

Gravimetric Determination of Phosphorus in Plant Food

Name: _____

Section: _____

Date: _____

Purpose (goal of the experiment):

Plant Food Name: _____

Label Percentage: _____

Experimental data	Trial 1	Trial 2	Trial 3
Mass of the sample:			
Mass of $\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$:			
Mass of P in $\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$ (from mass above):			
% P in initial sample:			
% P_2O_5 in initial sample:			
Average % P:			
Standard deviation:			
% P (average \pm sd):			
% P_2O_5 (average \pm sd):			
Guaranteed minimum % P_2O_5 (from the label):			

Show all calculations for one trial:

Mass of P in $\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$:

% P in initial sample:

% P_2O_5 in initial sample:

Post Lab Questions

1. Do any of the experimental phosphorus percentages differ from the average by more than one standard deviation? If yes, provide an explanation for that difference.
2. Do the guaranteed minimum and experimental average of P_2O_5 percentages agree with one another? If not, provide a detailed explanation.
3. $MgNH_4PO_4 \cdot 6H_2O$ has a solubility of 0.023g/100 mL in water. Suppose a 5.02 g sample were washed with 20 mL of water. What fraction of $MgNH_4PO_4 \cdot 6H_2O$ would be lost? Show all calculations.
4. $MgNH_4PO_4 \cdot 6H_2O$ loses H_2O stepwise as it is heated. Between $40^\circ C$ and $60^\circ C$ the monohydrate (one H_2O in chemical formula) is formed, and above $100^\circ C$ the anhydrous material (no water present in chemical formula) is formed. What are the phosphorus percentages of the monohydrate and anhydrous material? Show calculations.
5. Ignition of $MgNH_4PO_4 \cdot 6H_2O$ produces magnesium pyrophosphate, $Mg_2P_2O_7$, NH_3 , and H_2O . Complete and balance the chemical equation for this reaction.