

Recitation Worksheet 7 (10/27/2020)

Name:

UGA ID:

Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname).
- Your UGA myID is a combination of letters and numbers (example: mine is wpe28548). **Do not use your 81x number.**
- If you do not have a printer, type your answers in the then upload the worksheet template to Gradescope by Tuesday, March 23 at 11:59 p.m. Write your work on separate sheets of paper, convert to a PDF and upload to eLC.
- If you have a printer download the worksheet, convert it to a PDF and upload to Gradescope by Tuesday, March 23 at 11:59 p.m. You do not need to upload anything to eLC.
- For full credit, **show your work.**

1. A sample of apple juice has a pOH of 10.24. Calculate the hydronium ion concentration.

M

2. The ion product constant for water varies with temperature as shown in the table. We can conclude that as water is heated,

- A. $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ both decrease
- B. $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ both increase
- C. $[\text{H}_3\text{O}^+]$ increases and $[\text{OH}^-]$ decreases
- D. $[\text{H}_3\text{O}^+]$ decreases and $[\text{OH}^-]$ increases

| T (°C) | K_w |
|--------|------------------------|
| 0.0 | 0.12×10^{-14} |
| 25.00 | 1.00×10^{-14} |
| 60.00 | 9.60×10^{-14} |

3A. A solution has a pH = 10.82. The $[\text{H}_3\text{O}^+]$ in this solution is

- A. $1.5 \times 10^{-11} \text{ M}$
- B. $6.6 \times 10^{-10} \text{ M}$
- C. $1.5 \times 10^{-5} \text{ M}$
- D. $6.6 \times 10^{-4} \text{ M}$

3B. The $[\text{OH}^-]$ in this solution is

- A. $1.5 \times 10^{-11} \text{ M}$
- B. $6.6 \times 10^{-10} \text{ M}$
- C. $1.5 \times 10^{-5} \text{ M}$
- D. $6.6 \times 10^{-4} \text{ M}$

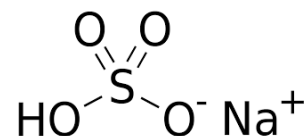
4. Which of the following are Bronsted-Lowry Acids?

- A. HCl
- B. RbOH
- C. H_2O
- D. CH_3OH
- E. None of these

5. Which of the following are Bronsted-Lowry bases?

- A. $\text{Ca}(\text{OH})_2$
- B. NH_3
- C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- D. None of these

6. Sodium bisulfate, NaHSO_4 , is used in some household cleansers because it contains the HSO_4^- ion, a weak acid. What is the pH of a 0.50 M solution of HSO_4^- ? $K_a = 1.2 \times 10^{-2}$.

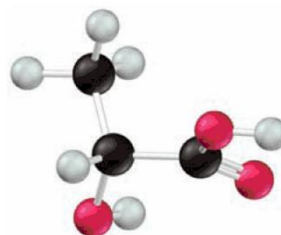


7. Which of these acid solutions has the higher $[\text{H}_3\text{O}^+]$?

- A. $1 \times 10^{-3} \text{ M HIO}_3$ ($K_a = 1.6 \times 10^{-1}$)
- B. 1 M HClO_2 ($K_a = 1.1 \times 10^{-2}$)

8. What are the two species in highest concentration in a 0.1 M solution of lactic acid ($\text{CH}_3\text{CH}(\text{OH})\text{COOH}$), ($K_a = 1.4 \times 10^{-4}$)

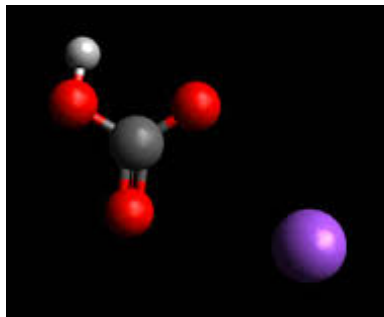
- A. $\text{CH}_3\text{CH}(\text{OH})\text{COO}^-$ and H_3O^+
- B. $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$ and H_3O^+
- C. H_2O and H_3O^+
- D. $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$ and H_2O
- E. OH^- and H_3O^+



▲ Lactic acid,
 $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$.

9. What is the conjugate acid of HCO_3^- ?

- A. H_3O^+
- B. H_2O
- C. CO_3^{2-}
- D. OH^-
- E. H_2CO_3



10. Which of the following is **not** a conjugate acid-base pair?

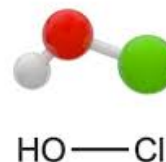
- A. $\text{NH}_4^+/\text{NH}_3$
- B. $\text{H}_3\text{O}^+/\text{OH}^-$
- C. $\text{H}_2\text{SO}_3/\text{HSO}_3^-$
- D. $\text{C}_2\text{H}_3\text{O}_2^-/\text{HC}_2\text{H}_3\text{O}_2$
- E. All of the above are conjugate acid-base pairs.

11. What is the concentration of hydroxide ions in pure water at 30.0 °C, if K_w at this temperature is 1.47×10^{-14} ?

M

12. Determine the $[\text{H}_3\text{O}^+]$ in a 0.265 M HClO solution. The K_a of HClO is 2.9×10^{-8} .

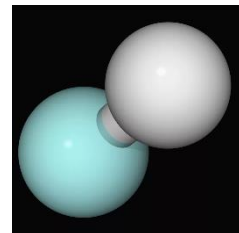
M



13. Find the percent ionization of a 0.337 M HF solution. The K_a for HF is 3.5×10^{-4} .

%

14. Determine the K_a of an acid whose 0.294 M solution has a pH of 2.80.



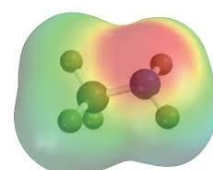
15. Determine the $[\text{OH}^-]$ concentration in a 0.169 M $\text{Ca}(\text{OH})_2$ solution.

M

16. Determine the K_b for CN^- at 25°C. The K_a for HCN is 4.9×10^{-10} .

17. The base-dissociation constant of methylamine (CH_3NH_2) is 6.4×10^{-4} at 25.0 °C. The $[\text{H}^+]$ in a 1.6×10^{-2} M solution of methylamine is _____ M.

M



18. The pictures represent aqueous solutions of three acids HA (A = X, Y, or Z); water molecules have been omitted for clarity. Which acid has the **smallest** value of K_a ?

- A. HX
- B. HY
- C. HZ
- D. All have the same K_a value.

