1) Write a balanced equation for the reaction of tin (IV) phosphate with sodium carbonate to make tin (IV) carbonate and sodium phosphate.

2) If 36 grams of tin (IV) phosphate is mixed with an excess of sodium carbonate, how many grams of tin (IV) carbonate will form?

3) If 29.8 grams of tin (IV) carbonate are actually formed when this reaction goes to completion, what is the percent yield?

4) If 7.3 grams of sodium carbonate are used in the reaction and the result a 74.0% yield, how many grams of sodium phosphate will be formed?

Solutions

1) Write a balanced equation for the reaction of tin (IV) phosphate with sodium carbonate to make tin (IV) carbonate and sodium phosphate.

$Sn_3(PO_4)_4 + 6\ Na_2CO_3 \rightarrow 3\ Sn(CO_3)_2 + 4\ Na_3PO_4$

2) If 36 grams of tin (IV) phosphate is mixed with an excess of sodium carbonate, how many grams of tin (IV) carbonate will form?

$36\ g\ Sn_3(PO_4)_4\ \times\ \dfrac{1\ mole\ Sn_3(PO_4)_4}{736\ g\ Sn_3(PO_4)_4}\ \times\ \dfrac{3\ mole\ Sn(CO_3)_2}{1\ mole\ Sn_3(PO_4)_4}\ \times\ \dfrac{238.73\ g\ Sn(CO_3)_2}{1\ mole\ Sn(CO_3)_2}\ =$

$=\ 35\ g\ Sn(CO_3)_2$

3) If 29.8 grams of tin (IV) carbonate are actually formed when this reaction goes to completion, what is the percent yield?

$\dfrac{29.8\ g\ Sn(CO_3)_2}{35\ g\ Sn(CO_3)_2}\ \times\ 100\ =\ $ **85%**

4) If 7.3 grams of sodium carbonate are used in the reaction and the result a 74.0% yield, how many grams of sodium phosphate will be formed?

$7.3\ g\ Na_2CO_3\ \times\ \dfrac{1\ mole\ Na_2CO_3}{105.99\ g\ Na_2CO_3}\ \times\ \dfrac{4\ mole\ Na_3PO_4}{6\ mole\ Na_2CO_3}\ \times\ \dfrac{163.94\ g\ Na_3PO_4}{1\ mole\ Na_3PO_4}\ =$

$=\ 7.5\ g\ Na_3PO_4$ **theoretical**

$(7.5\ g\ Na_3PO_4)\ (0.74)\ =\ 5.6\ g\ Na_3PO_4$ **actual**