

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



b. $\text{HC}_2\text{H}_3\text{O}_2$ (hint: name = acetic acid)



c. CH_3NH_2



2. Write the chemical equation showing the dissociation of _____. [4 points]

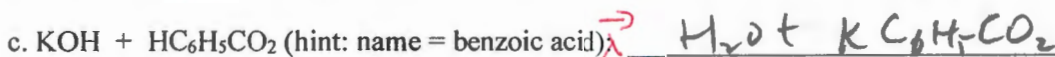
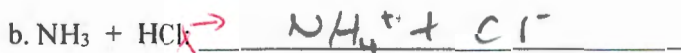
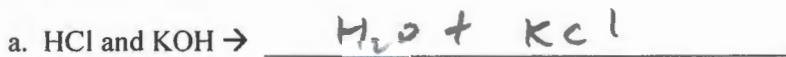
a. HBr



b. LiOH



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



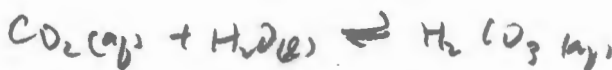
* 4. What is the difference between a strong versus weak acid? base? [4 points]

$K \gg 1$

$K \ll 1$

react/dissociate: completely or partially
fully in completely

5. Using chemical equation(s), describe how elevated 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]



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

a. 125 mM HNO_3

$$\begin{aligned} \text{pH} &= -\log [\text{H}^+] = -\log [\text{HNO}_3] \\ &= -\log (125 \cdot 10^{-3}) \\ &= 0.98 \end{aligned}$$

b. 125 mM KOH

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

$$\begin{aligned} \text{ii) } \text{pOH} + \text{pH} &= 14 \\ \text{pH} &= 14 - \text{pOH} \\ &= 14 - 0.903 \\ &= \boxed{13.097} \end{aligned}$$

7. solve. [20 points]

a. if $[\text{H}^+] = 25 \text{ mM}$, then $[\text{OH}^-] = \underline{\hspace{2cm}}$

$$\begin{aligned} [\text{H}^+] [\text{OH}^-] &= 10^{-14} \\ (25 \cdot 10^{-3}) [\text{OH}^-] &= 10^{-14} \\ [\text{OH}^-] &= 4 \cdot 10^{-13} \text{ M} \end{aligned}$$

b. if $[\text{H}^+] = 75 \text{ mM}$, then $\text{pH} = \underline{\hspace{2cm}}$

$$\begin{aligned} \text{pH} &= -\log [\text{H}^+] \\ &= -\log (75 \cdot 10^{-3}) \\ &= 1.12 \end{aligned}$$

c. if $\text{pH} = 3.7$, then $[\text{H}^+] = \underline{\hspace{2cm}}$

$$\begin{aligned} \text{pH} &= -\log [\text{H}^+] \\ [\text{H}^+] &= 10^{-\text{pH}} \\ &= 10^{-3.7} \\ &= 1.2 \cdot 10^{-4} \text{ M} \end{aligned}$$

d. if $[\text{OH}^-] = 125 \text{ mM}$, then $\text{pH} = \underline{\hspace{2cm}}$

$$\begin{aligned} \text{i) } [\text{H}^+] [\text{OH}^-] &= 10^{-14} \\ [\text{H}^+] (125 \cdot 10^{-3}) &= 10^{-14} \\ [\text{H}^+] &= 8 \cdot 10^{-14} \\ \text{ii) } \text{pH} &= -\log [\text{H}^+] \\ &= -\log (8 \cdot 10^{-14}) \end{aligned}$$