Dougherty Valley HS Chemistry - AP
Acid Base – NChO Practice

Worksheet #7

Name: **Period:** **Seat#:**

Directions: Show all work and/or annotate with an AP Chem level explanation for non-math answers.

1999 NChO Exam

1. Which oxide forms a basic solution when mixed with water?

(A) K_2O (C) CO_2
(B) Al_2O_3 (D) SO_3

35. Which 0.1 M solution has the highest pH?

(A) sodium carbonate
(B) sodium chloride
(C) ammonium carbonate
(D) ammonium chloride

36. Which is the strongest acid?

(A) acetic acid - ($K_a = 1.8 \times 10^{-5}$)
(B) benzoic acid - ($K_a = 6.3 \times 10^{-5}$)
(C) formic acid - ($K_a = 1.8 \times 10^{-4}$)
(D) nitrous acid - ($K_a = 6.0 \times 10^{-4}$)

37. What is the order of concentration of the ions and molecules in a nitrous acid solution? Nitrous acid, HNO_2, is a weak acid.

(A) $H_3O^+ = NO_2^- > HNO_2 > OH^-$
(B) $H_3O^+ = NO_2^- = HNO_2 = OH^-$
(C) $HNO_2 > H_3O^+ = NO_2^- > OH^-$
(D) $HNO_2 > NO_2^- > H_3O^+ > OH^-$

1998 NChO Exam

33. A water solution of sodium carbonate, Na_2CO_3, has a pH greater than 7 because

(A) it contains more carbonate ions than water molecules.
(B) it contains more sodium ions than carbonate ions.
(C) sodium ions react with water.
(D) carbonate ions react with water.

34. Which species dissociates most completelyin water solution?

(A) NH_4^+ (C) HNO_3
(B) H_2CO_3 (D) HSO_4^-

37. According to Brønsted -Lowry Theory,which of these species cannot be amphoteric?

(A) NH_4^+ (aq) (C) NH_2^{1-} (aq)
(B) NH_3 (aq) (D) NH^{2-} (aq)

1997 NChO Exam

34. Which acid reacts with NaOH to form sodium hypochlorite (the ingredient inhousehold bleach)?

(A) HOCl (C) $HOClO_2$
(B) HOClO (D) $HOClO_3$

35. Which of these acids is the strongest inaqueous solution?

(A) H_3PO_4 (C) $HClO_3$
(B) H_2SO_3 (D) HOCl

37. Normal rain water has a pH of 5.6. This is best explained by the presence of

(A) nitrogen oxides.
(B) carbon dioxide.
(C) sulfur oxides.
(D) particulates.

38. In a 0.050 M solution of a weak monoprotic acid, $[H^+] = 1.8 \times 10^{-3}$. What is its K_a?

(A) 3.6×10^{-2} (C) 6.7×10^{-5}
(B) 9.0×10^{-5} (D) 1.6×10^{-7}

1996 NChO Exam

34. According to the Brønsted-Lowry definition, a base is a substance that

(A) increases the hydroxide ion concentration in water.
(B) can react with water to form OH^- ions.
(C) can donate an electron pair to form acovalent bond.
(D) can accept a proton from an acid.

35. What is the pH of a 0.02 M solution of KOH?

(A) 12.3 (C) 2.0
(B) 12.0 (D) 1.7

36. Which couple is not a conjugate acid-basepair?

(A) HCO_3^- and CO_3^{2-}
(B) H_3O^+ and H_2O
(C) $H_2PO_4^-$ and $PO4^{3-}$
(D) NH_3 and NH_2^-

37. These acids are listed in order of decreasing acid strength in water. HI > HNO_2 > CH_3COOH > HCN
According to the Brønsted-Lowry theory,which anion is the weakest base?

(A) I^- (C) CH_3COO^-
(B) NO_2^- (D) CN^-

38. What is the $[H^+]$ in a 0.40 M solution of HOCl?

Substance	Equilibrium Constant, K_a
HOCl	3.5×10^{-8}

(A) 1.4×10^{-8} M (C) 1.9×10^{-4} M(B)
1.2×10^{-4} M (D) 3.7×10^{-4} M

39. Which of these salts will give a basic solution when added to water?

(A) NH_4NO_3 (C) $Ca(NO_3)_2$
(B) $NH_4C_2H_3O_2$ (D) $Ca(C_2H_3O_2)_2$

1995 NChO Exam

2. When sodium oxide, Na_2O, is added to water, the major products expected are

(A) Na^+ and OH^- ions
(B) Na^+ ions and H_2O
(C) Na^+ and O^{2-} ions
(D) Na^+ and OH^- ions, and O_2 gas

36. At 0 °C the ion product constant of water, K_w, = 1.2×10^{-15} The pH of pure water at this temperature is

(A) 6.88 (C) 7.46
(B) 7.00 (D) 7.56

37. What is the $[H^+]$ in a 0.010 M solution of HCN? The equilibrium constant, K_a, forHCN equals 6.2×10^{-10}

(A) 3.6×10^{-3} M (C) 1.0×10^{-7} M
(B) 2.5×10^{-6} M (D) 6.2×10^{-10} M\

38. HCN (aq) + HCO_3^- (aq) ↔ CN^- (aq) + H_2CO_3 (aq)
If the value of the equilibrium constant, K, is less than 1, what is the strongest base in this system?

(A) HCN (C) CN^-
(B) HCO_3^- (D) H_2CO_3

40. The conjugate acid of the bicarbonate ion, HCO_3^-, in H_2O is

(A) H_3O^+ (C) OH^-
(B) CO_3^{2-} (D) H_2CO_3

41. The sodium salt, NaA, of a weak acid is dissolved in water and no other substance isadded. Which of the following statements iscorrected?

(A) $[H^+] = [A^-]$ (C) $[A^-] = [OH^-]$
(B) $[H^+] = [OH^-]$ (D) $[HA] = [OH^-]$

42. Which of these ions is predicted to produce the most acidic solution when dissolved in H_2O?

(A) K^+ (C) Co^{2+}
(B) Ba^{2+} (D) Fe^{3+}

43. When 0.10 M solutions of solutes; $HClO_4$, NH_4Br, KOH, KCN, are arranged in order in increasing $[H^+]$, the correct order is:

(A) KOH < KCN < NH_4Br < $HClO_4$
(B) KCN < KOH < $HClO_4$ < NH_4Br
(C) $HClO_4$ < NH_4Br < KCN < KOH
(D) NH_4Br < $HClO_4$ < KOH < KCN

Answers

1999	1998	1997	1996	1995
1) A	33) D	34) A	34) D	2) A
35) A	34) C	35) C	35) A	36) C
36) D	37) A	37) B	36) C	37) B
37) C		38) C	37) A	38) C
			38) B	40) D
			39) D	41) D
				42) D
				43) A