Equilibre en phase gazeuse

①

mol	$4\,HCl_{(g)} + O_{2(g)} = 2\,H_2O_{(g)} + 2\,Cl_{2(g)}$				n_{N_2}	$n_{T\,gaz}$
EI	1	$\frac{4}{5}$	—	—	$\frac{16}{5}$	5
EF	$1-4\xi$	$\frac{4}{5}-\xi$	2ξ	2ξ	$\frac{16}{5}$	$5-\xi$

$$K^\circ = \frac{P_{Cl_2}^2\, P_{H_2O}^2\, P^\circ}{P_{HCl}^4\, P_{O_2}} = \frac{n_{Cl_2}^2\, n_{H_2O}^2}{n_{HCl}^4\, n_{O_2}} \left(\frac{P}{n_{T\,gaz}}\right)^4 P^\circ \times \left(\frac{n_{T\,gaz}}{P}\right)^5$$

$$K^\circ = \frac{n_{Cl_2}^2\, n_{H_2O}^2\, P^\circ\, n_{T\,gaz}}{n_{HCl}^4\, n_{O_2}\, P} = \boxed{\frac{(2\xi)^2\,(2\xi)^2\,P^\circ\,(5-\xi)}{(1-4\xi)^4\left(\frac{4}{5}-\xi\right)P} = K^\circ}$$

② Tracé Python.

$$16\xi^4(5-\xi) - K^\circ(1-4\xi)^4\left(\frac{4}{5}-\xi\right)P = f(\xi) = 0$$

③ Par méthode dichotomique (cf Python)

$\underline{\xi_{eq} = 0{,}16\ mol}$ (car continue monotone sur $[0;\ 0{,}25]$)

④ $n_{HCl\,eq} = 0{,}36\ mol$ $\quad n_{H_2O\,eq} = 0{,}32\ mol$

$n_{O_2\,eq} = 0{,}64\ mol$ $\quad n_{Cl_2\,eq} = 0{,}32\ mol$.