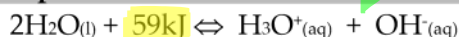


Effect of Temperature on Kw

January 17, 2018 11:08 PM

Effect of Temperature on Kw



This reaction is ENDOthermic in the forward direction and EXOTHERMIC in the reverse direction.

If temperature is increased, in what direction will a shift occur?

shift to favor the endothermic rxn. ∴ FWD rxn shift RIGHT

How does this affect $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$?

↑ of $[\text{H}_3\text{O}^+]$ and ↑ $[\text{OH}^-]$

How does this affect the value of K_w ?

$K_w = [\text{H}_3\text{O}^+][\text{OH}^-]$ ∴ K_w will increase

If temperature is decreased, in what direction will a shift occur?

How does this affect $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$?

How does this affect K_w ?

Example: $\rightarrow \uparrow \text{temp} = \text{add energy}$.

If pure water is heated on the stove, explain the effect on $[\text{H}_3\text{O}^+]$, K_w , and explain if it's acidic, basic, or neutral. $2\text{H}_2\text{O}(\text{l}) + 59\text{kJ} \rightleftharpoons \text{H}_3\text{O}^+(\text{aq}) + \text{OH}^-(\text{aq})$

- $\uparrow \text{temp} = \text{endothermic rxn}$ ∴ shift right
- $\uparrow [\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$
- K_w will increase
- $[\text{H}_3\text{O}^+] = [\text{OH}^-]$ 1:1 ∴ neutral solution

* Assignment 7: K_w Exercises

1. Calculate the $[\text{OH}^-]$ for solutions with the given $[\text{H}_3\text{O}^+]$. Is each solution acidic, basic, or neutral?
 - a. $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-3}\text{M}$
 - b. $[\text{H}_3\text{O}^+] = 2.6 \times 10^{-10}\text{M}$
 - c. $[\text{H}_3\text{O}^+] = 8.7 \times 10^{-7}\text{M}$
2. Calculate the $[\text{H}_3\text{O}^+]$ for solutions with the given $[\text{OH}^-]$. Is each solution acidic, basic, or neutral?
 - a. $[\text{OH}^-] = 1.0 \times 10^{-2}\text{M}$
 - b. $[\text{OH}^-] = 3.4 \times 10^{-6}\text{M}$
 - c. $[\text{OH}^-] = 9.2 \times 10^{-9}\text{M}$
3. What is the $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ in 0.00345M NaOH?
4. Calculate the $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ in
 - a. $2.5 \times 10^{-4}\text{M HNO}_3$
 - b. 5.0M HCl