Chemistry *Acids and Bases*

# Practice Problems

## ANSWERS

1a. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14 Pure Water [H1+] = [OH1-]

1. x 10-14 = x2 let x = [H1+]
2. x 10-7 = x

1a. 1.0 x 10-7 M

1b. pH = - log [H1+]

pH = - log [1.0 x 10-7]

pH = 7 (neutral)

1b. pH = 7

2a. NaOH 🡪 Na1+ + OH1-

0.1 M 0.1 M 0.1 M

Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [H1+] [0.1 M]

[H1+] = 1.0 x 10-13 M

2a. 1.0 x 10-13 M

2b. pH = - log [H1+]

pH = - log [1.0 x 10-13]

pH = 13 (base)

2b. pH = 13

3a. pH = - log [H1+]

1. = - log [H1+]

10x

(on your calculator) - 5 = [H1+]

[H1+] = 1.0 x 10-5 M

3a. 1.0 x 10-5 M

3b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [1.0 x 10-5] [OH1-]

[OH1-] = 1.0 x 10-9 M

3b. 1.0 x 10-9 M

4a. x mol HCl = 1.90 g HCl (1 mol HCl) = 0.052 mol HCl

(36.5 g HCl)

Molarity = mol / liters pH = - log [H1+]

M = (0.052 M) / 0.642 L pH = - log [0.081 M]

[HCl] = 0.081 M pH = 1.1 (acid)

4a. 0.081 M

Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [0.081 M] [OH1-]

[OH1-] = 1.2 x 10-13 M

4b. 1.2 x 10-13 M

5a. x mol KOH = 16.3 g KOH (1 mol KOH) = 0.2906 mol KOH

(56.1 g KOH)

Molarity = mol / liters

M = (0.2906 M) / 4.07 L

[KOH] = 0.0714 M

KOH 🡪 K1+ + OH1-

0.0714 M 0.0714 M 0.0714 M

5a. 0.0714 M

5b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [H1+] [0.0714 M]

[H1+] = 1.4 x 10-13 M

5b. 1.4 x 10-13 M

5c. pH = - log [H1+]

pH = - log [1.4 x 10-13 M]

pH = 12.8 (base) 5c. 12.8

6a. x mol H2SO4  = 0.314 g H2SO4  (1 mol H2SO4 ) = 3.2 x 10-3 mol H2SO4

(98.1 g H2SO4)

H2SO4  🡪 2 H1+ + SO42-

0.0032 M 0.0064 M 0.0032 M

6a. 0.0064 M

6b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [0.0064 M] [OH1-]

[OH1-] = 1.56 x 10-12 M

6b. 1.56 x 10-12 M

6c. pH = - log [H1+]

pH = - log [0.0064M]

pH = 2.2 (acid) 6c. 2.2

7a. x mol Ba(OH)2  = 0.009 g Ba(OH)2   (1 mol Ba(OH)2  ) = 5.25 x 10-5 mol Ba(OH)2

(171.3 g Ba(OH)2  )

Molarity = mol / liters

M = (5.25 x 10-5 M) / 3.55 L

[Ba(OH)2 ] = 1.48 x 10-5 M

Ba(OH)2  🡪 Ba2+ + 2 OH1-

1.48 x 10-5 M 2.96 x 10-5 M

7a. 2.96 x 10-5 M

7b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14= [H1+] [2.96 x 10-5 M]

[OH1-] = 3.38 x 10-10 M

7b. 3.38 x 10-10 M

7c. pH = - log [H1+]

pH = - log [3.38 x 10-10 M]

pH = 9.47 (base) 7c. 9.47

8a. pH = 5.17 [H1+] = ?

pH = - log [H1+]

* 1. = - log [H1+]

log

2nd

(on your calculator) - 5.7 = [H1+]

10x

[H1+] = 2.0 x 10-6 M

8a. 2.0 x 10-6 M

8b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [2.0 x 10-6 M] [OH1-]

[OH1-] = 5.0 x 10-9 M

8b. 5.0 x 10-9 M

9a. pH = 9.22 [H1+] = ?

pH = - log [H1+]

9.22 = - log [H1+]

log

2nd

(on your calculator) - 9.2 = [H1+]

10x

[H1+] = 6.0 x 10-10 M

9a. 6.0 x 10-10 M

9b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

1. x 10-14 = [6.0 x 10-10 M] [OH1-]

[OH1-] = 1.7 x 10-5 M

9b. 1.7 x 10-5 M