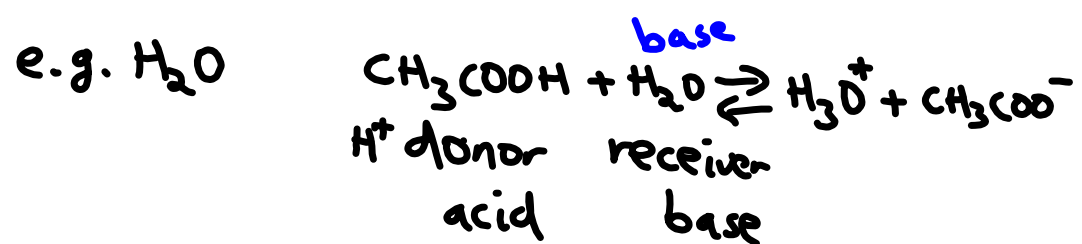


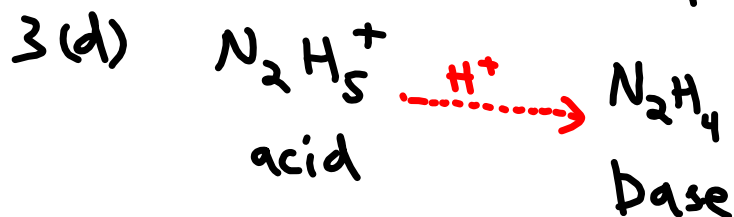
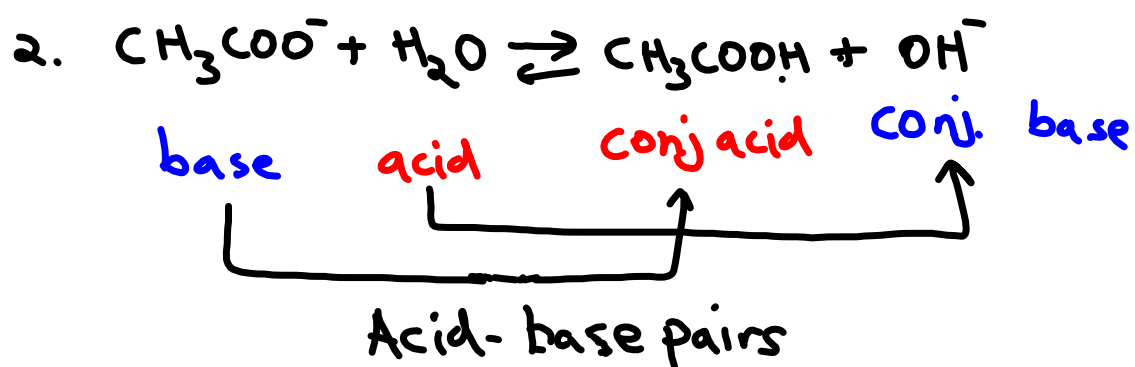
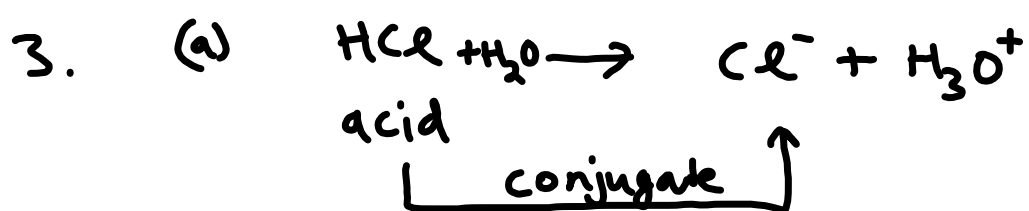
From last class- Amphoteric

(behaves as an acid or base.)

e.g. H_2O



Questions p. 557



Strong/Weak Acids and Bases Demonstration

<u>Substances</u>	<u>Conductivity (electr.)</u>
H ₂ O (pure)	no
HCl	yes - good
CH ₃ COOH	weak
NaOH	good
Ca(OH) ₂	good
NH ₄ OH	weak
NaCl	good
NaOH (s)	no

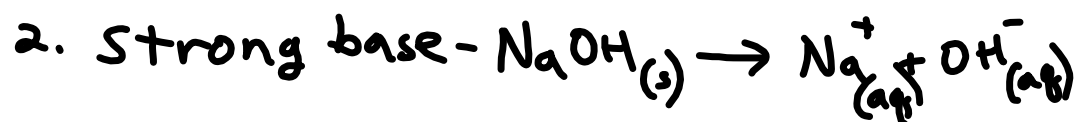
Read text p. 560-563

See animations (web site)

Conclusion -

Strong → 100% ionization
 Weak → < 100% (equilibrium)

Using equations



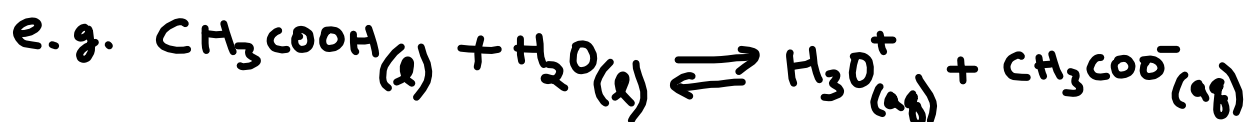
3. weak acid -



See list p. 563

Ionization Constants Ka and Kb

Text - p. 587 Derive ionization constant



$$K_{eq} = \frac{[\text{H}_3\text{O}^+][\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}][\text{H}_2\text{O}]}$$

↑
constant

$$K_{eq} \cdot [\text{H}_2\text{O}] = \frac{[\text{H}_3\text{O}^+][\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

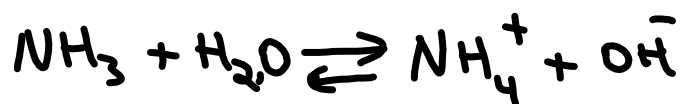
↑
constant

new constant

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

↑
 1.8×10^{-5}

For bases -



$$K_b = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_3]}$$

Calculations with K_a and K_b

given $\rightarrow K_a$
 \rightarrow [acid] \rightarrow calculate $[H_3O^+]$

example- Find $[H_3O^+]$ in a 0.010 mol/L solution of CH_3COOH .

$$CH_3COOH + H_2O \rightleftharpoons H_3O^+ + CH_3COO^-$$

I	0.010	}	0	0
C	-x	}	+x	+x
E	0.010-x	}	x	x

$$K_a = \frac{[H_3O^+][CH_3COO^-]}{[CH_3COOH]}$$

$$1.8 \times 10^{-5} = \frac{x \cdot x}{0.010 - x} \quad \text{assume } x \text{ is small}$$

$$1.8 \times 10^{-5} = \frac{x^2}{0.010}$$

$$1.8 \times 10^{-7} = x^2$$

$$\sqrt{1.8 \times 10^{-7}} = \sqrt{x^2}$$

$$[H_3O^+] = 4.2 \times 10^{-4} = x$$