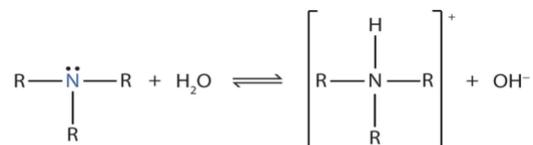


## Chemistry 2, HW 22

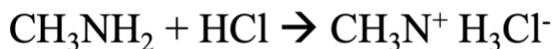
### Amines:

Central atom is nitrogen. Amines are derivatives of ammonia (NH<sub>3</sub>) where carbon atom replaces one, two, or three hydrogen atoms.

Amines are weak bases, they accept proton, they produce hydroxide ions in aqueous solution. Amines react with strong acids, the products are amine salt.



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Amine table (ignore K and pK values, it shows basically that these substances are weak bases):

Amine	Name	Bp. °C	Mp. °C	Water solubility, g/100 ml	K <sub>b</sub> in water*	pK <sub>a</sub> <sup>b</sup>
NH <sub>3</sub>	ammonia	-33	-77.7	90 <sup>o</sup>	1.8 × 10 <sup>-5</sup>	9.26
CH <sub>3</sub> NH <sub>2</sub>	methanamine (methylamine)	-6.5	-92.5	1156	4.4 × 10 <sup>-4</sup>	10.64
CH <sub>3</sub> CH <sub>2</sub> NH <sub>2</sub>	ethanamine (ethylamine)	16.6	-80.6	∞	5.6 × 10 <sup>-4</sup>	10.75
(CH <sub>3</sub> ) <sub>3</sub> CNH <sub>2</sub>	1,1-dimethylethanamine ( <i>tert</i> -butylamine)	46	-67.5	∞	2.8 × 10 <sup>-4</sup>	10.45
(CH <sub>3</sub> CH <sub>2</sub> ) <sub>2</sub> NH	<i>N</i> -ethylethanamine (diethylamine)	55.5	-50	v. sol.	9.6 × 10 <sup>-4</sup>	10.98
(CH <sub>3</sub> CH <sub>2</sub> ) <sub>3</sub> N	<i>N,N</i> -diethylethanamine (triethylamine)	89.5	-115	1.5 <sup>20</sup>	4.4 × 10 <sup>-4</sup>	10.64
(CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> ) <sub>3</sub> N	<i>N,N</i> -dibutylbutanamine (tributylamine)	214		sl. sol.		
	azacyclohexane (piperidine)	106	-9	∞	1.6 × 10 <sup>-3</sup>	11.20
	azabenzene (pyridine)	115	-42	∞	1.7 × 10 <sup>-9</sup>	5.23
	cyclohexanamine	134	-18	sl. sol.	4.4 × 10 <sup>-4</sup>	10.64
	benzenamine (aniline)	184.4	-6.2	3.4 <sup>20</sup>	3.8 × 10 <sup>-10</sup>	4.58
H <sub>2</sub> NCH <sub>2</sub> CH <sub>2</sub> NH <sub>2</sub>	1,2-ethanediamine (ethylenediamine)	116	8.5	sol.	8.5 × 10 <sup>-5</sup>	9.93

\*Usually at 20–25°. <sup>o</sup>The pK<sub>a</sub> values refer to the dissociation of the conjugate acid RNH<sub>3</sub><sup>o</sup> + H<sub>2</sub>O  $\rightleftharpoons$  RNH<sub>2</sub> + H<sub>3</sub>O<sup>o</sup>, where pK<sub>a</sub> = -log K<sub>a</sub> = 14 + log K<sub>b</sub> (see Sections 8-1 and 23-7).

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Question: Write chemical reactions that show ethylamine

1. Ionizing in water
2. Neutralized in HCl