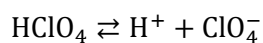


A 451 ml sample of HClO<sub>4</sub> has a pH of 0.2887. If 531 mL of distilled water was added to the HClO<sub>4</sub> solution what would the new pH of the solution be?

**Solution**



$$c_1(\text{HClO}_4) = c_1(\text{H}^+) = c_1(\text{ClO}_4^-)$$

$$\text{pH}_1 = 0.2887$$

$$c_1(\text{H}^+) = 10^{-\text{pH}} = 10^{-0.2887} = 0.5144 \text{ mol/L}$$

$$c_1(\text{HClO}_4) = 0.5144 \text{ L}$$

$$V_1 = 0.451 \text{ L}$$

$$V_2 = 0.451 \text{ L} + 0.531 \text{ L} = 0.982$$

$$n(\text{HClO}_4) = c_1 \cdot V_1 = 0.5144 \text{ L} \cdot 0.451 \text{ L} = 0.2319 \text{ mols}$$

$$c_2(\text{HClO}_4) = \frac{n(\text{HClO}_4)}{V_2} = \frac{0.2319 \text{ mol}}{0.982 \text{ L}} = 0.2361 \text{ mol/L}$$

$$c_2(\text{H}^+) = c_2(\text{HClO}_4) = 0.2361 \text{ mol/L}$$

$$\text{pH}_2 = -\log(c_2(\text{H}^+)) = 0.6269 \text{ (new pH)}$$

**Answer:** new pH = 0.6269