Answer to the Question #47430 - Chemistry – Inorganic Chemistry

Question

$BaCl_2 + Na_3PO_4$ -----> $NaCl + Ba_3(PO_4)_2$.

If 0.5 moles of $BaCl_2$ is mixed with 0.2 moles of Na_3PO_4, the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed is?

Answer:

Balanced reaction equation is:

$3BaCl_2 + 2Na_3PO_4 = 6NaCl + Ba_3(PO_4)_2$

Make a proportion:

3 moles of $BaCl_2$ react with 2 moles of Na_3PO_4

0.5 moles of $BaCl_2$ – *x* moles of Na_3PO_4

$$x = \frac{0.5 \cdot 2}{3} = 0.33\ moles\ of\ Na_3PO_4\ should\ react\ with\ 0.5\ moles\ of\ BaCl_2$$

We have only 0.2 moles of Na_3PO_4, therefore it is the limiting reactant.

We need to make another proportion to calculate the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed by mixing 0.5 moles of $BaCl_2$ with 0.2 moles of Na_3PO_4:

2 moles of Na_3PO_4 produce 1 mole of $Ba_3(PO_4)_2$

0.2 moles of Na_3PO_4 – *x* moles of $Ba_3(PO_4)_2$

$$x = \frac{0.2 \cdot 1}{2} = 0.1\ moles\ of\ Ba_3(PO_4)_2\ could\ be\ produced$$

Answer: $0.1\ moles\ of\ Ba_3(PO_4)_2$