

Name : _____



pH Worksheet



1. Consider the dissociation of aluminum hydroxide. If the pH is 9.85, what is the concentration of the aluminum hydroxide solution ?

2. Consider the dissociation of calcium hydroxide. If the pH is 11.64 and you have 2.55 L of solution, how many grams of calcium hydroxide are in the solution ?

3. What is the pH of a solution with a $[\text{OH}^-]$ of 5.7×10^{-5} M ?

4. A solution has a pH of 6.1. What is the concentration of hydroxide ions ?

5. A solution is created by measuring 3.60×10^{-3} moles of NaOH and 5.95×10^{-4} moles of HCl into a container. Then, water is added until the final volume is 1.00 L. What is the pH of this solution ?

6. A solution with a H^+ concentration of 1.00×10^{-7} M is considered neutral. Why?

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1. Consider the dissociation of aluminum hydroxide. If the pH is 9.85, what is the concentration of the aluminum hydroxide solution ?

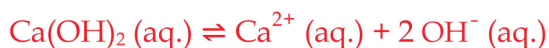


$$\text{pOH} = (14 - \text{pH}) = (14 - 9.85) = 4.15$$

$$[\text{OH}^-] = 10^{-\text{pOH}} = 10^{-4.15} = 7.08 \times 10^{-5} \text{ M}$$

$$[\text{Al(OH)}_3] = [\text{OH}^-]/3 = 7.08 \times 10^{-5} \text{ M}/3 = 2.36 \times 10^{-5} \text{ M}$$

2. Consider the dissociation of calcium hydroxide. If the pH is 11.64 and you have 2.55 L of solution, how many grams of calcium hydroxide are in the solution ?



$$\text{pOH} = (14 - \text{pH}) = (14 - 11.64) = 2.36$$

$$[\text{OH}^-] = 10^{-\text{pOH}} = 10^{-2.36} = 4.4 \times 10^{-3} \text{ M}$$

$$\text{Number of moles of Ca(OH)}_2 = (4.4 \times 10^{-3} \text{ mol/L}/2) \times 2.55 \text{ L} = 0.00561 \text{ mol}$$

$$\text{Mass of NaOH} = (0.00561 \text{ mol} \times 74.093 \text{ g/mol}) = 0.416 \text{ g}$$

3. What is the pH of a solution with a $[\text{OH}^-]$ of $5.7 \times 10^{-5} \text{ M}$?

$$\text{pOH} = -\log [\text{OH}^-] = -\log [5.7 \times 10^{-5}] = 4.24$$

$$\text{pH} = 14 - 4.24 = 9.76$$

4. A solution has a pH of 6.1. What is the concentration of hydroxide ions ?

$$\text{pOH} = 14 - \text{pH} = 14 - 6.1 = 7.9$$

$$[\text{OH}^-] = 10^{-\text{pOH}} = 10^{-7.9} = 1.25 \times 10^{-8} \text{ M}$$

5. A solution is created by measuring 3.60×10^{-3} moles of NaOH and 5.95×10^{-4} moles of HCl into a container. Then, water is added until the final volume is 1.00 L. What is the pH of this solution ?

Since there is both acid and base, we will assume a 1 mole acid:1 mole base ratio of neutralization. There is more base than acid so the leftover base will affect the solution's pH.

$$3.60 \times 10^{-3} \text{ moles} - 5.95 \times 10^{-4} \text{ moles} = 3.01 \times 10^{-3} \text{ moles NaOH}$$

$$3.01 \times 10^{-3} \text{ moles NaOH}/1 \text{ L} = 3.01 \times 10^{-3} \text{ M NaOH}$$

$$\text{pOH} = -\log [\text{OH}^-] = -\log (3.01 \times 10^{-3}) = 2.521$$

$$\text{pH} = 14 - \text{pOH} = 14 - 2.521 = 11.479$$

6. A solution with a H^+ concentration of $1.00 \times 10^{-7} \text{ M}$ is considered neutral. Why?

$$\text{pH} = -\log [\text{H}^+] = -\log (1 \times 10^{-7}) = 7$$

$$\text{pOH} = 14 - \text{pH} = 14 - 7 = 7$$

$$[\text{OH}^-] = 10^{-\text{pOH}} = 10^{-7} = 1.00 \times 10^{-7} \text{ M}$$

The concentrations of H^+ and OH^- are equal, as are the pH and pOH, so the solution must be neutral.