Determination of Perchlorate in Fertilizers by Ion Chromatography

Baohua Gu and Gilbert M. Brown, Oak Ridge National Laboratory, P. O. Box 2008, Oak Ridge, TN 37831.

Edward T. Urbansky and Matthew L. Magnuson, U.S. Environmental Protection Agency, National Risk Management Research laboratory, Mail stop 681, Cincinnati, OH 45268.

ABSTRACT

Perchlorate contamination in fertilizers is a subject of recent controversy. In this study, we developed a sensitive ion chromatographic (IC) technique for determining perchlorate content in nearly 50 agricultural and horticultural fertilizer products. With the exception of Chilean nitrate (or Chile saltpeter), no perchlorate was detected in any of these fertilizer samples with a detection limit of approximately 0.002% (w/w fertilizer). Matrix interferences were studied for the IC analysis, and methods of standard addition were utilized for an accurate determination of perchlorate in fertilizers. Results indicate that, with the exception of Super Phosphate 0-46-0 fertilizers, a fertilizer extract of ~2 - 5 g/L gives minimal matrix interferences and satisfactory recovery of added perchlorate standards (100±7%) using a 0.1-mL sample loop. Among six Chilean nitrate samples analyzed (obtained from different suppliers or under different trade names), perchlorate concentration was found to range from 0.13% to 0.21% with an average of ~0.17% (w/w fertilizer). The present study thus suggests that synthetic fertilizers are unlikely to be a significant contributor to perchlorate contamination in the environment as previously claimed. However, the use of Chilean nitrate can contribute to perchlorate in the environment.

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