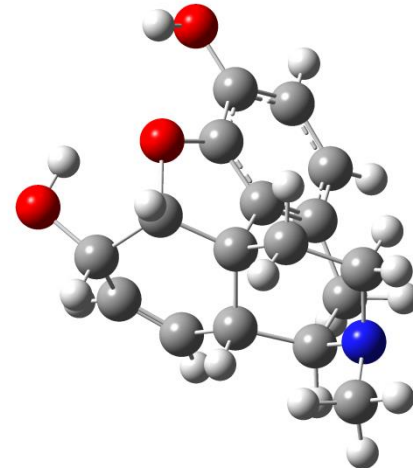
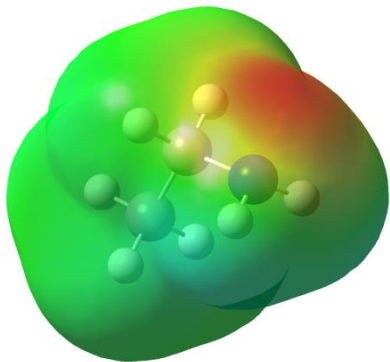




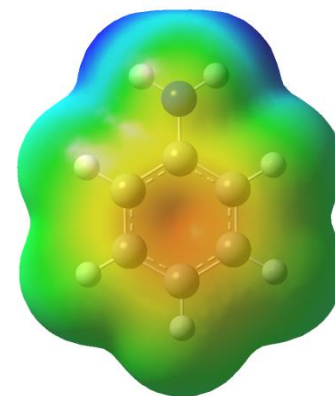
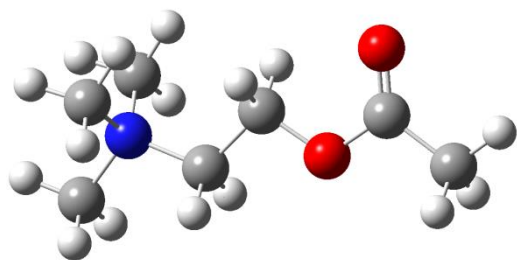
# Organic chemistry

Lec: Ch(11)

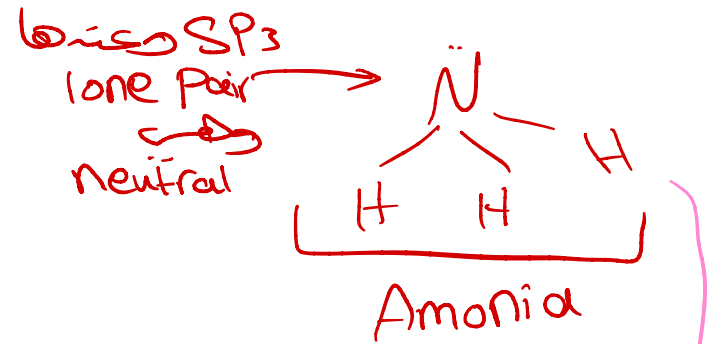
Done by: Shahed Zaytoon



# Chapter 11: Amines



الفكرة بسهولة المركبات  
 ال (Amines) كانت  
 أنا موجود عندي  
 N عاملة ثلاث  
 روابط مع ال (H)



الفكرة لو شلت وحدة  
 H وحطيت مكانها R



# Classification and Structure

Amines can be classified as follows:

$\text{NH}_3$  ammonia

$\text{R-NH}_2$  1° amine

$\text{R}_2\text{-NH}$  2° amine

$\text{R}_3\text{-N}$  3° amine

$\text{NH}_4^+$  ammonium

$\text{R}_4\text{N}^+$  4° alkylammonium (salt) <sup>as</sup>

← ان گنوا كلهم R

تصنيفها  
يعتمد على  
كم R شايكة  
مع N

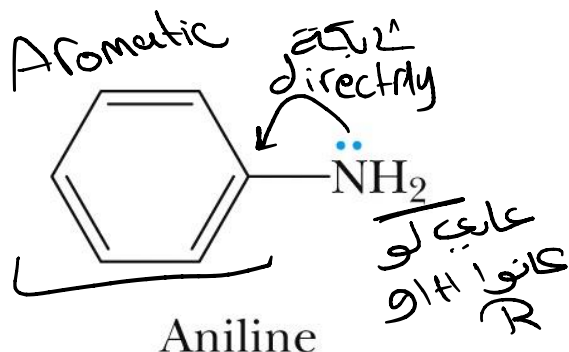
\* ال N يتكون  
3 bonds  
in its  
neutral  
state  
وهي تتصل  
اربطه  
اربطه مع  
لرعا عنه  
الالكترونات

# Structure & Classification

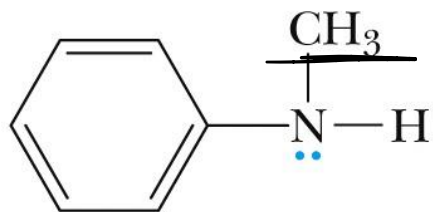
- Amines are further divided into aliphatic, aromatic, and heterocyclic amines.

– **Aliphatic amine**: An amine in which nitrogen is bonded only to alkyl groups.  $\rightarrow N + R$

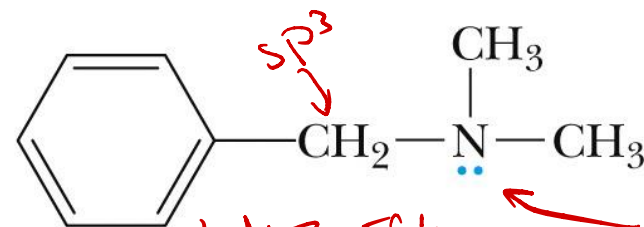
– **Aromatic amine**: An amine in which nitrogen is bonded to one or more aryl groups.  $\rightarrow N + R$  (where R is an aryl group)



(a 1° aromatic amine)



N-Methylaniline  
(a 2° aromatic amine)



N,N-Dimethylbenzylamine  
(a 3° aliphatic amine)

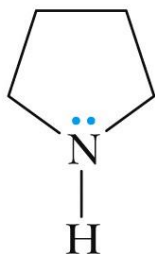
(RNH<sub>2</sub>)

لذلك

# Structure & Classification

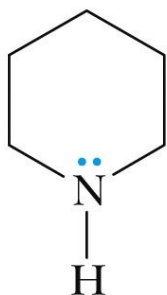
– **Heterocyclic amine**: An **amine** in which nitrogen is one of the atoms of a ring.

استبدال ذرة في الحلقة بال N



Pyrrolidine

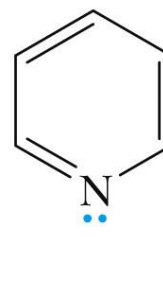
(heterocyclic aliphatic amines)



Piperidine



Pyrrole



Pyridine

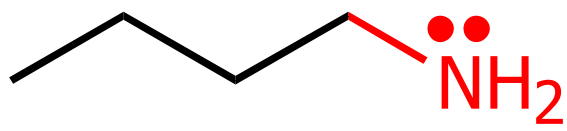
(heterocyclic aromatic amines)

الطريقة الأولى

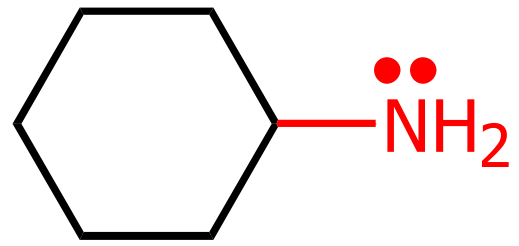
لينيچر نشوف ووالك شايك  
مع ال N

# 1. Nomenclature

❖ 1° Amines ← كالتالي 1° نسميه  
as Alkyl Amine



Butylamine

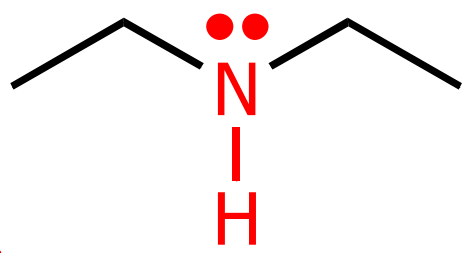


Cyclohexylamine

❖ 2° Amines ← Alkyl Alkyl Amine  
حسب الأجزاء

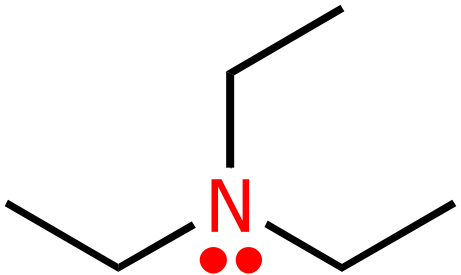


Butylethylamine



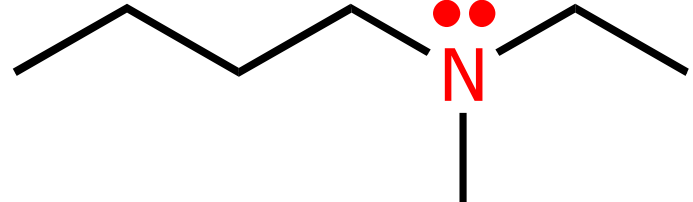
الثنائية  
Diethylamine

❖ 3° Amines ← Alkyl Alkyl Alkyl Amine



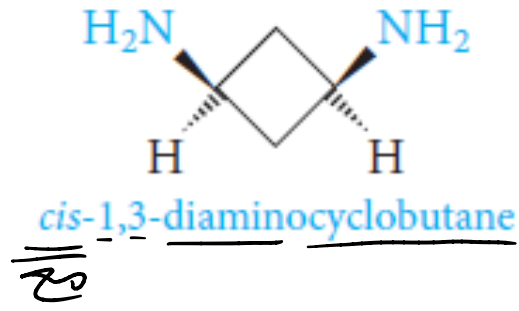
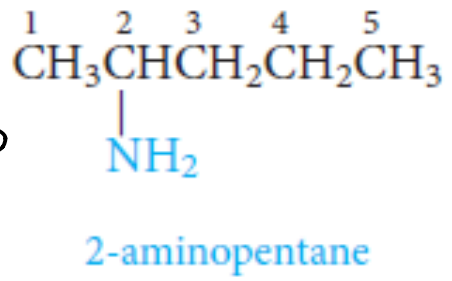
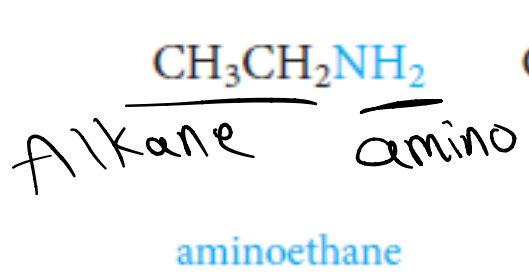
ثلاثي إيثيل

Triethylamine



Butylethylmethylamine

الطريقة الثانية ← انتقِب الـ NH<sub>2</sub> ← (Amino)

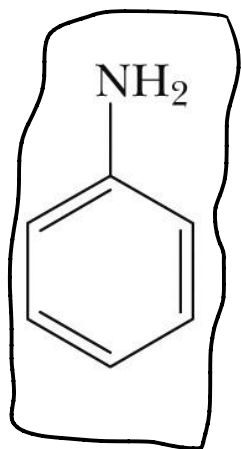




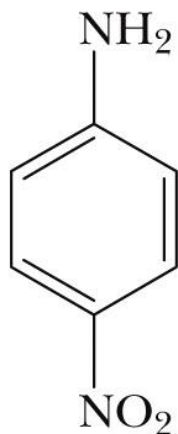
التذكير

# Nomenclature

- The IUPAC system retains the common name aniline.



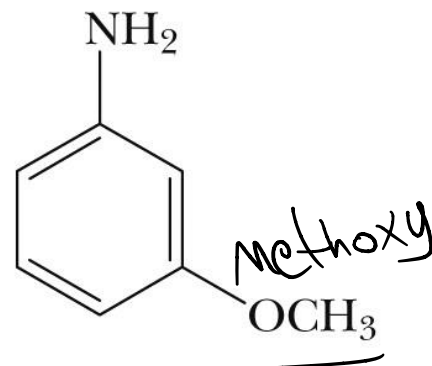
Aniline



4-Nitroaniline  
(*p*-Nitroaniline)



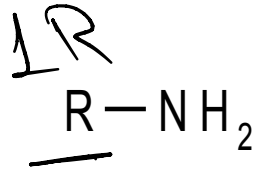
4-Methylaniline  
(*p*-Toluidine)



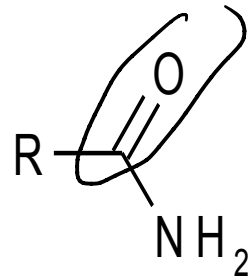
3-Methoxyaniline  
(*m*-Anisidine)

# Classification and Structure

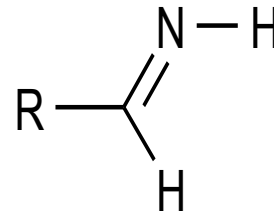
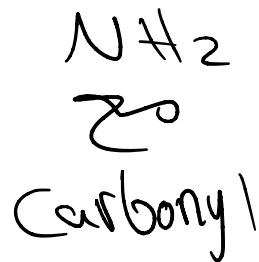
Other types of nitrogen compounds:



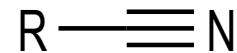
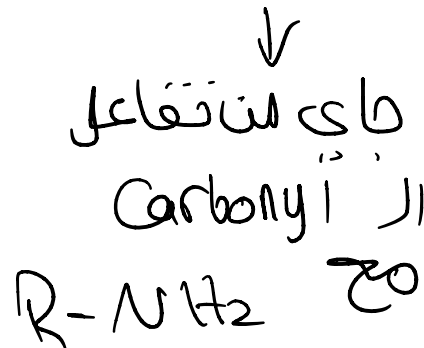
amine



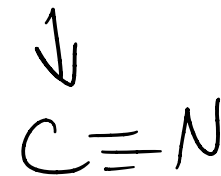
amide



imine



nitrile



# Physical Properties of Amines

N atom is  $sp^3$  hybridized.

N-H is polar but less so than O-H, so the H-bonds are weaker than an alcohol. (N is less EN than O)

Similar to alcohols the H-bonding makes the smaller amines soluble in water.

# Physical Properties of Amines

Since the H-bonds in amines are weaker than alcohols, their BP is intermediate between alkanes and alcohols, i.e.

name	formula	BP (°C)	Solubility (mg/L)
Propane	CH <sub>3</sub> CH <sub>2</sub> CH <sub>3</sub>	-42	40
Ethanamine	CH <sub>3</sub> CH <sub>2</sub> NH <sub>2</sub>	17	Miscible
Ethanol	CH <sub>3</sub> CH <sub>2</sub> OH	78	Miscible

*With low molecular weight*

*(Soluble in water)*

\* الفرق بين الـ H-bonding في الـ Amines و الـ Alcohols يعود السبب الى ان الـ Alcohol  
 الفرق بين الـ Amines و الـ Alcohols يعود السبب الى ان الـ Alcohol الفرق بين الـ Amines و الـ Alcohols يعود السبب الى ان الـ Alcohol