

Write a balanced equation for each reaction then solve the problem.

A 20.00 gram mixture of KNO_3 and Na_3PO_4 is analyzed by adding an excess of iron(II) chloride which forms a precipitate. After filtering, washing, and drying 1.15 grams of precipitate is recovered. What is the composition of the mixture?

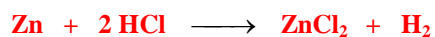


Stoichiometry

$$\frac{1.15 \text{ gram Fe}_3(\text{PO}_4)_2}{1} \times \frac{1 \text{ mol Fe}_3(\text{PO}_4)_2}{357.4 \text{ g Fe}_3(\text{PO}_4)_2} \times \frac{2 \text{ mol Na}_3\text{PO}_4}{1 \text{ mol Fe}_3(\text{PO}_4)_2} \times \frac{164 \text{ g Na}_3\text{PO}_4}{1 \text{ mol Na}_3\text{PO}_4} = \mathbf{1.06 \text{ g Na}_3\text{PO}_4}$$

$$\text{Percentage of Na}_3\text{PO}_4 \text{ in mixture: } \frac{1.06 \text{ g Na}_3\text{PO}_4}{20.00 \text{ g mixture}} \times 100 = \mathbf{5.3\% \text{ Na}_3\text{PO}_4, \text{ 94.7\% KNO}_3}$$

An alloy (an alloy is a mixture of metals) that contains zinc and palladium is analyzed by reacting hydrochloric acid with the alloy. Only the zinc metal reacts. A 3.206 gram zinc alloy containing mixture is reacted with an excess of hydrochloric acid to produce 720 ml of hydrogen gas at STP. What is the percentage of zinc in the alloy?



What is the percentage of zinc in the alloy?

$$\frac{0.720 \text{ L H}_2}{22.4 \text{ L H}_2} \times \frac{1 \text{ mole H}_2}{1 \text{ mole H}_2} \times \frac{1 \text{ mol Zn}}{1 \text{ mol H}_2} \times \frac{65.4 \text{ g}}{1 \text{ mol Zn}} = 2.10 \text{ gram Zn} , \quad \frac{2.10 \text{ gram Zn}}{3.206 \text{ gram mixture}} \times 100 = 65.5\%$$