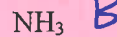


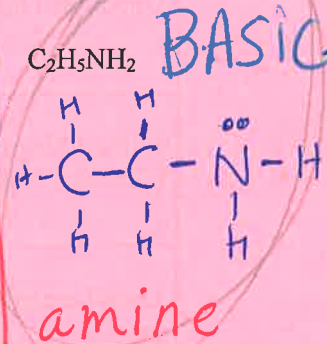
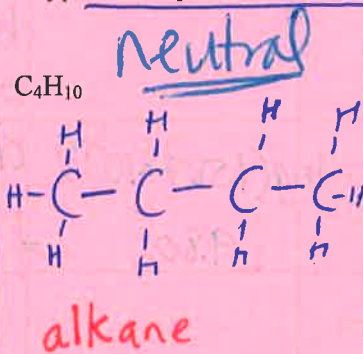
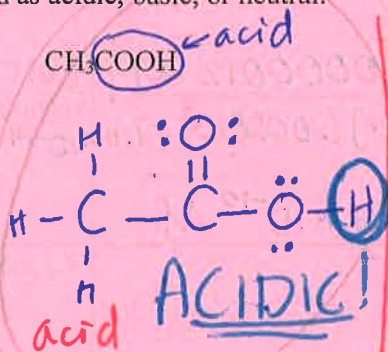
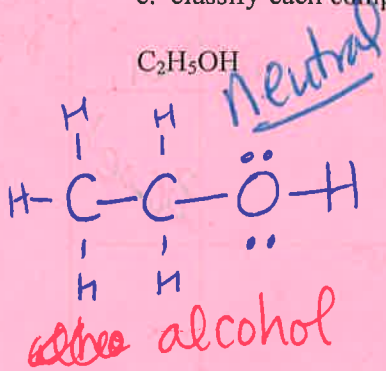
$pH = -\log [H^+]$  Name: \_\_\_\_\_

$[H^+] = 10^{-pH}$

1. Classify each compound as acidic, basic, or neutral.



2. a. Draw the dot structure of each molecule b. Identify the type of compound/functional group c. classify each compound as acidic, basic, or neutral.

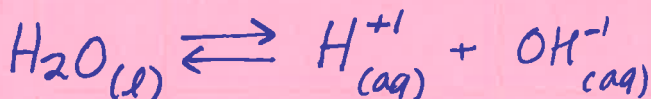


3. a. What is the pH of a 0.01 Molar solution of HNO<sub>3</sub>? 2.0  
 b. What is the pH of a 0.0001 M solution of HCl? 4.0  
 c. What is the pH of a 10 Molar solution of HBr? -1.0

4. a. If an HCl solution has a pH of 5.0, what is the concentration of hydrogen ion in this solution? 10<sup>-5</sup> = 0.00001 M  
 b. If an HNO<sub>3</sub> solution has a pH of 1.0, what is the concentration of hydrogen ion in this solution? 10<sup>-1</sup> = 0.1 M  
 c. If a solution has a pH of -1.0, what is the concentration of hydrogen ion in this solution? 10<sup>+1</sup> = 10 M  
 d. If a solution has a pH of 0.0, what is the concentration of hydrogen ion in this solution? 10<sup>-0</sup> = 1 M

5. a. What is the pH of pure water? 7.00  
 b. Based on the pH, what is the concentration of hydrogen ion in pure water? 10<sup>-7.00</sup> = 1.0 × 10<sup>-7</sup> M

6. Notes on the "Autoionization of Water" and the Equilibrium Constant, K<sub>w</sub>



$K_w = [H^+][OH^-] = 1.0 \times 10^{-14} M^2$  acc to expt at 25°C

In pure H<sub>2</sub>O, [H<sup>+</sup>] = [OH<sup>-</sup>] = x

$x^2 = (x)(x) = 1.0 \times 10^{-14} M^2$

$x = \sqrt{1.0 \times 10^{-14} M^2}$

$x = 1.0 \times 10^{-7} M$

$[H^+] = [OH^-] = 1.0 \times 10^{-7} M$

$pH = -\log(1.0 \times 10^{-7}) = \boxed{7.00}$   
 (neutral)

acidic

$pH < 7$

$[H^+] > 10^{-7} M$

$[OH^-] < 10^{-7} M$

basic  $pH > 7$

$[OH^-] > 10^{-7} M$

$[H^+] < 10^{-7} M$

## 11. Fill in the blanks and SHOW WORK!!!

Substance	pH	Concentration of Hydrogen ion	Concentration of Hydroxide ion	A/B/N?
Cocacola (contains $H_3PO_4$ and $H_2CO_3$ )	$-\log(.0032) = 2.49$	0.0032 M	$\frac{1.00 \times 10^{-14}}{.0032} = 3.1 \times 10^{-12} M$	acid
Unpolluted Rain	5.92	$10^{-5.92} = 1.2 \times 10^{-6} M$	$\frac{1.00 \times 10^{-14}}{1.202 \times 10^{-6}} = 8.3 \times 10^{-9} M$	acidic (slightly)
Milk of Magnesia (Contains $Mg(OH)_2$ )	$-\log(1.587 \times 10^{-10}) = 9.80$	$\frac{1.00 \times 10^{-14}}{.000063} = 1.6 \times 10^{-10} M$	0.000063 M	Basic
Lime/Lemon Juice (contains $H_3C_6H_5O_7$ )	$-\log(.0040) = 2.40$	$\frac{1.00 \times 10^{-14}}{2.5 \times 10^{-12}} = .0040 M$	$2.5 \times 10^{-12} M$	acidic
Blood	$-\log(3.8 \times 10^{-8}) = 7.42$	$3.8 \times 10^{-8} M$	$\frac{1.00 \times 10^{-14}}{3.8 \times 10^{-8}} = 2.6 \times 10^{-7} M$	very slightly basic
Drano (contains NaOH)	13.14	$10^{-13.14} = 7.2 \times 10^{-14} M$	$\frac{1.00 \times 10^{-14}}{7.2 \times 10^{-14}} = 1.4 \times 10^{-1} \rightarrow 0.14 M$	Basic
Apple Juice	$-\log(.00078 M) = 3.11$	0.00078 M	$\frac{1.00 \times 10^{-14}}{.00078} = 1.3 \times 10^{-11} M$	acidic
Washing Soda Solution (Contains $Na_2CO_3$ )	11.63	$10^{-11.63} = 2.3 \times 10^{-12} M$	$\frac{1.00 \times 10^{-14}}{2.34 \times 10^{-12}} = .0043 M$	Basic
Gastric Juice (from your stomach)	$-\log(.030303) = 1.52$	$\frac{1.00 \times 10^{-14}}{3.3 \times 10^{-13}} = 0.030 M$	$3.3 \times 10^{-13} M$	acidic
Coffee	$-\log(2.083 \times 10^{-6}) = 5.68$	$\frac{1.00 \times 10^{-14}}{4.8 \times 10^{-9}} = 2.1 \times 10^{-6} M$	$4.8 \times 10^{-9} M$	slightly acidic
Bleach (contains NaClO)	12.60	$2.5 \times 10^{-13} M$	$4.0 \times 10^{-2} \rightarrow .040 M$	basic
Vinegar ( $HC_2H_3O_2(aq)$ )	3.11	0.00077 M	$1.3 \times 10^{-11} M$	acid
2.0 Molar HCl	-0.30	2.0 M	$5.0 \times 10^{-15} M$	acid
Limewater (contains $Ca(OH)_2$ )	10.43	$3.7 \times 10^{-11} M$	$2.7 \times 10^{-4} M$	base
2.0 Molar NaOH	14.30	$5.0 \times 10^{-15} M$	2.0 M	base