Name : _____ Date : _____

pH and pOH Worksheet

1. Calculate the pH and pOH for the following solutions:

a) $[H^+] = 1 \times 10^{-5}$ M

b) $[OH^-] = 3 \times 10^{-8}$ M

c) $[H^+] = 2.5 \times 10^{-2}$ M

d) $[OH^-] = 7.5 \times 10^{-3}$ M

e) $[H^+] = 1.2 \times 10^{-14}$ M

f) $[H^+] = 6.0$ M

2. Calculate $[H^+]$ and $[OH^-]$ for the following:

a) pH = 3.0

b) pOH = 2.6

c) pOH = 5.63

d) pH = 7.51

e) pOH = -1.13

f) pH = 0.03

3. 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

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pH and pOH Worksheet

1. Calculate the pH and pOH for the following solutions:

a) $[H^+] = 1 \times 10^{-5}$ M

$pH = -\log [H^+] = -\log (1 \times 10^{-5}) = 5$

$pOH = 14 - pH = 14 - 5 = 9$

b) $[OH^-] = 3 \times 10^{-8}$ M

$pOH = -\log [OH^-] = -\log (3 \times 10^{-8}) = 7.52$

$pH = 14 - pOH = 14 - 7.52 = 6.48$

c) $[H^+] = 2.5 \times 10^{-2}$ M

$pH = -\log [H^+] = -\log (2.5 \times 10^{-2}) = 1.6$

$pOH = 14 - pH = 14 - 1.6 = 12.4$

d) $[OH^-] = 7.5 \times 10^{-3}$ M

$pOH = -\log [OH^-] = -\log (7.5 \times 10^{-3}) = 2.12$

$pH = 14 - pOH = 14 - 2.12 = 11.88$

e) $[H^+] = 1.2 \times 10^{-14}$ M

$pH = -\log [H^+] = -\log (1.2 \times 10^{-14}) = 13.92$

$pOH = 14 - pH = 14 - 13.92 = 0.08$

f) $[H^+] = 6.0$ M

$pH = -\log [H^+] = -\log (6) = -0.78$

$pOH = 14 - pH = 14 + 0.78 = 14.78$

2. Calculate $[H^+]$ and $[OH^-]$ for the following:

a) pH = 3.0

$[H^+] = 10^{-pH} = 1 \times 10^{-3}$ M

$[OH^-] = 10^{-(14-pH)} = 10^{-(14-3)} = 1 \times 10^{-11}$ M

b) pOH = 2.6

$[OH^-] = 10^{-pOH} = 10^{-2.6} = 2.5 \times 10^{-3}$ M

$[H^+] = 10^{-(14-pOH)} = 10^{-(14-2.6)} = 10^{-(11.4)} = 3.98 \times 10^{-12}$ M

c) pOH = 5.63

$[OH^-] = 10^{-(5.63)} = 2.3 \times 10^{-6}$ M

$[H^+] = 10^{-(14-5.63)} = 10^{-(8.37)} = 4.3 \times 10^{-9}$ M

d) pH = 7.51

$[H^+] = 10^{-(7.51)} = 10^{-(7+0.51)} = 3.1 \times 10^{-8}$ M

$[OH^-] = 10^{-(14-7.51)} = 10^{-6.49} = 3.2 \times 10^{-7}$ M

e) pOH = -1.13

$[OH^-] = 10^{-(-1.13)} = 13.49$ M

$[H^+] = 10^{-(14+1.13)} = 10^{-(15.13)} = 7.4 \times 10^{-16}$ M

f) pH = 0.03

$[H^+] = 10^{-(0.03)} = 0.93$ M

$[OH^-] = 10^{-(14-0.03)} = 10^{-13.97} = 1.1 \times 10^{-14}$ M

3. 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

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

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