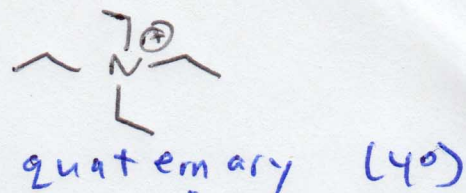
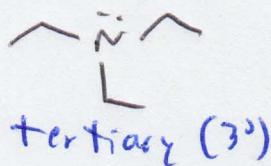
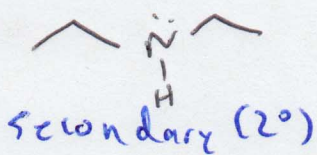
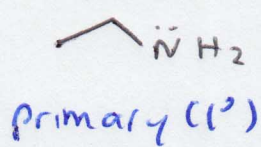


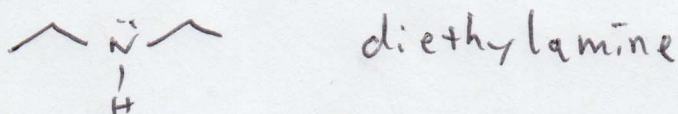
Amines



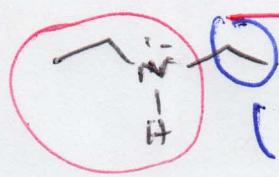
The designation of 1°, 2°, etc. depends on the # of alkyl groups attached to the nitrogen itself, and not on the type of carbon adjacent to the nitrogen.

Common nomenclature

- List the alkyl groups attached to N.



Systematic (IUPAC) nomenclature



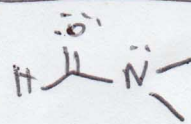
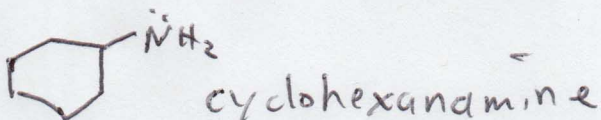
parent chain - ~~longest~~ longest carbon chain with the most important functional group

substituent to nitrogen

N-ethylethanamine

Cyclic amines

- N not in the ring



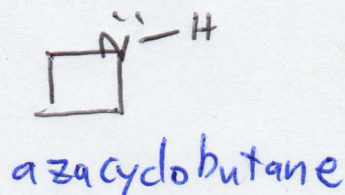
N,N-dimethylformamide

DMF

- N in the ring - Heterocycle - a cyclic molecule in which the ring itself contains an atom other than carbon.

- replacement nomenclature

"aza" → replace C w/ N



- common

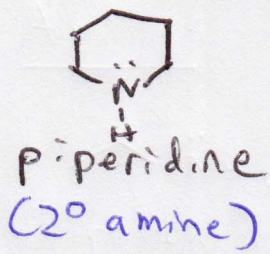
piperidine



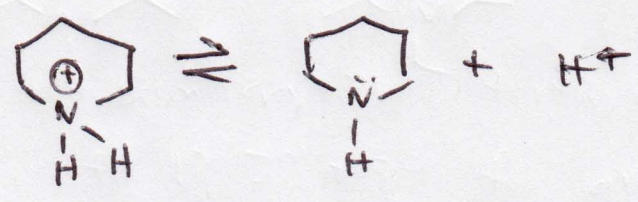
pyrrolidine



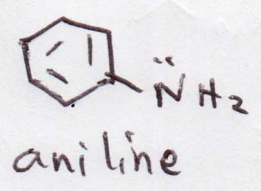
Acid/base properties of amines



pKa of conj. acid = 11.27



Amines are weaker bases with base strengths comparable to the average acid strength of a carboxylic acid ($pK_b \sim 4-6$) \Rightarrow
 Average pKa of the conjugate 9-11



conj. pKa = 4.58

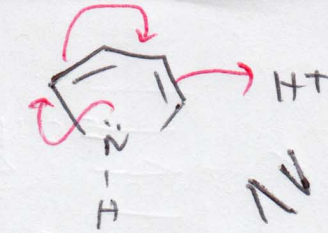
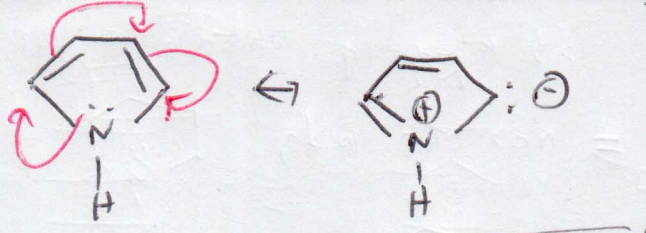
Question: Which is a stronger base: piperidine or aniline?
 Follow-up: Which is the stronger acid conjugate?
 piperidinium ion or anilinium ion? \rightarrow stronger acid
 pKa = 11.27 pKa = 4.58 low pKa = stronger acid

Because the ~~conj.~~ conjugate of aniline is the stronger acid, aniline is the weaker base.

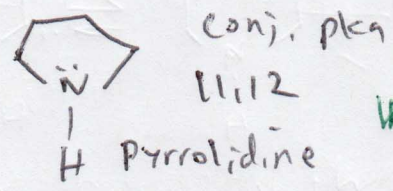
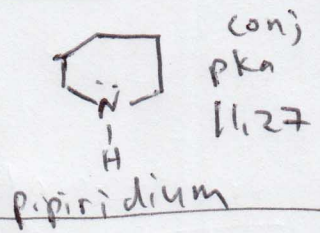
Why? The lone pair on N in aniline is heavily conjugated w/ the neighboring benzene ring, so it is less able to act as a base (Lewis).



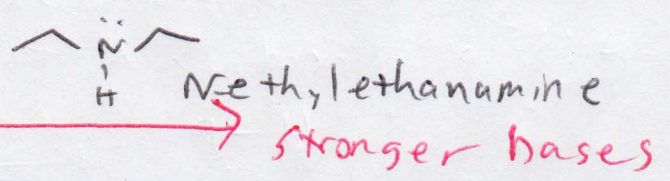
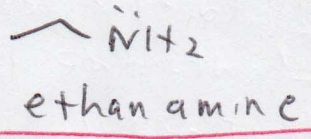
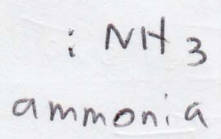
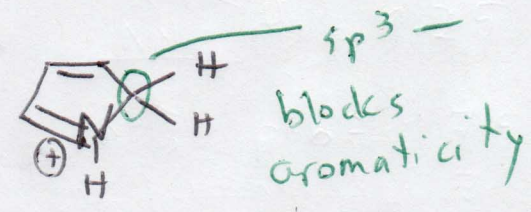
conj. pKa = -3.8 Conj. of pyrrole is a very strong acid, meaning pyrrole is a very weak base. Protonating pyrrole breaks aromaticity, which is highly unfavorable, which is why the conj. is so acidic.



Directed electrophilic aromatic substitution

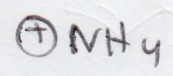


Why?

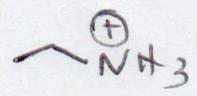


conj. pKa

9.25

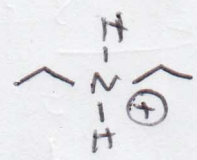


10.81

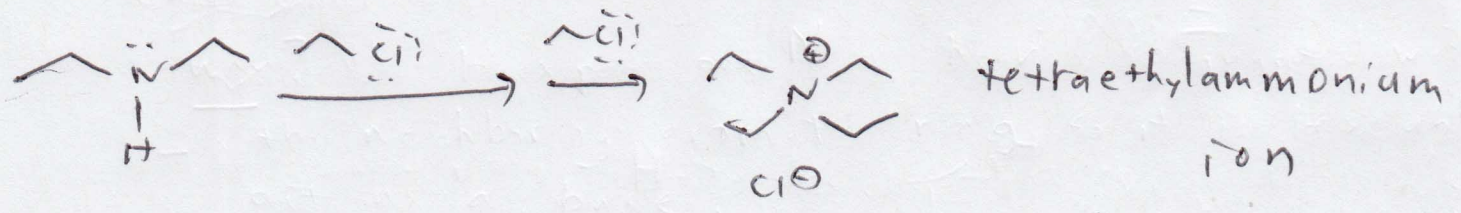
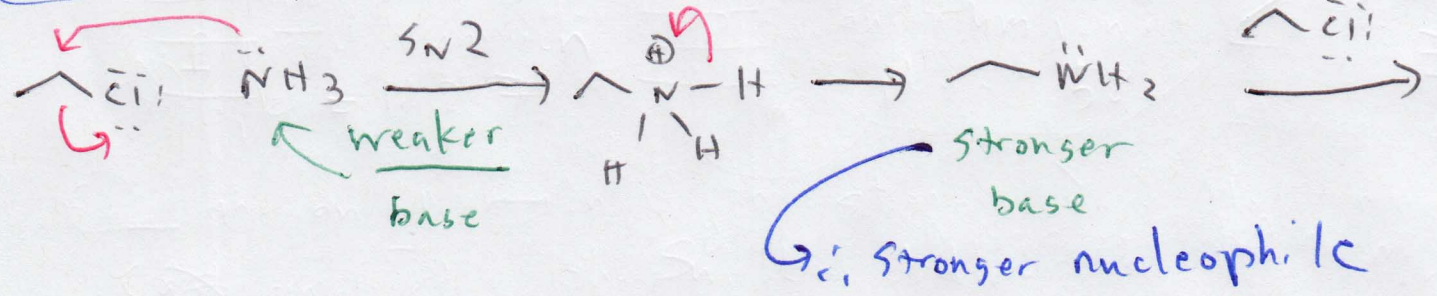


ethan ammonium ion

11.02



Stronger acid conjugate



SN2 rxns involving amines are generally problematic since the amine produced is usually more basic than the reactant, so it can be difficult to prevent multiple alkylation,

A10