Chemistry *Acids and Bases*

# Practice Problems

##  ANSWERS

1a. 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

1a. 1.0 x 10-13 M

1b. pH = - log [H1+]

 pH = - log [1.0 x 10-13]

 pH = 13 (base)

1b. pH = 13

2a. pH = - log [H1+]

1. = - log [H1+]

10x

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

[H1+] = 1.0 x 10-5 M

2a. 1.0 x 10-5 M

2b. 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

2b. 1.0 x 10-9 M

3a. 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 mol) / 0.642 L pH = - log [0.081 M]

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

3a. 0.081 M

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

Kw = 1.0 x 10-14

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

[OH1-] = 1.2 x 10-13 M

3b. 1.2 x 10-13 M

3c. pH = - log [H1+]

pH= - log [0.0811 M]

 [pH = 1.09

3c. pH = 1.09

4a. x mol KOH = 16.3 g KOH (1 mol KOH) = 0.2906 mol KOH

 (56.1 g KOH)

 Molarity = mol / liters

 M = (0.2906 mol) / 4.07 L

 [KOH] = 0.0714 M

 KOH 🡪 K1+ + OH1-

 0.0714 M 0.0714 M 0.0714 M

4a. 0.0714 M

4b. Kw = [H1+] [OH1-]

Kw = 1.0 x 10-14

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

[H1+] = 1.4 x 10-13 M

4b. 1.4 x 10-13 M

4c. pH = - log [H1+]

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

 pH = 12.8 (base) 4c. 12.8

5a. x mol H2SO4 = 0.314 g H2SO4 (1 mol H2SO4) = 0.0032 mol H2SO4

 (98 g H2SO4)

 Molarity = mol / liters

 M = (0.032 mol) / 10.79 L

 [H2SO4] = 2.97 x 10-4 M H2SO4

 H2SO4 🡪 2 H1+ + SO42-

 0.000297 M 0.000594 M 0.000297 M

5a. 0.000594 M

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

Kw = 1.0 x 10-14

1x 10-14 = [OH1-] [0.000594 M]

[OH1-] = 1.68 x 10-11 M

5b. 1.68 x 10-11 M

5c. pH = - log [H1+]

pH = - log [5.94 x 10-4 M]

 pH = 3.23 (acid) 5c. 3.23

6a. 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

6a. 2.96 x 10-5 M

6b. 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

6b. 3.38 x 10-10 M

6c. pH = - log [H1+]

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

 pH = 9.47 (base) 6c. 9.47

7a. [H3O+] = 10-pH

[H3O+] = 10-5.17

[H3O+] = 6.76 x 10-6 M 7a. 6.76 x 10-6 M

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

Kw = 1.0 x 10-14

1x 10-14 = [OH1-] [6.76 x 10-6 M]

[OH1-] = 1.48 x 10-9 M 7b. 1.48 x 10-9 M

8a. [H3O+] = 10-pH

[H3O+] = 10-9.22

[H3O+] = 6.0 x 10-10 M 7a. 6.0 x 10-10 M

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

Kw = 1.0 x 10-14

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

[OH1-] = 1.48 x 10-9 M 7b. 1.48 x 10-9 M

8b. 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

 8b. 1.7 x 10-5 M

9. x mol H3PO4  = 5.61 g H3PO4 (1 mol H3PO4) = 0.057 mol H3PO4

 (98 g H3PO4)

Molarity = mol / liters

 M = (0.057mol ) / 0.0783 L

 [H3PO4] = 0.731 M

 H3PO4 🡪 3 H1+ + PO43-

 0.731 M 2.19 M

9. 2.19 M