

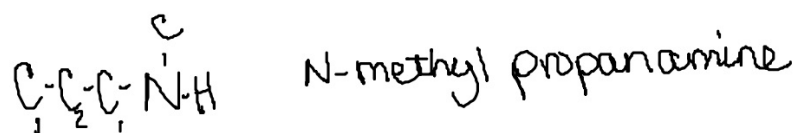
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## Amines

Nomenclature:

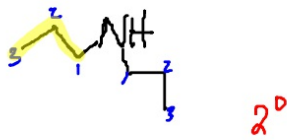
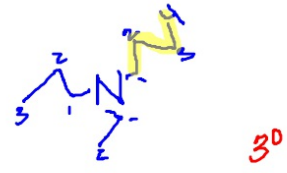
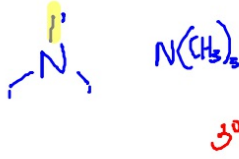

IUPAC - name longest carbon chain as parent, remove "e" and add amine. Name remaining portion of molecule as normal.

If there are branches attached to the N, use "N-" as the locator.



Common: name all attachments to N as branches



Illustration	IUPAC	Common
	N-propylpropanamine	dipropyl amine
	N-ethyl-N-propylbutanamine	butylethylpropyl amine
	N,N-dimethylmethanamine	trimethyl amine
	2-chloro-N,N-diethylpropanamine	diethyl (2-chloropropyl) amine

## Classification of Amines

1° amine  $R-NH_2$  (a single alkyl group)  $C-NH_2$

2° amine  $R'-NH$   
|  
 $R$  (2 alkyl groups)

3° amine  $R'-N-R''$   
|  
 $R$  (3 alkyl groups)

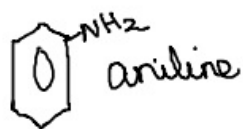
$NH_3$  ammonia  $NH_4^+$  ammonium ion

If  $NH_2$  is named as a branch it is listed as amino

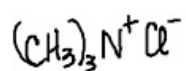
ammonium ion occurs when four groups of atoms have attached to the nitrogen atom, when naming replace "amine" with ammonium.

Heterocyclic amines - when nitrogen is part of the carbon ring.

Aromatic amine - at least one aryl group is attached



Name the following:

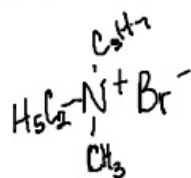


IUPAC

N,N-dimethyl  
methan ammonium chloride

Common

trimethyl ammonium  
chloride



N-ethyl-N-methyl  
propan ammonium bromide

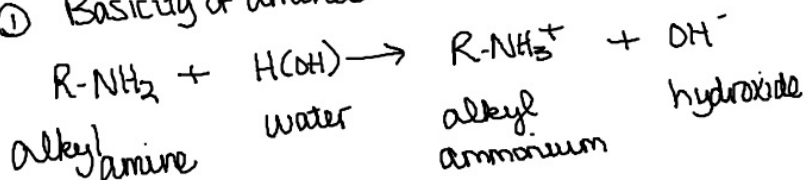
ethyl methyl propyl  
ammonium bromide

## Physical Properties of Amines

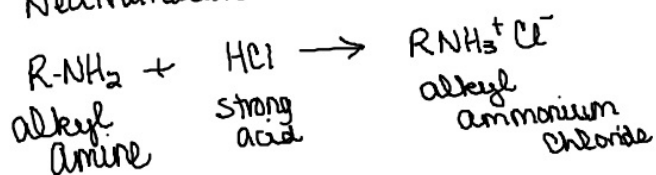
1.  $1^\circ + 2^\circ$  amines can hydrogen bond ( $3^\circ$  can't, there's no hydrogen)
2. low mol. weight amines are water soluble, solubility decreases w/ size  
low  $3^\circ \rightarrow 2^\circ \rightarrow 1^\circ$  highest (\* critical point - 6 carbon)
3. amines are weak bases - form alkyl ammonium salts.
4. low m.w. amines have very pungent, putrid odors.
3. (cont'd) Basicity low - aromatic amines  $\rightarrow$  ammonia  $\rightarrow$  alkyl amines  
strongest
5. Boiling Points are elevated, but not as high as alcohols.  
low -  $3^\circ \rightarrow 2^\circ \rightarrow 1^\circ$  highest

## Reactions of Amines

### ① Basicity of amines



### ② Neutralization of amines

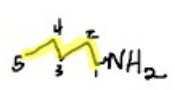
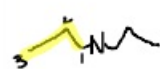

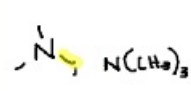
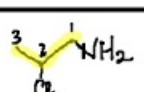


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Amines

- IUPAC** - ① name the longest carbon chain as the parent, remove the "e" and add "amine".  
 ② use regular protocol to list and name any other branches on the parent chain.  
 ③ \* branches attached to nitrogen get "N" as the locator and then name the branch.

**Common** - name all attachments to nitrogen as branches, list alpha order, use ( ) for larger, complicated branches then amine

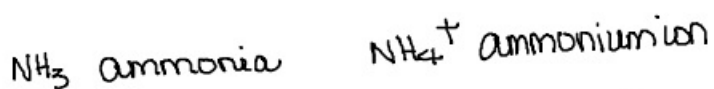
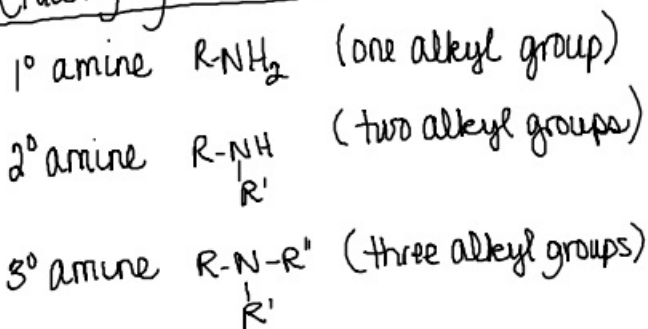
molecule	IUPAC	Common
	1° pentanamine	pentyl amine
	2° N-propylpropanamine	dipropyl amine
	3° N-ethyl-N-propylbutanamine	butylethylpropyl amine
	3° N,N-dimethylmethanamine	trimethyl amine
	1° 2-chloropropanamine	(2-chloropropyl) amine



2-methylpropanamine

isobutyl amine

## Classifying amines

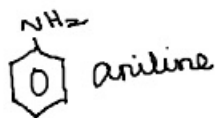


if  $NH_2$  has to be named as a branch - "amino"

ammonium ion occurs when 4 groups of atoms have attached to the nitrogen atom. When naming replace "amine" with "ammonium".

Heterocyclic amine - nitrogen is part of the ring.

Aromatic amines - at least one aryl group is attached to the nitrogen.



Molecule	IUPAC	Common
$(H_3C)_3N^+Cl^-$	N,N-dimethylmethan ammonium chloride	trimethyl ammonium chloride
$\begin{array}{c} C_3H_7 \\   \\ H_5C_2-N^+Br^- \\   \\ CH_3 \end{array}$	N-ethyl-N-methylpropan ammonium bromide	ethyl methyl propyl ammonium bromide

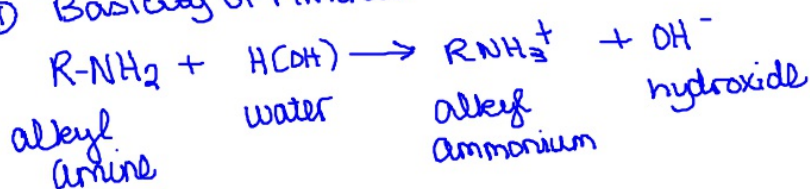


## Physical Properties of Amines

- ① Polar (except 3°)
- ② 1° & 2° will form hydrogen bonds (3° doesn't have "H")
- ③ Solubility - generally soluble in water - low m.w. molecules are more soluble (\* w/c or less); the larger the molecule the lower the solubility  
1° & 2° amines are more soluble than 3°
- ④ Boiling Points are elevated, but not as high as alcohols.  
low 3° → 2° → 1° highest
- ⑤ Basicity - amines are weak bases forming alkyl ammonium salts  
low - aromatic amine → ammonia → alkyl amines <sup>strongest base</sup>
- ⑥ Odor - pungent, putrid (rotting fish)

## Reactions of Amines

### ① Basicity of Amines



### ② Neutralization of Amines

