Name: _____ period: _____ date: _____

Ch. 16 acid, base, pH **test** 60 points ngss chemistry

In problems involving any calculation, show your work in an organized manner, include (i) any relevant equation (or formula), (ii) conversion factor(s), (iii) put the proper units in your calculations and answer, and (iv) have the proper number of significant figures in your answer.

1. Write the chemical equation describing the reaction between water and ___. [6 points]
   a. $HNO_3$

$HNO_3 + H_2O \rightarrow H_3O^+ + NO_3^-$

2pt@

   b. $HC_2H_3O_2$ (hint: name = acetic acid)

$HC_2H_3O_2 + H_2O \rightarrow H_3O^+ + C_2H_3O_2^-$

   c. $CH_3NH_2$

$CH_3NH_2 + H_2O \rightarrow CH_3NH_3^+ + OH^-$

2. Write the chemical equation showing the dissociation of ___. [4 points]
   a. HBr

$HBr \rightarrow H^+ + Br^-$

2pt@

   b. LiOH

$LiOH \rightarrow Li^+ + OH^-$

3. Fill-in the below blanks. [6 points]

2pt@

   a. HCl and KOH → $H_2O + KCl$

   b. $NH_3$ + HCl → $NH_4^+ + Cl^-$

   c. KOH + $HC_6H_5CO_2$ (hint: name = benzoic acid) → $H_2O + KC_6H_5CO_2$

4. What is the difference between a strong versus weak acid? base? [4 points]

$K >> 1$ $K << 1$

OH-

H+

react/dissociate: completely or fully partial or incompletely

5. Using chemical equation(s), describe how evaluated atmospheric carbon dioxide can lead to ocean acidification; include the "phase" (e.g: g, l, s, aq) of each chemical to clarify your response. [10 points]

3pt

$CO_2(g) \rightleftharpoons CO_2(aq)$

3 $CO_2(aq) + H_2O(l) \rightleftharpoons H_2CO_3(aq)$

4 $H_2CO_3(aq) \rightleftharpoons H^+ + HCO_3^-$

6. What is the pH of the below strong acid or base ? [10 points]

a. 125 mM $HNO_3$

$pH = -\log [H^+] = -\log [HNO_3]$

$= -\log (125 \cdot 10^{-3})$

$\approx 0.90$

b. 125 mM KOH

i) $pOH = -\log [OH^-] = -\log [KOH] = -\log (0.125) = 0.903$

ii) $pOH + pH = 14$

$pH = 14 - pOH$

$= 14 - 0.9$

$= 13.671$

7. solve. [20 points]

a. if $[H^+] = 25$ mM, then $[OH^-] =$ ___

$[H^+][OH^-] = 10^{-14}$

$(25 \cdot 10^{-3})[OH^-] = 10^{-14}$

$[OH^-] = 4 \cdot 10^{-13}$ M

b. if $[H^+] = 75$ mM, then pH = ___

$pH = -\log [H^+]$

$= -\log (75 \cdot 10^{-3})$

$= 1.12$

c. if pH = 3.7, then $[H^+] =$ ___

$pH = -\log [H^+]$

$[H^+] = 10^{-pH}$

$= 10^{-3.7}$

$= 2.0 \cdot 10^{-4}$ M

d. if $[OH^-] = 125$ mM, then pH = ___

i) $[H^+][OH^-] = 10^{-14}$

$[H^+](125 \cdot 10^{-3}) = 10^{-14}$

$[H^+] = 8 \cdot 10^{-14}$

ii) $pH = -\log [H^+]$

$= -\log (8 \cdot 10^{-14})$