Magruder 160611 25-5-15

Results due July 15, 2016

Important Note:

Because of the hygroscopic nature of the product, this sample has not been ground in preparation for distribution as Magruder samples normally would be. This product is water soluble.

- Transfer to a suitable airtight container to prevent a loss or gain of moisture.
- **Please follow the attached procedure provided by the manufacturer to prepare this sample.**

Guaranteed Analysis

Total Nitrogen (N)	25.0 %
Ammoniacal Nitrogen (N)	10.75 %
Nitrate Nitrogen (N)	14.25 %
Available phosphate (P_2O_5)	5.0 %
Soluble potash (K_2O)	15.0 %
Magnesium (Mg)	0.10 %
Water soluble Magnesium (Mg)	0.10 %
Sulfur (S) total	0.13 %
Combined Sulfur (S)	0.13 %
Boron (B)	0.0250 %
Copper (Cu)	0.0125 %
Chelated Copper (Cu)	0.0125 %
Iron (Fe)	0.125 %
Chelated Iron (Fe)	0.125 %
Manganese (Mn)	0.0630 %
Chelated Manganese (Mn)	0.0630 %
Molybdenum (Mo)	**125 ppm**
Zinc (Zn)	0.0630 %
Chelated Zinc (Zn)	0.0630 %

Also analyze for:

As (ppm), Cd (ppm), Cr (ppm), Co (ppm), Pb (ppm), Hg (ppm), Ni (ppm), Se (ppm)

The units above are those required for reporting data from this Magruder sample. They may not be the units required on a commercial fertilizer label.

Note: This Magruder Check Sample material is not to be used in the manufacture of products nor applied to any crops or for other fertilizer uses. It is intended for analytical testing purposes only.

SDS for this product can be found at:

http://www.magrudercheckssample.org/SDS/160611sds.pdf

Sample Preparation for Magruder sample 160611 (WS 25-5-15)

Follow the procedure below in preparing the fertilizer for analysis. There is no standard procedure for preparing water-soluble fertilizer material for analysis. The procedure below was adapted from the Manufacturer's standard practice for analysis of their product.

1. Thoroughly mix gross sample by tumbling (not shaking) in a container with sufficient headspace to allow for good sample movement to break up lumps and disperse granules throughout the sample. Withdraw portions for weighing at random locations throughout the material.
2. Weigh a 250 g (to the nearest 0.1g) sub-sample, record weight, and transfer to a 1000 mL volumetric flask.
3. Add approximately 700 mL DI water.
4. Place mixture on stir plate. Insert stir bar and stir until visibly dissolved. Since this is an endothermic reaction, allow the sample to stir at room temperature for at least 12 hrs to ensure total sample dissolution and equilibration.
5. Remove the stir bar and bring to volume with D.I. water. Invert volumetric flask several times to mix thoroughly. The resulting solution is a 25% (w/v) fertilizer solution that can be used directly for N analysis via combustion or trace metal analysis.
6. Make the necessary dilutions from this solution for the portion used for wet chemistry and ICP analyses dependent on the concentration range of calibration standards.
7. Convert concentration of analyte in solution to the appropriate unit for analyte in the fertilizer (see equations below).
8. Analyte concentrations determined from this solution represent one determination for each analyte. Repeat the above steps to create a second solution for the duplicate determinations on a second day.

Below is an example calculation determining the expected concentration of Cu in solution analyzed via microwave acid digestion method (Magruder method code 221.33).

A soluble fertilizer with 0.0125 % Cu is tested. 250.8 g is weighed and dissolved in 1000 mL water to create a 25% fertilizer solution. The method of analysis specifies 1 g of sample be acid digested and brought to final volume of 100 mL. Four mL of the 25% fertilizer solution contains 1.0032 g of fertilizer as shown below.

$$4\ mL \times \left(\frac{0.2508\ g\ fertilizer}{mL\ 25\%\ fert\ soln}\right) = 1.0032\ g\ fertilizer$$

The expected concentration of Cu in the fertilizer is 0.0125 % which is equivalent to 125 mg/kg Cu. The weight of fertilizer analyzed is 1.0032 g with 4 mL of the 25% solution digested. The concentration of Cu in the acid digestate can then be calculated as shown below.

$$\left(\frac{125\ mg\ Cu}{kg\ fertilizer}\right) \times \left(\frac{kg\ fertlizer}{1000\ g\ fertilizer}\right) \times \left(\frac{1.0032\ g\ fertlizer}{4\ ml}\right) \times \left(\frac{4\ mL\ 25\%\ fert\ soln}{0.1\ L\ digestate}\right) = 1.254\ mg\ Cu\ /L$$

Below is an example calculation of the concentration of Cu in the fertilizer based on the concentration found in acid digestate of the microwave acid digestion method (Magruder method code 221.33).

A concentration of 1.254 mg/L Cu was found in an acid digestate with 4 mL of 25% fertilizer solution digested and brought to final volume of 100 mL. As shown in the previous calculation, 4 mL of 25% fertilizer solution contains 1.0032 g fertilizer.

$$\left(\frac{1.254\ mg\ Cu}{L\ digestate}\right) \times \left(\frac{L\ digestate}{1000\ mL\ digestate}\right) \times \left(\frac{100\ mL\ digestate}{4\ mL\ 25\%\ fert\ soln}\right) \times \left(\frac{4\ mL\ 25\%\ fert\ soln}{1.0032\ g\ fertlizer}\right) \times \left(\frac{1000\ g}{kg}\right) =$$

125 mg/kg Cu in fertilizer = 0.0125 % Cu in fertilizer