

Example Of PH Calculations

Going Between PH Scales

[ChemistryWiki](#) | [RecentChanges](#) | [Preferences](#)

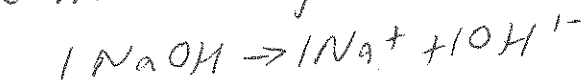
Answer the following question showing all appropriate work

What is the pH of a 4.53E-4M NaOH solution?

The NaOH will add OH^- to bucket whereas pH counts H^+ . So you need to go between scales.

$$[\text{NaOH}] = 4.53 \times 10^{-4} \text{ M}$$

pH = ?



$$[\text{OH}^-] = \left(4.53 \times 10^{-4} \text{ M}_{\text{NaOH}} \right) \left(\frac{1 \text{ mol OH}^-}{1 \text{ mol NaOH}} \right) = 4.53 \times 10^{-4} \text{ M}$$

Method 1: Take $[\text{OH}^-]$ change into $[\text{H}^+]$, then get pH

$$[\text{OH}^-][\text{H}^+] = 1 \times 10^{-14} \text{ M}^2 \Rightarrow [\text{H}^+] = \frac{1 \times 10^{-14} \text{ M}^2}{4.53 \times 10^{-4} \text{ M}} = 2.207 \times 10^{-11} \text{ M}$$

$$\text{pH} = -\log [\text{H}^+]$$

$$\text{pH} = -\log (2.207 \times 10^{-11} \text{ M}) = -(-10.6561)$$

$$\boxed{\text{pH} = 10.656}$$

Method 2: Find pOH from $[\text{OH}^-]$, then find pH from pOH

$$\text{pOH} = -\log [\text{OH}^-] = -\log (4.53 \times 10^{-4} \text{ M})$$

$$\text{pOH} = -(-3.3439)$$

$$\text{pOH} = 3.3439$$

$$\text{pOH} + \text{pH} = 14$$

$$\text{pH} = 14.0000 - \text{pOH}$$

$$\text{pH} = 14.0000 - 3.3439$$

$$\text{pH} = 10.6561$$

$$\boxed{\text{pH} = 10.656}$$