

(#8-3)
CHEMISTRY
PH and pOH

$$\begin{aligned} \text{pH} + \text{pOH} &= 14 \\ -\log[\text{H}^+] &= \text{pH} \\ 10^{-\text{pH}} &= [\text{H}^+] \\ [\text{H}^+][\text{OH}^-] &= 1.0\text{E-}14 \end{aligned}$$

1. What is the range of pH.
2. Is it possible to have a pH greater or smaller than 14 and 0 respectively?
3. Which pH is basic and which is acidic?

In the following questions, calculate the **pH** from the concentrations of **[H₃O⁺]**. Indicate acidic or basic.

[H₃O⁺]	...to...	pH
4. 1.0		0
5. 0.1		1
6. 0.01		2
7. 0.001		3

8. What is the [H₃O⁺] at neutral?
 $1.0\text{E-}7$
9. What is the [OH⁻] at neutral?
 $1.0\text{E-}7$

In the following calculate the concentration of **H₃O⁺** from the **pH**.

pH	...to...	H₃O⁺
10. 7		$1.0\text{E-}7$
11. 2	10^{-2}	.01
12. 3.5	$10^{-3.5} =$	$3.16\text{E-}4$

Calculate the **pOH** from the following pH.

pH	...to...	pOH
13. 12	→ 2	
14. 1	→ 13	

#15: $-\log(1.05\text{E-}6) = 5.6$
 $14 - 5.6 = 8.4$

Calculate the **pOH** from the following concentrations of **H₃O⁺**.

H₃O⁺	...to...	pOH
15. [1.05 E-16 M]		$-\log(1.05\text{E-}16) = 15.6$
16. [2.5 E-6 M]		$14 - 5.6 = 8.4$
17. [1.5 E-12 M]		$14 - 11.8 = 2.2$
18. [0.001M]		$14 - 3 = 11$

#16) $-\log(2.5\text{E-}6) = 5.6$
 $14 - 5.6 = 8.4$

#17) $-\log(1.5\text{E-}12) = 11.8$
 $14 - 11.8 = 2.2$

Calculate the **pH** from the following concentrations of **OH⁻**
are the following solution Acidic/basic/neutral?

19. [2.99 E-6M] OH ⁻	— B	$1.0\text{E-}7\text{M}$
20. [1.23 E-8M] OH ⁻	— A	
21. [9.99 E-11M] H ₃ O ⁺	— B	
22. [0.01M] H ₃ O ⁺	— A	

#18) $-\log(0.0001) = 4$
 $14 - 4 = 10$

23. Student hypothesis: A person's stomach is extremely acidic and therefore there is no hydroxide ions in the stomach.

False
always Both $\text{H}^+ + \text{OH}^-$
 $[\text{H}^+] > [\text{OH}^-]$