

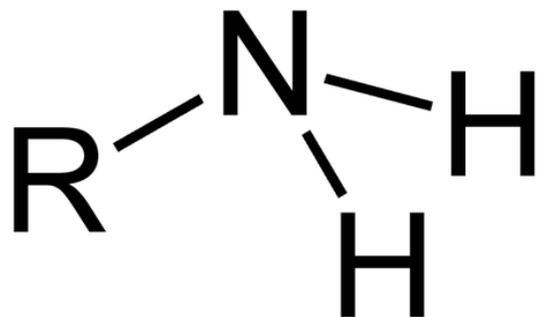
# Amines and Amides

Chapter 1.7

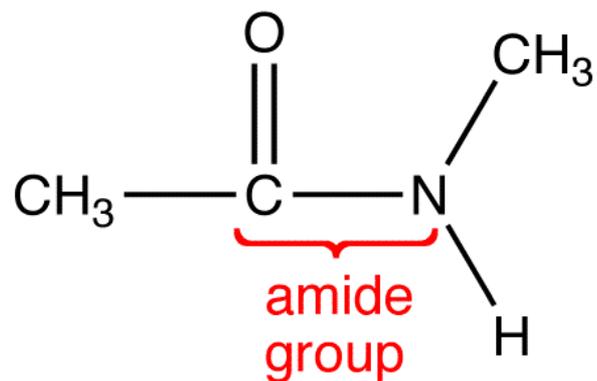
# Amines and Amides

- Amines and amides both contain nitrogen (N)

- An **amine** is an organic compound, related to ammonia, that contains a nitrogen atom bonded to one or more alkyl groups on each molecule

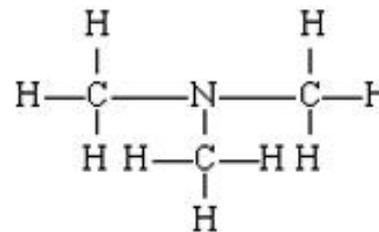
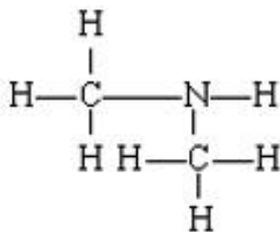
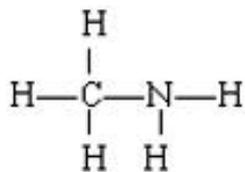
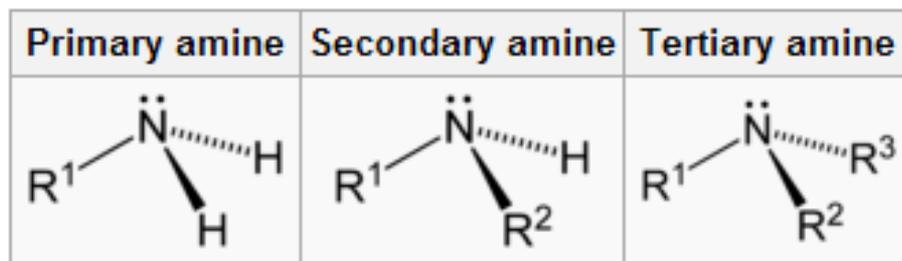


- An **amide** is an organic compound that contains a carbonyl group bonded to a nitrogen atom



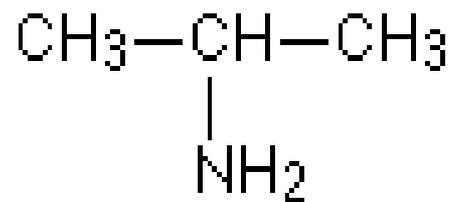
# Classifying Amines

- Amines can be classified as primary secondary or tertiary



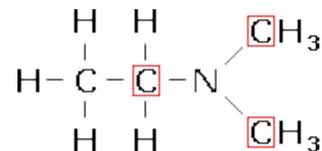
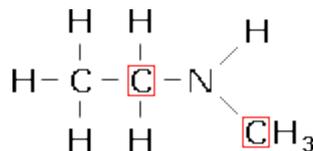
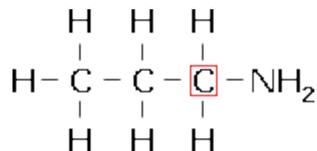
# Naming Amines

- Use the suffix *-amine*
- It may be necessary to include a number in the suffix to indicate which carbon group the amine is attached to



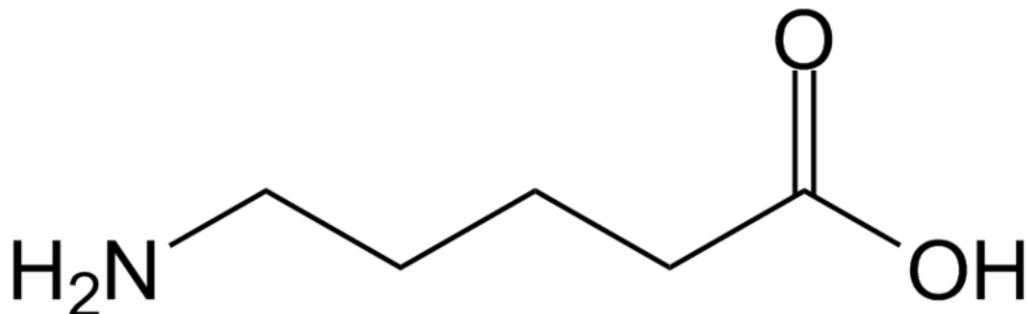
# Naming Amines

- Secondary and tertiary amines are named using the locator, *N*, to indicate the attachment of additional chains to the nitrogen atom



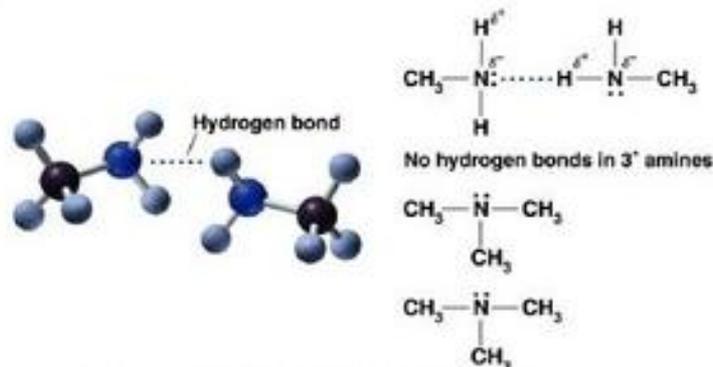
# Naming Amines

- Sometimes it is necessary to name the amine group as a branch
- In this case the prefix *amino-* is used

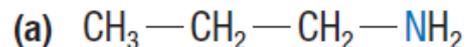


# Properties of Amines

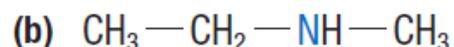
- Amines are polar and some can hydrogen bond
- Amines have higher melting and boiling points than their corresponding alkanes



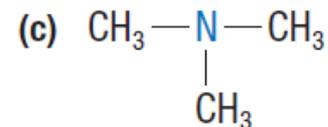
- Can you explain the trend below?



primary amine  
b.p. 49 °C



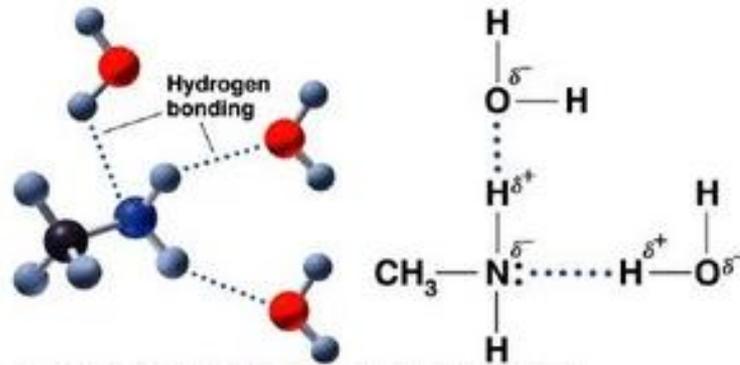
secondary amine  
b.p. 37 °C



tertiary amine  
b.p. 3 °C

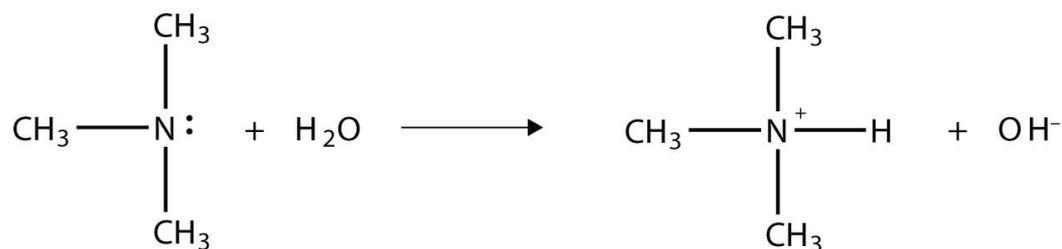
# Properties of Amines

- Small amines are soluble in water

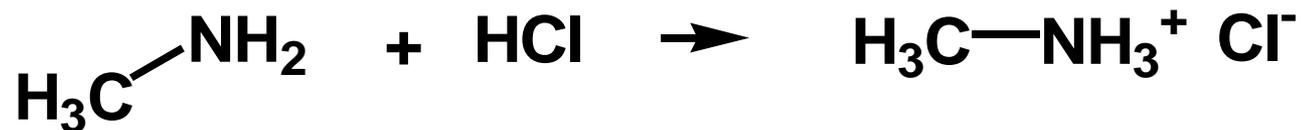


# Reactions Involving Amines

- Amines behave as **weak bases** in water

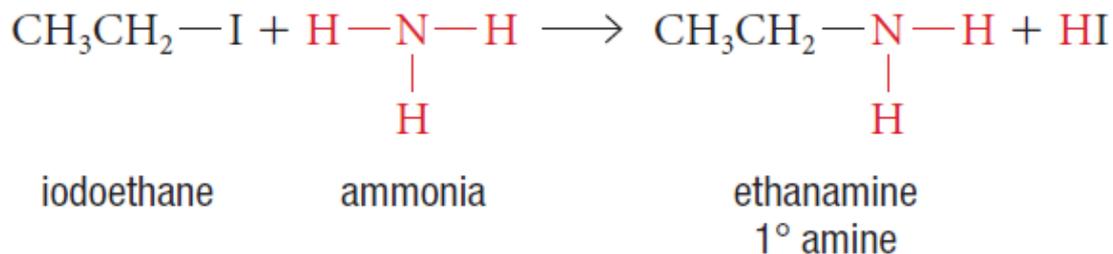


- Amines can undergo **neutralization** reactions with acid

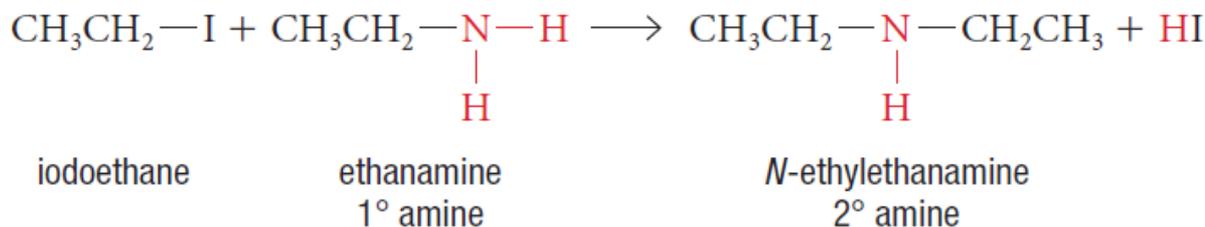


# Reactions Involving Amines

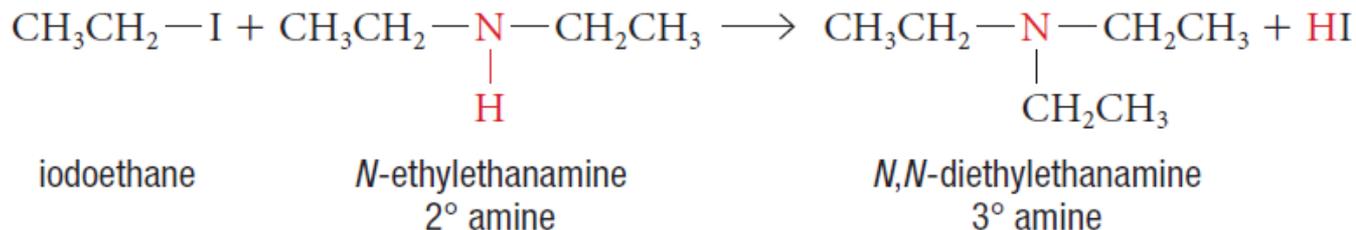
- Primary amines* can be synthesized by reacting an alkyl halide with **ammonia**



- Secondary amines* require an alkyl halide and a **primary amine**

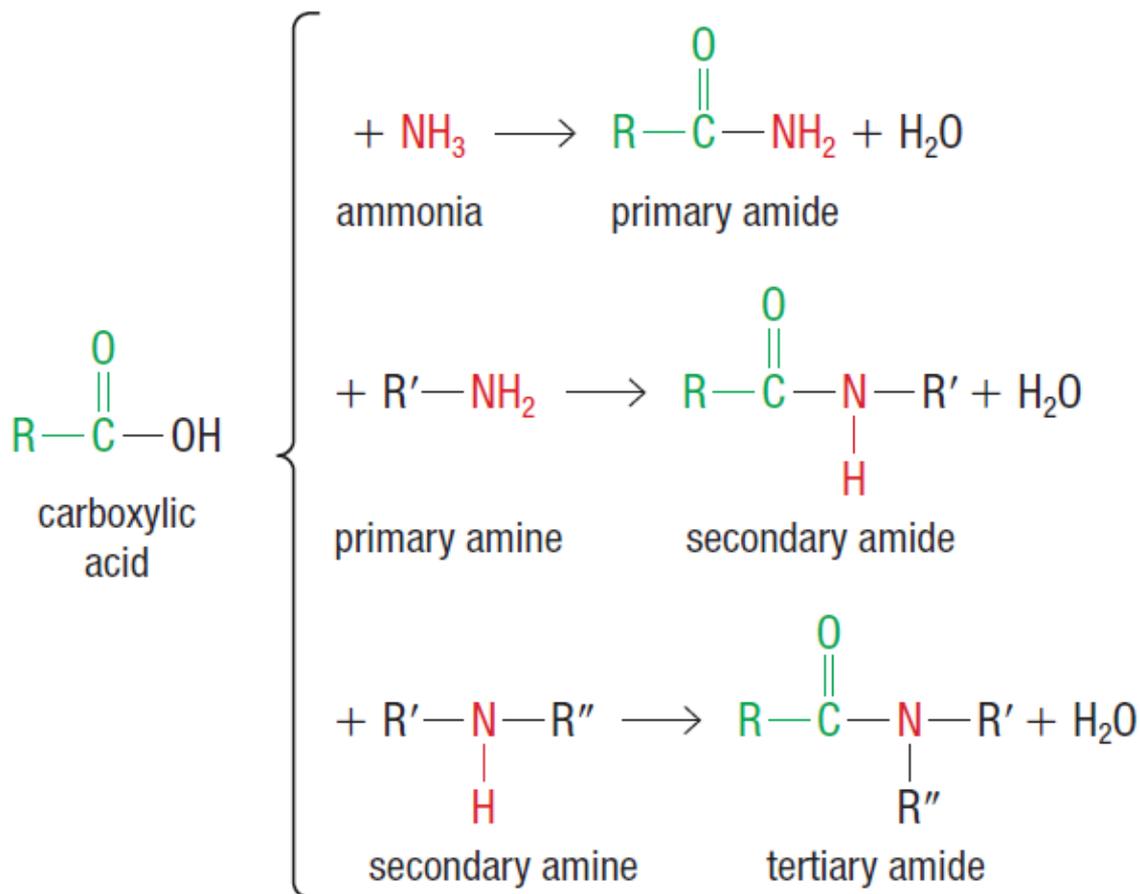


- Tertiary amines* require an alkyl halide and a **secondary amine**



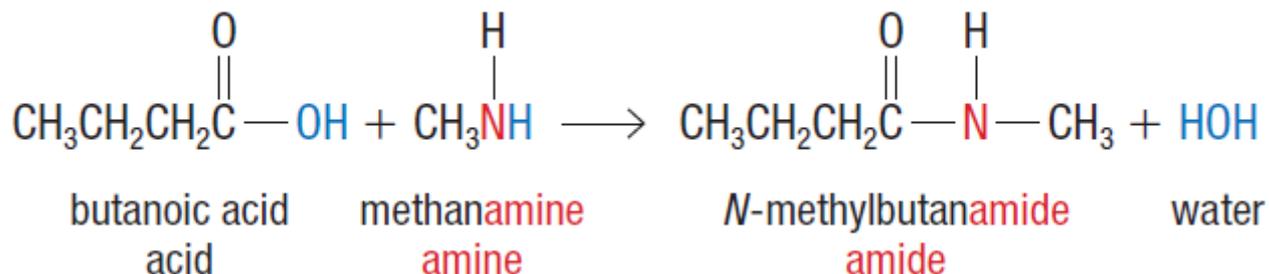
# From Amines to Amides

- Amides can be synthesized by the **condensation reaction** of a carboxylic acid with ammonia or a primary or secondary amine



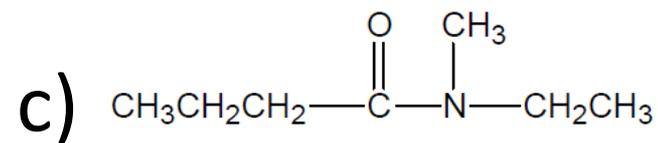
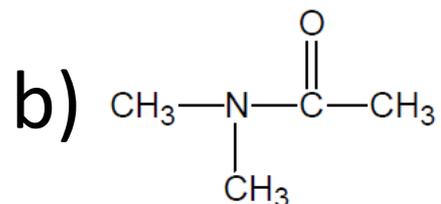
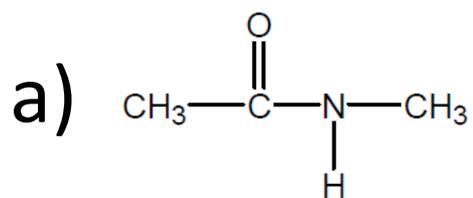
# Naming Amides

- Use the suffix *-amide*
- Recall that amides are synthesized from the reaction of an amine with a carboxylic acid
  - The first part of the name comes from the amine
  - The second part of the name comes from the carboxylic acid



# Practice

Name the following:



Draw a structural diagram for:

3-chloro-4-methylpentanamide

# Properties of Amides

- Amides are weak bases
- Low molecular weight amides are soluble in water
- Amides that have the ability to hydrogen bond will have higher melting and boiling points

# Reactions Involving Amides

- Amides can undergo a **hydrolysis reaction** (the reverse of condensation) to form an amine (or ammonia) and a carboxylic acid
- This reaction can take place under acidic or basic conditions

