TERMS AND DEFINITIONS COMMITTEE
SUBMISSION REQUEST FORM

Submission Date: 12/19/2017

CONTACT INFORMATION

Name: Gary R. Orr, PhD

Telephone Number: (919) 825-1901 ext. 115

E-Mail Address: gary.orr@vlsci.com

Category: New Fertilizer Material **X** New Term Soil Amendment Beneficial Substance

Submission's Proposed Definition:

Maleic – Itaconic Copolymer, Calcium Salt – A substance composed of a partial calcium salt of maleic – itaconic copolymer that can be applied to granular urea fertilizers or mixed with liquid ammoniacal nitrogen/urea fertilizers.

AOAC or Equivalent Method(s) of Anlaysis (if applicable):

See attached summary. Methods listed there are included in this application by reference.

Submitted Research: (Minimum of 3 required)

See attached summary. Research on efficacy listed there is included in this application by reference.

Additional Research Citations:

See attached summary. Research on mode of action listed there is included in this application by reference.

Can this material be posted to the Secure Site of the AAPFCO Website? (For control officials only.)

X Can this material be posted to the AAPFCO Website for everyone to see?

Bibliography of Documents Submitted[1] in Support of AAPFCO Applications for Term for NutriSphere-N

Proposed AAPFCO Term

Term: Maleic – Itaconic Copolymer, Calcium Salt – A substance composed of a partial calcium salt of maleic – itaconic copolymer that can be applied to granular urea fertilizers or mixed with liquid ammoniacal nitrogen/urea fertilizers.

AOAC or Equivalent Methods of Analysis

1. Enforcement Analytical Methodology for AVAIL and NutriSphere-N Polymeric Fertilizer Enhancement Products – Recipe and Example Chromatography.

2. Validation of "Aqueous gel permeation/size exclusion chromatography (GPC/SEC) analysis procedure for selected AVAIL and Nutrisphere-N products" method following AOAC Guidelines (Revised 12/21/2015) – Validation Data.

3. APHA/AWWA Standard Methods for the Examination of Water and Waste Water Method 4500-NH3, *available at* https://www.standardmethods.org.

4. AOAC Official Method 965.09 Nutrients (Minor) in Fertilizers- Atomic Absorption Spectrophotometric Method, *available at* https://www.aoac.org.

5. AOAC Official Method 983.04 Sodium in Fertilizers Atomic Absorption Spectrophotometric Method, *available at* https://www.aoac.org.

6. ASTM Method E203 – 08 Standard Test Method for Water Using Volumetric Karl Fischer Titration, *available at* https://www.astm.org.

7. Trathnigg, Bernd. "Size-exclusion chromatography of polymers." Encyclopedia of analytical chemistry (2000). R.A. Meyers (Ed.) Copyright John Wiley & Sons Ltd.

Submitted Research

Published Efficacy Studies for NutriSphere-N

8. Heiniger, R.W., Smith, T.A. and Wiatrak, P. North Carolina State University, Department of Crop Science; and Clemson University, School of Agricultural, Forest and Environmental Sciences, 2014. The Impact of the Polymer Coating NutriSphere-N in Increasing Nitrogen Use Efficiency and Corn Yield. Am. J. Agric. Biol. Sci., 9: 44-54. DOI : 10.3844/ajabssp.2014.44.54.

9. Wiatrak, P. Clemson University, School of Agricultural, Forest and Environmental Sciences, 2014. Evaluation of Nitrogen Application Methods and Rates with NutriSphere-N on Soil Nitrate-Nitrogen in

[1] Each listed document is being submitted as part of the AAPFCO application for a term for NutriSphere-N, except documents 3-6, which are available on the websites indicated above.

Southeastern Coastal Plains. Am. J. Agric. Biol. Sci., 9: 64-71. DOI : 10.3844/ajabssp.2014.64.71.

10. Wiatrak, P. and Gordon, W.B. Clemson University, School of Agricultural, Forest and Environmental Sciences; and Kansas State University, Department of Agronomy, 2014. Effect of Urea with NutriSphere-N Polymer in Fall and Spring Nitrogen Applications for Corn. Am. J. Agric. Biol. Sci., 9: 89-93. DOI : 10.3844/ ajabssp.2014.89.93.

Additional Research Citations

Efficacy and Mode of Action Trial Data Comparing NutriSphere-N, Agrotain, and Humic Acid

11. Bernhard, B. and Below, F. University of Illinois, Department of Crop Sciences, 2017. "Nitrogen Management to Increase Nutrient Use Efficiency and Corn Grain Yield" (Interim Report, 2017).

12. Yield and Efficiency Graphs – Results from Trials Detailed in Bernhard, B. and Below, F., 2017.

Efficacy Meta-Analysis for NutriSphere-N

13. Baird, D. VSN NZ Ltd., 2016 "Meta-analysis of 383 NutriSphere trials". Unpublished report.

Summary of Uses and Benefits of NutriSphere-N

14. Bond, C.R. Verdesian Life Sciences, 2015. "Calibration and Validation of NutriSphere-N Nitrogen Fertilizer Manager." (Unpublished manuscript).

Published Environmental Effects Data for NutriSphere-N

15. Peng, X., et al. Northeast Agricultural University, Resource and Environment College; University of Nebraska, Department of Agronomy and Horticulture; Harbin University of Science and Technology, Institute of Chemical and Environmental Engineering; and USDA-Agricultural Research Service, 2015. "A Laboratory Evaluation of Ammonia Volatilization and Nitrate Leaching following Nitrogen Fertilizer Application on a Coarse-Textured Soil." Agronomy Journal, 107:871-879.

Additional Mode of Action Studies

16. Krajewska, B. and Ciurli, S. Jagiellonian University, Faculty of Chemistry; and University of Bologna, Department of Agro-Environmental Science and Technology, 2005. "Jack bean (Canavalia ensiformis) urease. Probing acid–base groups of the active site by pH variation" Plant Physiology and Biochemistry 43, 651–658.

17. Zhenghu, D. and Honglang, X. Chinese Academy of Sciences, Innovation Project of Cold and Arid Regions Environmental and Engineering Research Institute, 2000. "Effects of soil properties on ammonia volatilization", Soil Science and Plant Nutrition, 46:4, 845-852, DOI: 10.1080/00380768.2000.10409150.

18. Dixon, N. E., Gazzola, C, Asher, C. J., Lee, D. S. W., Blakeley, R. L. & Zerner, B. University of Queensland, Departments of Biochemistry and Agriculture, 1980. "Jack bean urease (EC 3.5.1.5). II. The relationship between nickel, enzymatic activity, and the "abnormal" ultraviolet spectrum. The nickel content of jack beans." Can. J. Biochem. 58, 474-480.

19. Cuirli, S., Faculty of Chemistry; and University of Bologna, Department of Agro-Environmental Science and Technology, 2017. "An Evaluation of Maleic-Itaconic Copolymers as Urease Inhibitors." Manuscript submitted to Soil Science Society of America Journal.

Except where otherwise noted, each of these supporting documents is available in the zip file accompanying this submission.