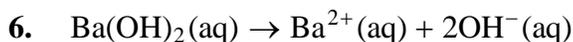


Calculating Concentration from pH and pOH Answer Key

1. (a) $[\text{H}_3\text{O}^+(\text{aq})] = 10^{-\text{pH}} = 10^{-2.34} = 4.6 \times 10^{-3} \text{ mol/L H}_3\text{O}^+(\text{aq})$
 (b) $[\text{H}_3\text{O}^+(\text{aq})] = 10^{-\text{pH}} = 10^{-15.6} = 3 \times 10^{-16} \text{ mol/L H}_3\text{O}^+(\text{aq})$
 (c) $[\text{H}_3\text{O}^+(\text{aq})] = 10^{-\text{pH}} = 10^{-4.4} = 4 \times 10^{-5} \text{ mol/L H}_3\text{O}^+(\text{aq})$
 (d) $[\text{H}_3\text{O}^+(\text{aq})] = 10^{-\text{pH}} = 10^{-1.892} = 0.0128 \text{ mol/L H}_3\text{O}^+(\text{aq})$
 (e) $[\text{H}_3\text{O}^+(\text{aq})] = 10^{-\text{pH}} = 10^{-5.63} = 2.3 \times 10^{-6} \text{ mol/L H}_3\text{O}^+(\text{aq})$
2. (a) $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-1.45} = 0.035 \text{ mol/L OH}^-(\text{aq})$
 (b) $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-10.672} = 2.13 \times 10^{-11} \text{ mol/L OH}^-(\text{aq})$
 (c) $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-7.3} = 5 \times 10^{-8} \text{ mol/L OH}^-(\text{aq})$
 (d) $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-2.982} = 1.04 \times 10^{-3} \text{ mol/L OH}^-(\text{aq})$
 (e) $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-4.932} = 1.17 \times 10^{-5} \text{ mol/L OH}^-(\text{aq})$
 (f) $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-10.2} = 6 \times 10^{-11} \text{ mol/L OH}^-(\text{aq})$
3. $[\text{H}_3\text{O}^+(\text{aq})] = 10^{-\text{pH}} = 2.0 \times 10^{-4} \text{ mol/L}$
 $\text{H}_2\text{O}(\ell) + \text{HCl}(\text{aq}) \rightarrow \text{H}_3\text{O}^+(\text{aq}) + \text{Cl}^-(\text{aq})$
 $[\text{HCl}(\text{aq})] = 2.0 \times 10^{-4} \text{ mol/L H}_3\text{O}^+ \times \frac{1 \text{ mol HCl}}{1 \text{ mol H}_3\text{O}^+}$
 $= 2.0 \times 10^{-4} \text{ mol/L HCl}$
4. $\text{LiOH}(\text{aq}) \rightarrow \text{Li}^+(\text{aq}) + \text{OH}^-(\text{aq})$
 $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 2.12 \times 10^{-5} \text{ mol/L OH}^-(\text{aq})$
 $[\text{LiOH}(\text{aq})] = 2.12 \times 10^{-5} \text{ mol/L OH}^- \times \frac{1 \text{ mol LiOH}}{1 \text{ mol OH}^-}$
 $= 2.12 \times 10^{-5} \text{ mol/L}$
5. $\text{NaOH}(\text{aq}) \rightarrow \text{Na}^+(\text{aq}) + \text{OH}^-(\text{aq})$
 $\text{pOH} = 14 - \text{pH} = 3.68$
 $[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-3.68} = 2.1 \times 10^{-4} \text{ mol/L}$

CHAPTER 6	<h2 style="margin: 0;">Calculating Concentration from pH and pOH Answer Key</h2> <p style="margin: 0;">(continued)</p>	BLM 6.3.12A
ANSWER KEY		

$$\begin{aligned}
 [\text{NaOH}(\text{aq})] &= 2.1 \times 10^{-4} \text{ mol/L OH}^- \times \frac{1 \text{ mol NaOH}}{1 \text{ mol OH}^-} \\
 &= 2.1 \times 10^{-4} \text{ mol/L NaOH (aq)}
 \end{aligned}$$

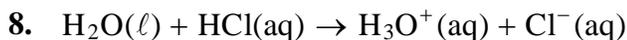


$$\text{pOH} = 14.00 - \text{pH} = 2.164$$

$$[\text{OH}^-(\text{aq})] = 10^{-\text{pOH}} = 10^{-2.164} = 6.85 \times 10^{-3} \text{ mol/L OH}^-(\text{aq})$$

$$\begin{aligned}
 [\text{Ba}(\text{OH})_2(\text{aq})] &= 6.85 \times 10^{-3} \text{ mol/L OH}^- \times \frac{1 \text{ mol Ba}(\text{OH})_2}{2 \text{ mol OH}^-} \\
 &= 3.43 \times 10^{-3} \text{ mol/L Ba}(\text{OH})_2(\text{aq})
 \end{aligned}$$

7. This solution is acidic. You can't make a basic solution acidic through dilution.

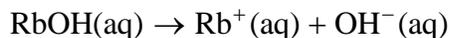


$$[\text{H}_3\text{O}^+(\text{aq})] = 10^{-3.298} = 5.04 \times 10^{-4} \text{ mol/L}$$

$$\begin{aligned}
 m_{\text{HCl}(\text{g})} &= 5.04 \times 10^{-4} \text{ mol/L H}_3\text{O}^+ \times \frac{1 \text{ mol HCl}}{1 \text{ mol H}_3\text{O}^+} \times \frac{2.00 \text{ L}}{1} \times \frac{36.46 \text{ g}}{\text{mol}} \\
 &= 0.0367 \text{ g HCl}(\text{g})
 \end{aligned}$$

9. $m_{\text{RbOH}(\text{s})} = 2.2 \times 10^{-5} \text{ mol/L OH}^- \times \frac{1 \text{ mol RbOH}}{1 \text{ mol OH}^-} \times \frac{1.50 \text{ L}}{1} \times \frac{102.48 \text{ g}}{\text{mol}}$

$$= 0.0034 \text{ g RbOH}(\text{s})$$



$$\text{pOH} = 14.00 - \text{pH} = 4.65$$

$$[\text{OH}^-(\text{aq})] = 10^{-4.65} = 2.2 \times 10^{-5} \text{ mol/L OH}^-(\text{aq})$$



$$[\text{OH}^-(\text{aq})] = 10^{-5.66} = 2.2 \times 10^{-6} \text{ mol/L OH}^-(\text{aq})$$

$$\begin{aligned}
 m_{\text{Sr}(\text{OH})_2(\text{s})} &= 2.2 \times 10^{-6} \text{ mol/L OH}^- \times \frac{1 \text{ mol Sr}(\text{OH})_2}{2 \text{ mol OH}^-} \times \frac{3.0 \text{ L}}{1} \times \frac{121.64 \text{ g}}{\text{mol}} \\
 &= 4.0 \times 10^{-4} \text{ g Sr}(\text{OH})_2(\text{s})
 \end{aligned}$$