

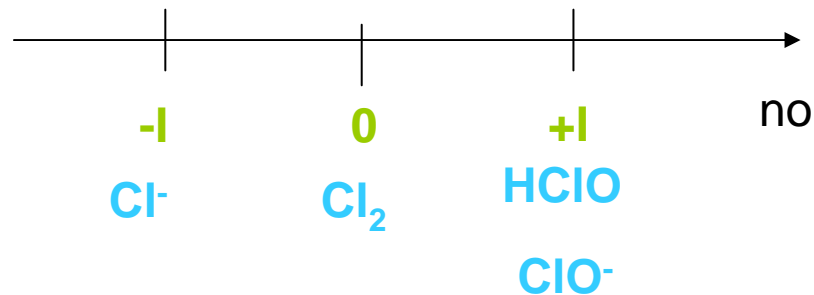
## DIAGRAMME POTENTIEL-pH du CHLORE

Données :  $E^\circ(\text{Cl}_2/\text{Cl}^-) = 1,36 \text{ V}$  ;  $E^\circ(\text{HClO}/\text{Cl}^-) = 1,49 \text{ V}$  ;  $E^\circ(\text{HClO}/\text{Cl}_2) = 1,63 \text{ V}$   
 $\text{pK}_a(\text{HClO}/\text{ClO}^-) = 7,3$ .

On prendra les concentrations des espèces dissoutes égales à 1 mol/L et les pressions égales à 1 bar.

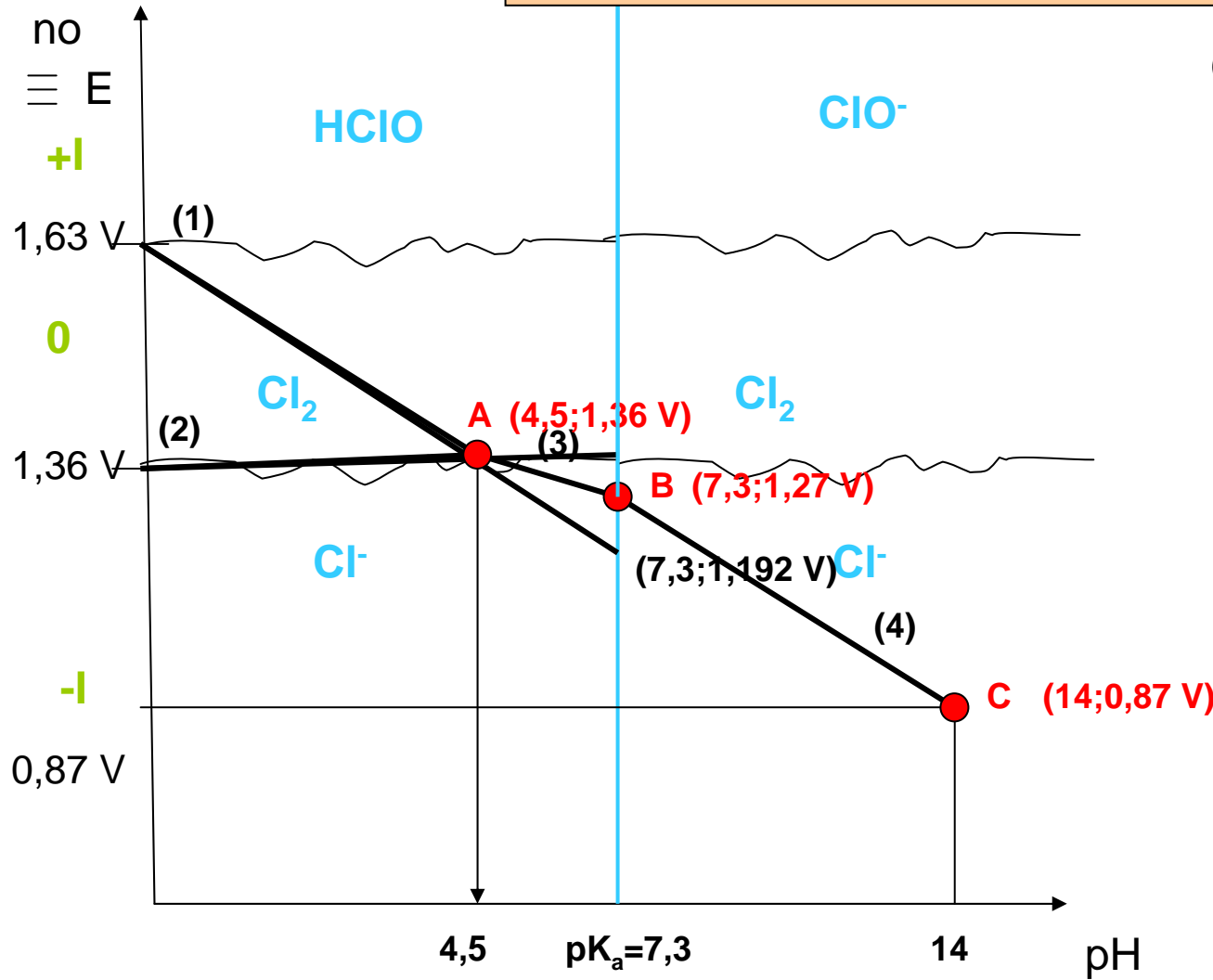
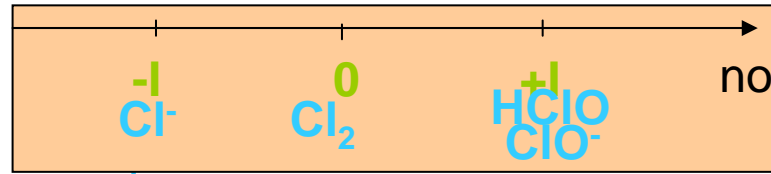
1- Espèces mises en jeu:  $\text{Cl}_2$   $\text{Cl}^-$   $\text{HClO}$   $\text{ClO}^-$   
0 -1 +1 +1

2- Echelle des n.o:



Données :  $E_1^\circ(\text{HClO}/\text{Cl}_2) = 1,63 \text{ V}$  ;  $E_2^\circ(\text{Cl}_2/\text{Cl}^-) = 1,36 \text{ V}$  ;  $E_3^\circ(\text{HClO}/\text{Cl}^-) = 1,49 \text{ V}$  ;  
 $\text{pK}_a(\text{HClO}/\text{ClO}^-) = 7,3$ .

3- n.o = f(pH):



(1):  $E_1 = 1,63 - 0,06 \text{ pH}$

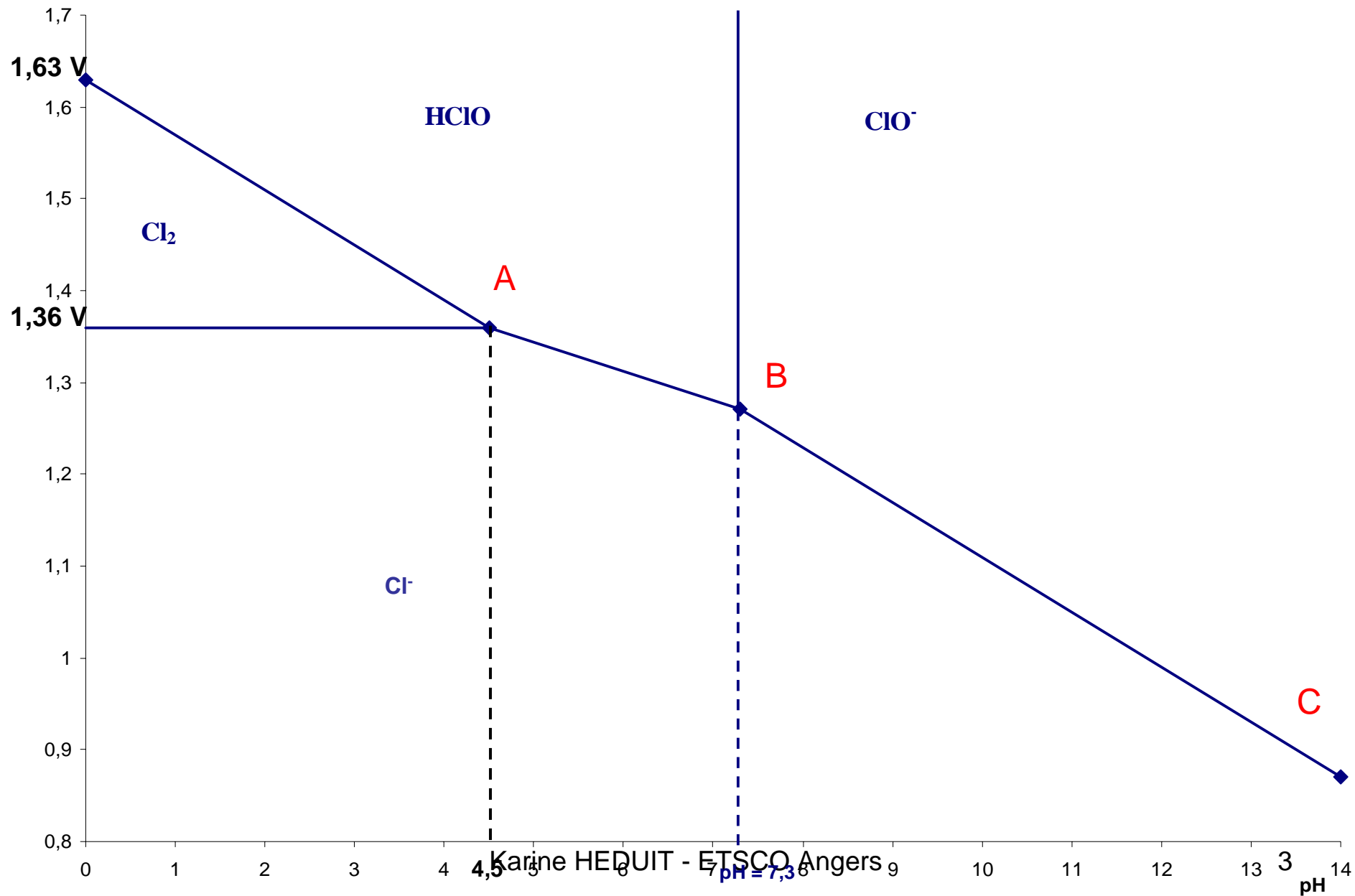
(2):  $E_2 = 1,36 \text{ V}$

(3):  $E_3 = 1,49 - 0,03 \text{ pH}$

(4):  $E_4 = 1,71 - 0,06 \text{ pH}$

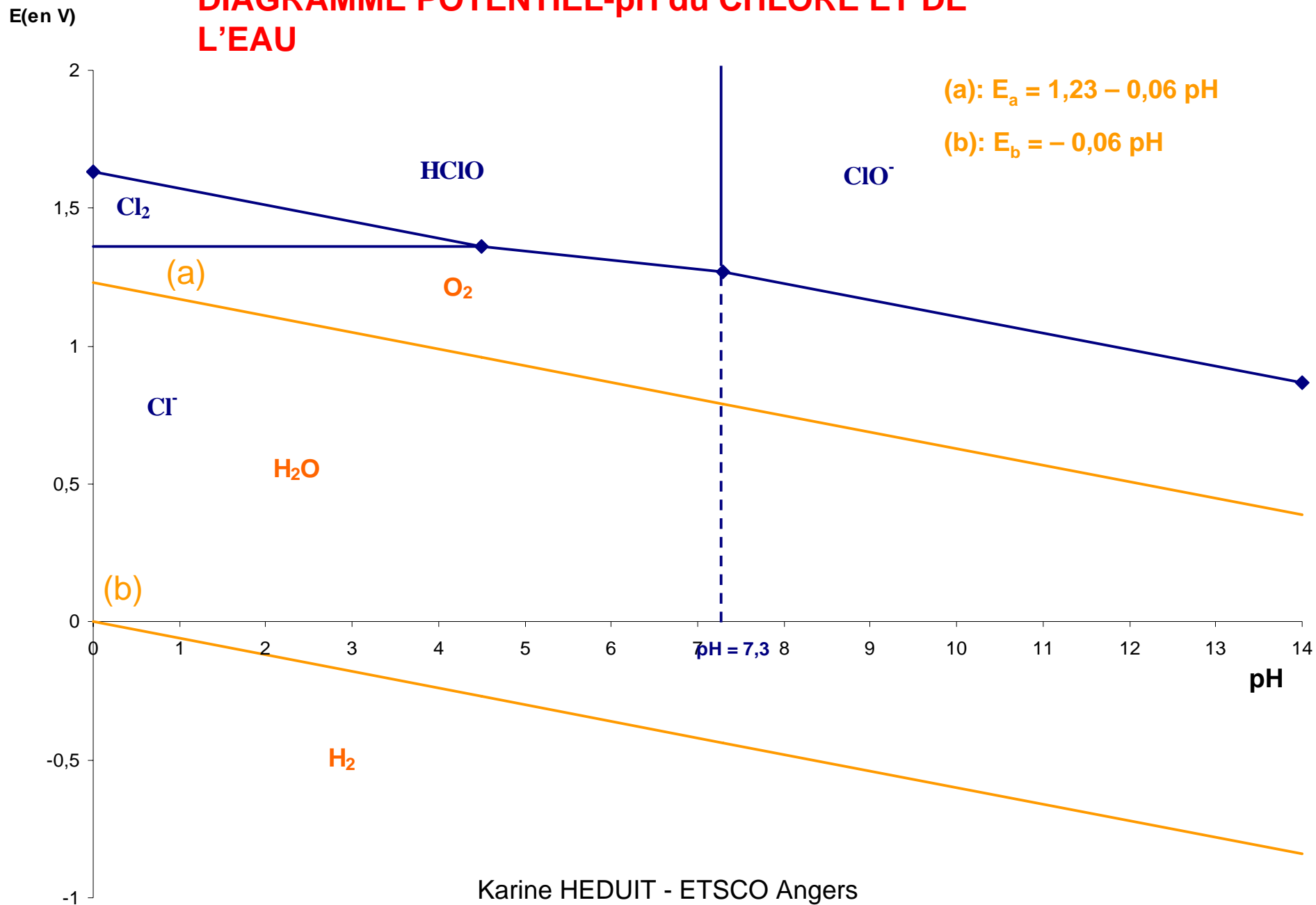
# DIAGRAMME POTENTIEL-pH du CHLORE

E(en V)



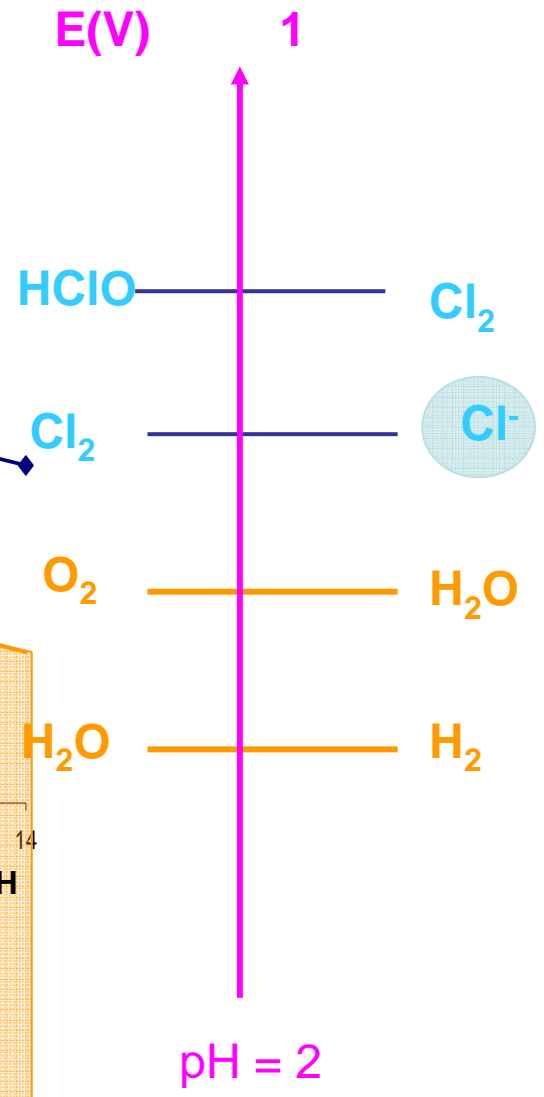
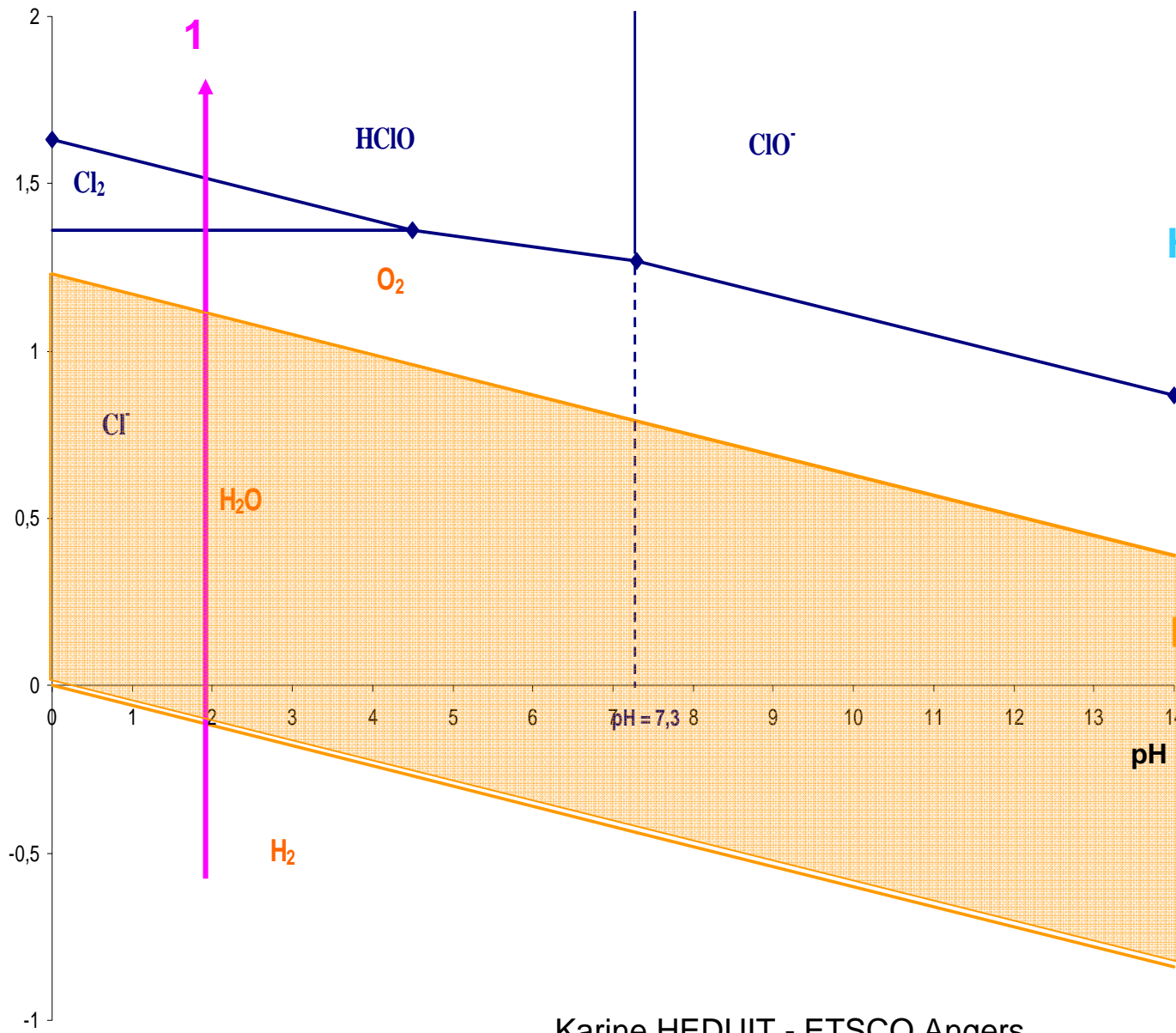
Karine HEDUIT - ETSCO, Angers

# DIAGRAMME POTENTIEL-pH du CHLORE ET DE L'EAU



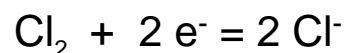
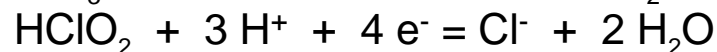
# DIAGRAMMES POTENTIEL-pH du CHLORE ET DE L'EAU

E(en V)

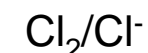
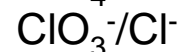
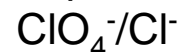


## EXERCICE : DIAGRAMME DE FROST du CHLORE

### Réactions à pH = 0



couple redox



$E^\circ$  (en volts) à pH = 0

$$E^\circ_4 = 1,39$$

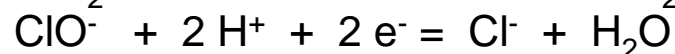
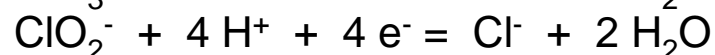
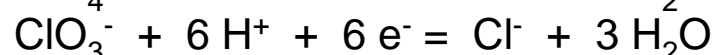
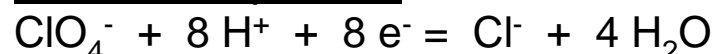
$$E^\circ_3 = 1,45$$

$$E^\circ_2 = 1,57$$

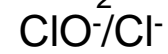
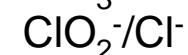
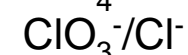
$$E^\circ_1 = 1,49$$

$$E^\circ_0 = 1,36$$

### Réactions à pH = 14



couple redox



$E^\circ$  (en volts) à pH = 14

$$E'^\circ_4 = 0,55$$

$$E'^\circ_3 = 0,61$$

$$E'^\circ_2 = 0,76$$

$$E'^\circ_1 = 0,88$$

		$E^\circ(\text{V}) - \Delta E^\circ(\text{V})$	
n.o.	Couple	pH = 0	pH = 14
-I	$\text{Cl}^-/\text{Cl}_2$	<b>-1,36 V</b>	<b>-1,36 V</b>
+I	$\text{HClO}/\text{Cl}_2$	1,62 V	
	$\text{ClO}^-/\text{Cl}_2$		<b>0,40 V</b>
+III	$\text{HClO}_2/\text{Cl}_2$	<b>1,62 V</b>	
	$\text{ClO}_2^-/\text{Cl}_2$		<b>0,68 V</b>
+V	$\text{ClO}_3^-/\text{Cl}_2$	<b>1,45 V</b>	<b>0,40 V</b>
+VII	$\text{ClO}_4^-/\text{Cl}_2$	<b>1,39 V</b>	<b>0,03 V</b>

# DIAGRAMME DE FROST du CHLORE

n.o.	$-\Delta rG/F$	pH = 0	pH = 14
-I	Cl <sup>-</sup> /Cl <sub>2</sub>	-1,36 V	-1,36 V
+I	HClO/Cl <sub>2</sub>	1,62 V	
	ClO <sup>-</sup> /Cl <sub>2</sub>		0,40 V
+III	HClO <sub>2</sub> /Cl <sub>2</sub>	4,92V	
	ClO <sub>2</sub> <sup>-</sup> /Cl <sub>2</sub>		1,68 V
+V	ClO <sub>3</sub> <sup>-</sup> /Cl <sub>2</sub>	7,35 V	2,30 V
+VII	ClO <sub>4</sub> <sup>-</sup> /Cl <sub>2</sub>	9,73 V	3,01 V

