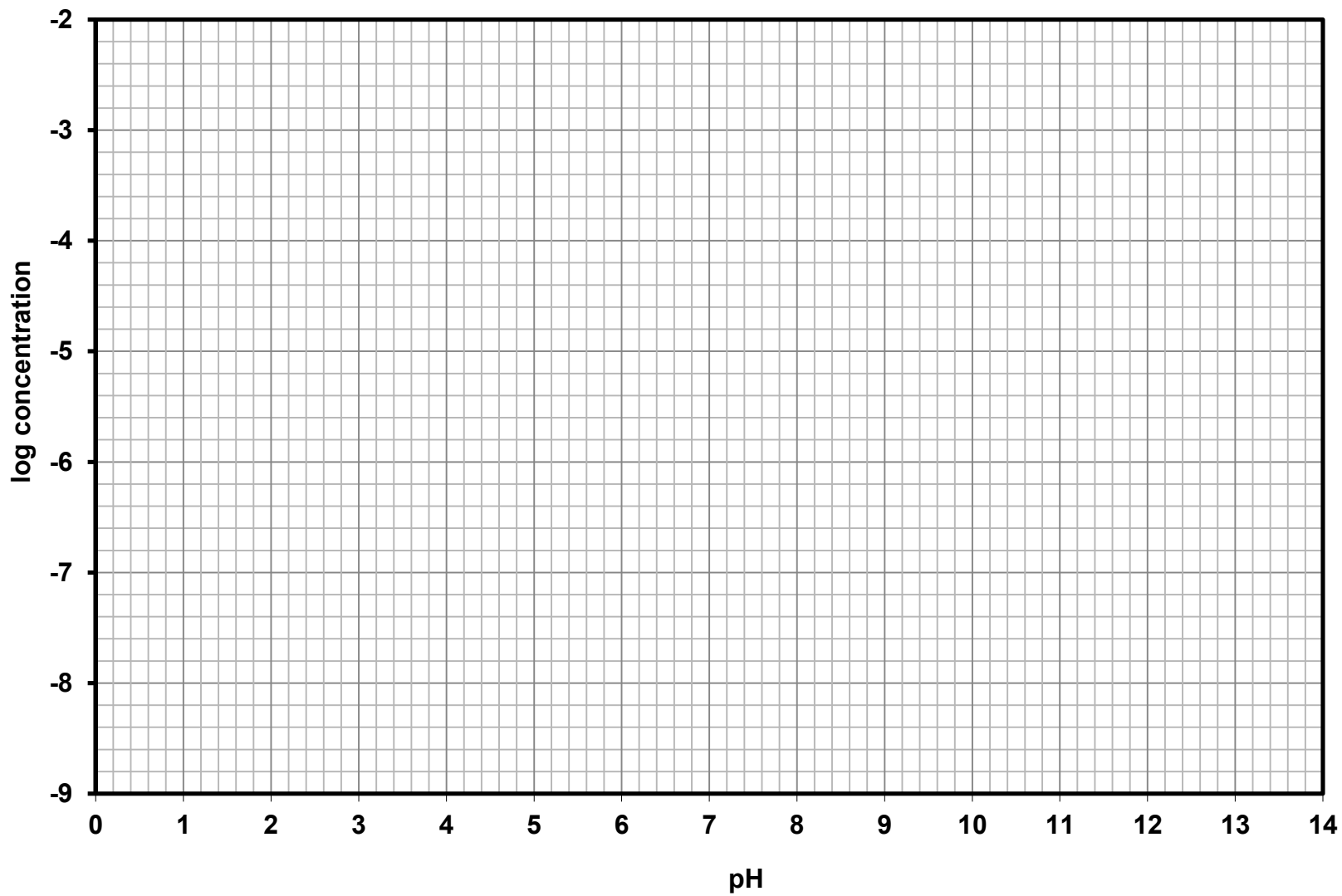# Strong Acids and Bases

What is the pH of 10^{-3} M HCl solution?
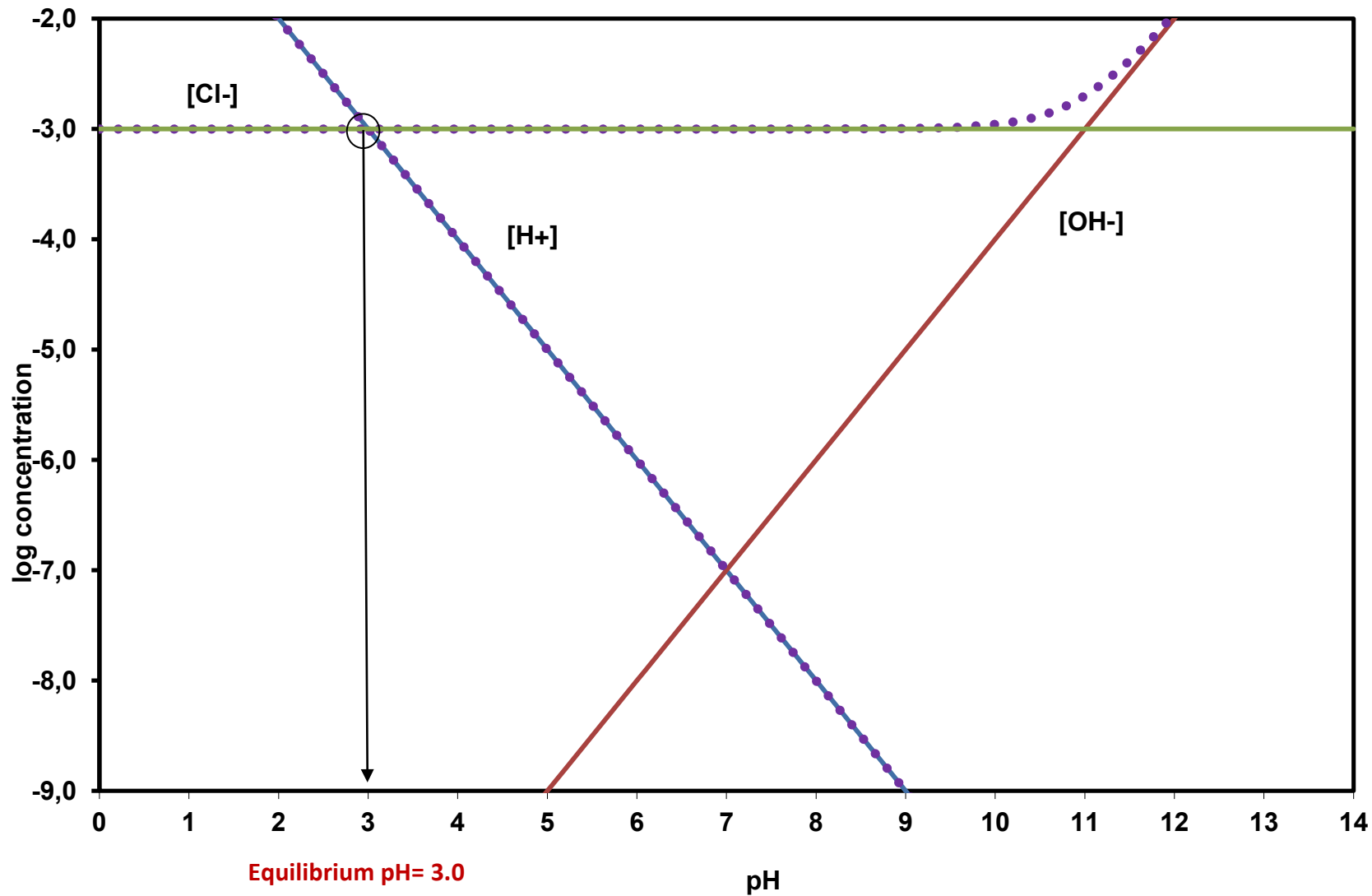
What is the pH of 10^{-5} M HCl solution?

What is the pH of 10^{-7} M HCl solution?
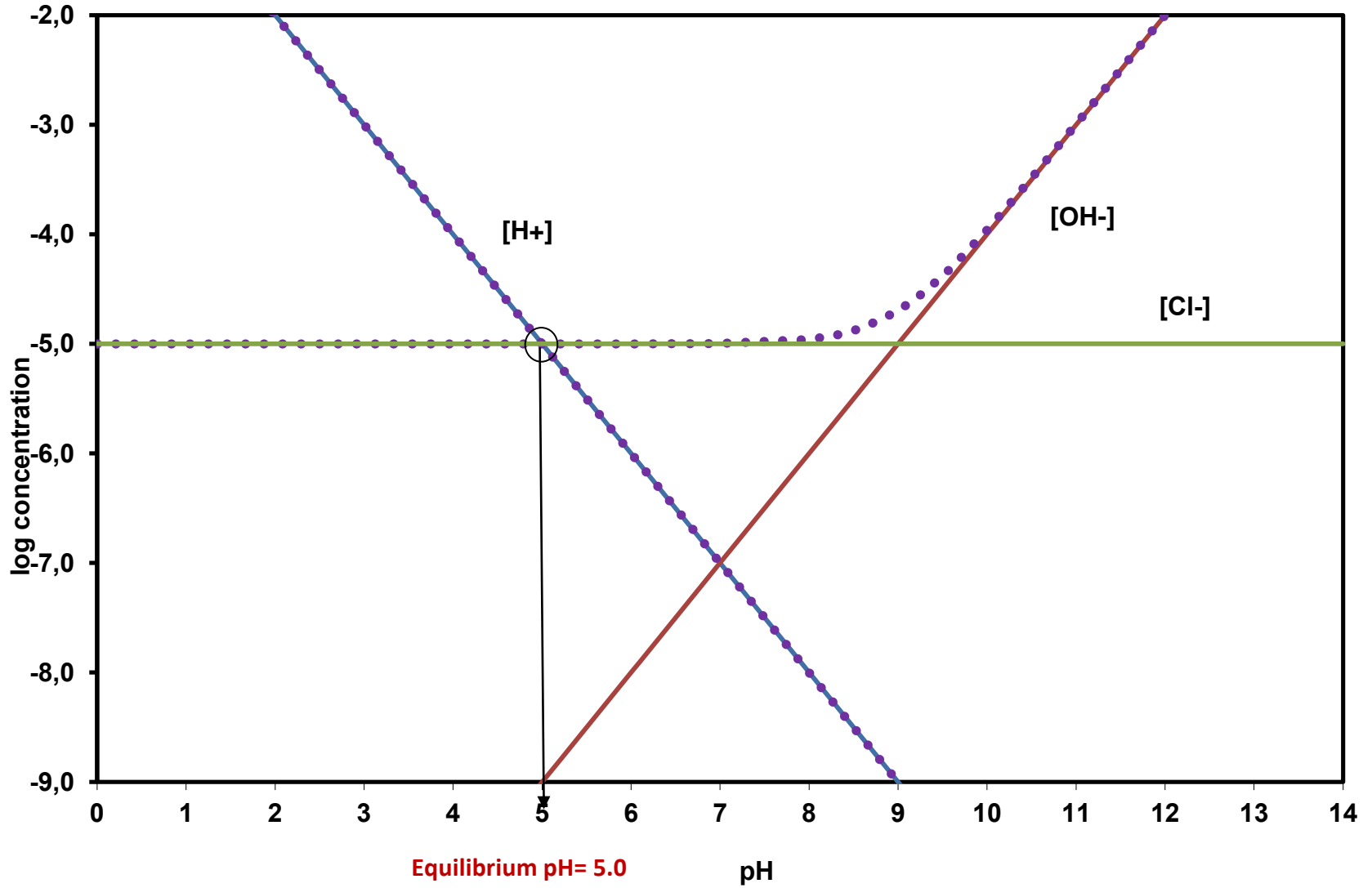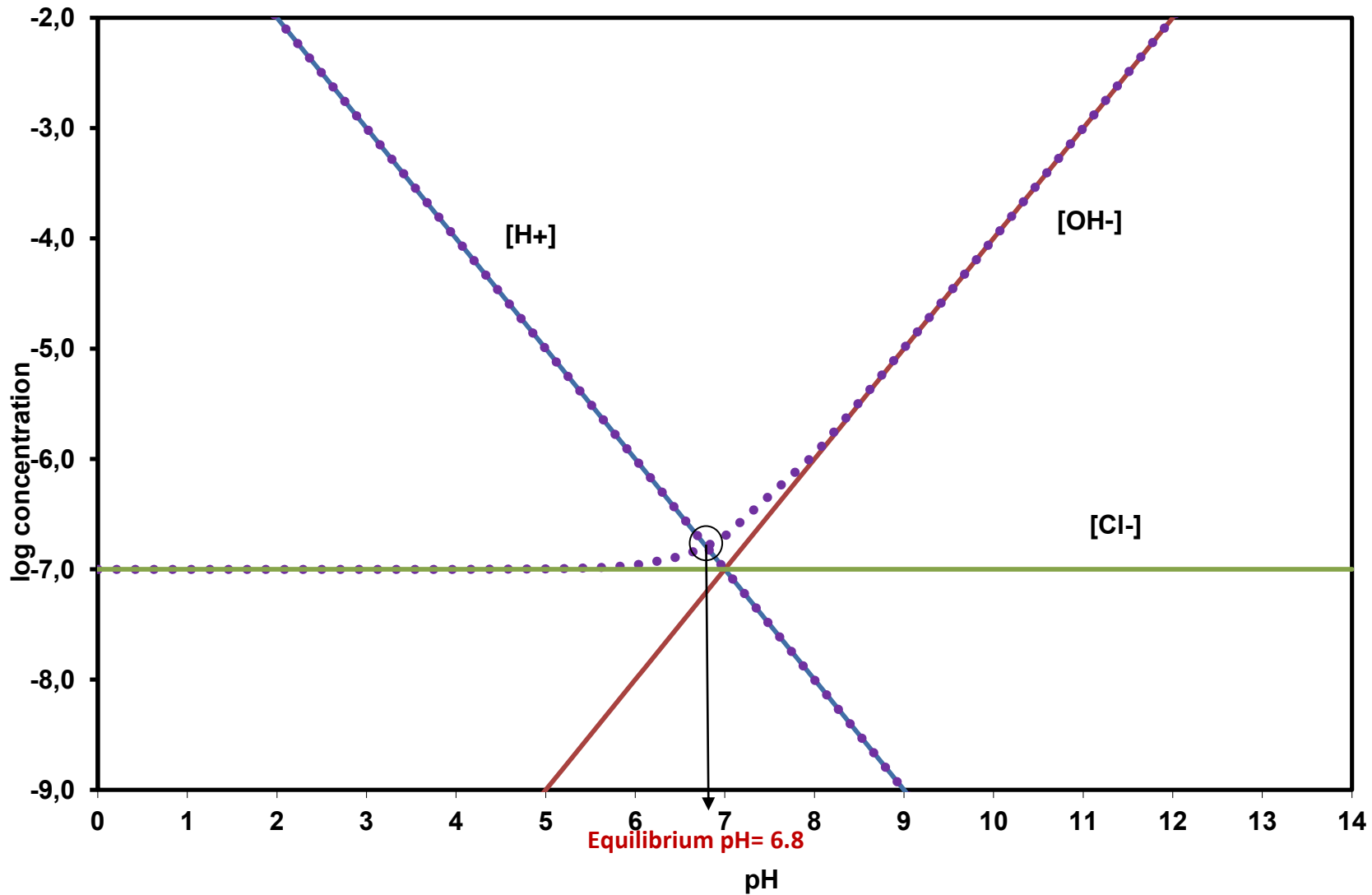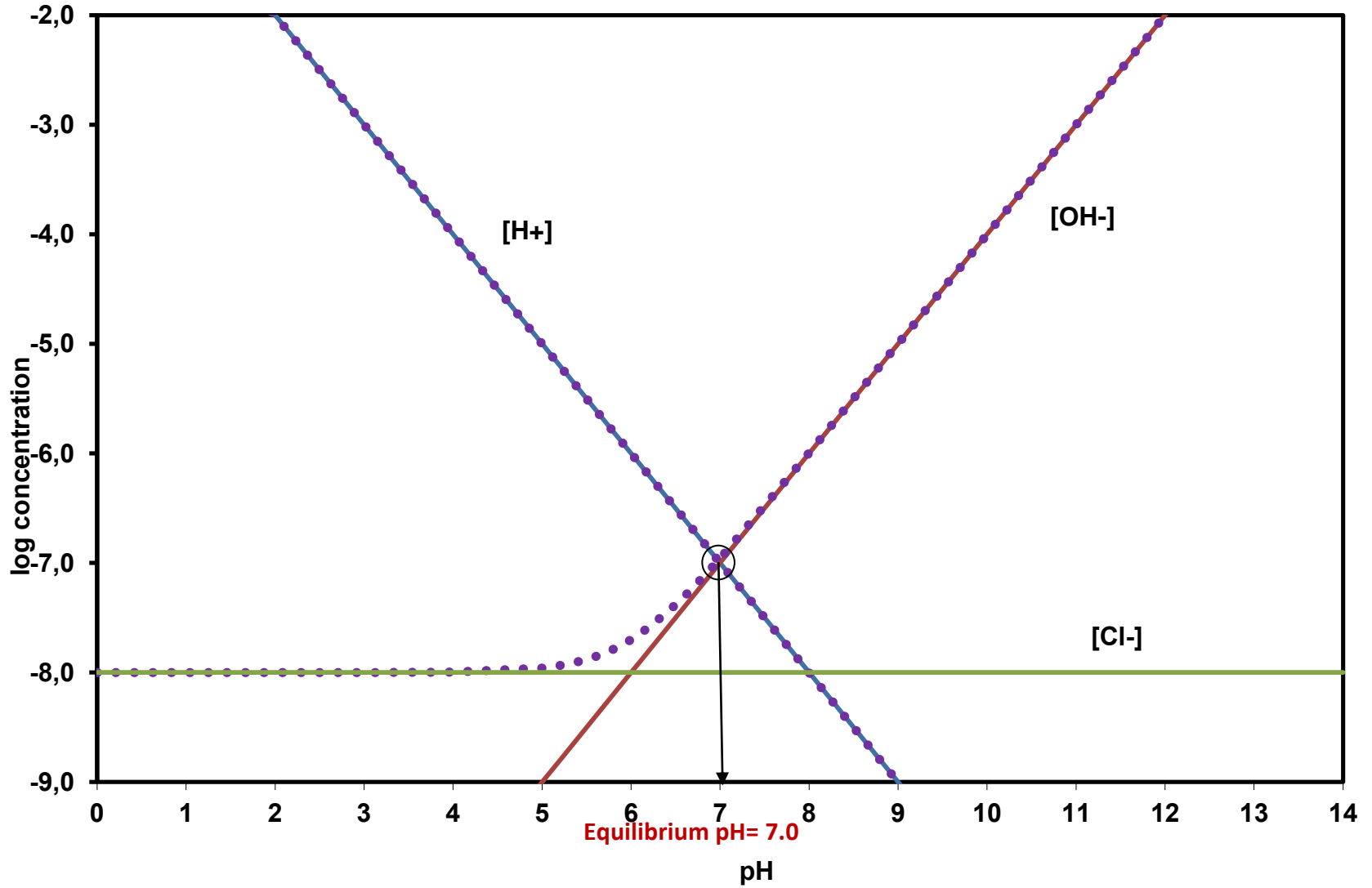
What is the pH of 10^{-8} M HCl solution?

0.001 M HCl

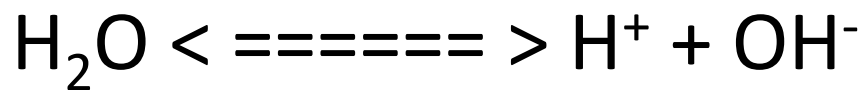Equilibrium pH= 3.0

10⁻⁵ M HCl

10^{-7} M HCl

log concentration

[H+]

[OH-]

[Cl-]

Equilibrium pH= 6.8

pH

10⁻⁸ M HCl

10^{-8} M HCl

(Graph with x-axis labeled "pH" ranging from 0 to 14, and y-axis labeled "log concentration" ranging from -9,0 to -2,0)

[H+]

[OH-]

[Cl-]

Equilibrium pH= 7.0

$HCl \ \text{------} > \ H^+ + Cl^-$

$H_2O < ===== > H^+ + OH^-$

$pH = - \log [H^+]$

$[H^+] = [H^+]_{HCl} + [H^+]_{H2O}$

In using the above assumption *($[H^+]_{H2O}$ is negligible wrt. $[H^+]$ coming from the strong acid*) make sure that the strong acid concentration is above 10^{-7} M. **Otherwise, the assumption does not hold.**

pH of 10^{-3} M HCl solution= 3.0

pH of 10^{-5} M HCl solution= 5.0

pH of 10^{-7} M HCl solution= 6.8

pH of 10^{-8} M HCl solution= 7.0