



# pH and pOH Worksheet



1. What is the  $[\text{OH}^-]$  in 0.025 M HCl ?

2. Calculate the pH of 0.250 M  $\text{Al}(\text{OH})_3$ .

3. Which of the following is possible for an acid ?

	Acid Strength	Concentration	pH
A	Strong	0.01 M	2
B	Weak	0.01 M	1
C	Strong	3 M	5.5
D	Weak	3 M	-0.5

4. What is the  $[\text{H}_3\text{O}^+]$  in 200.0 mL of 0.0010 M KOH ?

5. Tomato juice has a pH of 4.20. Calculate the  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  in tomato juice.

6. A student records the pH of 0.1 M solutions of two monoprotic acids:

Acid	pH
X	4.0
Y	2.0

What can be concluded from the above data ?



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1. What is the  $[\text{OH}^-]$  in 0.025 M HCl ?

$$[\text{H}^+] = 0.025 \text{ M}$$

$$[\text{OH}^-] = 1 \times 10^{-14} / 0.025 = 4.0 \times 10^{-13} \text{ M}$$

2. Calculate the pH of 0.250 M  $\text{Al}(\text{OH})_3$ .

$$[\text{OH}^-] = 3 \times 0.250 \text{ M} = 0.750 \text{ M}$$

$$\text{pOH} = -\log [\text{OH}^-] = -\log (0.75) = 0.125$$

$$\text{pH} = 14 - \text{pOH} = 14 - 0.125 = 13.875$$

3. Which of the following is possible for an acid ?

	Acid Strength	Concentration	pH
A	Strong	0.01 M	2
B	Weak	0.01 M	1
C	Strong	3 M	5.5
D	Weak	3 M	-0.5

Strong acids will ionize completely.  $\text{HA} \rightleftharpoons \text{H}^+ + \text{A}^-$

$\text{pH} = -\log (0.01) = 2$ . The answer is A.

4. What is the  $[\text{H}_3\text{O}^+]$  in 200.0 mL of 0.0010 M KOH ?

$$[\text{OH}^-] = 0.0010 \text{ M}$$

$$[\text{H}_3\text{O}^+] = 1 \times 10^{-14} / 0.0010 = 1.0 \times 10^{-11} \text{ M}$$

5. Tomato juice has a pH of 4.20. Calculate the  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  in tomato juice.

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}} = 10^{-4.2} = 6.3 \times 10^{-5} \text{ M}$$

$$[\text{OH}^-] = 1 \times 10^{-14} / (6.3 \times 10^{-5}) = 1.6 \times 10^{-10} \text{ M}$$

6. A student records the pH of 0.1 M solutions of two monoprotic acids:

Acid	pH
X	4.0
Y	2.0

What can be concluded from the above data ?

If the acid is strong, 100% ionization will make  $\text{pH} = -\log [0.1] = 1$ . Since both acids have  $\text{pH} > 1$ , they did not complete ionization. Both are weak acids, with acid Y being a stronger weak acid.