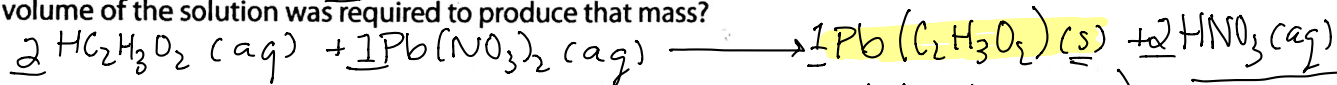




17. A flask containing 450 mL of 0.500 M HBr was accidentally knocked to the floor. How many grams of  $\text{K}_2\text{CO}_3$  would you need to put on the spill to completely neutralize the acid?

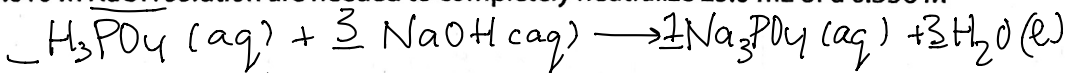
$$450 \text{ mL} \left( \frac{1 \cdot 10^{-3} \text{ L}}{1 \text{ mL}} \right) \left( \frac{0.500 \text{ mol HBr}}{1 \text{ L}} \right) \left( \frac{1 \text{ mol K}_2\text{CO}_3}{2 \text{ mol HBr}} \right) \left( \frac{138.2 \text{ g K}_2\text{CO}_3}{1 \text{ mol K}_2\text{CO}_3} \right) = \boxed{16 \text{ g K}_2\text{CO}_3}$$

18. The acetic acid in a 2.5 mol/L sample of a solution of a kettle scale remover is reacted with an excess of a lead(II) nitrate solution to form a precipitate, which is then filtered and dried. The mass of the precipitate is 8.64 g. What volume of the solution was required to produce that mass?



$$8.64 \text{ g Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \left( \frac{1 \text{ mol Pb}(\text{C}_2\text{H}_3\text{O}_2)_2}{325.2 \text{ g}} \right) \left( \frac{2 \text{ mol HC}_2\text{H}_3\text{O}_2}{1 \text{ mol Pb}(\text{C}_2\text{H}_3\text{O}_2)_2} \right) \left( \frac{1 \text{ L}}{2.5 \text{ mol HC}_2\text{H}_3\text{O}_2} \right) = \boxed{0.021 \text{ L HC}_2\text{H}_3\text{O}_2}$$

19. How many milliliters of a 0.610 M NaOH solution are needed to completely neutralize 25.0 mL of a 0.356 M phosphoric acid solution?



$$25.0 \text{ mL} \left( \frac{1 \cdot 10^{-3} \text{ L}}{1 \text{ mL}} \right) \left( \frac{0.356 \text{ mol H}_3\text{PO}_4}{1 \text{ L}} \right) \left( \frac{3 \text{ mol NaOH}}{1 \text{ mol H}_3\text{PO}_4} \right) \left( \frac{1 \text{ L}}{0.610 \text{ mol NaOH}} \right) \left( \frac{1 \text{ mL}}{1 \cdot 10^{-3} \text{ L}} \right) = \boxed{43.8 \text{ mL NaOH}}$$

20. What volume of hydrogen gas is formed at STP by the reaction of excess zinc metal with 150 mL of 0.185 mol/L hydroiodic acid?



$$150 \text{ mL} \left( \frac{1 \cdot 10^{-3} \text{ L}}{1 \text{ mL}} \right) \left( \frac{0.185 \text{ mol HI}}{1 \text{ L}} \right) \left( \frac{1 \text{ mol H}_2}{2 \text{ mol HI}} \right) \left( \frac{22.4 \text{ L}}{1 \text{ mol H}_2} \right) = \boxed{0.31 \text{ L H}_2}$$

#17  $\text{K}_2\text{CO}_3$

$$\begin{array}{r} 2 \text{K} = 78.2 \\ 1 \text{C} = 12.0 \\ 3 \text{O} = 48.0 \\ \hline 138.2 \text{ g K}_2\text{CO}_3 / \text{mol} \end{array}$$

#18  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$

$$\begin{array}{r} 1 \text{Pb} = 207.2 \\ 4 \text{C} = 48.0 \\ 6 \text{H} = 6.0 \\ 4 \text{O} = 64.0 \\ \hline 325.2 \text{ g Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 / \text{mol} \end{array}$$