SNC2D 06 - 07

The pH — of a solution indicates the concentration of the hydrogen ions, the **p**ower of the **H**ydrogen ion, that is the acid strength in a solution.

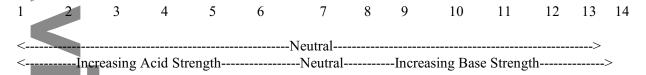
The pH scale ranges from $1 \rightarrow 14$

A pH value of < 7 indicates an acid solution, the lower the pH number, the stronger the acid.

A pH value of > 7 indicates a basic solution, the higher the pH value, the stronger the base.

A neutral solution is indicated by a pH value of 7.

The pH scale is represented as shown below:



The pH values of some common solutions are given in the pH scale below:

pH is measured on the log scale: $pH = -\log [H^{+1}]$

Using the logarithm scale is a convenient way to count a wide range of values by powers of 10.

One unit on the pH scale represents a tenfold (x10) effect.

The concept of pH makes working with very small numbers, such as 0.000 000 000 01, much easier. Using the log scale, it is possible to calculate the pH from the hydrogen ion concentration, [H⁺¹]:



[H ⁺¹] (mol/L)	рН
0.1	1
0.01	
0.001	
1 x 10 ⁻⁹	

For example:

pH 3 is 10 x more acidic than pH 4

pH 12 is 1000 x more basic than pH 9

pH 4 is 100 x more acidic than pH 6

Assignment					
1. How much more acidic is a solution with a pH of 4.5 compared to the solution with:					
(a) $pH = 5$.5	(b) pH =	= 6.5		
2. How much more basic is a solution with a pH of 12.5 compared to a solution with:					
(a) pH = 1	0.5	(b) $pH = 8$.	5		
3. Apples with	a pH of 3 are	acidic	than lemon jui	ce with a pH of 2.	
4. Bleach with	a pH of 12.4 is	m	nore basic than	blood with a pH of 7.3	
5. Stomach acid	d has a pH of 1.5, this	is	more acid	ic than tomatoes with a pH of	
pH Indicator A pH indicator is a substance that changes colour over some narrow range of pH values. Some indicators are shown below:					
Methyl orange	red to yellow		рН 3	3> 5	
Bromothymol blue	e yellow to blue	e	рН б	5> 8	
Phenolphthalein	colourless to	magenta	рН 8	3> 10	
Assignment 1. page 295 # 3	,4, page 299 # 1	1 – 6			
2. There are three sensors on a tongue. One part of the tongue has sensors of acids, another for					
bases, and another for salts. Sketch a diagram of the tongue and record the words sour taste, bitter					
taste and salty taste into the appropriate parts of the tongue.					
3. Enter a number from the tongue diagram into each box provided to the left of each substance:					
sea water	☐gastric juice	□Vinegar	□tears	☐Soap suds	

4. Identify	the acids, bases, and	I salts among the following list:				
	pH paper	Aqueous solution of the substance	Category (acid, base, salt)			
	red	Vitamin C				
	blue	Windex				
	red	carbonated drink (7-UP)				
Savi	dark blue	Tums antacid				
	green	table salt				
	blue	oven cleaner				
	green	Miracle Grow (sodium nitrate)				
	blue	baking soda				
0	red	Javex				
	5. The following substances, in solution, were used for some experiments:(i) Acetic acid(ii) sodium chloride(iii) hydrochloric acid					
	ssium hydroxide	(ii) sodium chloride (v) sodium hydroxide	(iii) hydrochloric acid (vi) sulphuric acid			
	(vii) Sodium hydrogen carbonate					
a) Pair each substance with its formula by entering the matching number from the above list in the box						
below: on the	e left. Enter an A, B o	or S in the boxes below to the right	for acid, base or salt:			
□ □ Ca(O	H) ₂	CH₃COOH □ □ NaCl	□ □ NaOH			
□ □ HCl □ □ KOH □ □ NaHCO ₃						
b) What is in the formula for acids that identifies them?						
c) What is in the formula for bases that identifies them?						
d) How is the formula for salts different?						
e) If the electrical conductivity apparatus was placed in each of the solutions above, what would be						
observed? Explain why?						
f) If equal volumes and equal concentrations of (iii) and (v) were to be mixed:						
(i) What nam	e is given to this type	of reaction?				

(iii) Write a balanced equation.

(ii) Name the substance formed.