Task #80857

A Crop of Maize needs 5 kg of P_2O_5 /ton of grain. If the yield goal is 12 ton/ha and the soil has a concentration of 10 ppm of P_2O_5, how many kg of Diammonium phosphate (DAP fertilizer with 50% P) must be added in the basal fertilizer to meet the crop demand? Assume we apply all 100% DAP at one time.

Solution.

Firstly, we need to find how many m'(P_2O_5) we need for the harvest.

$P_2O_5 + 3H_2O + 4NH_3 = 2(NH_4)_2HPO_4$

m'(P_2O_5) = 5 kg/ton * 12 ton = 60 kg

Secondly, since 10 ppm phosphorus is present in the soil, we must dissolve the resulting mass by the concentration of phosphorus in the soil.(10 ppm = 0.005%)
$m_t(P_2O_5)$ = 60/0.001 = 60000 kg

$n_t(P_2O_5)$ = 422 535 mole

$n((NH_4)_2HPO_4)$ = 845070 mole

$m((NH_4)_2HPO_4)$ = 97183.05 kg

Answer:

$m((NH_4)_2HPO_4)$ = 97183.05 kg