

Chapter 16 Worksheet 2 (acid strength)

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 Monday, March 22 at 11:59 pm. 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 Monday, March 22 at 11:59 pm. You do not need to upload anything to eLC.

1.

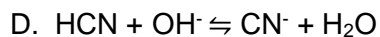
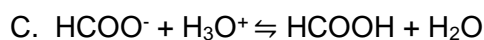
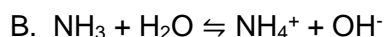
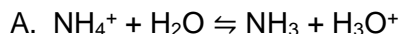
| | Acid | K_a | pK_a |
|---|--------------|------------------------|--------|
| A | C_6H_5COOH | 6.30×10^{-5} | 4.201 |
| B | $HCOOH$ | 1.80×10^{-4} | 3.745 |
| C | HCN | 6.20×10^{-10} | 9.208 |
| D | HBr | 1.00×10^9 | -9.000 |
| E | HF | 6.60×10^{-4} | 3.180 |

A. Which of these acids is a strong acid?

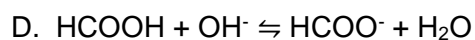
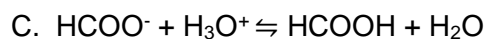
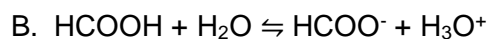
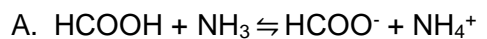
B. Leaving out HBr , if we made separate 0.10 M solutions of each of the other acids, which one would have the greatest concentration of hydronium ion?

C. Which acid will have the smallest percent dissociation when its starting concentration is 0.10 M?

2. The equilibrium constant for which of these reactions in water is an acidity constant?



3. K_a for HCOOH is the equilibrium constant for which of these reactions in water?



4. Arrange these acids from weakest to strongest.

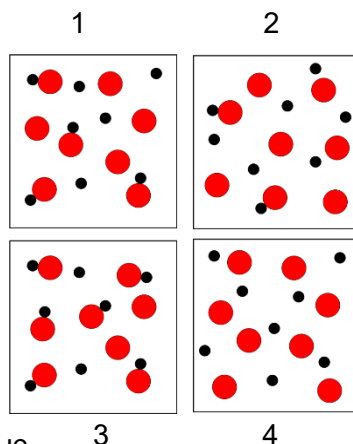
A. $1 < 2 < 3 < 4$

B. $4 < 2 < 1 < 3$

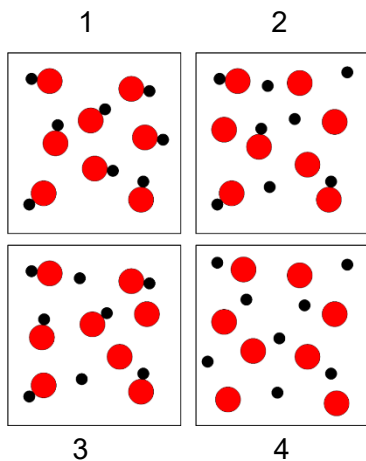
C. $2 < 4 < 3 < 1$

D. $3 < 1 < 2 < 4$

E. $2 < 4 < 3 < 1$



5. Which of these images best represents a strong acid?



6. A sample of 6.00 g of acetic acid ($\text{CH}_3\text{CO}_2\text{H}$) is diluted with enough water to make 1 L of solution. After equilibrium had been reached, the pH was measured to be 2.87. What is the $\text{p}K_a$ of acetic acid?

7. Which of these are possible conjugate acids or bases to the anion in sodium dihydrogen phosphate?

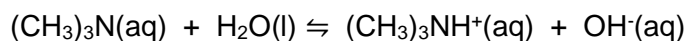
- A. hydrogen phosphate ion
- B. phosphate ion
- C. phosphoric acid
- D. tetrahydrogen phosphate
- E. None of these

8. A. What is the pH of a 0.025 M solution of hydrobromic acid, HBr? $K_a = 1.00 \times 10^9$

B. What is the pH of the solution if we double the concentration of hydrobromic acid, HBr?

$K_a = 1.00 \times 10^9$

9. Find the concentration of hydroxide ion in a 0.25 M solution of trimethylamine, a weak base. $K_b = 6.3 \times 10^{-5}$.



10. Formic acid, HCO_2H , is the irritant that causes the body's reaction to ant stings. What is the concentration of hydronium ion and the pH in a 0.534 M solution of formic acid? $K_a = 1.8 \times 10^{-4}$.



11. In a sample of pure water, only one of the following statements is **always** true at all conditions of temperature and pressure. Which one is always true?

- A. $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-7} \text{ M}$
- B. $[\text{OH}^-] = 1.0 \times 10^{-7} \text{ M}$
- C. $\text{pH} = 7.0$
- D. $\text{pOH} = 7.0$
- E. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$

12. If K_w is 2.9×10^{-15} at 10°C , what is the pH of pure water at 10°C ?

- A. 6.72
- B. 7.00
- C. 7.27
- D. 7.53
- E. none of these

13. What is the percent ionization of a 1.2 M HF solution? K_a for HF is $6.8\text{E-}4$.

- A. 2.4 %
- B. 4.2 %
- C. 0.84 %
- D. 0.082 %
- E. 0.22 %

14. Which of the following is **true** about a 0.10 M solution of a weak acid, HX?

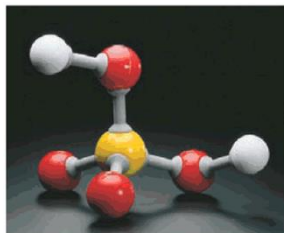
- A. $[\text{X}^-] = 0.10 \text{ M}$
- B. $\text{pH} = 1$
- C. $[\text{HX}] > [\text{H}^+]$
- D. $[\text{H}^+] = 0.10 \text{ M}$
- E. both b and d

15. What is the pH of 500 mL of solution containing 0.0124 grams of $\text{Ca}(\text{OH})_2$?

- A. 11.04
- B. 9.68
- C. 2.96
- D. 3.17
- E. 10.83

16. Sulfuric acid, H_2SO_4 , is one of the six strong common acids. It has two ionizable protons. What is the **approximate** concentration of H_3O^+ in a 2 M solution?

- A. 1 M
- B. 2 M
- C. 4 M
- D. 2.5 M



▲ Sulfuric acid, H_2SO_4 .