Ω Metrohm

Thermo. Titr. Application Note No. H-008

Title:	Determination of phosphate by magnesium titration

Scope:	Determination of soluble orthphosphate ion, for example soluble phosphate in fertilizers such as DAP.

Principle:	Orthophosphate will react exothermically with magnesium ions in the presence of ammonia to form an insoluble magnesium ammonium phosphate, $MgNH_4PO_4.6H_2O$

Reagents:	1 mol/L $Mg(NO_3)_2$ – standardized
	NH_3/NH_4Cl buffer solution. Add 142mL concentrated NH_3 solution to 17.5g NH_4Cl and dilute to 250mL with D.I. water

Method:	Basic Experimental Parameters:
	Data rate (per second) 10
	Titrant delivery rate (mL/min.) 1
	No. of endothermic endpoints 1
	Data smoothing factor 35
	Procedure:
	Weigh accurately approximately 10g of finely ground DAP fertilizer, and dissolve with deionized water in a 200mL volumetric flask. Make to volume, mix well, and filter through a dry Whatman #1 filter. Pipette a 20mL aliquot into a titration vessel and add 5mL NH_3/NH_4Cl buffer solution. Titrate to an exothermic endpoint.
	Determine the method blank by titrating aliquots of 20, 15, 10 and 5mL of a similar sample solution. Perform a linear regression on the titration data (Y-axis = titres (mL), X-axis = aliquot volumes (mL)). The Y-axis intercept is the method blank in mL.
	The titrant is standardized by thermometric titration against standard 0.2M EDTA solution.

Results:	Analysis of di-ammonium phosphate fertilizer: Mean (n=5) = 17.96 ± 0.007% w/w di-ammonium phosphate as P

Calculation:	$\%P = \dfrac{((Titre,\,mL - blank,\,mL) \times M\ Mg^{2+} \times FW\ P \times 100)}{(Sample\ mass,\,g \times 1000)}$ $\%P = \dfrac{((5.545 - 0.0555) \times 1.05933 \times 30.9738 \times 100)}{(1.00340 \times 1000)}$ $= 17.95\%$

Thermometric Titration Plot:

Legend:

Red = solution temperature curve

Green = first derivative curve

Black = second derivative curve