

1. What is the conjugate acid of HAsO_4^{2-} ? (2 pt) H_2AsO_4^-

2. What is the conjugate base of $\text{HC}_3\text{H}_2\text{O}_4^-$? (2 pt) $\text{C}_3\text{H}_2\text{O}_4^{2-}$

A 3. Which of the following is not a strong acid? (2 pt)

- A. HF B. HNO_3 C. HClO_4 D. H_2SO_4 E. all of these are strong acids

B 4. Which one of the following statements about strong acids is *true*?

- A. All strong acids contain H bonded to an oxygen atom.
 B. Strong acids are 100% ionized in water.
 C. The conjugate base of a strong acid is itself a strong base.
 D. Strong acids produce solutions with a higher pH than weak acids.

C 5. In the reaction $\text{H}_2\text{CO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{HCO}_3^- + \text{H}_3\text{O}^+$, the Brønsted Lowry acids are

- A. H_2CO_3 and H_2O B. H_2O and H_3O^+ C. H_3O^+ and H_2CO_3 D. H_2O and HCO_3^-

6. The pOH of a solution is 10.25.

a) What are the pH, $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ for this solution? Make sure to show the formulas used and express your answers with the proper number of significant figures. (6 pts)

$$[\text{OH}^-] = 10^{-10.25} = 5.6 \times 10^{-11} \text{ M}$$

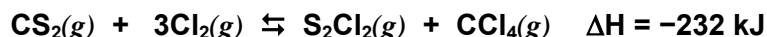
$$\text{pH} = 14 - 10.25 \quad \text{pH} = 3.75$$

$$[\text{H}^+] = 10^{-3.75} \quad [\text{H}^+] = 1.8 \times 10^{-4} \text{ M}$$

b) Is the solution in question 6a acidic, basic or neutral? (2 pt)

Acidic

7. Consider the following reaction:



For parts a-e, predict the effect of the following changes on the position of equilibrium (left, right, no change), when each of the following changes is made (12 pts):

a. Adding more $\text{CCl}_4(g)$ Left

b. Increasing the pressure Right

c. Removing some $\text{Cl}_2(g)$ Left

d. Decreasing the temperature Right

e. Adding a catalyst No Change

f. If the temperature of the reaction is decreased, does the value of K_c increase, decrease or stay the same?

Increases