What is Acid-Base Equilibrium?

Worksheet

At equilibrium, [H][A]/[HA] = Ka for weak acids. Equilibrium position depends on acid strength (Ka) and concentration.

Questions

1. Weak acid at equilibrium: strong presence of

A) H only
B) A only
C) both HA and A
D) neither

2. If Ka increases, acidity

A) decreases
B) increases
C) stays same
D) undefined

3. At equilibrium, which rate equals which?

A) forward reverse
B) forward = reverse
C) forward >> reverse
D) no rate

4. Neutral solution at 25 C: [H] = ?

A) 1 M
B) 0.1 M
C) 1 10 M
D) 1 10 M

5. A 0.1 M acetic acid (CHCOOH) solution has Ka = 1.8 10. Find [H] at equilibrium.

6. A 0.05 M ammonia (NH) solution, Kb = 1.8 10. Find [OH].

7. At 25 C, Kw = 1.0 10. If pH = 5, find pOH.

8. Define: What is an acid-base equilibrium?

9. Define: What is Ka?

10. Define: Weak vs strong acid equilibrium?

Answer Key

1. C) both HA and A - Weak acids only partially ionize; both forms coexist.
2. B) increases - Larger Ka = more H released = stronger acid.
3. B) forward = reverse - Equilibrium: ionization rate = recombination rate.
4. C) 1 10 M - pH = 7 [H] = 10 M = 1 10 M.
5. Ka = [H][A]/[HA] 1.8 10 = x/(0.1 x) x/0.1 (if x << 0.1) x = 1.8 10, x = 1.34 10 M [H] 1.34 10 M
6. Kb = [NH][OH]/[NH] 1.8 10 = x/(0.05 x) x/0.05 x = 9 10, x = 9.49 10 M [OH] 9.49 10 M
7. pH + pOH = 14 pOH = 14 5 = 9 [OH] = 10 = 1 10 M
8. The dynamic balance in which forward ionization and reverse neutralization occur at equal rates.
9. The acid dissociation constant; larger Ka = stronger acid (more ionization).
10. Weak: significant [HA] remains, mixture of acid & conjugate base. Strong: complete ionization.