pH worksheet 2

1) Find the pH of a 9.8×10^{-4} M HI solution.

2) Find the pH of a 2.76×10^{-4} M NaOH solution. (Hint: this is a basic solution – concentration is of OH^-)

3) Find the pH of a solution made by diluting 35 mL of 4.5 M HNO_3 to a final volume of 2.25 L.

4) Find the pH of 4.75 L of an aqueous solution that contains 3.20 grams of HCl and 1.85 grams of nitrous acid.

5) Find the pOH's for the solutions in problems 1 – 4 above:

#1) _____

#2) _____

#3) _____

#4) _____

Solutions

<u>Note</u>: The significant figures in the concentration of $[H^+]$ or $[OH^-]$ is equal to the number of decimal places in the pH or pOH and vice versa.

1) Find the pH of a 9.8×10^{-4} M HI solution.

$pH = -\log (9.8 \times 10^{-4}) = 3.01$

2) Find the pH of a 2.76×10^{-4} M NaOH solution.

$pOH = -\log (2.76 \times 10^{-4}) = 3.559$
$pH = 14.000 - 3.559 = 10.441$

3) Find the pH of a solution made by diluting 35 mL of 4.5 M HNO_3 to a final volume of 2.25 L.

$M_1V_1 = M_2V_2$

$M_2 = \frac{M_1V_1}{V_2} = \frac{(4.5\ M)(35\ mL)}{(2250\ mL)} = 0.070\ M$

$pH = -\log (0.070) = 1.15$

4) Find the pH of 4.75 L of an aqueous solution that contains 3.20 grams of HCl and 1.85 grams of nitrous acid.

$3.20\ g\ HCl \times \frac{1\ mole\ HCl}{36.45\ g\ HCl} = 0.0878\ mole\ HCl$

$1.85\ g\ HNO_2 \times \frac{1\ mole\ HNO_2}{47\ g\ HNO_2} = 0.0394\ mole\ HNO_2$

$0.0878\ mole\ HCl + 0.0394\ mole\ HNO_2 = 0.1272\ moles\ acid$

$\frac{0.1272\ moles\ acid}{4.75\ L\ H_2O} = 0.0268\ M\ acid\ solution$

$pH = -\log (0.0268) = 1.572$

5) Find the pOHs for the solutions in problems 1 – 4 above:

#1) **$pOH = 14.00 - 3.01 = 10.99$**

#2) **$pOH = 3.559$**

#3) **$pOH = 14.00 - 1.15 = 12.85$**

#4) **$pOH = 14.000 - 1.572 = 12.428$**