



-1-3

-2-3

-3-3

(Q)

-4-3

K

-5-3

:

X_f

X_{max}

τ

$$\tau = \frac{X_f}{X_{max}}$$

$$0 < \tau < 1$$

$$.(0 < \tau < 100\%)$$

.(mol)

X_{max} X_f

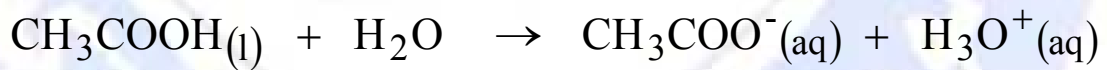
) .

1 L

0,1 mol

.(m = 1 kg = 1000 g

1 L



$$n_1(\text{CH}_3\text{COOH}) = 0,1\text{mol/L}$$

$$n_2(\text{H}_2\text{O}) = \frac{m}{M} = \frac{1000}{18} = 55,6\text{mol}$$

	التقدم	$\text{CH}_3\text{COOH} + \text{H}_2\text{O} = \text{CH}_3\text{COO}^-_{(\text{aq})} + \text{H}_3\text{O}^+_{(\text{aq})}$				
(mol)	0	0,1	زيادة		0	0
(mol)	x	0,1 - x	زيادة		x	x
الحالة المتوقعة (mol)	$x_{\text{max}} = 0,10$	0	زيادة		0,1	0,1

$\text{pH} = 2,88$

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}} = 10^{-2,88} = 0,0013 \text{ mol / L}$$

CH_3 x moles H_3O^+ x moles COO^-

(0,1 - x) moles

$$n_{\text{final}}(\text{H}_3\text{O}^+) = x_{\text{fin}} = 0,0013 \text{ mol}$$

		CH ₃ COOH + H ₂ O		CH ₃ COO ⁻ _(aq)	+ H ₃ O ⁺ _(aq)
	التقدم (mol)				
(mol)	0	0,1	زيادة	0	0
(mol)	x	0,1 - x	زيادة	x	x
	x _{max} =0,10	0	زيادة	0,1	0,1
(mol)	x = 0,0013	0,0987	زيادة	0,0013	0,0013

x_f

x_{max} = 0,10 mol

= 0,0013 mol

:

$$\tau = \frac{x_f}{x_{\max}} = \frac{0,0013}{0,1} = 0,013 = 1,3 \%$$

CH₃COO⁻ 1,3 CH₃COOH_(aq) 98,7

CH₃COOH 100

:

.()	$\tau \approx 1$ $X_f \approx X_{max}$	•
.()	$\tau < 1$ $X_f < X_{max}$	•

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.() 100 % 1

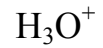
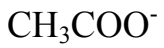
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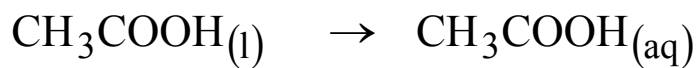
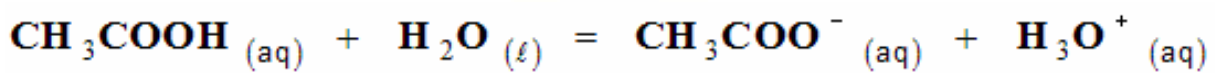
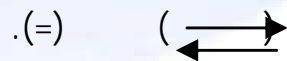
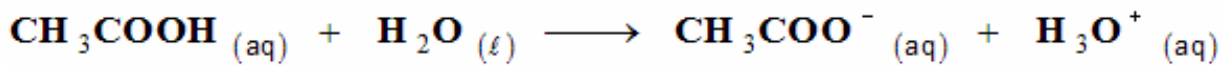
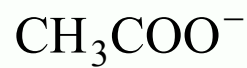
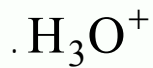
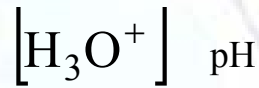
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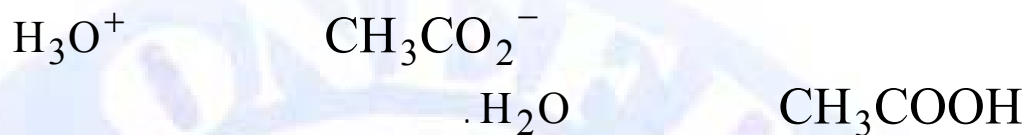
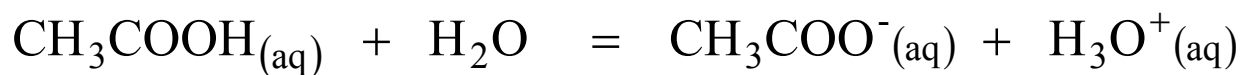


pH



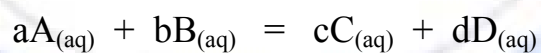
pH





$$1 + 2 = 1 + 2$$

:(Q) -4-3

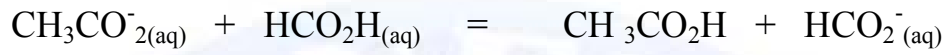


$$Q = \frac{[\text{C}]^c \cdot [\text{D}]^d}{[\text{A}]^a \cdot [\text{B}]^b}$$

Q

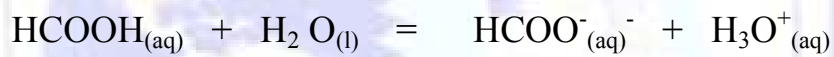
: 1

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$$Q = \frac{[\text{CH}_3\text{CO}_2\text{H}][\text{HCO}_2^-]}{[\text{CH}_3\text{COO}^-][\text{HCO}_2\text{H}]}$$

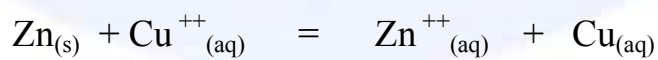
: " " •
 .Q ()



.Q

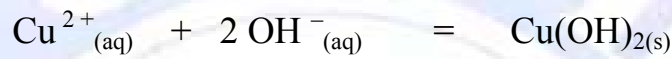
$$Q = \frac{[\text{H}_3\text{O}^+][\text{HCO}_2^-]}{[\text{HCOOH}]}$$

: •
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$$Q = \frac{[Zn^{2+}]}{[Cu^{2+}]}$$



$$Q = \frac{1}{[Cu^{2+}][OH^{-}]^2}$$

:K

-5-3

: S L G

$$G = \sigma \frac{S}{L}$$

.(S) Siemens

$$[X_i] X_i = \sigma$$

$$\sigma = \lambda_1 [X_1] + \lambda_2 [X_2] + \lambda_3 [X_3] + \dots$$

(S/m)

.(S.m²/mol)

= λ_i

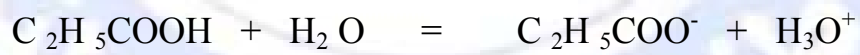
: 25°C

λ (S.m ² /mol) (25 °C)	
$35,0 \cdot 10^{-3}$	H ₃ O ⁺
$20,0 \cdot 10^{-3}$	HO ⁻
$16,0 \cdot 10^{-3}$	SO ₄ ⁻⁻
$11,9 \cdot 10^{-3}$	Ca ⁺⁺
$7,63 \cdot 10^{-3}$	Cl ⁻
$7,35 \cdot 10^{-3}$	K ⁺
$7,14 \cdot 10^{-3}$	NO ₃ ⁻
$5,00 \cdot 10^{-3}$	Na ⁺

.C₂ C₁

S₂ S₁

:



:

$$C_2 = 1,0 \cdot 10^{-3} \text{ mol/L}$$

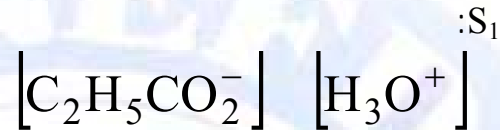
$$C_1 = 1,0 \cdot 10^{-2} \text{ mol/L}$$

$$\sigma_2 = 43 \cdot 10^{-4} \text{ S/m}$$

$$\sigma_1 = 143 \cdot 10^{-4} \text{ S/m}$$

$$\lambda_{\text{H}_3\text{O}^+} = 35,0 \text{ mS.m}^2 / \text{mol}$$

$$\lambda_{\text{C}_2\text{H}_5\text{CO}_2^-} = 3,58 \text{ mS.m}^2 / \text{mol}$$



$$(1) \dots \sigma_1 = \lambda_{\text{H}_3\text{O}^+} \cdot \left[\text{H}_3\text{O}^+ \right]_{\text{eq}} + \lambda_{\text{C}_2\text{H}_5\text{CO}_2^-} \cdot \left[\text{C}_2\text{H}_5\text{CO}_2^- \right]_{\text{eq}}$$

$$(2) \dots \left[\text{C}_2\text{H}_5\text{CO}_2^- \right] = \left[\text{H}_3\text{O}^+ \right] :$$

(2) (1)

$$\left[\text{H}_3\text{O}^+ \right]_{\text{eq}} = \left[\text{C}_2\text{H}_5\text{CO}_2^- \right]_{\text{eq}} = \frac{\sigma_1}{\lambda_{\text{H}_3\text{O}^+} + \lambda_{\text{C}_2\text{H}_5\text{CO}_2^-}}$$

$$= \frac{143 \cdot 10^{-4}}{(35 + 3,58) 10^{-3}} = 3,71 \cdot 10^{-4} \text{ mol/L}$$

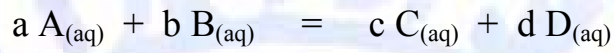
$$\left[\text{C}_2\text{H}_5\text{CO}_2\text{H} \right] = C_1 - \left[\text{C}_2\text{H}_5\text{CO}_2^- \right]_{\text{eq}} = 1 \cdot 10^{-2} - 3,71 \cdot 10^{-4} = 9,63 \cdot 10^{-3} \text{ mol/L}$$

$$Q = \frac{\left[\text{C}_2\text{H}_5\text{CO}_2^- \right] \left[\text{H}_3\text{O}^+ \right]}{\left[\text{C}_2\text{H}_5\text{CO}_2\text{H} \right]}$$

$$Q = 1,4 \cdot 10^{-5} :$$

$$Q = 1,4 \cdot 10^{-4} \quad \text{S}_2$$

.K



K

$$K = \frac{[C]_{eq}^c \cdot [D]_{eq}^d}{[A]_{eq}^a \cdot [B]_{eq}^b}$$

$Q \neq K$:

$Q_{eq} = K$:

: $K \geq 10^4$

: $K = 1$

: $K \leq 10^{-4}$

$$\tau = \frac{n(C_2H_5CO_2^-)_{eq}}{n(\text{حمض})_{init}}$$

$\tau_2 = 0,11$

$\tau_1 = 0,037$

+

		RCOOH +	H ₂ O		RCOO ⁻ _(aq)	+ H ₃ O ⁺ _(aq)
(mol)	التقدم : 0	C.V	مذيب		0	0
(mol)	X _{eq} : التقدم	C.V - x _{eq}	مذيب		X _{eq}	X _{eq}
(mol/L)		$\frac{C.V - x_{eq}}{V}$			$\frac{x_{eq}}{V}$	$\frac{x_{eq}}{V}$

$$K = \frac{[H_3O^+]_{eq} \cdot [RCOO^-]_{eq}}{[RCOOH]_{eq}}$$

$$K = \frac{\left(\frac{x_{eq}}{V}\right)^2}{C - \frac{x_{eq}}{V}} \dots(1)$$

$$\tau = \frac{N(RCOO^-)_{eq}}{N(\text{حمض})_{init}} = \frac{[RCOO^-]}{C}$$

$$\tau = \frac{x_f}{x_{max}} = \frac{x_{eq}}{CV} :$$

$$x_{eq} = \tau.CV \dots(2)$$

:(1) (2)

$$K = \frac{\left(\frac{CV \cdot \tau}{V}\right)^2}{C - \tau C} = \frac{C\tau^2}{1 - \tau}$$

$$K = \frac{C\tau^2}{1 - \tau}$$

:

.() K

$$\tau = f(K) \quad K \quad \tau$$

