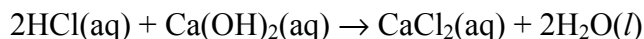


WKS
Solution Stoichiometry I

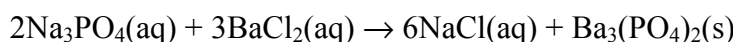
Name Answer Key
Period _____

1. How many mL of 0.25 M Ca(OH)₂ are needed to completely react with 10.0 mL of 0.25 M HCl? The balanced reaction is:



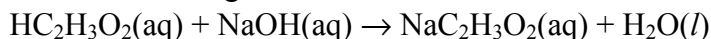
$$\begin{aligned} ? \text{ mL Ca}(\text{OH})_2 &= 10.0 \text{ mL HCl} \times \frac{0.25 \text{ mol HCl}}{1000 \text{ mL HCl}} \times \frac{1 \text{ mol Ca}(\text{OH})_2}{2 \text{ mol HCl}} \times \frac{1000 \text{ mL Ca}(\text{OH})_2}{0.25 \text{ mol Ca}(\text{OH})_2} \\ &= \boxed{5.00 \text{ mL Ca}(\text{OH})_2} \end{aligned}$$

2. What volume of 0.325 M Na₃PO₄ would be needed to fully react with 25.0 mL of 0.480 M BaCl₂ by the following balanced reaction?



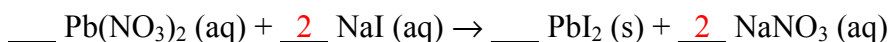
$$\begin{aligned} ? \text{ mL Na}_3\text{PO}_4 &= 25.0 \text{ mL BaCl}_2 \times \frac{0.480 \text{ mol BaCl}_2}{1000 \text{ mL BaCl}_2} \times \frac{2 \text{ mol Na}_3\text{PO}_4}{3 \text{ mol BaCl}_2} \times \frac{1000 \text{ mL Na}_3\text{PO}_4}{0.325 \text{ mol Na}_3\text{PO}_4} \\ &= \boxed{24.6 \text{ mL Na}_3\text{PO}_4} \end{aligned}$$

3. Calculate the volume of 0.2250 M HC₂H₃O₂ (acetic acid) solution needed to neutralize (use up) 25.19 mL of 0.4295 M NaOH in the following balanced reaction.



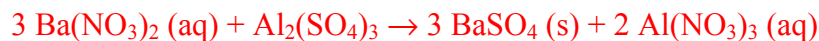
$$\begin{aligned} ? \text{ mL HC}_2\text{H}_3\text{O}_2 &= 25.19 \text{ mL NaOH} \times \frac{0.4295 \text{ mol NaOH}}{1000 \text{ mL NaOH}} \times \frac{1 \text{ mol HC}_2\text{H}_3\text{O}_2}{1 \text{ mol NaOH}} \times \frac{1000 \text{ mL HC}_2\text{H}_3\text{O}_2}{0.2250 \text{ mol HC}_2\text{H}_3\text{O}_2} \\ &= \boxed{48.08 \text{ mL HC}_2\text{H}_3\text{O}_2} \end{aligned}$$

4. How many mL of 0.120 M Pb(NO₃)₂ are required to react with 75.0 mL of 0.280 M NaI according to the following equation? You must balance the equation first!



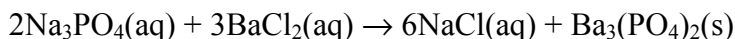
$$\begin{aligned} ? \text{ mL Pb}(\text{NO}_3)_2 &= 75.0 \text{ mL NaI} \times \frac{0.280 \text{ mol NaI}}{1000 \text{ mL NaI}} \times \frac{1 \text{ mol Pb}(\text{NO}_3)_2}{2 \text{ mol NaI}} \times \frac{1000 \text{ mL Pb}(\text{NO}_3)_2}{0.120 \text{ mol Pb}(\text{NO}_3)_2} \\ &= \boxed{87.5 \text{ mL Pb}(\text{NO}_3)_2} \end{aligned}$$

5. How many mL of 0.280 M barium nitrate solution are required to fully react with 25.0 mL of 0.350 M aluminum sulfate solution to form solid barium sulfate and aluminum nitrate solution? Write and balance the reaction first.



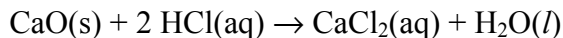
$$\begin{aligned} ? \text{ mL Ba}(\text{NO}_3)_2 &= 25.0 \text{ mL Al}_2(\text{SO}_4)_3 \times \frac{0.350 \text{ mol Al}_2(\text{SO}_4)_3}{1000 \text{ mL Al}_2(\text{SO}_4)_3} \times \frac{3 \text{ mol Ba}(\text{NO}_3)_2}{1 \text{ mol Al}_2(\text{SO}_4)_3} \times \frac{1000 \text{ mL Ba}(\text{NO}_3)_2}{0.280 \text{ mol Ba}(\text{NO}_3)_2} \\ &= \boxed{93.8 \text{ mL Ba}(\text{NO}_3)_2} \end{aligned}$$

6. What volume of 0.325 M Na_3PO_4 would be needed to precipitate 25.00 g $\text{Ba}_3(\text{PO}_4)_2$ with excess BaCl_2 by the following balanced reaction?



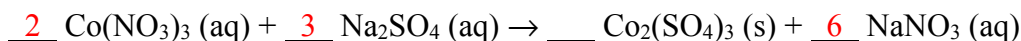
$$\begin{aligned} ? \text{ mL Na}_3\text{PO}_4 &= 25.00 \text{ g Ba}_3(\text{PO}_4)_2 \times \frac{1 \text{ mol Ba}_3(\text{PO}_4)_2}{601.9 \text{ g Ba}_3(\text{PO}_4)_2} \times \frac{2 \text{ mol Na}_3\text{PO}_4}{1 \text{ mol Ba}_3(\text{PO}_4)_2} \times \frac{1000 \text{ mL Na}_3\text{PO}_4}{0.325 \text{ mol Na}_3\text{PO}_4} \\ &= \boxed{256 \text{ mL Na}_3\text{PO}_4 (0.256 \text{ L})} \end{aligned}$$

7. How many grams of CaO are required for complete reaction with the HCl in 275 mL of a 0.523 M HCl solution? The balanced equation for the reaction is:



$$\begin{aligned} ? \text{ g CaO} &= 275 \text{ mL HCl} \times \frac{0.523 \text{ mol HCl}}{1000 \text{ mL HCl}} \times \frac{1 \text{ mol CaO}}{2 \text{ mol HCl}} \times \frac{56.1 \text{ g CaO}}{1 \text{ mol CaO}} = \boxed{4.03 \text{ g CaO}} \end{aligned}$$

8. How many mL of 0.750 M cobalt (III) nitrate, when added to a sodium sulfate solution, are needed to precipitate 8.07 g of cobalt (III) sulfate? Balance the equation first.



$$\text{MM} (\text{Co}_2(\text{SO}_4)_3) = 2 \times 58.93 \text{ g} + 3 \times 32.06 \text{ g} + 12 \times 16.00 \text{ g} = 406.0 \text{ g/mol}$$

$$\begin{aligned} ? \text{ mL Co}(\text{NO}_3)_3 &= 8.07 \text{ g Co}_2(\text{SO}_4)_3 \times \frac{1 \text{ mol Co}_2(\text{SO}_4)_3}{406.0 \text{ g Co}_2(\text{SO}_4)_3} \times \frac{2 \text{ mol Co}(\text{NO}_3)_3}{1 \text{ mol Co}_2(\text{SO}_4)_3} \times \frac{1000 \text{ mL Co}(\text{NO}_3)_3}{0.750 \text{ mol Co}(\text{NO}_3)_3} \\ &= \boxed{53.0 \text{ mL Co}(\text{NO}_3)_3} \end{aligned}$$