Properties of logs

Definitions: $\log 10^x = x$ antilog of $x = 10^x$

$\log AB = \log A + \log B$ $\log (A/B) = \log A - \log B$ $\log A^x = x \log A$

Find the log of the following numbers

1. 5.23×10^3
2. 9.39×10^5
3. 5.36×10^4
4. 2.33×10^{12}
5. 6.46×10^8
6. 6.23×10^{-3}
7. 7.34×10^{-9}
8. 8.62×10^3
9. 34,000,000
10. 0.00000235

Find the antilog of the following numbers.

11. 0.9523
12. 2.35
13. 6.236
14. 6.356
15. -2.365
16. -6.256
17. -8.265
18. -6.265
19. -3.982
20. -1.5123

pH & pOH

Definitions: **pH = -log [H^+]** **pOH = -log [OH^-]**

Things to notice:

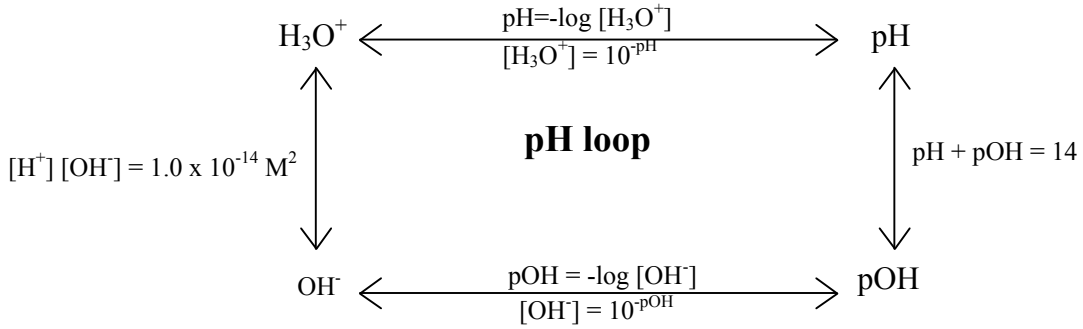
pH comes from the hydrogen ion, pOH comes from the hydroxide ion

In both cases it is lower case p and upper case for either H or OH

[ ] have a very specific meaning in chemistry - the numbers used in the calculations where these brackets appear **must** have units of molarity (moles of solute per liter of solution).

$H^+_{(aq)}$ is the same as $H_3O^+_{(aq)}$ which is also a "proton in solution" (why?)

$HOH_{(l)}$ <=====> $H^+ + OH^-$ pH + pOH = 14, $K_w = [H^+]\,[OH^-] = 1.0 \times 10^{-14}\ M^2$ at room temperatures.



I. What is the hydrogen ion concentration of a 0.00152 M solution of hydrochloric acid?

What is the pH, the pOH?

II. What is the hydrogen ion concentration of a 0.000623 M solution of sulfuric acid?

What is the pH, the pOH?

III. What is the hydrogen ion concentration of a 0.00122 M solution of nitric acid?

What is the pH, the pOH? For each problem the pH, the pOH, the hydroxide ion concentration or the hydronium ion concentration is given. Find each of the other values.

pH	**pOH**	**$[H^+] = [H_3O^+]$**	**$[OH^-]$**
		10^{-6} M	
	3		
1			
			10^{-5} M
			10^{-9} M
2			
	4		
		10^{-11} M	
		3.4×10^{-9} M	
	11.82		
			2.64×10^{-9} M
12.05			
		7.32×10^{-3} M	
9.28			
	7.35		
		5.14×10^{-4} M	
			8.45×10^{-3} M
	5.85		
		7.65×10^{-2} M	
8.85			
			9.65×10^{-6} M
10.32			
	10.32		
		5.5×10^{-3} M	
			5.5×10^{-3} M
		8.45×10^{-4} M	
	6.23		