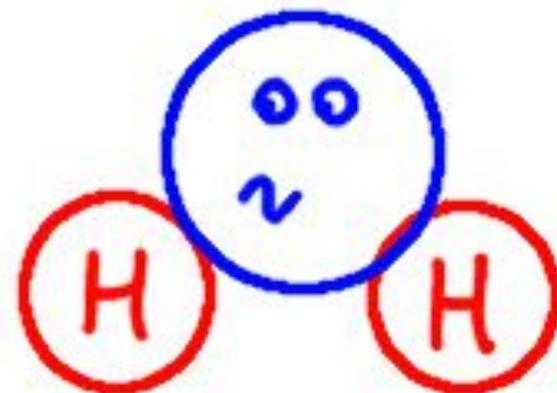


Acid Base Chemistry

1. Foundation knowledge
2. The pH scale
3. The pH of Water
4. Acids
5. Bases
 - a. Defining strong bases and weak bases
 - b. Strong bases
 - c. Weak bases
 - i. What makes a weak base?
 - ii. How to calculate the pH of a weak base
6. Acid base titrations
7. Relative acidity and basicity – competition for H^+



pH of weak bases

- What makes a weak base?

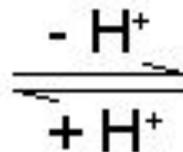
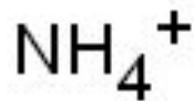
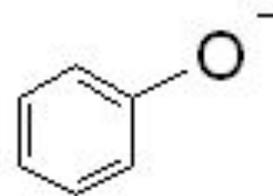
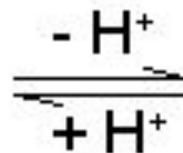
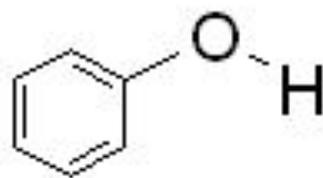
- Define K_b

- Derive $[-OH] = \sqrt{K_b [B]}$

- Use $pH + pOH = pK_w$

What makes a weak base?

conjugate bases of weak acids



H^+
|
0

weak acids

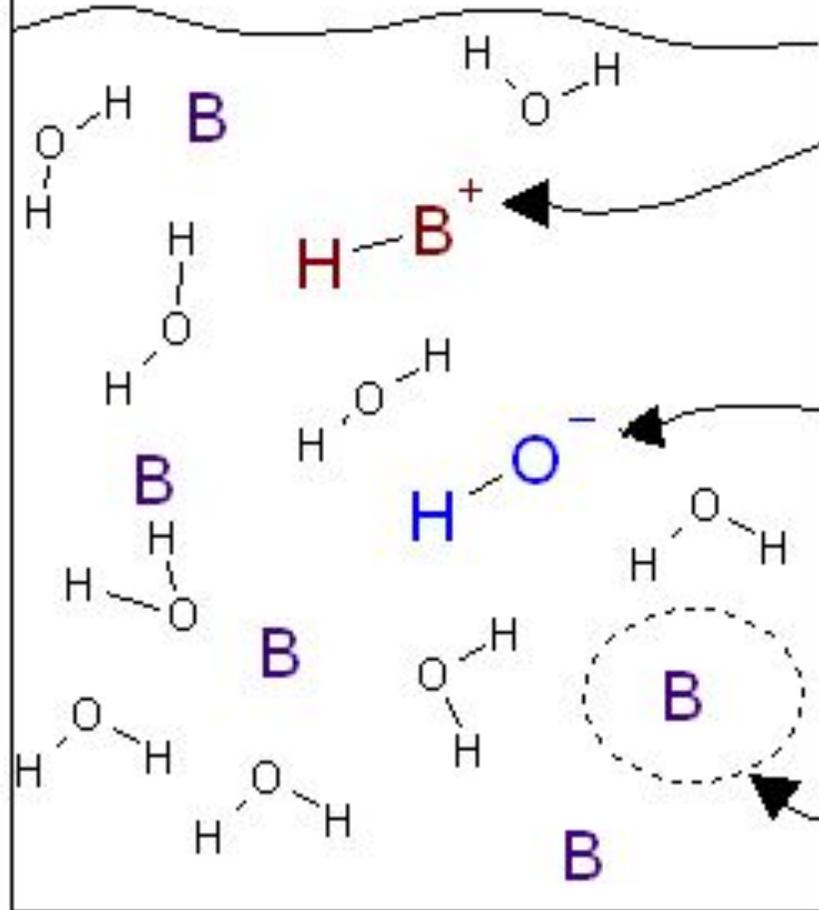
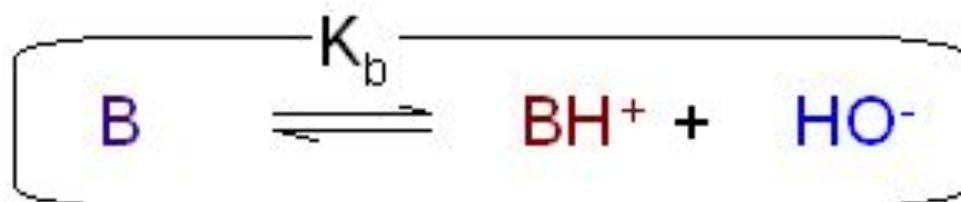
Na^+
 Cl^-
|
7

weak bases

OH^-
|
14

• Define K_b

• Derive $[-OH] = \sqrt{K_b [B]}$



$$[BH^+] = [HO^-]$$

[B] has dropped only very slightly

$$K_b = \frac{[BH^+][HO^-]}{[B]}$$

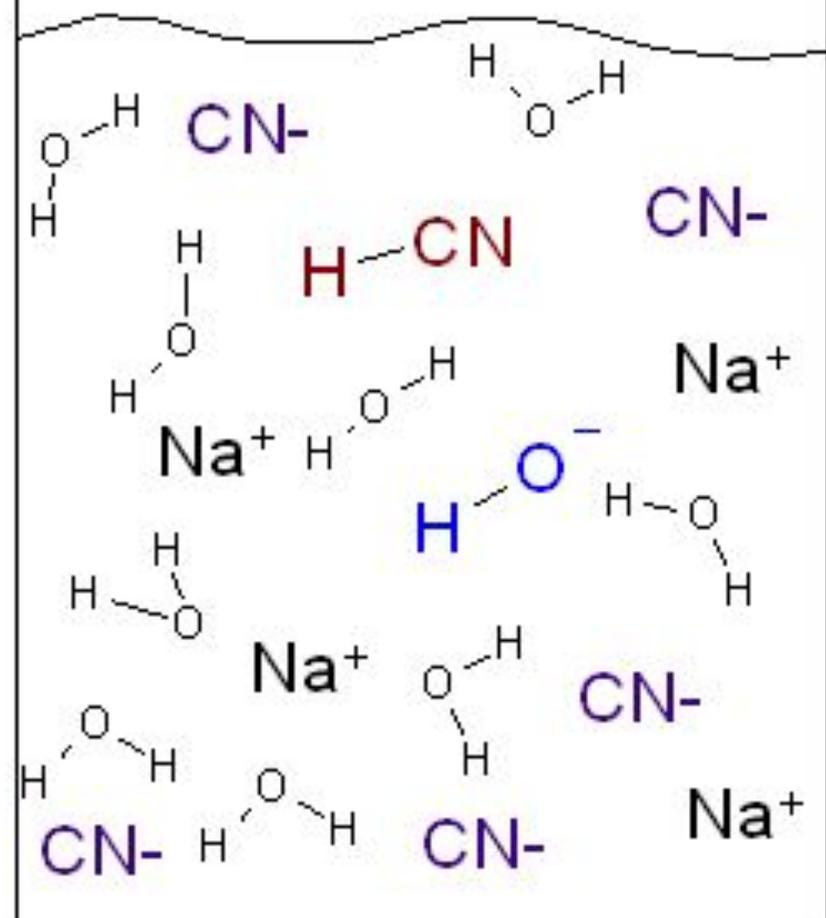
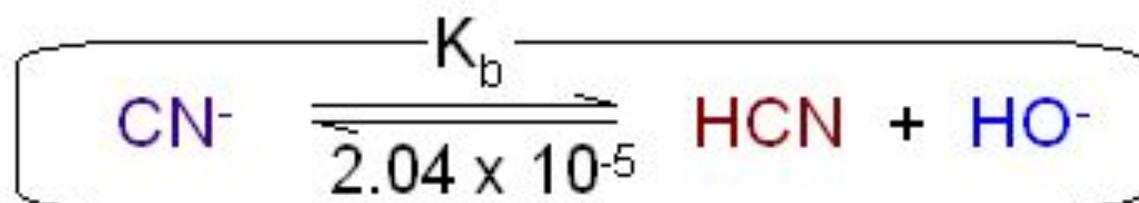
$$K_b = \frac{[HO^-]^2}{[B]}$$

$$K_b [B] = [HO^-]^2$$

$$[HO^-] = \sqrt{K_b [B]}$$

use original [B]

- Calculate pH of 0.5 mol dm^{-3} NaCN(aq)



$$[\text{HO}^-] = \sqrt{K_b [\text{B}]}$$

$$= \sqrt{2.04 \times 10^{-5} \times 0.05}$$

$$= 1.01 \times 10^{-3} \text{ mol dm}^{-3}$$

$$\text{pOH} = -\log 1.01 \times 10^{-3} \text{ mol dm}^{-3}$$

$$= 3$$

$$\text{pH} + \text{pOH} = 14 \quad (298\text{K})$$

$$\text{pH} = 14 - \text{pOH}$$

$$\underline{\underline{\text{pH} = 11}}$$

pH of weak bases

- Amines or partially stabilized anions



- $K_b = \frac{[BH^+][HO^-]}{[B]}$

- $[HO^-] = \sqrt{K_b [B]}$

$$pOH = -\log [HO^-]$$

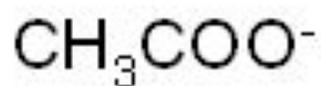
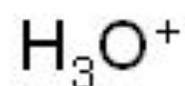
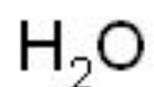
$$pH = 14 - pOH$$

Which are in a solution of $\text{CH}_3\text{COO}^-\text{Na}^+(\text{aq})$, a weak base?

YES

A FEW

NO

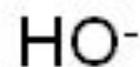
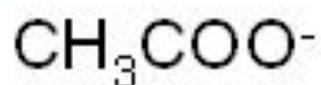
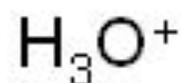
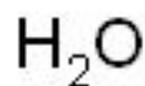


Which are in a solution of $\text{CH}_3\text{COO}^-\text{Na}^+(\text{aq})$, a weak base?

YES

A FEW

NO

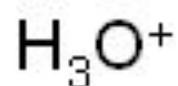
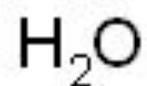


Which are in a solution of $\text{NH}_3(\text{aq})$, a weak base?

YES

A FEW

NO



Which are in a solution of $\text{NH}_3(\text{aq})$, a weak base?

YES

A FEW

NO

