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a)

$[H^+] = .00100\,M$

$-\log[.00100] = 3.000$

(Acidic)

b)

$[H^+] = 2.19 \times 10^{-4}\,M$

$-\log\langle 2.19 \times 10^{-4}] = 3.660$

(Acidic)

c)

$[H^+] = 9.18 \times 10^{-11}\,M$

$-\log\langle 9.18 \times 10^{-11}] = 10.037$

(Basic)

d)

$[H^+] = 4.71 \times 10^{-7}\,M$

$-\log[4.71 \times 10^{-7}] = 6.327$

(acidic)

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Need $K_w = 1.0 \times 10^{-14}$ (for water)

so $pOH + pH = 14$!

to get $pH = 14 - pOH$

a) $[OH^-] = 1.00 \times 10^{-7} M$

$-\log[1.00 \times 10^{-7}] = 7.000$ pOH

$14 - 7 = 7$

pH = 7.00 (Neutral)

b) $[OH^-] = 4.59 \times 10^{-13}$

$pOH = -\log[4.59 \times 10^{-13}] = 12.338$

$pH = 1.662$ (acidic)

c) $[OH^-] = 1.04 \times 10^{-4} M$

$pOH = -\log[1.04 \times 10^{-4}] = 3.983$

$pH = 10.017$ (basic)

d) $pOH = -\log[7.00 \times 10^{-1}] = .155$

$pH = 13.845$ (basic)