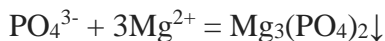**Answer on Question #55367 – Chemistry – General chemistry**

Question:

A student obtains 15.0 mL of 0.65 M phosphate solution and reacts it with excess ammonium and magnesium (Mg2+) under basic conditions. Upon reaction completion, she isolates and dries the product, and finds its mass to be 1.9426 g. Calculate the % yield.

Solution:

$PO_4^{3-} + 3Mg^{2+} = Mg_3(PO_4)_2\downarrow$

Ammonia doesn`t precipitate at these conditions.

$n(PO_4^{3-}) = c \times V = 0.015 \times 0.65 = 0.00975$ (mol) (or 9.75 mmol)

$M(Mg_3(PO_4)_2) = Ar(Mg) \times 3 + Ar(P) \times 2 + Ar(O) \times 8 = 24 \times 3 + 31 \times 2 + 16 \times 8 = 72 + 62 + 128 = 262$

$n(Mg_3(PO_4)_2) = 0.00975$ (mol)

$m (Mg_3(PO_4)_2)_T = n(Mg_3(PO_4)_2) \times M(Mg_3(PO_4)_2) = 0.00975 \times 262 = 2.5545$ (g)

Yield $= m_P/m_T \times 100\% = 1.9426/2.5545 \times 100\% = 76.05 \%$

Answer: Yield 76.05 %