Answer on Question #82653 – Chemistry – General Chemistry

Suppose another student performed a similar titration on a bottle of hydrogen peroxide he found in his home's medicine cabinet. Given the data in the table below, what is the molarity of the hydrogen peroxide solution? Volume of hydrogen peroxide solution (mL) 20.00mL, volume of 0.225 M $KMnO_4$ dispensed in the titration (mL) 24.38mL

Solution:

$2KMnO_4 + 5H_2O_2 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 5O_2$

$n(KMnO_4) = C(KMnO_4) \times V(KMnO_4) = 0.225\ mol/L \times 0.02438\ L = 5.5 \times 10^{-3}\ mol$

$n(KMnO_4) = 2\ mol$; $n(H_2O_2) = 5\ mol$

$n(KMnO4) = 5.5 \times 10^{-3}\ mol$, $n(H_2O_2) = 13.75 \times 10^{-3}\ mol$

$C(H_2O_2) = n(H_2O_2) / V(H_2O_2) = 13.75 \times 10^{-3}\ mol / 0.020\ L = 0.6875\ M$