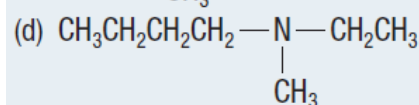
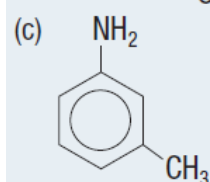
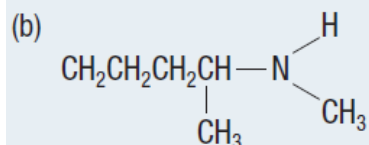
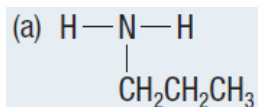


methanamine

The IUPAC name for an aromatic amine consisting of an amine group attached to a benzene ring is **aniline**, rather than benzamine.

SCH4U - Organic Chemistry

To name secondary and tertiary amines, begin with an amine name based on the name of the longest alkyl group. We use the locator, **N**, to indicate the attachment of additional chains to the nitrogen atom, just as we use a number to indicate a specific carbon atom.



(a) a primary amine

(b) a secondary amine

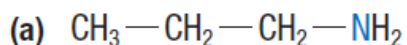
(c) a tertiary amine

2-methylpropan-1-amine

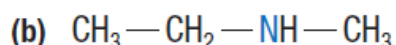
a primary amine with a 2-carbon alkyl group

Properties of Amines

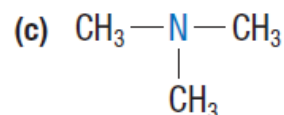
- Small amines are soluble in water.
- Since nitrogen is more electronegative than either carbon or hydrogen, the N-C bonds and any N-H bonds are polar.
- Amines have higher melting points and higher boiling points than corresponding hydrocarbon compounds.



primary amine
b.p. 49 °C



secondary amine
b.p. 37 °C

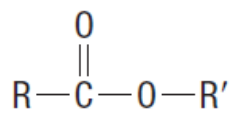


tertiary amine
b.p. 3 °C

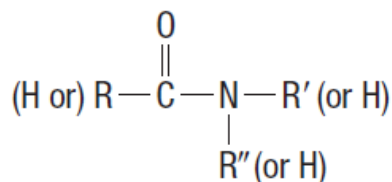
Amides

Amides are structurally similar to esters, except the two chains are joined by a nitrogen atom next to a carbonyl group rather than by an oxygen atom.

The amide functional group consists of a carbonyl group bonded to a nitrogen atom.



ester

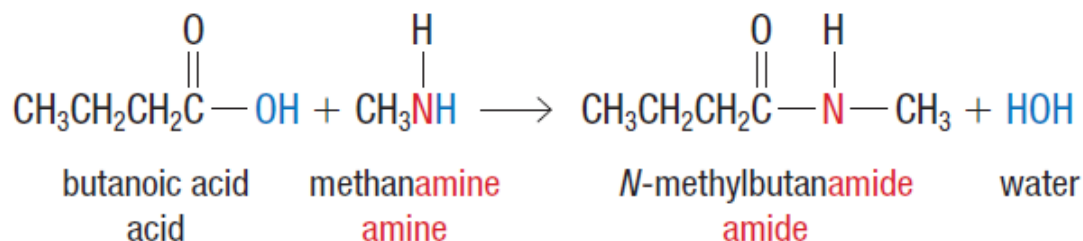


amide

Naming Amides

Naming amides is similar to naming esters. The name of an amide has three parts:

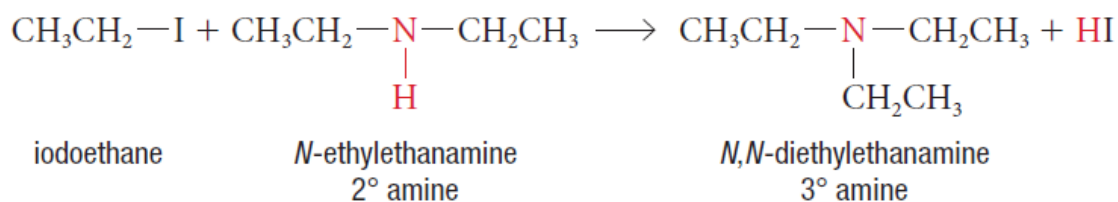
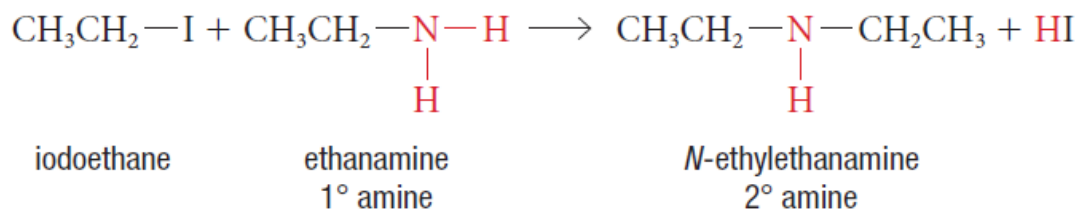
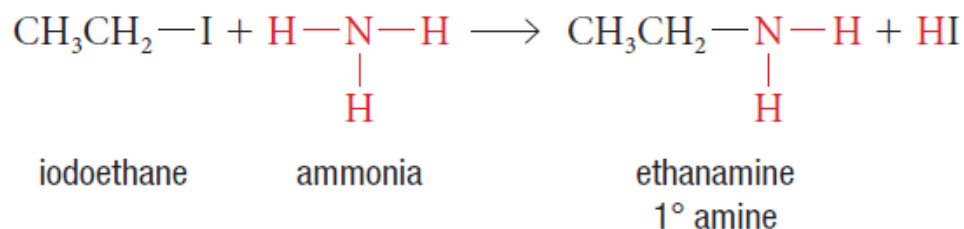
1. From the amine;
2. From the acid;
3. The ending, which is always the suffix **-amide**.

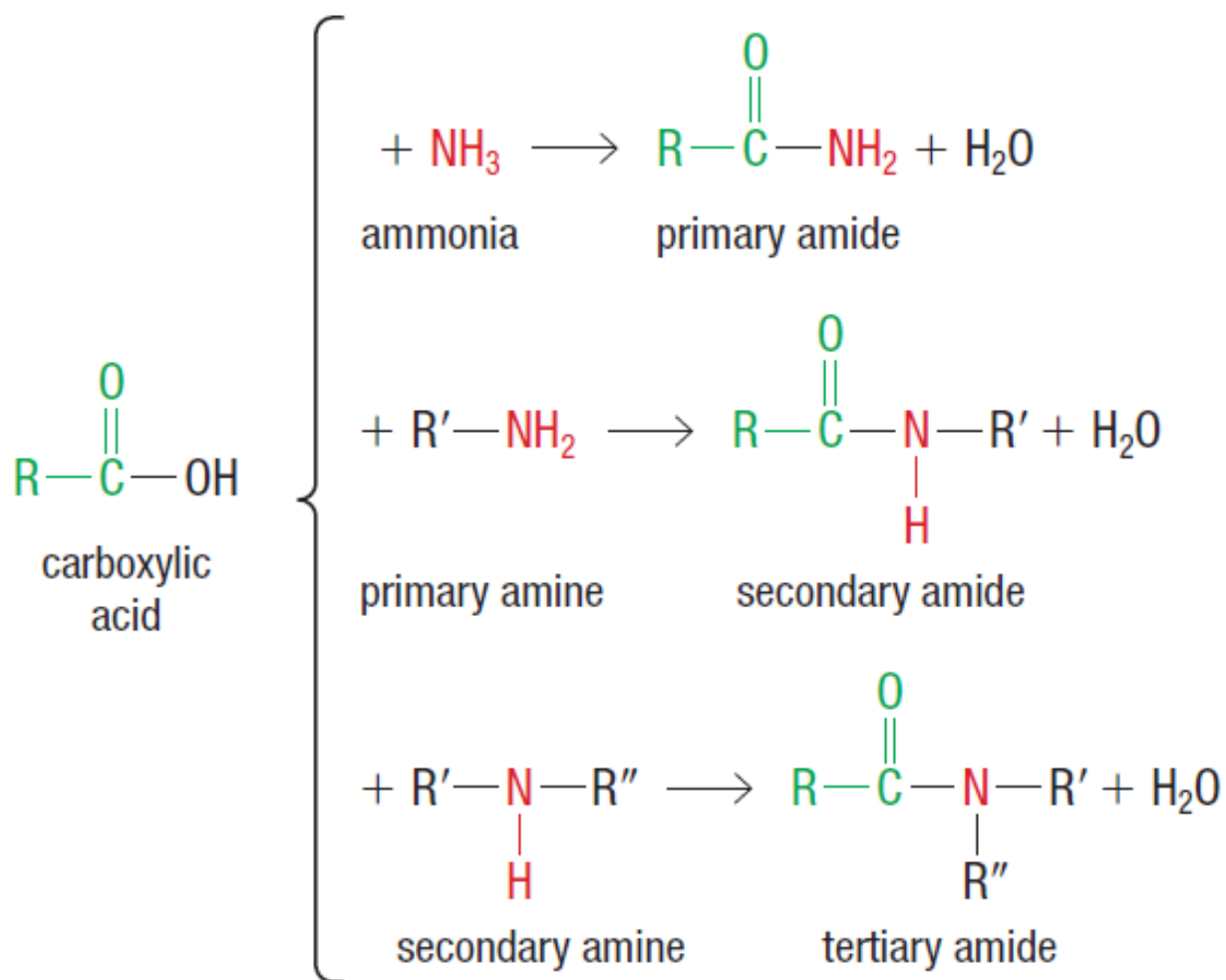


Properties of Amides

- The smaller amides are somewhat soluble in water.
- This can be explained by the molecules' structure: the -NH groups form hydrogen bonds with water molecules.
- As the length of the carbon chain increases, solubility decreases.
- Primary amides, with their nitrogen atoms each bonded to 2 hydrogen atoms, have higher melting points and boiling points than similar amides. This is likely due to more hydrogen bonding between primary amide molecules.

Reactions Involving Amines and Amides





Worksheet 1.7: Amides and Amines

p.62 Q. 1, 3, 4, 5, 6