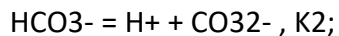
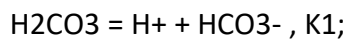


## Answer on Question #80138 - Chemistry - Physical Chemistry

Question:

Find the concentrations of  $[H]^+$ ,  $HCO_3^-$ , and  $CO_3^{2-}$  in a 0.01M solution of carbonic acid if the pH of solution is 4.18. [ $k_1=4.45 \times 10^{-7}$   $k_2=4.69 \times 10^{-11}$ ]

**Solution:**



$$[HCO_3^-] = \sqrt{K_1 \cdot C(H_2CO_3)} = (4.45 \times 10^{-7} \cdot 0.01)^{1/2} = (4.45 \times 10^{-9})^{1/2} = 6.67 \times 10^{-5} \text{ M};$$

$$[H^+]_1 = [HCO_3^-] = 6.67 \times 10^{-5} \text{ M};$$

$$[CO_3^{2-}] = \sqrt{K_2 \cdot C(HCO_3^-)} = (4.69 \times 10^{-11} \cdot 6.67 \times 10^{-5})^{1/2} = (3.13 \times 10^{-15})^{1/2} = 5.59 \times 10^{-8} \text{ M};$$

$$[H^+]_2 = [CO_3^{2-}] = 5.59 \times 10^{-8} \text{ M};$$

$$[H^+]_{\text{total}} = [H^+]_1 + [H^+]_2 = 6.68 \times 10^{-5} \text{ M};$$

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