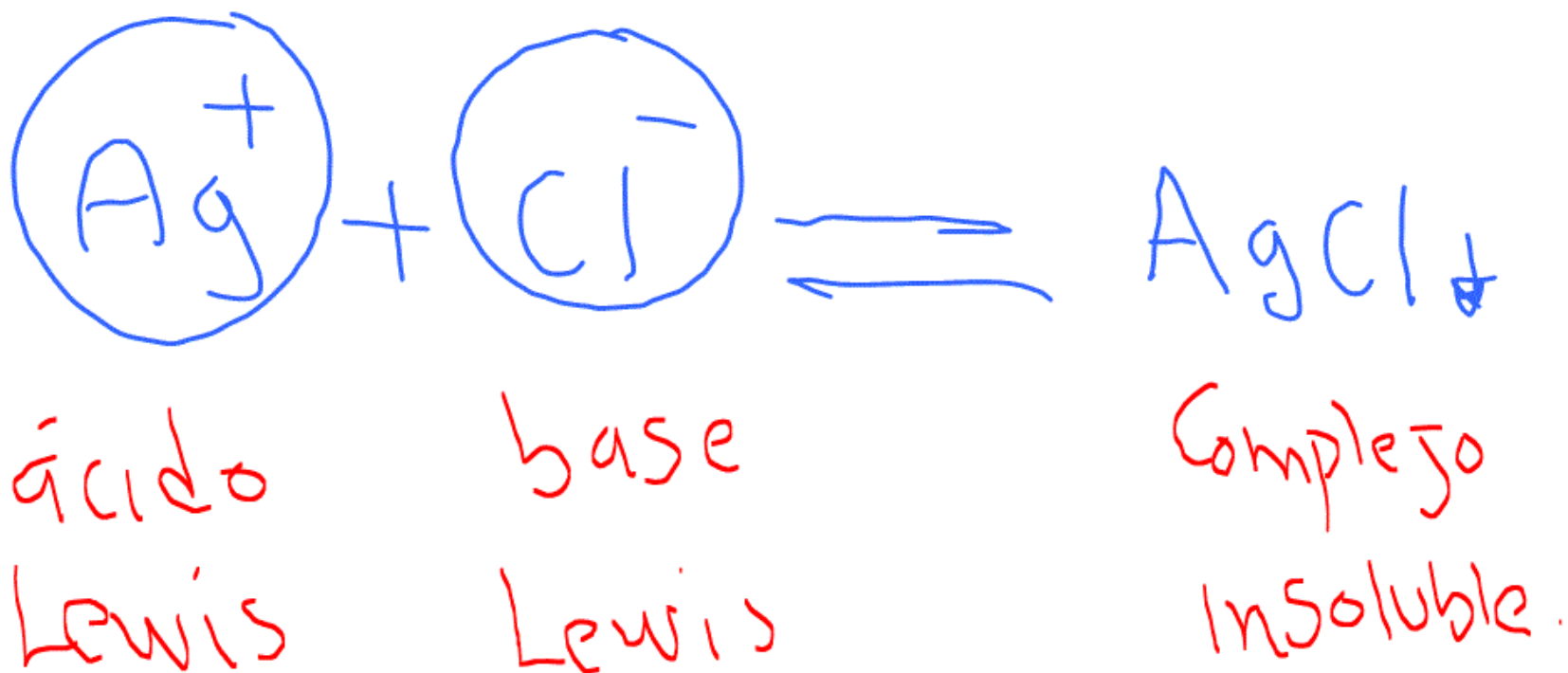
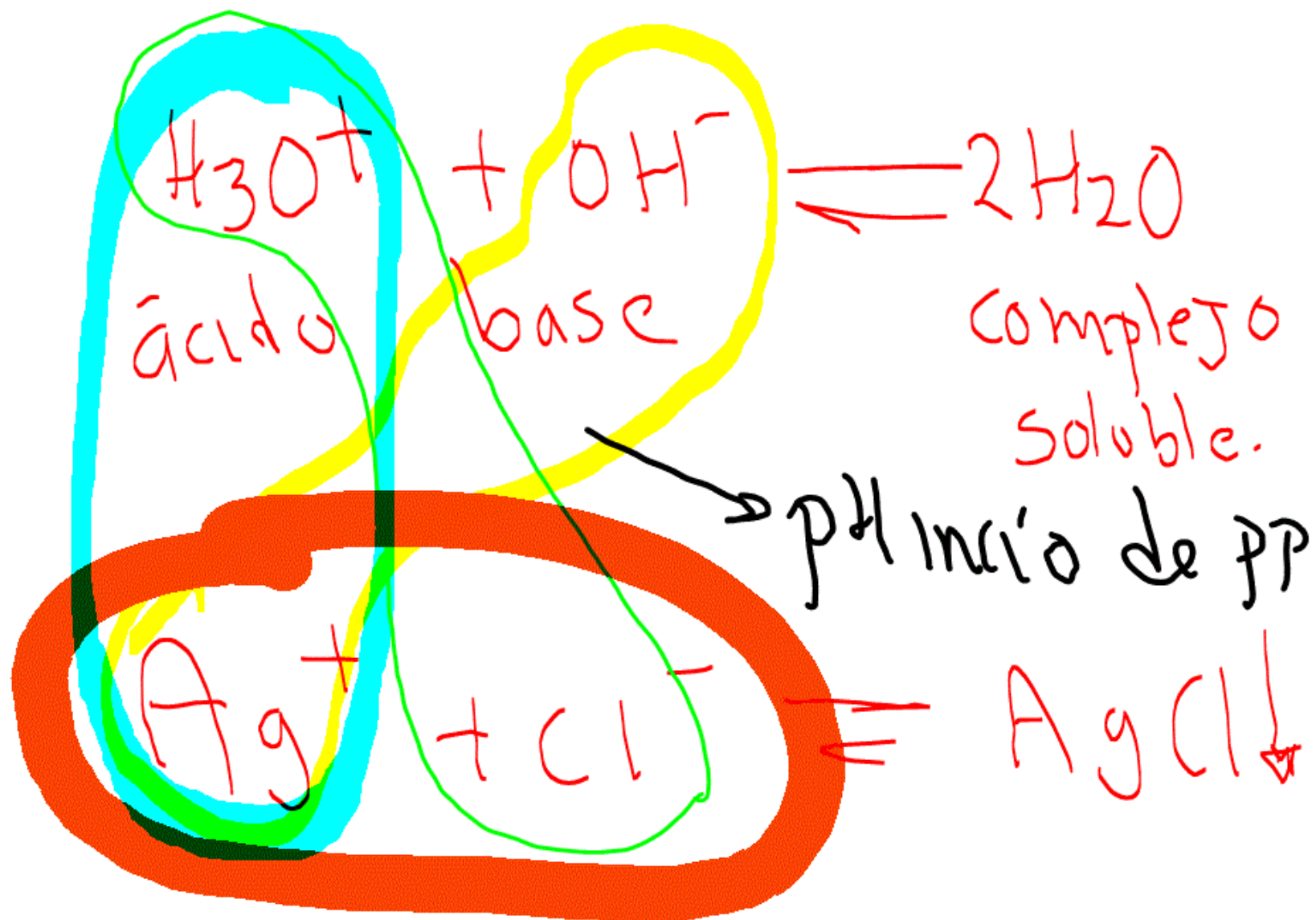


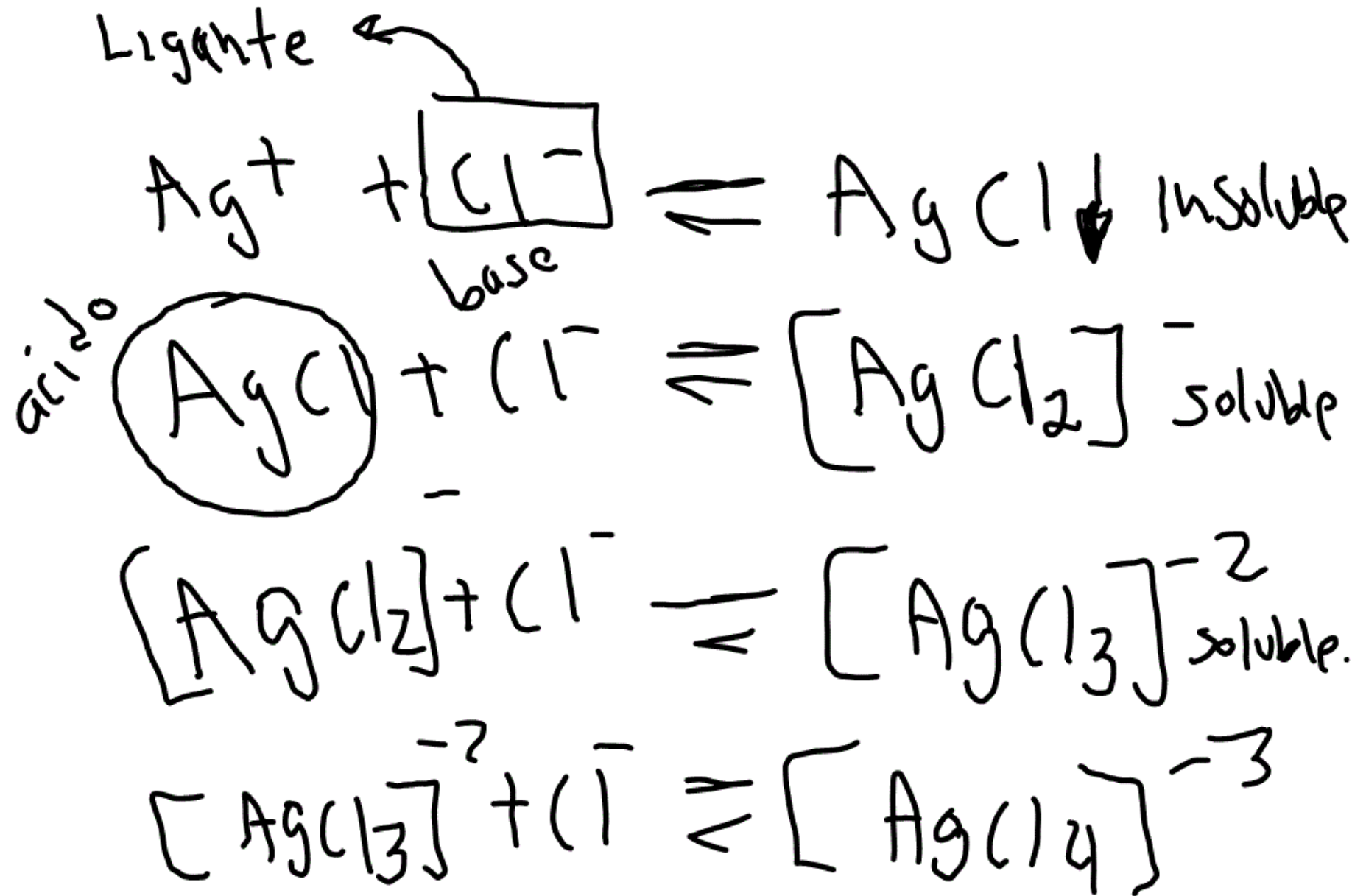
Clase 9 29 octubre 2021

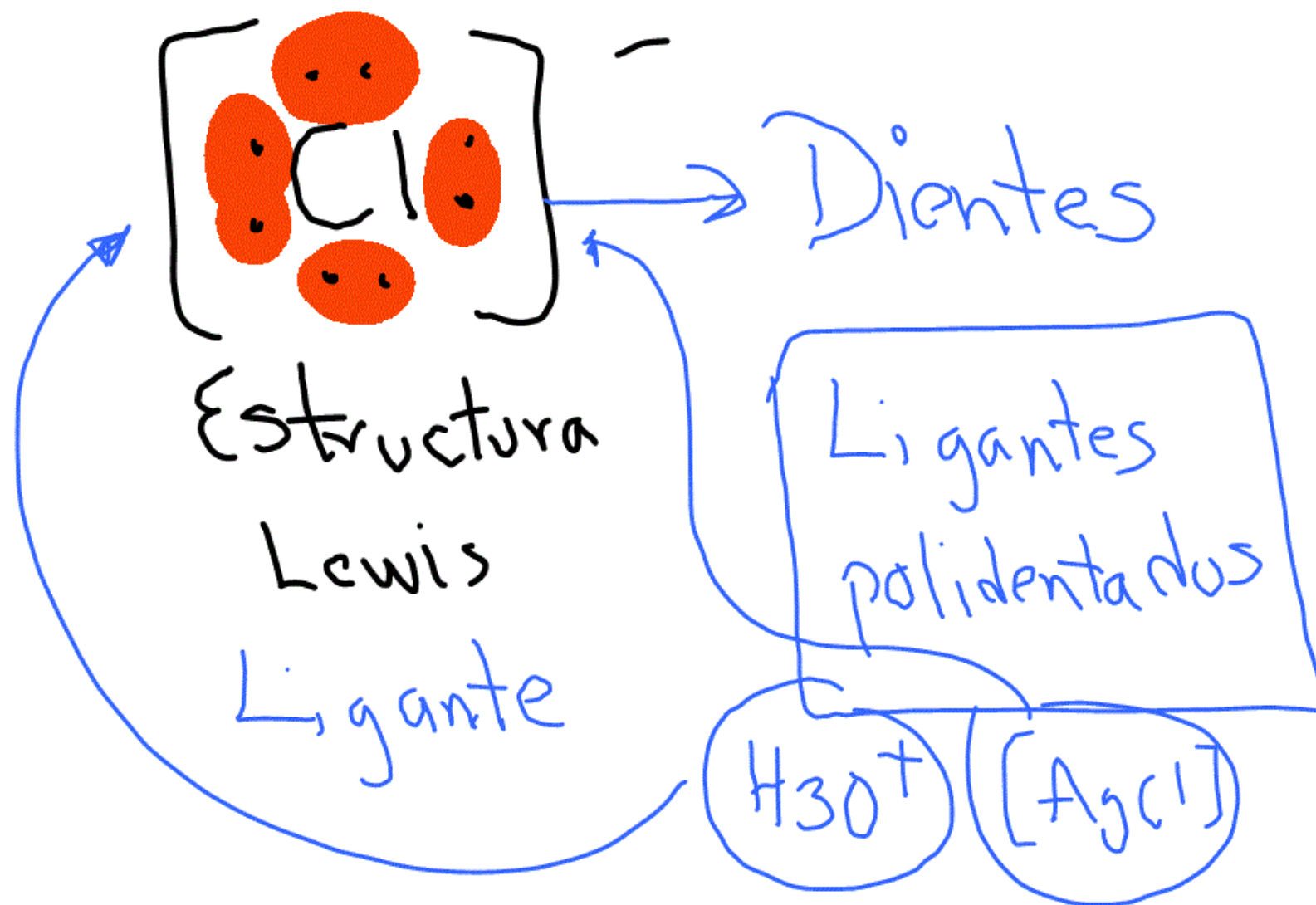
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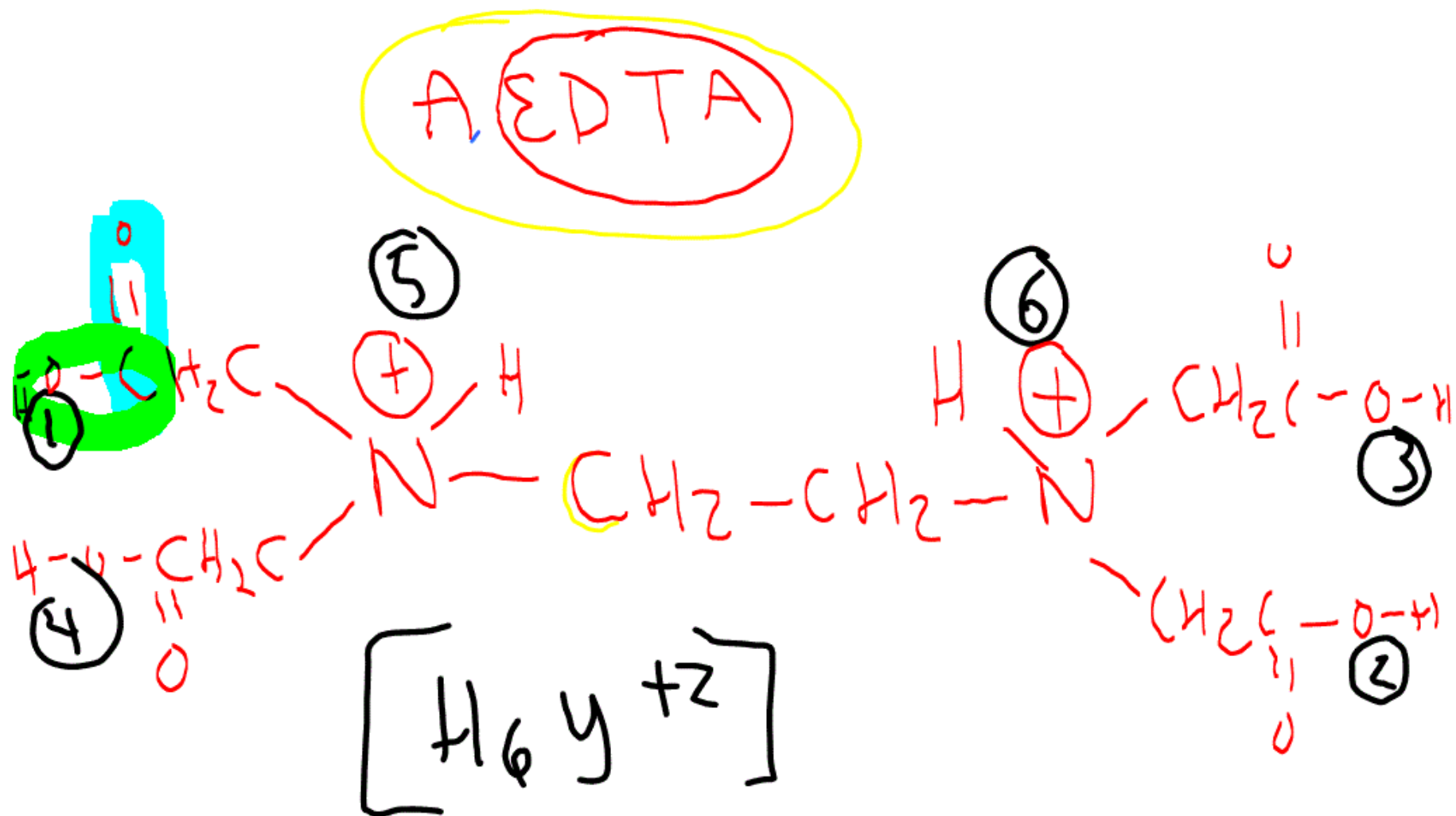
29/10/2021

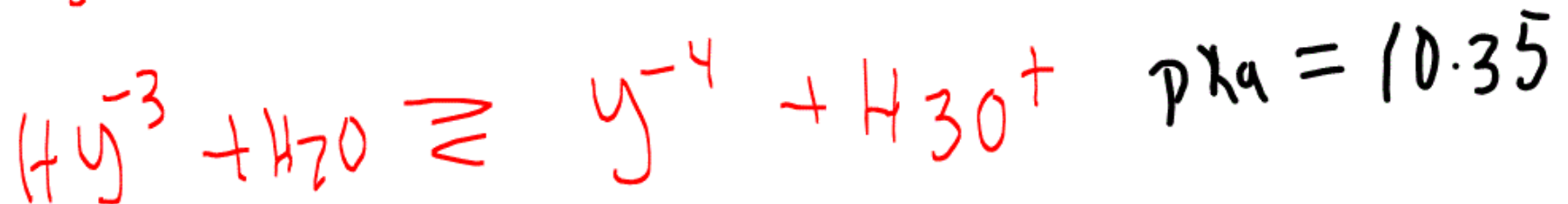
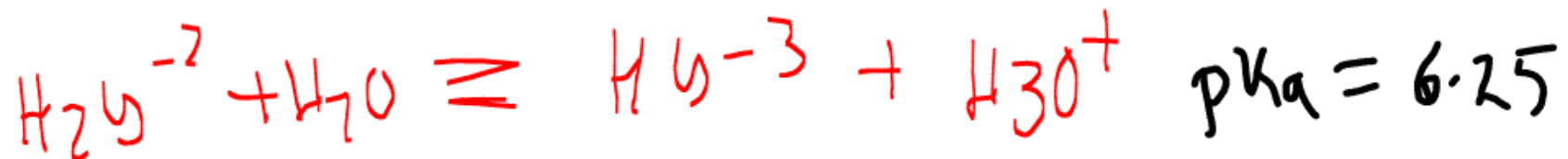
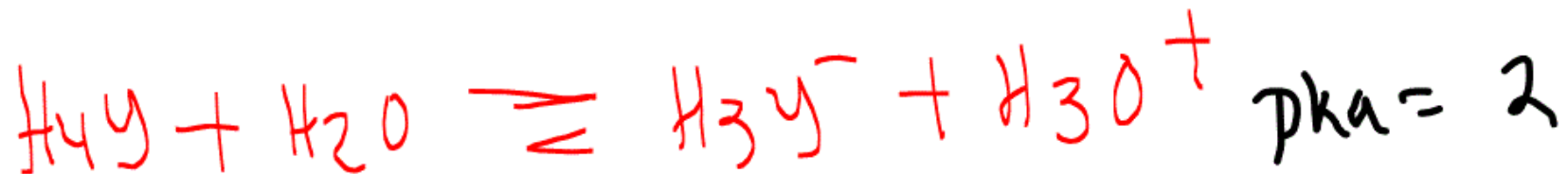
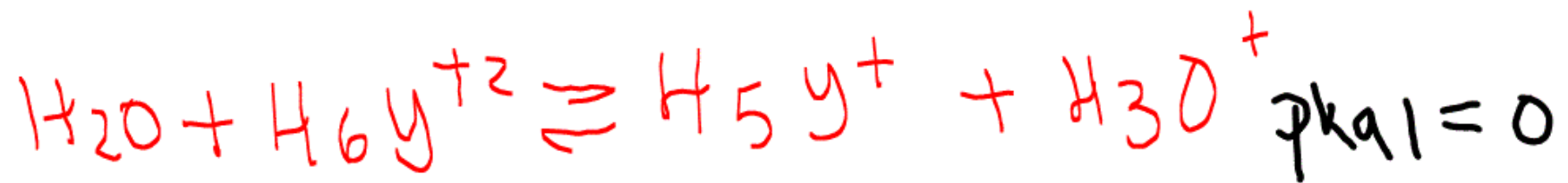






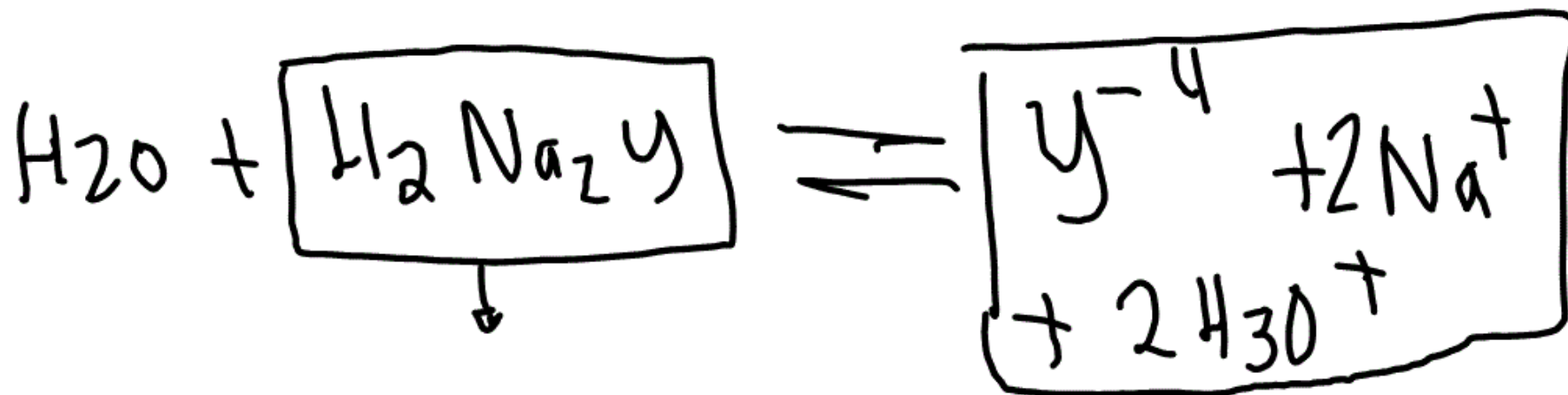


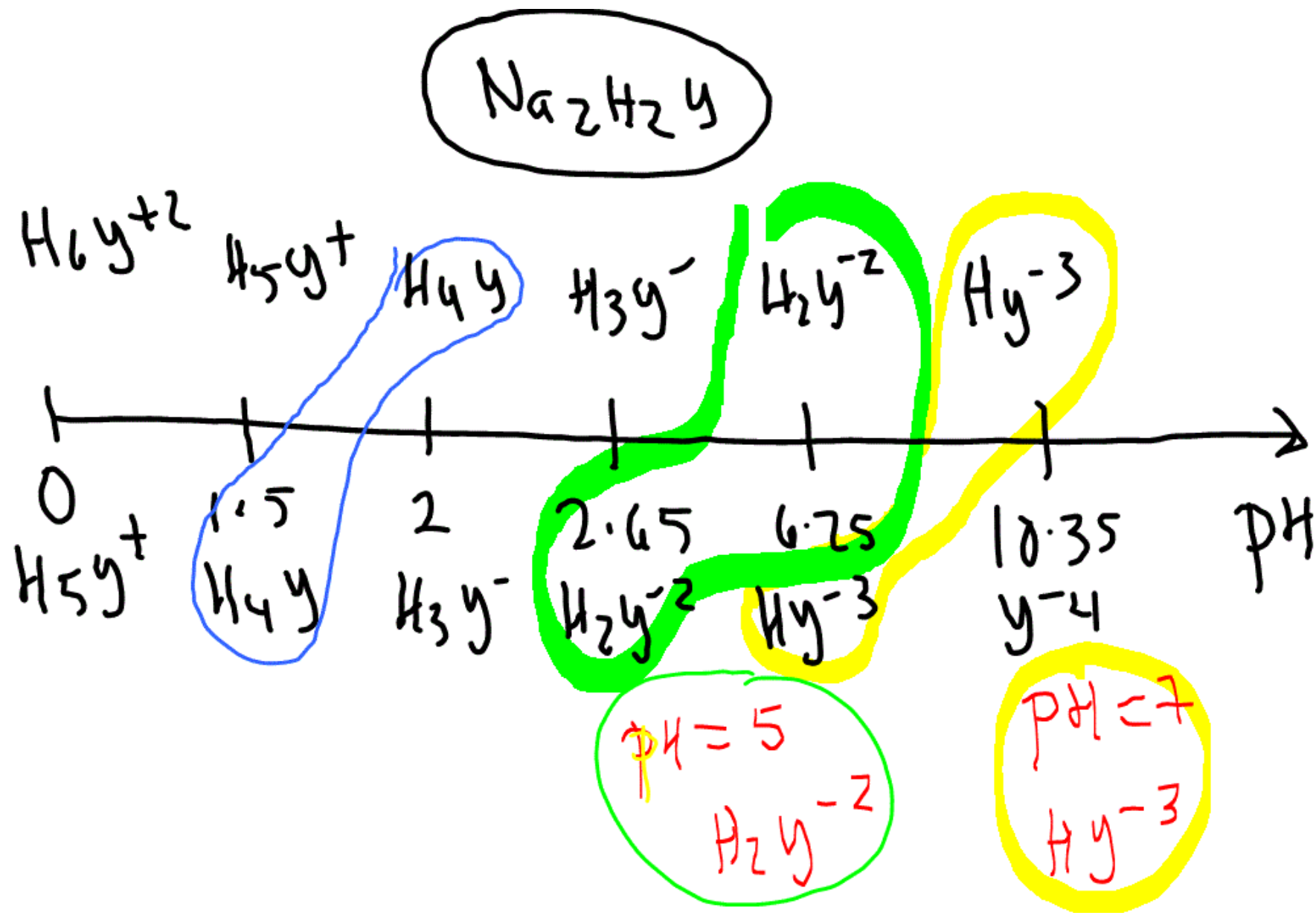


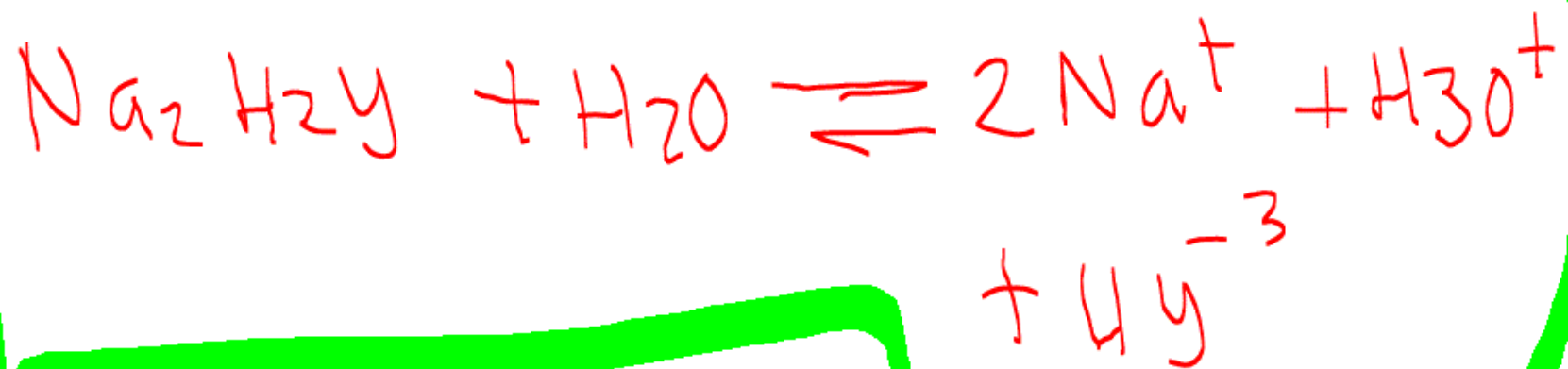


AEDTA
Sol disódica

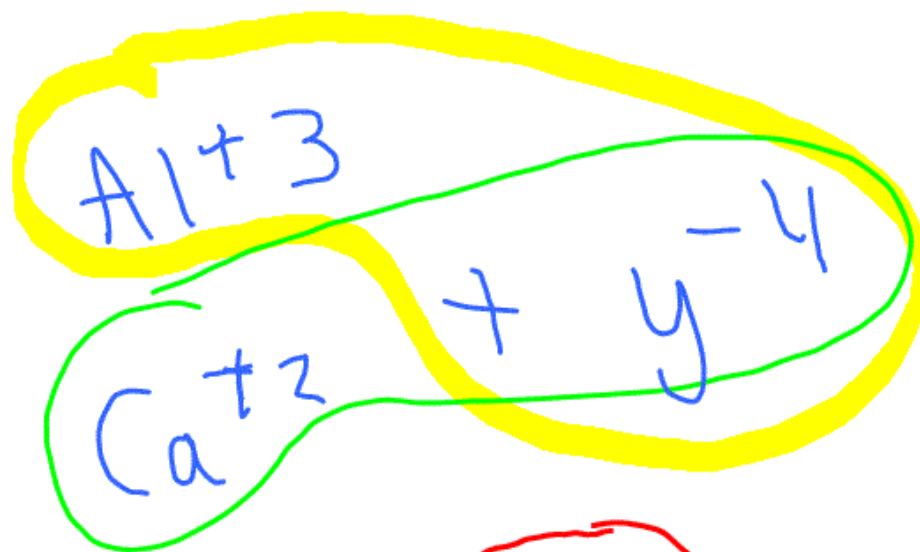
AEDTA clorhidrato



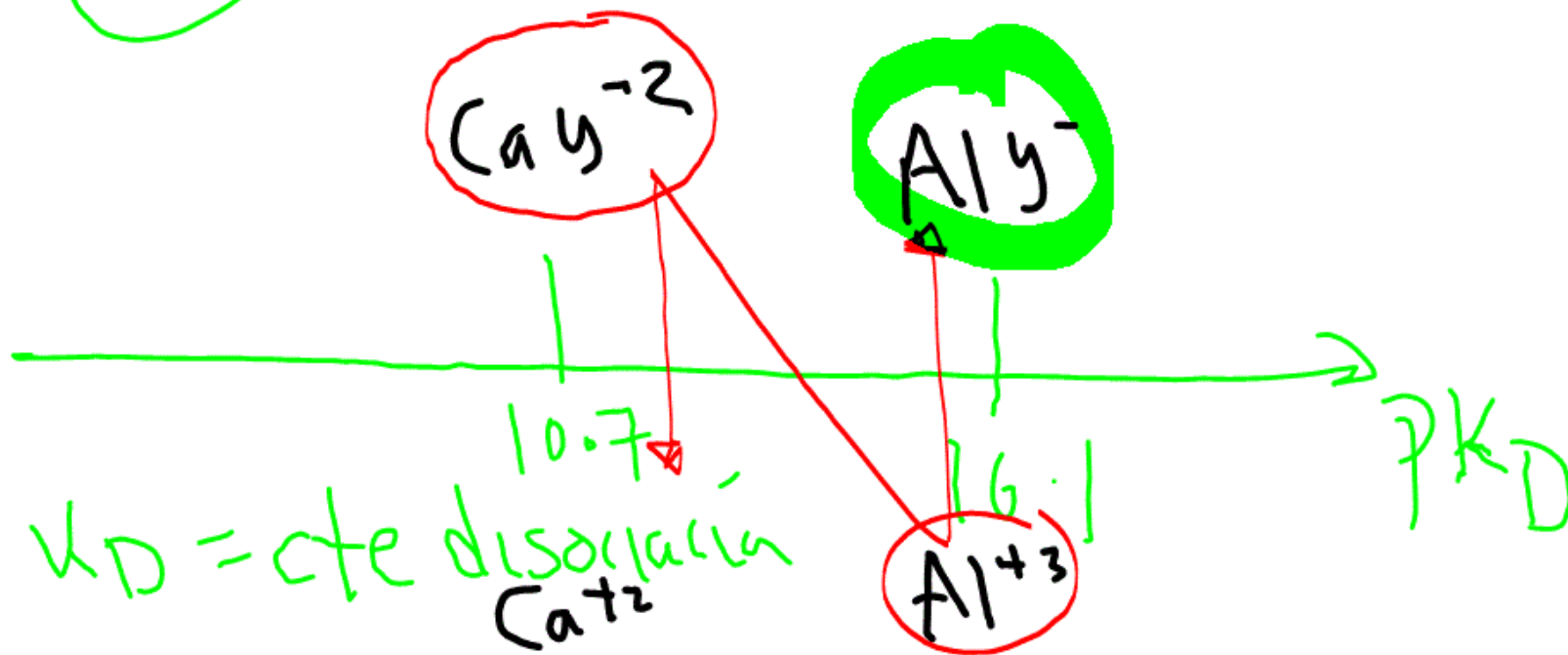




$$\text{pH} = 5 - 6$$



$$pK_D = -\log K_D$$





$$K_D = 10^{-16.1}$$

$$K_F = \frac{1}{K_D} = \frac{1}{10^{-16.1}} = 10^{16.1}$$



inicio de pp.



$$K_F = 10^{1.3}$$



$$K_S = 10^{-5.3}$$

$$K_F = \frac{1}{K_S} = \frac{1}{10^{-5.3}} = 10^{5.3}$$

Calcula el pH de inicio de pp
 de $\text{Ca}(\text{OH})_2$ cuando $\text{Ca}^{+2} = 10^{-2} \text{M}$
 $K_s = 10^{-5.3}$



$$K_F = \frac{[\text{Ca}(\text{OH})_2]}{[\text{Ca}^{+2}] [\text{OH}^-]^2} = \frac{1}{K_s}$$

pH de inicio de precipitación

Ca(OH)_2	\rightleftharpoons	Ca^{+2}	2OH^-	pH	12.35
$K_s =$	$[\text{Ca}^{+2}]$	$[\text{OH}^-]^2$	$=$	$5.0119\text{E-}06$	
$[\text{OH}^-]^2$	$=$	K_s	$=$	$5.0119\text{E-}06$	$=$
		$[\text{Ca}^{+2}]$		0.01	0.00050119
$[\text{OH}^-]$	$=$	0.022387211			

$$K_s = [\text{Ca}^{+2}] [\text{OH}^-]^2$$

$$s = \sqrt[3]{\frac{K_s}{4}}$$

$$K_s = [Ca^{+2}] [OH^{-}]^2$$

$$[OH^{-}]^2 = \frac{K_s}{[Ca^{+2}]}$$

$$[OH^{-}]^2 = \frac{10^{-5.3}}{10^{-2}}$$

$$[OH^{-}] = \sqrt{10^{-3.3}} = 10^{-3.3/2} = 10^{-1.65}$$

$$pH = 14 + \log CB \quad (B = [OH^-])$$

$$pH = 14 + \log 10^{-1.65}$$

$$pH = 14 - 1.65 = 12.35$$

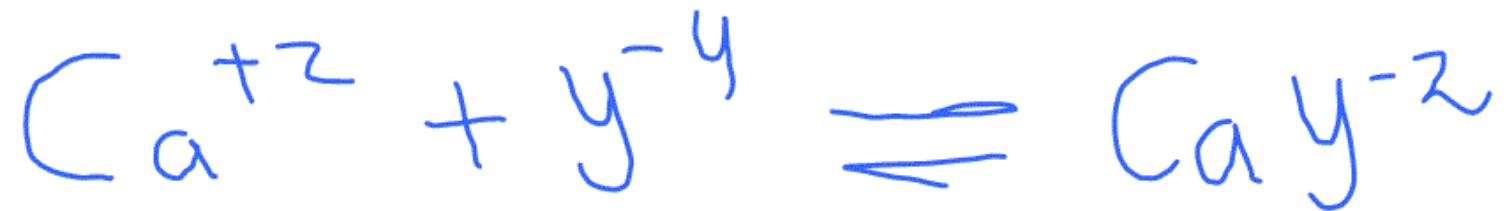
pH de inicio de precipitación					pKs	
					Ca(OH) ₂	5.30
Ca(OH) ₂	↔	Ca ⁺²	2OH ⁻	pH = 11.85		
Ks=	[Ca ⁺²]	[OH] ²	=	5.0119e-6		
	=	Ks	=	5.0119e-6	=	5.0119e-5
[OH] ⁻²		[Ca ⁺²]		0.1		
[OH]	=	0.0071				

$$[Ca^{+2}] = 10^{-1}$$

pH de inicio de precipitación					pKs	
					Ca(OH) ₂	5.30
Ca(OH) ₂	↔	Ca ⁺²	2OH ⁻	pH = 12.85		
Ks=	[Ca ⁺²]	[OH] ²	=	5.0119e-6		
	=	Ks	=	5.0119e-6	=	5.0119e-3
[OH] ⁻²		[Ca ⁺²]		0.001		
[OH]	=	0.0708				

$$[Ca^{+2}] = 10^{-3}$$

a pH 12



Reacciones secundarias o de
competencia

$$Ca^{+2} = 10^{-2} M$$

$$[M]_T = 10^{-2} M$$

$$\alpha_{M(OH^-)} = \frac{[M]_T}{[M]_L}$$

$$[M]_L$$

$$= \frac{[M]_T}{\alpha_{M(OH^-)}}$$

Catión
M = metalico



$$K_F = \frac{[Ca(OH)_2]}{[Ca^{2+}][OH^-]}$$

$$[Ca(OH)_2] = K_F [Ca^{2+}][OH^-]$$

$$K_F = \beta_F$$

				β_1	[OH]
$\alpha_{Ca(OH)}$	=	1	+	19.9526231	1.00E-02
$\alpha_{Ca(OH)}$	=	1	+	0.19952623	
$\alpha_{Ca(OH)}$	=	1.199526			
		LOG	=	0.07900975	

$$[Ca^{+2}]_T = [Ca^{+2}]_L + K_F [Ca^{+2}]_L [OH^-]$$

$$= [Ca^{+2}]_L + \beta_F [Ca^{+2}]_L [OH^-]$$

$$\alpha_{Ca(OH)} = \frac{[Ca^{+2}]_T}{[Ca^{+2}]_L}$$

$$= \frac{[Ca^{+2}]_L + \beta_F [Ca^{+2}]_L [OH^-]}{[Ca^{+2}]_L}$$

$$\alpha_{Ca(OH)} = 1 + \beta_F [OH^-]$$

$$\alpha_{Ca(OH)} = 1 + 10^{1.3} [10^{-2}]$$

$$[OH^-] \text{ a pH} = 12 = 10^{-2}$$

$$\begin{aligned} \alpha_{Ca(OH)} &= 1 + 10^{(1.3-2)} = 1 + 10^{-0.7} \\ &= 1 + 0.19 = 1.19 \end{aligned}$$

$$pH = 12$$

$$[Ca^{2+}]_L = \frac{[Ca^{2+}]_T}{\alpha_{Ca(OH)}}$$

$$= \frac{10^{-2}}{1.19} = 10^{-2.07}$$

$$\alpha_y(\text{H}_3\text{O}^+) = 1 + \beta_{p1}[\text{H}_3\text{O}^+] + \beta_{p2}[\text{H}_3\text{O}^+]^2 + \beta_{p3}[\text{H}_3\text{O}^+]^3 + \beta_{p4}[\text{H}_3\text{O}^+]^4 + \beta_{p5}[\text{H}_3\text{O}^+]^5 + \beta_{p6}[\text{H}_3\text{O}^+]^6$$

$$\beta_{p1} = \frac{1}{K_{a6}} = 10^{10.35}$$

$$\beta_{p2} = \frac{1}{K_{a6} K_{a5}} = \frac{1}{\frac{10^{-10.35}}{10^{-6.25}}} = 10^{16.6}$$

$$P_3 = \frac{1}{K_{a6} K_{a5} K_{a4}}$$

$$P_4 = \frac{1}{K_{a6} K_{a5} K_{a4} K_{a3}}$$

$$P_5 = \frac{1}{K_{a6} K_{a5} K_{a4} K_{a3} K_{a2}}$$

$$P_6 = \frac{1}{K_{a6} K_{a5} K_{a4} K_{a3} K_{a2} K_{a1}}$$

Perfil de pH (sin amortiguador)		Ca+2 0.01											
pH=	12												
		β_1	$[H_3O^+]$	β_2	$[H_3O^{+2}]$	β_3	$[H_3O^{+3}]$	β_4	$[H_3O^{+4}]$	β_5	$[H_3O^{+5}]$	β_6	$[H_3O^{+6}]$
$\alpha_1(H_3O^+)$	=	1	+ 2.2387E+10 1E-12	+ 3.98107E+16 1E-24	+ 1.77828E+19 1E-36	+ 1.77828E+21 1E-48	+ 5.62341E+22 1E-60	+ 5.62341E+22 1E-72					
$\alpha_2(H_3O^+)$	=	1	+ 0.02238721	+ 3.98107E-08	+ 1.77828E-17	+ 1.77828E-27	+ 5.62341E-38	+ 5.62341E-50					
$\alpha_3(H_3O^+)$	=	1.022387											
	LOG =	0.00961543											