Question #79824, Chemistry / General Chemistry

Question:

How much 31.5% HCl is required to neutralize 100,000 gal pH 13 water?

w(HCl)=31.5% = 0.315
pH(H2O) = 13
V(H2O)=100000 gal
m(HCl) - ?

Solution:

$[H^+][OH^-] = 10^{-14}$

$[H+] = 10^{-13}$, because pH = 13

$[OH-] = 10^{-14}/10^{-13} = 0.1$ mol/l

1 gal = 3.79 l

100000 gal = 379000 l

In one liter - 0.1 mol [H+]

In 379000 l - 37900 mol

$H^+ + OH^- = H2O$, need 37900 mol HCl

m(HCl) = n (HCl)* M(HCl) = 37900*36.5 =1383350 g

m(HCl solution) = m(HCl)/w(HCl) = 1383350/0.315 =4391587 g

Answer: m(HCl solution) =4391587 g