Calculating pH Worksheet

1. Calculate the pH and pOH of the following acids.

a) 0.5 M perchloric acid, $HClO_4$

b) 1.3 M hydrochloric acid, HCl

c) 0.257 M nitric acid, HNO_3

d) 0.75 M sulfuric acid, H_2SO_4

2. Calculate the pH of 0.250 M $Al(OH)_3$.

3. Which of the following is possible for an acid ?

	Acid Strength	Concentration	pH
A	Strong	0.01 M	2
B	Weak	0.01 M	1
C	Strong	3 M	5.5
D	Weak	3 M	-0.5

4. A student records the pH of 0.1 M solutions of two monoprotic acids:

Acid	pH
X	4.0
Y	2.0

What can be concluded from the above data ?

Calculating pH Worksheet

1. Calculate the pH and pOH of the following acids.

a) 0.5 M perchloric acid, $HClO_4$

$pH = -\log [H^+] = -\log (0.5) = 0.3$

$pOH = 14 - pH = 14 - 0.3 = 13.7$

b) 1.3 M hydrochloric acid, HCl

$pH = -\log (1.3) = -0.11$

$pOH = 14 - (-0.11) = 14.11$

c) 0.257 M nitric acid, HNO_3

$pH = -\log (0.257) = 0.59$

$pOH = 14 - 0.59 = 13.61$

d) 0.75 M sulfuric acid, H_2SO_4

$pH = -2 \times \log (0.75) = -0.18$

$pOH = 14 - (-0.18) = 14.18$

2. Calculate the pH of 0.250 M $Al(OH)_3$.

$[OH^-] = 3 \times 0.250\ M = 0.750\ M$

$pOH = -\log [OH^-] = -\log (0.75) = 0.125$

$pH = 14 - pOH = 14 - 0.125 = 13.875$

3. Which of the following is possible for an acid ?

	Acid Strength	Concentration	pH
A	Strong	0.01 M	2
B	Weak	0.01 M	1
C	Strong	3 M	5.5
D	Weak	3 M	-0.5

Strong acids will ionize completely. $HA \rightleftharpoons H^+ + A^-$

$pH = -\log (0.01) = 2$. The answer is A.

4. A student records the pH of 0.1 M solutions of two monoprotic acids:

Acid	pH
X	4.0
Y	2.0

What can be concluded from the above data ?

If the acid is strong, 100% ionization will make $pH = -\log [0.1] = 1$. Since both acids have $pH > 1$, they did not complete ionization. Both are weak acids, with acid Y being a stronger weak acid.