Science 30	Unit B: Chemistry
Lesson 3 - Measuring Acids	84 mins

pH Scale

Hydronium ions give a solution it's acidic properties. The concentration of Hydronium Ions gives the solution other properties as well: 1) How fast the acid reacts 2) How much change the acid may cause 3) The amount of base required to neutralize the acid 4) The amount of base or metal that will react with the acid	The concentration of Hydronium Ions is measured in: - MOLARITY - $[H_3O^+]$, mol/L, or M - pH - Potential Hydrogen

Calculating pH

$$pH = -log[H_3O^+]$$	Determine the pH of a sample of rainwater that has a hydronium ion concentration of $1.0 \times 10^{-4}\ M$ $$pH = -log[H_3O^+]$$ $$pH = -log(1.0 \times 10^{-4}\ M)$$ $$pH = 4.0$$ A sample of lake water has a hydronium ion concentration of $2.27 \times 10^{-7}\ M$ $$pH = -log[H_3O^+]$$ $$pH = -log(2.27 \times 10^{-7}\ M)$$ $$pH = 6.6439 = 6.644$$ (NOTE: the answer is 6.644 as the decimal places are the only Significant Figures in pH)

Calculating Molarity (Concentration) from pH

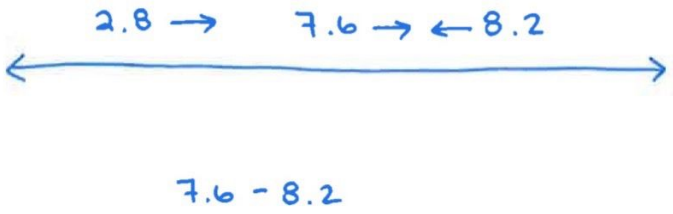
$$[H_3O^+] = 10^{-pH}$$	What happens to the concentration of an acid as the pH goes up? $$pH \uparrow \ = more\ basic = [H_3O^+] \downarrow$$ Determine the hydronium ion concentration of a sample of rainwater with a pH of 2.0? $$[H_3O^+] = 10^{-pH}$$ $$[H_3O^+] = 10^{-2.0} = 0.01\ M$$

	Determine the hydronium ion concentration of a solution with a pH of 13.283. Is the solution acidic or basic? $[H_3O^+] = 10^{-pH}$ $[H_3O^+] = 10^{-13.283} = 5.211947 \times 10^{-14}\ M$ $= 5.21 \times 10^{-14}\ M$ (only allowed 3 significant digits)

Naming Acids and Bases

In your Data booklet on pg 11

Indicators

Pg. 12 of your data booklet - Each indicator changes colour depending on the pH of the solution.	A sample of an unknown pH causes the following acid cause the following acid bases indicator colours - Orange IV = Yellow (>2.8) - Bromothymol blue = Blue (>7.6) - Phenolphthalein = colourless (<8.2) What is the pH of the solution?  7.6 - 8.2

Science 30 - Lesson 17 - Measuring Acids

Name: _____

1) Calculate the pH values of teach hydronium ion concentrations given. Identify whether the solution is acidic, basic or neutral. Show all your work and include the proper significant figures.

   a) 0.00125 mol/L

   b) 2.3×10^{-9} mol/L

   c) 4.42×10^{-13} M

   d) 5.6298×10^{-2} M

   e) 8.10×10^{-8} mol/L

2) Calculate the hydronium ion concentration for each pH give. Show all your work and include the proper significant figures.

   a) 2.13

   b) 7.1280

   c) 9.385702

   d) 11.00

3) A solution is yellow with thymol blue and blue with bromocresol green. Determine the colour of the solution with the following indicators

   a) Methyl violet _____

   b) Indigo carmine _____

   c) Alizarin yellow R _____

4) Write formulas for each of the following acids.
    a) hydrochloric acid.

    b) hydrobromic acid.

    c) hydroiodic acid.

    d) sulfurous acid.

    e) oxalic acid.

5) Write names for each of the following acids.
    a) $HClO_{3(aq)}$.

    b) $HNO_{2(aq)}$.

    c) $HNO_{3(aq)}$.

    d) $HF_{(aq)}$.