

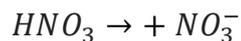
The hydrogen ion concentration of a solution prepared by diluting 50. mL of 0.10 M $\text{HNO}_3(\text{aq})$ with water to 500 mL of solution is?

Solution:

Amount of substance of HNO_3 in 50 mL of 0.10 M $\text{HNO}_3(\text{aq})$ is:

$$v(\text{HNO}_3) = (50 \text{ mL}) * \left(0.1 \frac{\text{mol}}{\text{L}}\right) = 0.05\text{L} * 0.1 \frac{\text{mol}}{\text{L}} = 0.005 \text{ mol} = 5 * 10^{-3}\text{mol}$$

As HNO_3 is a strong electrolyte (fully ionized):



Thus:

$$v(\text{HNO}_3) = v(\text{H}^+)$$

So:

$$M(\text{H}^+) = \frac{v(\text{H}^+)}{500 \text{ mL}} = \frac{5 * 10^{-3}\text{mol}}{0.5\text{L}} = 0.01 \text{ M}$$

Answer: hydrogen ion concentration is 0.01 M