Name : _____ Date : _____

pH and pOH Calculation Worksheet

1. What is the concentration of $[H^+]$ in a solution whose pH = 4.3 ?

2. What is the pH of a solution with a hydronium concentration of 3.4×10^{-3} ?

3. What is the pOH of a solution with a pH of 6.8 ?

4. What is the concentration of hydroxide ions in a solution with a pOH of 2.9 ?

5. What is the pOH of a solution with a $[OH^-]$ of 5.7×10^{-5} ?

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

7. 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 ?

8. A solution with a H^+ concentration of 1.00×10^{-7} M is said to be neutral. Why ?

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1. What is the concentration of $[H^+]$ in a solution whose pH = 4.3 ?

   $[H^+] = 10^{-pH} = 10^{-4.3} = 5 \times 10^{-5}$ M

2. What is the pH of a solution with a hydronium concentration of 3.4×10^{-3} ?

   $[H_3O^+] = [H^+]$

   $pH = -\log [H^+] = -\log (3.4 \times 10^{-3}) = 2.5$

3. What is the pOH of a solution with a pH of 6.8 ?

   $pOH = 14 - pH = 14 - 6.8 = 7.2$

4. What is the concentration of hydroxide ions in a solution with a pOH of 2.9 ?

   $[OH^-] = 10^{-pOH} = 10^{-2.9} = 1.3 \times 10^{-2}$ M

5. What is the pOH of a solution with a $[OH^-]$ of 5.7×10^{-5} ?

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

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

   $pOH = 14 - pH = 14 - 6.1 = 7.9$

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

7. 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.

   3.60×10^{-8} moles $- 5.95 \times 10^{-8}$ moles $= 3.01 \times 10^{-3}$ moles NaOH

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

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

   $pH = 14 - pOH = 14 - 2.521 = 11.479$

8. A solution with a H^+ concentration of 1.00×10^{-7} M is said to be neutral. Why ?

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

   $pOH = 14 - pH = 14 - 7 = 7$

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

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