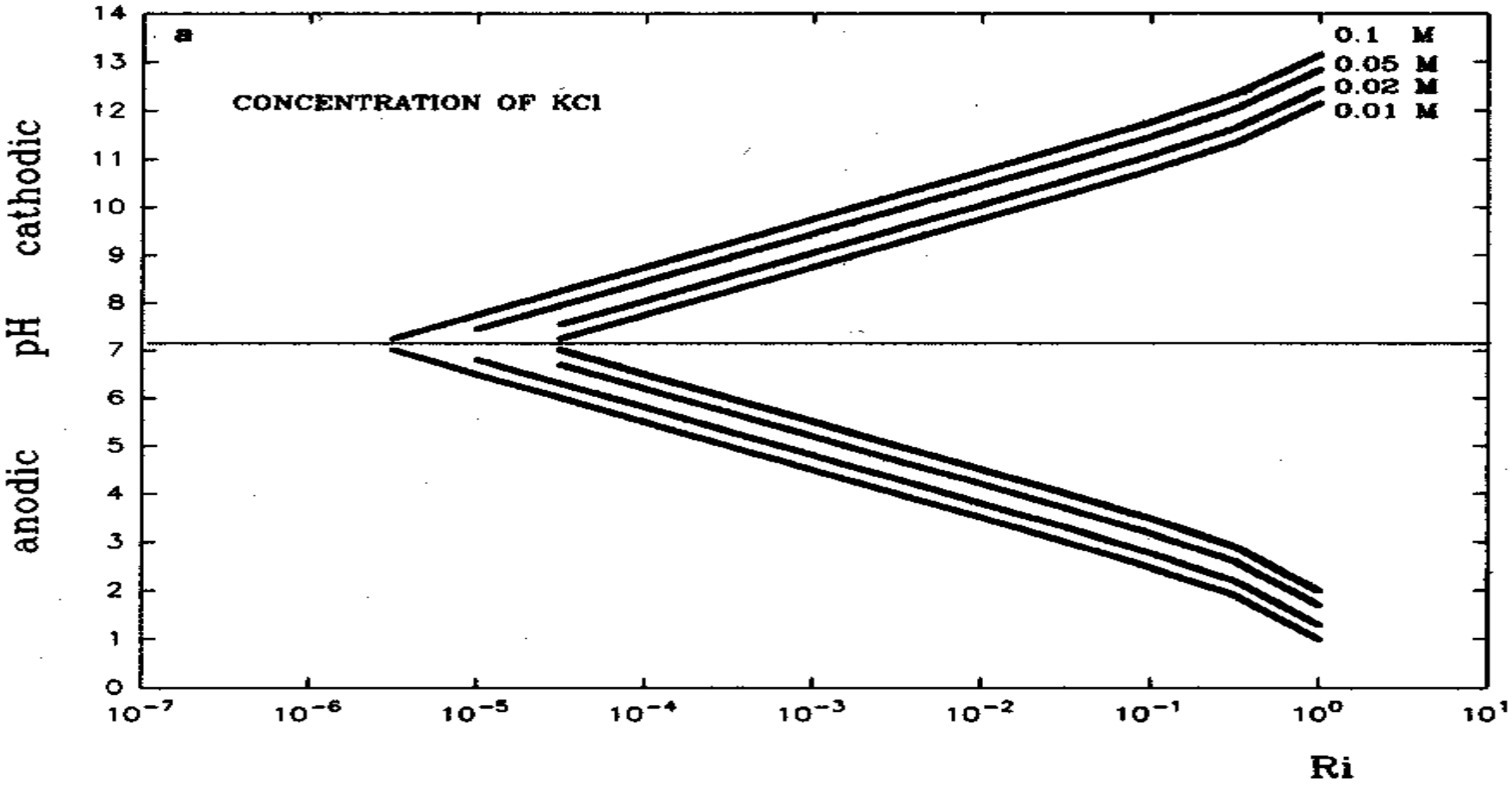
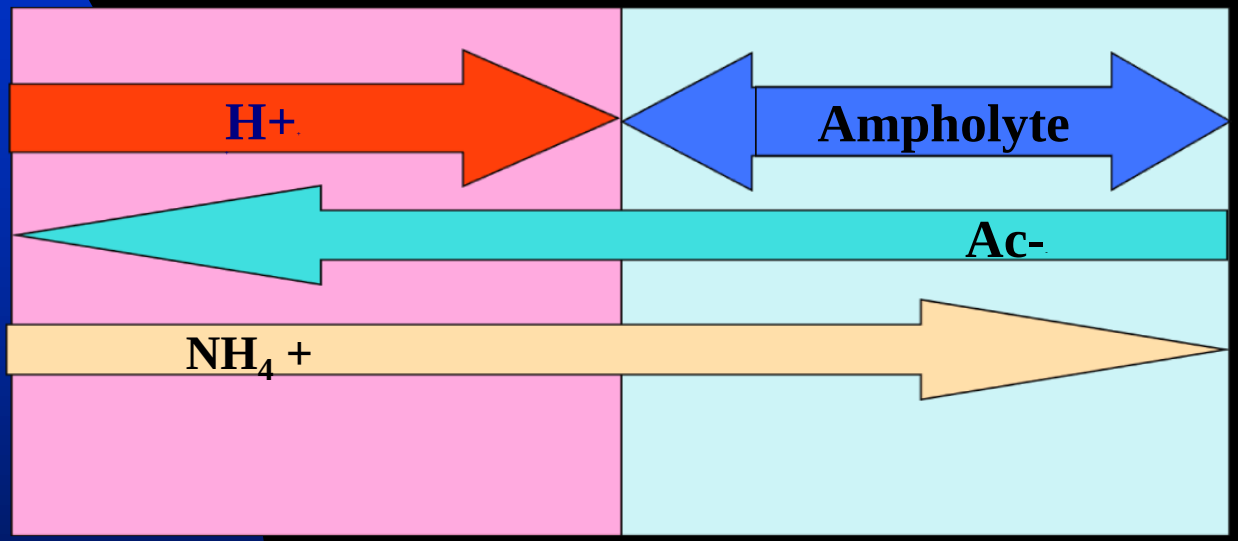
Symetrical and asymetrical neutralization reaction boudary

Expected advantages: selectivity and higher stability – extreme pH



Principle of the method

Scheme of the fluxes on asymetrical neutralization reaction boundary



Acidic electrolyte:

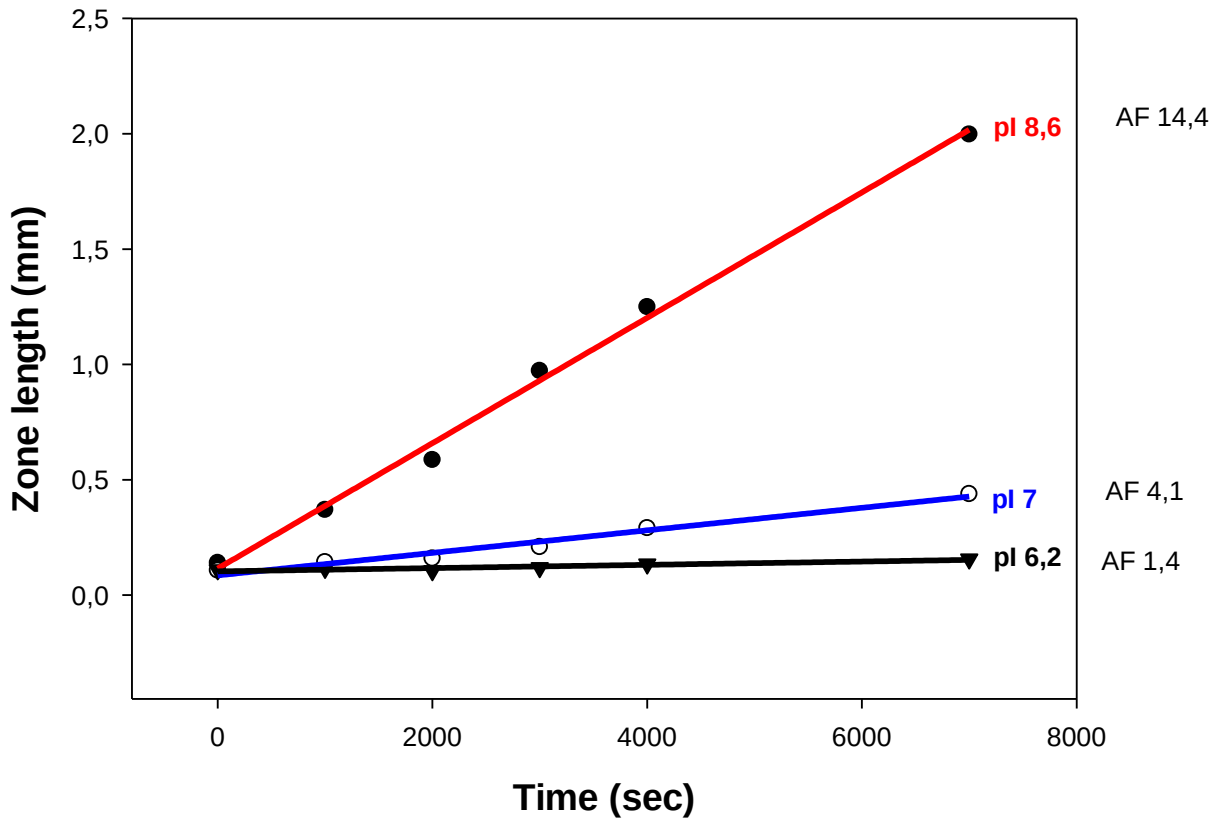
0,01M NH_4Ac
0,01M HAc
pH=4,75

Alkaline ? electrolyte:

0,01M NH_4Ac
X M Ampholyte
pH=pI

Asymetry is reached by presence of ampholyte at pH=pI

Accumulation of ampholytes on asymetrical neutralization reaction boundary H+/HIS



selectivity

DE: 0,002M HIS + 0,01M NH_4Ac + vzorek amfolytů, pH=6,95

PE: ca. 0,01M NH_4OH + 0,01M NH_4Ac + 1% PEG + 400ppm povrchově aktivní látky, pH=8,62

TE: 0,03M HAc, pH=3,12

LE: 0,01M NH_4Ac + 1% PEG + 400ppm povrchově aktivní látky, pH=6,75

Sample: LMW ampholyte dyes pI=8.6+7+6.2

Electrolyte systems used for asymetrical neutralization reaction boundary

Extreme pH

DE: 0,01 M HIS + Sample pH=pI=7,2

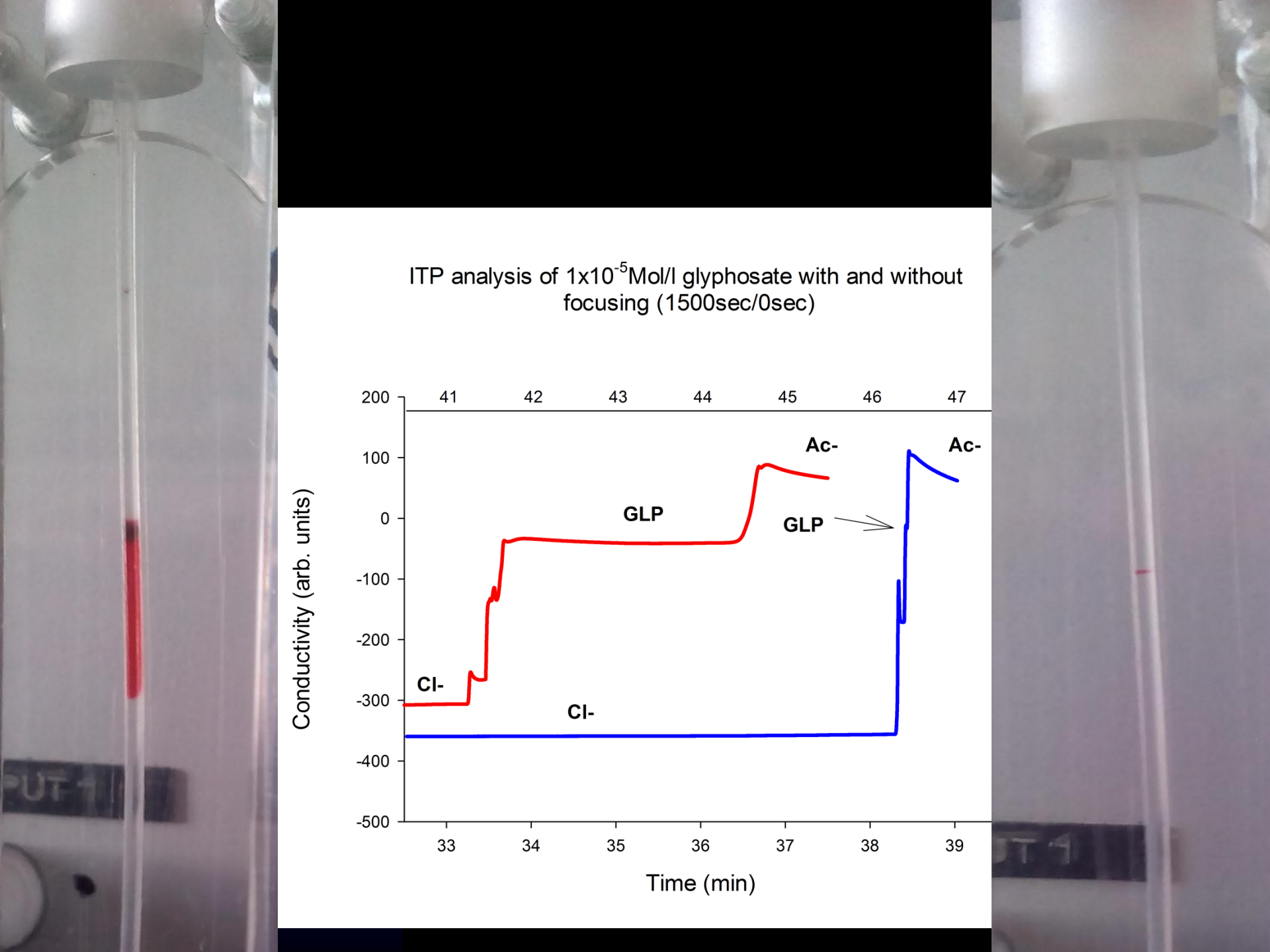
PE: 0,02 M HCl + 0,005M HIS pH=1,8

ME: 0,02 M HCl + 0,04M betaALA pH=3,7

LE: 0,02 M HCl + 0,04M betaALA pH=3,7

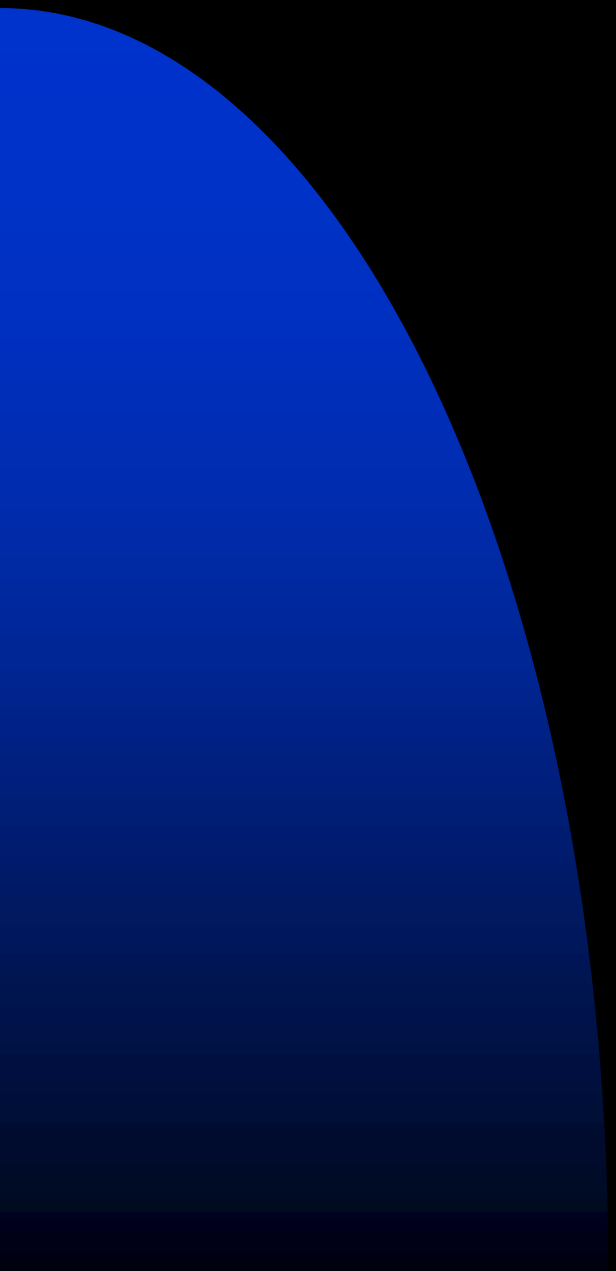
TE: 0,01 M HAc + 0,02 M HIS

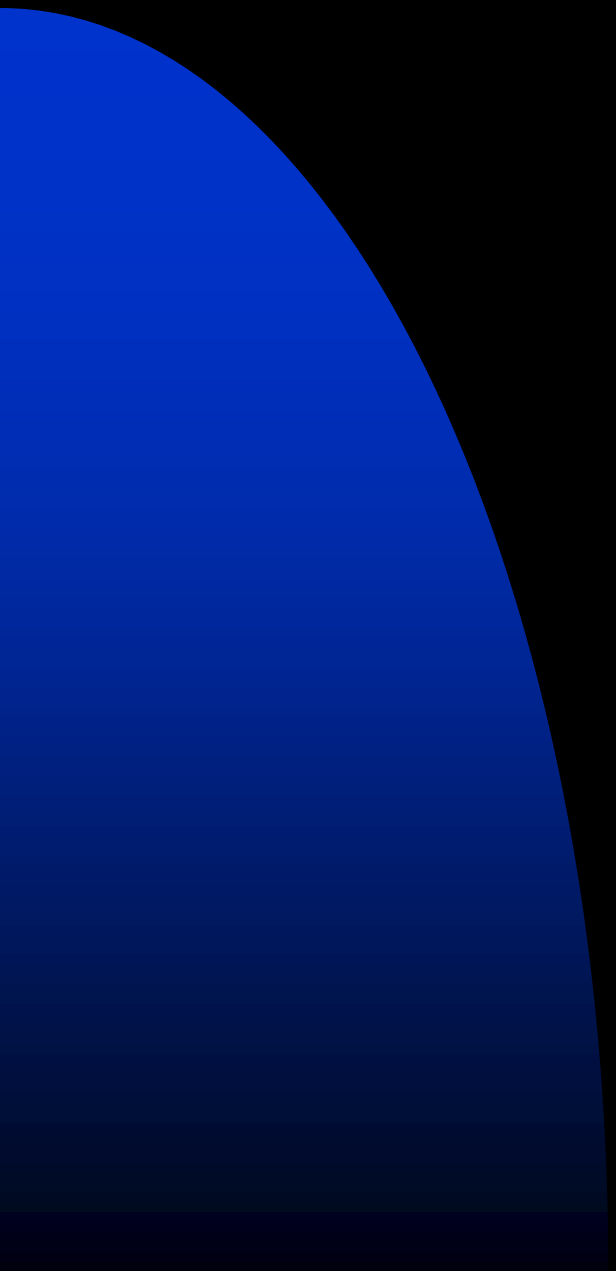
Procedure: focusing, modification, mobilization, analysis

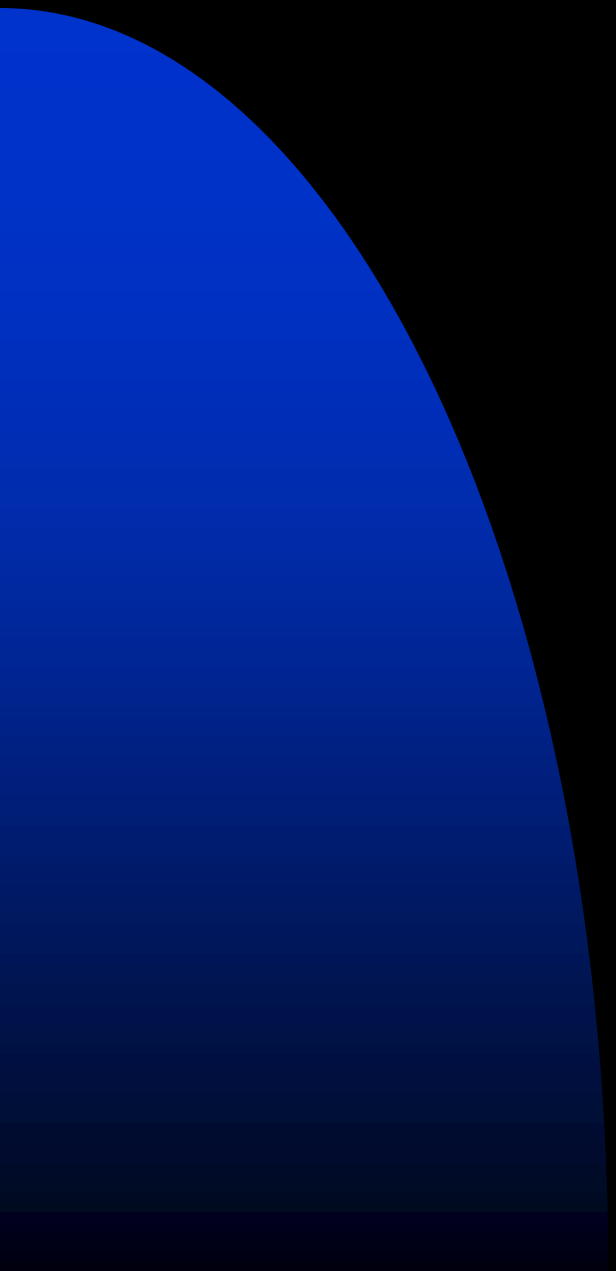

ITP analysis of 1x10-5Mol/l glyphosate with and without focusing (1500sec/0sec)
Conductivity (arb. units)
Time (min)
200
100
0
-100
-200
-300
-400
-500
41
42
43
44
45
46
47
33
34
35
36
37
38
39
Ac-
Ac-
GLP
GLP
Cl-
Cl-

Conclusion for focusing on asymetrical neutralization reaction boundary

Conclusion for focusing on asymetrical neutralization reaction boundary








UT 1

UT 1

Focusing pre-concentration for electrophoresis

- Introduction to the electrophoresis
- Principle of the method
- Analytical properties
- Choice of the electrolyte system
- Procedure of the focusing
- Results
- Conclusion

Electromigration methods origin

1800 - Alessandro Volta - voltaic pile – battery - DC

1800- Nicholson - decomposed water- electrolysis

1856- Weideman – reported migration of ions

1948 – Tisselius – Nobel prize for electrophoresis of proteins

Ionic mobility μ velocity of ion in the uniform electric field (30×10^{-5} $cm^2 V^{-1} s^{-1}$)

Effective mobility $\mu_{ef} = \mu \cdot \alpha$

Electromigration methods

Separation methods based on the different migration velocity of analytes in solution by influence of the electric field

$$v = E \cdot \mu_{ef} \qquad \mu_{ef} = f(pH, cL)$$

Zone electrophoresis	ZE
Isotachophoresis	ITP
Isoelectric focusing	IEF
Moving boundary el.	MBE

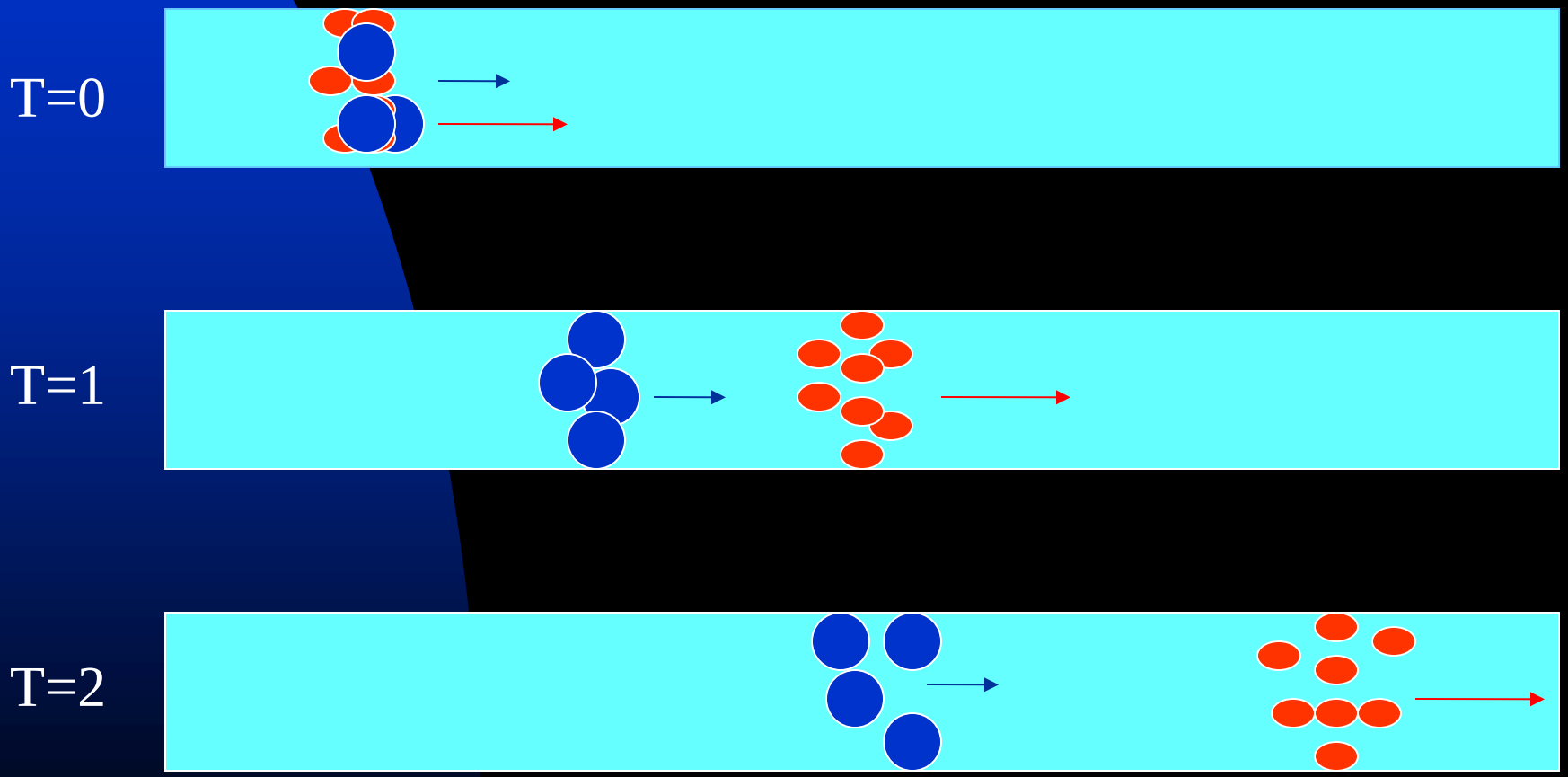
Zone electrophoresis

BGE

A B

$E=konst,\ pH = konst,\ V_A = E \cdot \mu_A \quad V_B = E \cdot \mu_B,$

$\mu_A > \mu_B,\ V_A > V_B$



Zone electrophoresis

E=konst, pH = konst, $V_A = E \cdot \mu_A$ $V_B = E \cdot \mu_B$,

$\mu_A > \mu_B$, $V_A > V_B$

Quantity is measured as a area of gaussiann peak

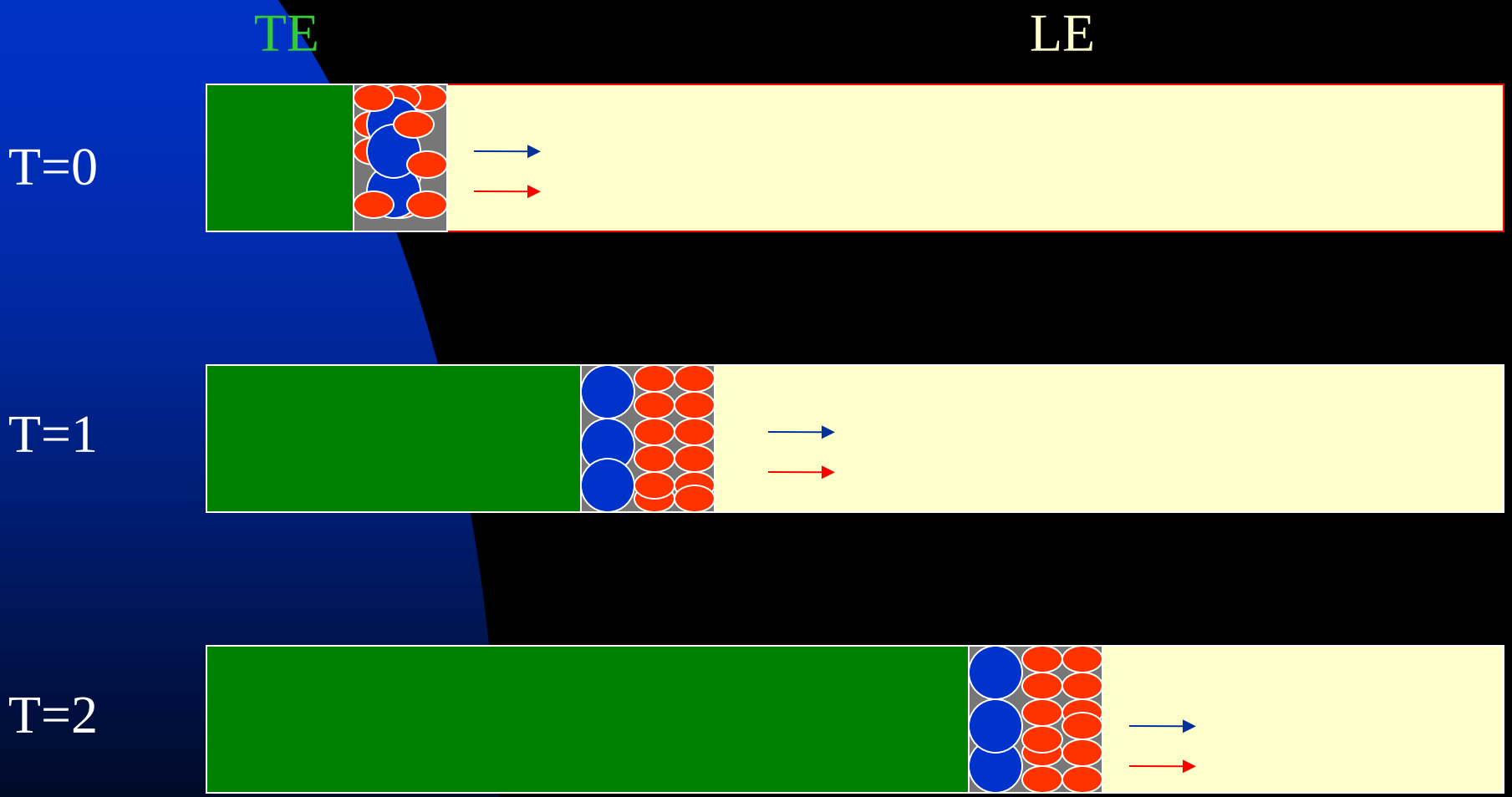
Quality is measured as a migration time from the beginning

of the analysis in the cappilary techniques. (the gell techniques as a RF factor relative migration distance)

http://www.youtube.com/watch?v=lJ-tTN3PlAY

Isotachophoresis

$E \neq konst$, $I = konst$, $pH \neq konst$, $v_A = E_A \cdot \mu_A$ $v_B = E_B \cdot \mu_B$, $\mu_L > \mu_A > \mu_B > \mu_T$, $E_L < E_A < E_B < E_T$, $v_A = v_B$



Isotachophoresis

$E \neq konst$, $I = konst$, $pH \neq konst$, $v_A = E_A \cdot \mu_A$ $v_B = E_B \cdot \mu_B$, $\mu_L > \mu_A > \mu_B > \mu_T$, $E_L < E_A < E_B < E_T$, $v_A = v_B$

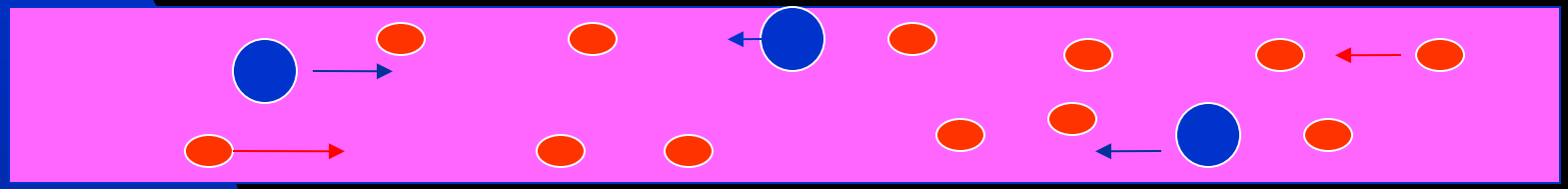
Quantity is measured as a length of the rectangular zone

Quality is measured as E or conductivity of the zone

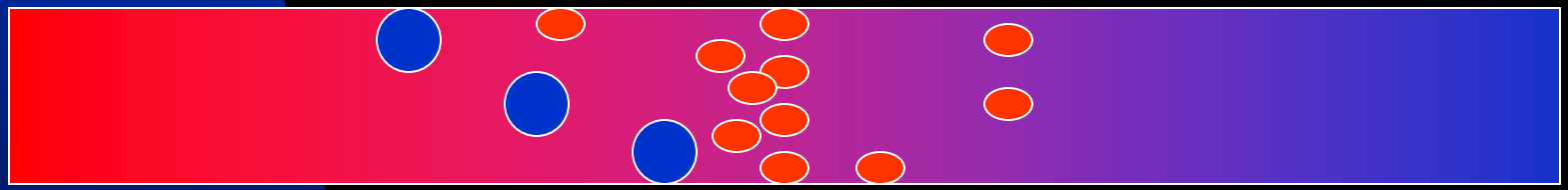
Isoelectric focusing

$E \neq konst$, pH = fce (X), $V_A = E_A \cdot \mu_A$, $V_B = E_B \cdot \mu_B$, $\mu_A > \mu_B$, $V_A = V_B = 0$, $pH_A = pI_A$, carrier ampholytes.

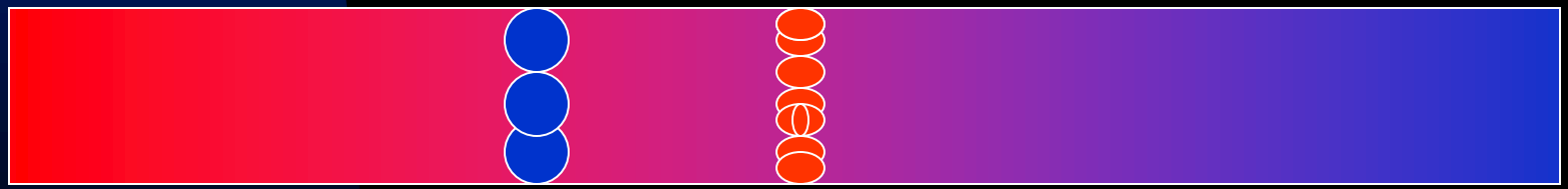
T=0



T=1



T=2



Isoelectric focusing

$E \neq konst$, $pH = fce(X)$, $V_A = E_A \cdot \mu_A$, $V_B = E_B \cdot \mu_B$, $\mu_A > \mu_B$, $V_A = V_B = 0$, $pH_A = pI_A$, carrier ampholytes.

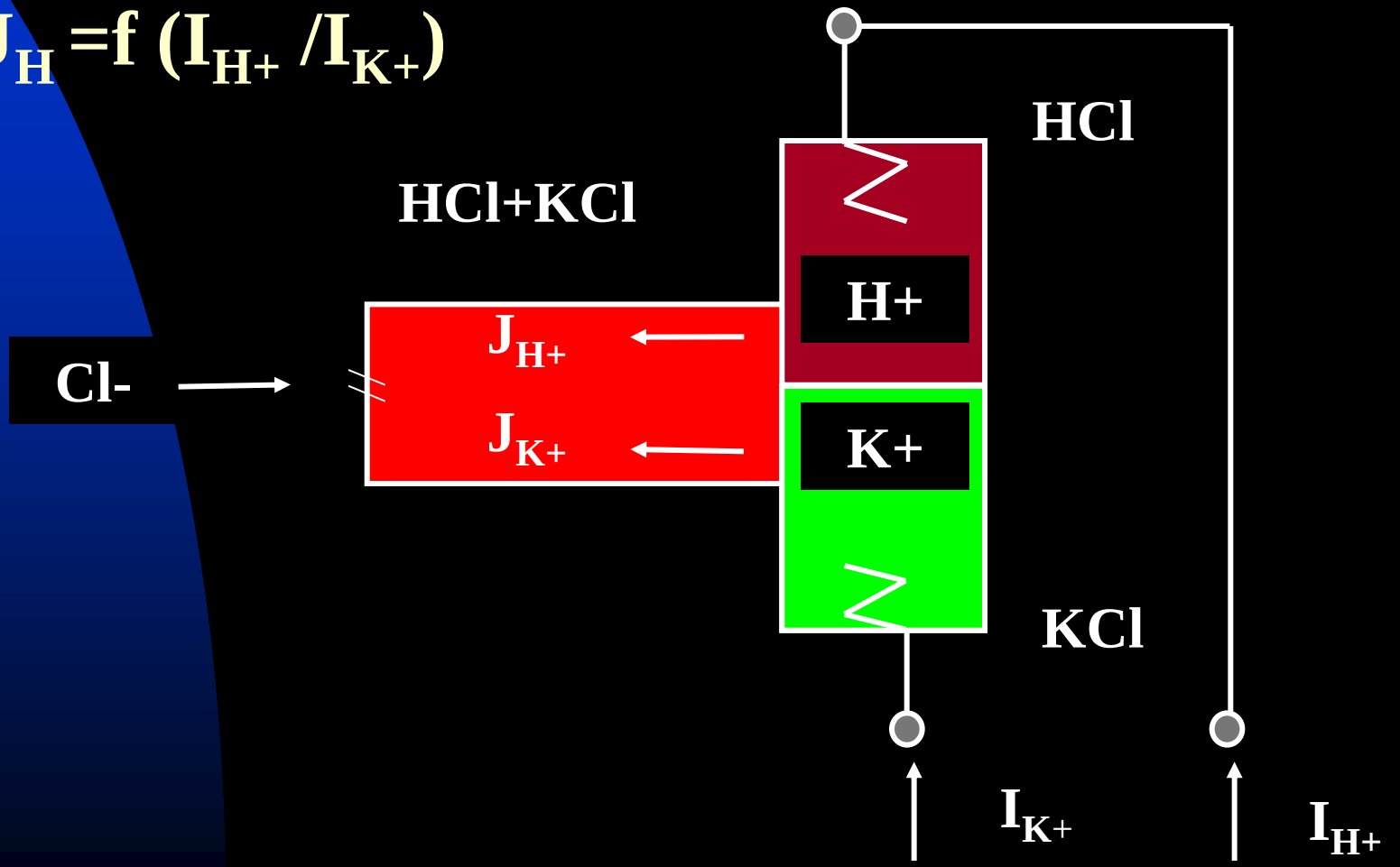
Quantity is measured as a area of gaussiann peak

Quality is measured as a position in the column gel

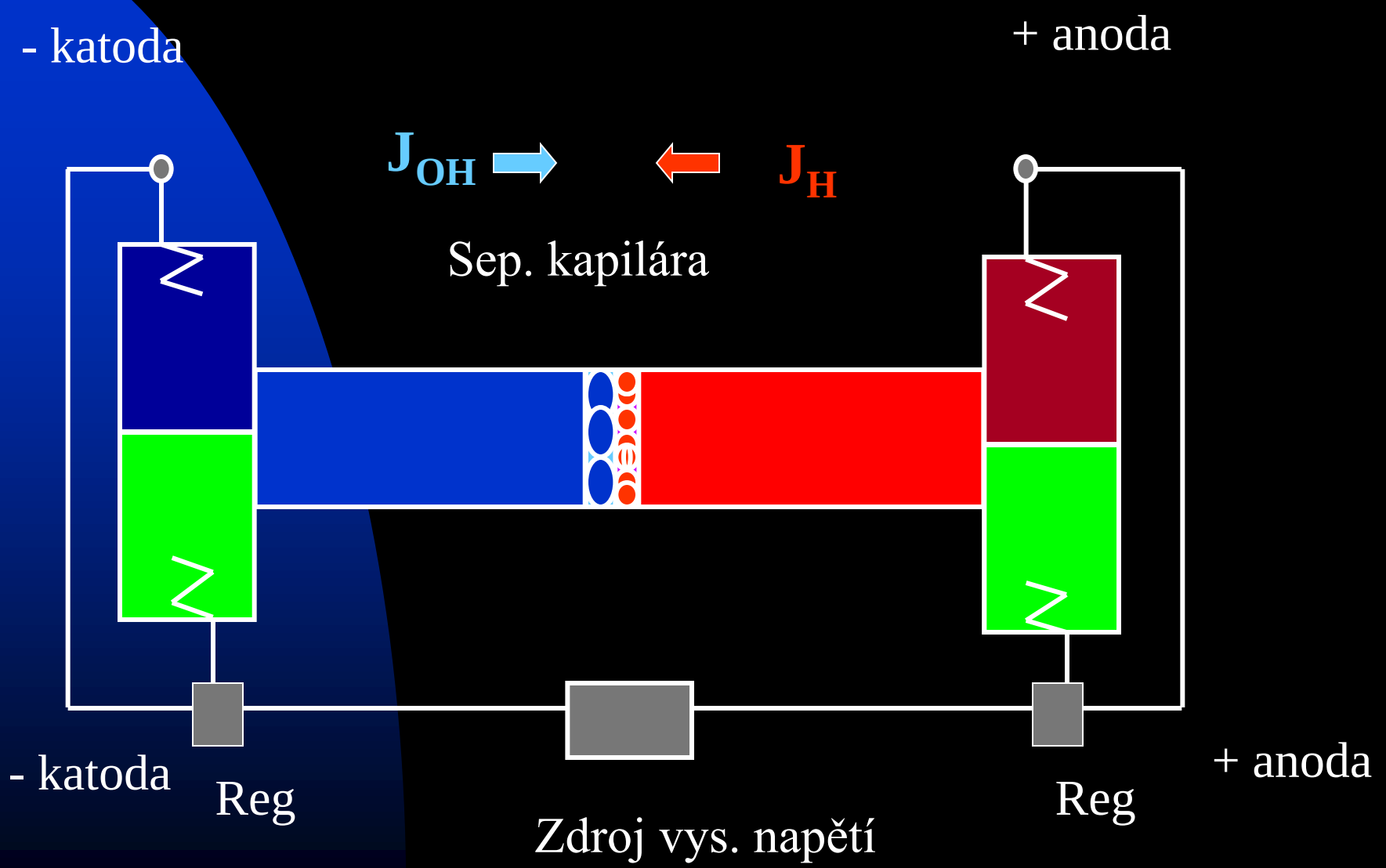
Izoelektrická fokusace bez nosných amfolytů CAF IEF

Aby rozhraní i zony stály, musí být $J_H = J_{OH}$

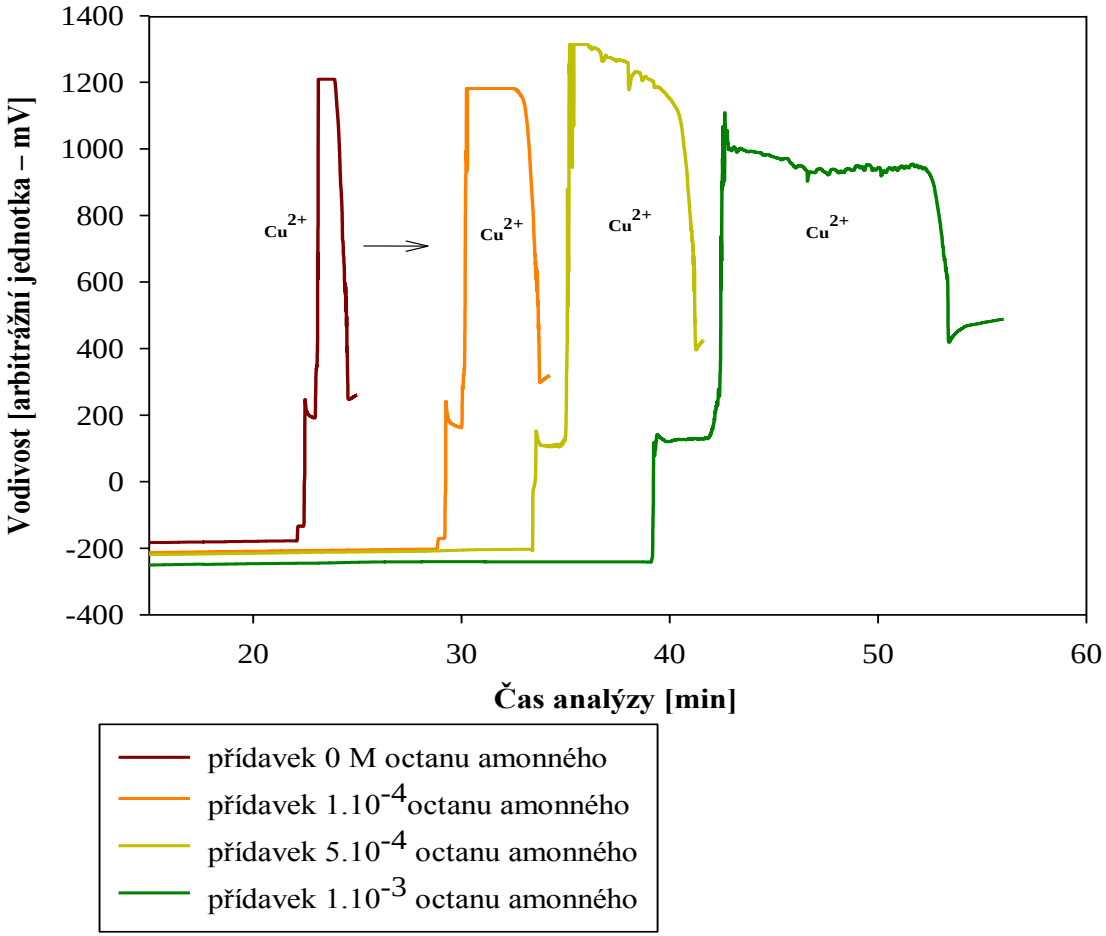
$J_H = f(I_{H+} / I_{K+})$



Izoelektrická fokusace bez nosných amfolytů CAF IEF



Závislost akumulace délky zóny mědi na koncetraci octanu amonného v DE (7.10^{-5} M Cu^{2+} + 1.10^{-2} M CH_3COOH + X M CH_3COONH_4)




UNIT
UV DETECTOR K-2501