Diagrama $pe=f(pH)_{pI}$ del I(V)/I(0)/I(-I)

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DATOS REDOX DEL YODO

Table 9.1 (Continued)

Element Redox couple	Oxidation–reduction system	Values of potentials	(log K)	$[I]$
I				
I(VII)/I(V)	$H_5IO_6 + H^+ + 2e = IO_3^- + 3\,H_2O$	+1.6	(54)	[0]
I(V)/I	$IO_3^- + 6\,H^+ + 5e = \frac{1}{2}I_{2(s)} + 3\,H_2O$	+1.19	(101)	[0]
I(V)/I(−I)	$IO_3^- + 6e = I^- + 6\,OH^-$	+0.26	(26)	[0]
I(III)/I	$ICl_{3(s)} + 3e = \frac{1}{2}I_{2(s)} + 3\,Cl^-$	+1.28	(64.9)	[0]
I(I)/I	$HIO + H^+ + e = \frac{1}{2}I_{2(s)} + H_2O$	+1.45	(24.5)	[0]
	$ICN + H^+ + e = \frac{1}{2}I_{2(s)} + HCN$	+0.63	(10.7)	[0]
	$ICl + e = \frac{1}{2}I_{2(s)} + Cl^-$	+1.19	(20.1)	[0]
	$IBr + e = \frac{1}{2}I_{2(s)} + Br^-$	+1.02	(17.2)	[0]
I(I)/I(−I)	$IO^- + 2e = I^- + 2\,OH^-$	+0.49	(16.6)	[0]
I/I(−I)	$\frac{1}{2}I_{2(s)} + e = I^-$	+0.535	(9.04)	[0]
	$\frac{1}{2}I_{2(aq)} + e = I^-$	+0.621	(10.5)	[0]
		+0.6276	(10.61)	[0.5M H_2SO_4]
	$I_3^- + 2e = 3\,I^-$	+0.536	(18.1)	[0]
		+0.545	(18.4)	[0.5M H_2SO_4]

"Handbook of chemical equilibria in Analytical Chemistry"
S. Kotrly and L. Sucha
Ellis Horword. John Wiley & Sons. 1985

Se necesitan las semi-reacciones de
yodo(V) $\longrightarrow$ yodo (0) $\longrightarrow$ yodo (-I)
(triyoduro)

$$(IO_3^- + 6H^+ + 5e^- = (1/2)I_2\downarrow + 3H_2O)\times 2 \qquad K=10^{202}$$

$$((1/2)I_2\downarrow + e^- = I^-)\times 2 \qquad K=10^{18.08}$$

$$3I^- = I_3^- + 2e^- \qquad K=10^{-18.4}$$

$$2IO_3^- + 12H^+ + 10e^- + I^- = I_3^- + 6H_2O \qquad K=10^{202}$$

para la semi-reacción de
yodo(V) ⟶ yodo (0)

$$2IO_3^- + 12H^+ + 10e^- + I^- = I_3^- + 6H_2O$$

Condiciones operatorias: (I_3^-) = Co y F_{KI}= 10Co.

$$K = \frac{(I_3^-)}{(IO_3^-)^2(H^+)^{12}(e^-)^{10}(10Co)}$$

¿cómo queda la funciòn pe =f(pH)?

R

$$(e^-)^{10} = \frac{(I_3^-)}{K_f(IO_3^-)^2(H^+)^{12}\,(10Co)}$$

Adimensionando:

$$10pe = pKd + \log(10Co) - 12pH + \log \frac{(IO_3^-)^2}{(I_3^-)}$$

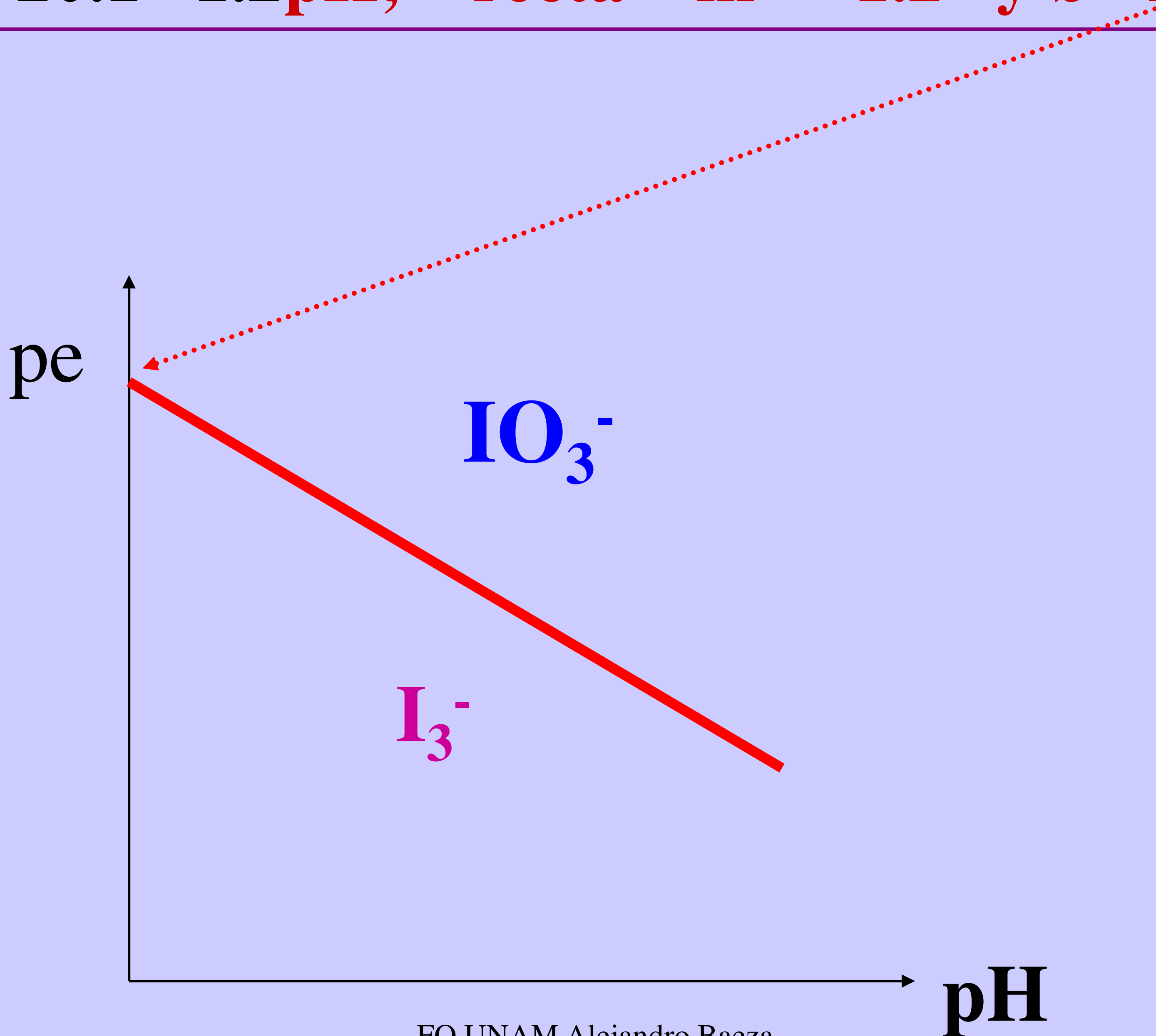
Para Co = 0.1 mol/L y pKd = 202

$$10pe = pKd + \log(10Co) - 12pH + \log \frac{Co^2}{Co}$$

$$\mathbf{pe} = 20.2 - 1.2pH + (1/10)\log(0.1) = 20.1 - 1.2\mathbf{pH}$$

pe = 20.1 –1.2pH; recta m = -1.2 y b= 20.1

$pe = 20.1 - 1.2pH$; recta $m = -1.2$ y $b = 20.1$



para la semi-reacción de yodo(0) $\longrightarrow$ yodo (-I)

$$3I^- \rightleftharpoons I_3^- + 2e^-$$

$$K_d = \frac{(I_3^-)(e^-)^2}{(I^-)^3} = 10^{-18.1}$$

Adimensionando:

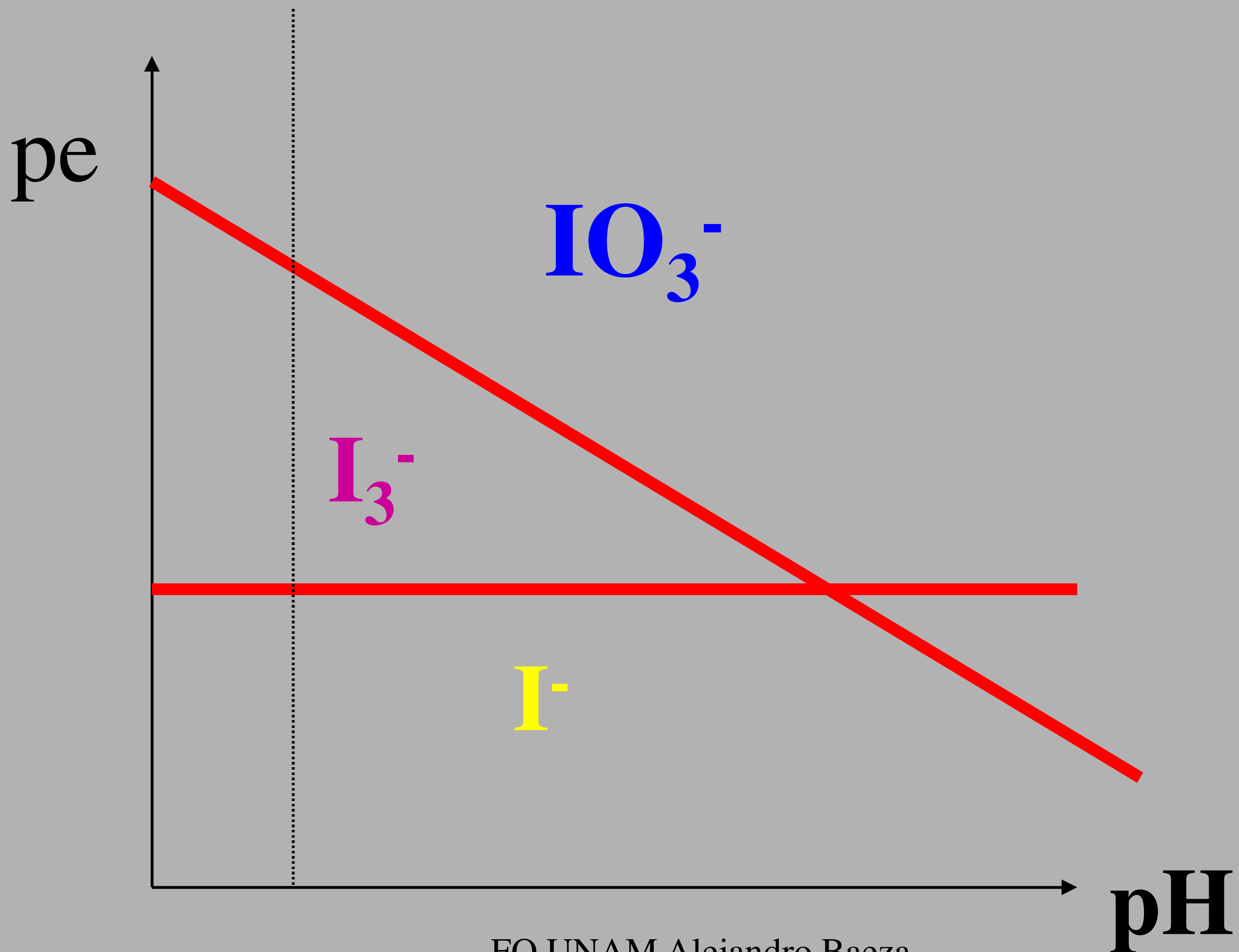
$$2pe = 18.1 + \log \frac{(I_3^-)}{(I^-)^3} = 18.1 + \log \frac{Co}{(10Co)^3}$$

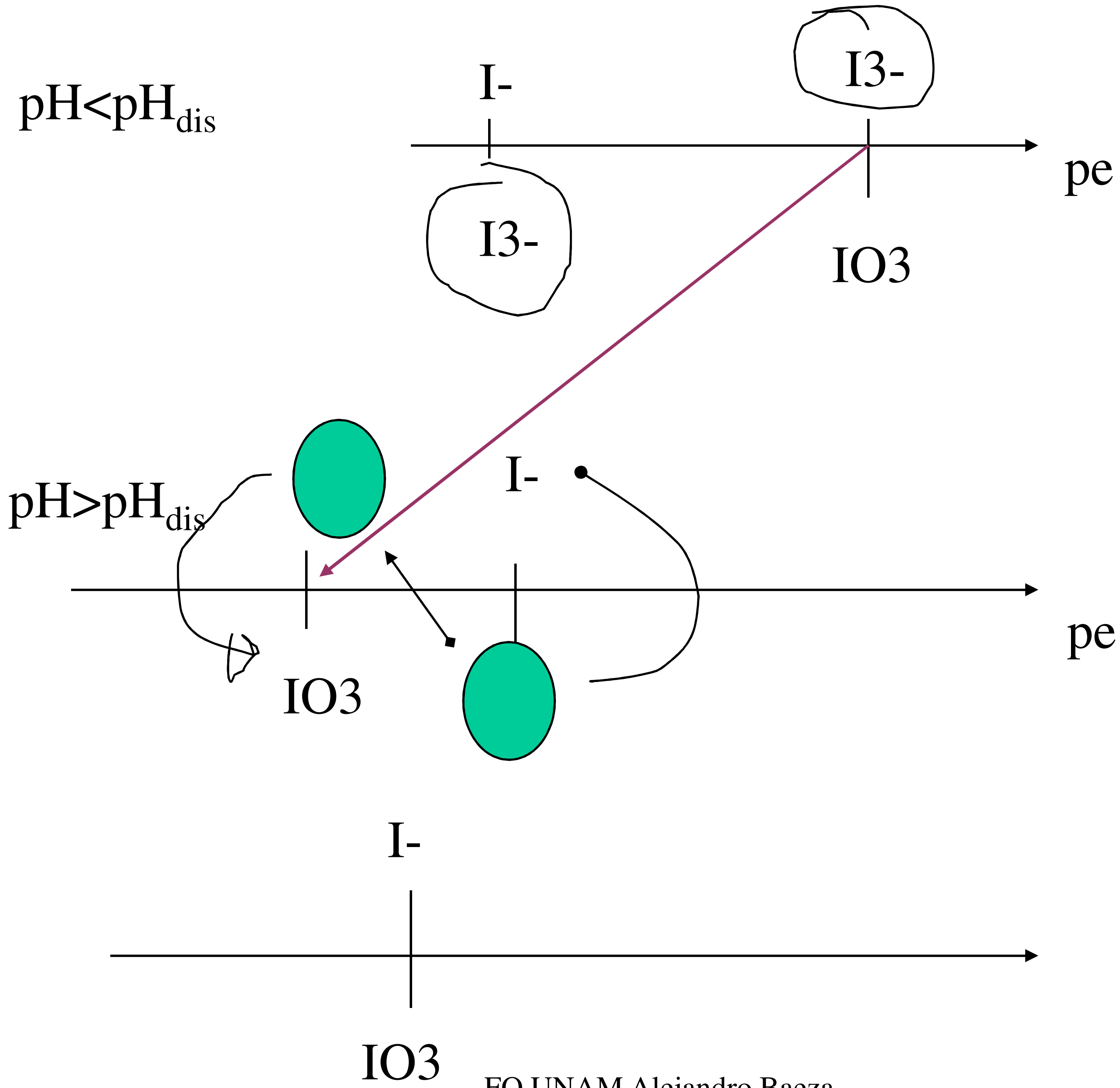
pe = 9.05 - log Co-0.5(3) = 8.6 ; ***linea recta b= 8.6 y m= 0***

Para Co = 0.1 mol/L

pe = 20.1 –1.2pH

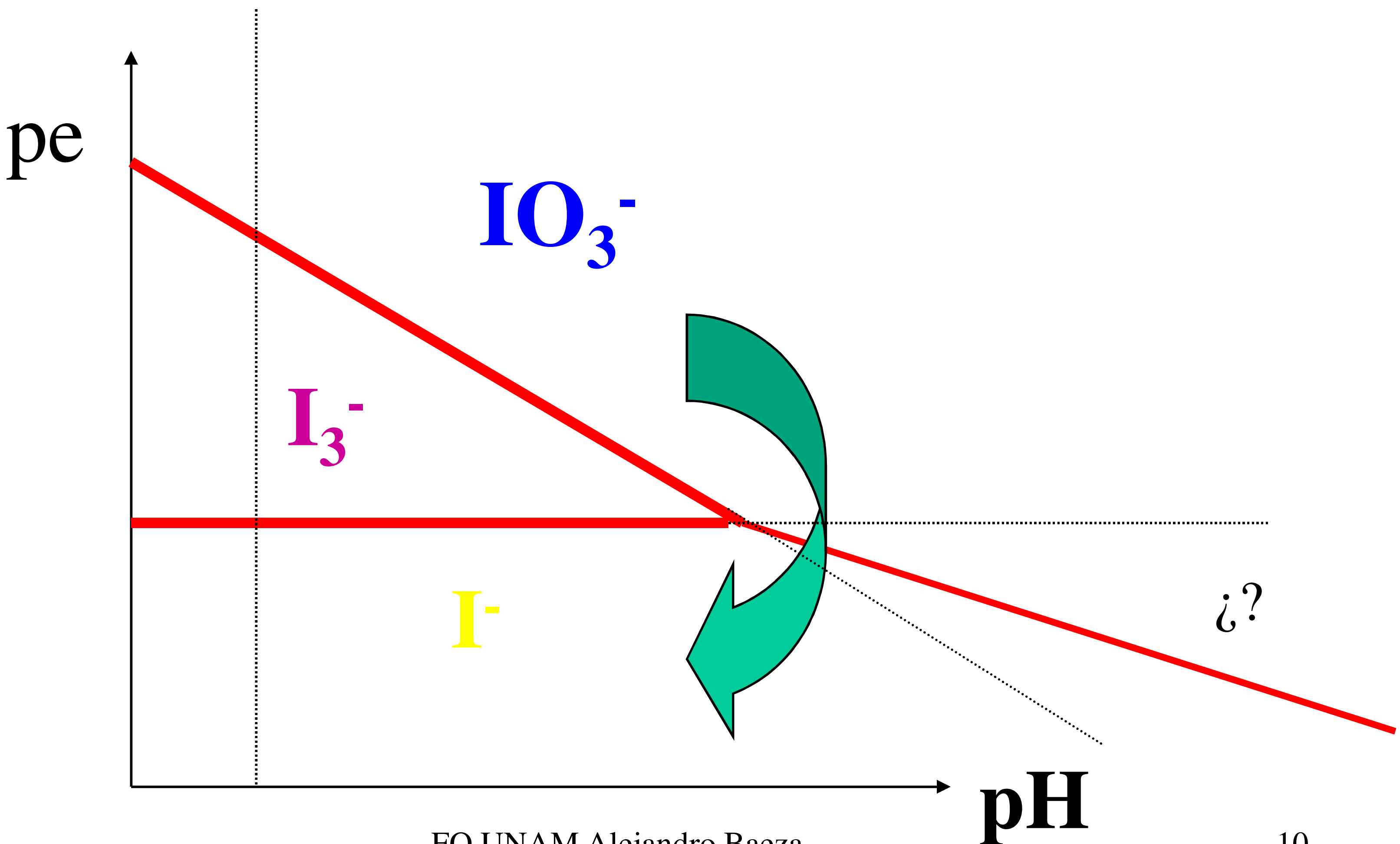
pe = 8.6




pH<pH$_{dis}$
I-
I3-
pe
I3-
IO3
pH>pH$_{dis}$
I-
pe
IO3
I-
IO3

pe = 20.1 –1.2pH

pe = 8.6



$IO_3^- + 6H^+ + 5e^- = (1/2)I_2 + 3H_2O$ $\qquad 10^{101}$

$(1/2)I_2 + e^- = I^-$ $\qquad 10^{9.04}$

$IO_3^- + 6H^+ + 6e^- = I^- + 3H_2O$ $\qquad K = 10^{110}$

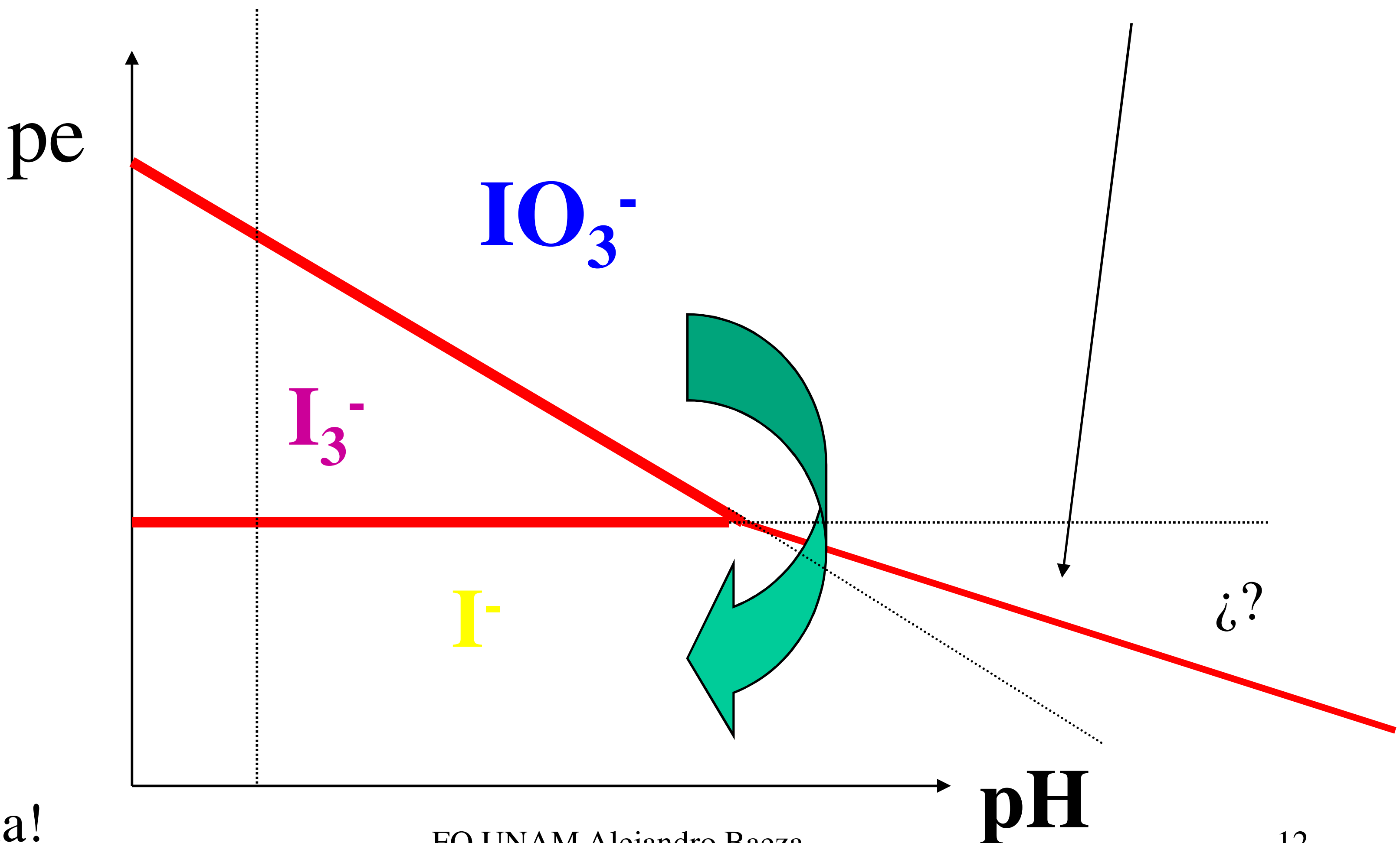
$$6pe = 110 - 6pH + \log \frac{Co}{10Co}$$

$pe = 18.4 - 0.16 - pH = 18.2 - pH$

$pe = 20.1 - 1.2pH$

$pe = 8.6$

$pe = 18.2 - pH$



Voila!