PUFRI

ŠIBKA KISLINA IN SOL NJENE KONJUGIRANE BAZE

$HA + H_2O \rightleftharpoons$	H_3O^+	+	A^-
$c_{o(K)}$	/		$c_{o(S)}$
$- x$	$+ x$		$+ x$
$c_{o(K)} - x$	x		$c_{o(S)} + x$

$$K_a = \frac{[H_3O^+] \cdot [A^-]}{[HA]} = \frac{x \cdot (c_{o(S)} + x)}{c_{o(K)} - x}$$

Predpostavka (ki jo, ko izračunamo x preverimo)

$$\frac{x}{c_{o(K)}}, \frac{x}{c_{o(S)}} \leq 0{,}01 \Rightarrow \quad K_a \approx \frac{x \cdot c_{o(S)}}{c_{o(K)}} = \frac{x \cdot n_{o(S)}}{n_{o(K)}}$$

$$[H_3O^+] = x = \frac{K_a \cdot c_{o(K)}}{c_{o(S)}} = \frac{K_a \cdot n_{o(K)}}{n_{o(S)}}$$

$$pH = -\log[H_3O^+] = -\log(x) = -\log\left(\frac{K_a \cdot c_{o(K)}}{c_{o(S)}}\right) = -\log\left(\frac{K_a \cdot n_{o(K)}}{n_{o(S)}}\right)$$

$$\Downarrow$$

$$c_{o(K)} = c_{o(S)}; n_{o(K)} = n_{o(S)} \Rightarrow \quad K_a \approx x$$

$$[H_3O^+] = x = K_a$$

$$pH = -\log[H_3O^+] = -\log(x) = -\log(K_a) = pK_a$$

Legenda:
$c_{o(K)}$ – koncentracija kisline v raztopini
$c_{o(S)}$ – koncentracija konjugirane baze (soli) v raztopini
$n_{o(K)}$ – množina kisline v raztopini
$n_{o(S)}$ – kmnožina konjugirane baze (soli) v raztopini
Ka – ravnotežna koncentracijska konstanta disociacije kisline

Primer: Protolitska reakcija ocetne kisline = Elektrolitska disociacija ocetne kisline

$$\underset{K_1}{CH_3COOH} + \underset{B_1}{H_2O} \rightleftharpoons \underset{K_2}{H_3O^+} + \underset{B_2}{CH_3COO^-}$$

PUFRI

ŠIBKA BAZA IN SOL NJENE KONJUGIRANE KISLINE

B	+	H_2O	⇌	OH^-	+	A^-
$c_{o(B)}$				/		$c_{o(S)}$
- x				+ x		+ x
$c_{o(B)}$ -x				x		$c_{o(S)}$ +x

$$K_b = \frac{\left[OH^-\right] \cdot \left[BH^+\right]}{\left[B\right]} = \frac{x \cdot (c_{o(S)} + x)}{c_{o(B)} - x}$$

Predpostavka (ki jo, ko izračunamo x preverimo)

$$\frac{x}{c_{o(B)}}, \frac{x}{c_{o(S)}} \leq 0{,}01 \Rightarrow \quad K_b \approx \frac{x \cdot c_{o(S)}}{c_{o(B)}} = K_b \approx \frac{x \cdot n_{o(S)}}{n_{o(B)}}$$

$$\left[OH^-\right] = x = \frac{K_b \cdot c_{o(B)}}{c_{o(S)}} = \frac{K_b \cdot n_{o(B)}}{n_{o(S)}}$$

$$pOH = -\log\left[OH^-\right] = -\log(x) = -\log\left(\frac{K_b \cdot c_{o(B)}}{c_{o(S)}}\right) = -\log\left(\frac{K_b \cdot n_{o(B)}}{n_{o(S)}}\right)$$

$$pH = 14 - pOH$$

$$\Downarrow$$

$$c_{o(B)} = c_{o(S)}; n_{o(B)} = n_{o(S)} \Rightarrow \quad K_b \approx x$$

$$\left[OH^-\right] = x = K_b$$

$$pOH = -\log\left[OH^-\right] = -\log(x) = -\log(K_b) = pK_b$$

Legenda:
$c_{o(B)}$ – koncentracija baze v raztopini
$c_{o(S)}$ – koncentracija konjugirane kisline (soli) v raztopini
$n_{o(B)}$ – množina baze v raztopini
$n_{o(S)}$ – kmnožina konjugirane kisline (soli) v raztopini
Kb – ravnotežna koncentracijska konstanta disociacije baze

Primer:
Protolitska reakcija amoniaka = Elektrolitska disociacija amoniaka

NH_3	+	H_2O	⇌	OH^-	+	NH_4^+
B_1		K_1		B_2		K_2