Answer on Question #54861 - Chemistry - Physical chemistry

Question:

10 raised to the power -6 M HCl is diluted to 100 times. Its pH is?

(1) 6.0; (2) 8.0; (3) 6.95; (4) 9.5

Solution

An initial HCl concentration is 10^{-6} M;

The HCl concentration after the dilution will be $c(HCl) = 10^{-6}/100 = 10^{-8}$ M

The ionic product of water is $[H^+][OH^-] = 10^{-14}$

Protone condition is $[H^+] = [OH^-] + 10^{-8}$

$[H^+]^2 - 10^{-8}\,[H^+] - 10^{-14} = 0$

$[H^+] = 1.051 \times 10^{-7}$

$pH = -\lg[H^+] = 6.97 \approx 6.95$

Answer: (3) 6.95