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# Fertilizers and soil conditioners — Determination of humic and hydrophobic fulvic acids concentrations in fertilizer materials

*Engrais et amendements minéraux basique - Détermination des acides humique et fulvique*

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This document was prepared by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners*.

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# Introduction

Humic substances are present in all ecosystems: oceans, rivers, lakes, and top soils. Quantifying the amount of humic material present in these systems is essential for academic research and commercial applications, specifically agricultural soil and plant management.

The increased use of humic substances in agriculture has generated intense interest among producers, consumers, and regulators for a reliable method for quantification of the active ingredients in raw humic ores and commercial fertilizer products; specifically humic and fulvic acids. As both commercial trade and regulation of humic products are based on percentage (%) of the humic and fulvic acids in commercial humic products, use of % units instead of SI units is warranted, therefore incorporated into this standard.

This document establishes a method for the determination of humic acids (HA) and acidic hydrophobic fulvic acids (HFA). The method is based on an existing preparative procedure use by the International Humic Substances Society (IHSS) for extracting high purity HA and HFA from soil samples[1], which is a modified form of the "classical" technique described in detail by Stevenson[2]. The "classical" methods and the IHSS method were developed as preparative methods for the fractionation of soil organic matter; they were not intended to be used as quantitative analytical methods. The classical method of extracting humic acids and *fulvic acids* from soil humus utilize a "strong base" to extract the alkaline soluble materials, and then the alkaline extract solution is acidified to flocculate the humic acids, which appear to precipitate out of solution. The remaining substances in solution after alkaline and acid treatment were called *fulvic acids*.

This method modifies the "classical" technique in a number of ways:

— it determines the quantity of humic substances on an "ash free" basis (mineral salts excluded);

— the alkali extraction is done under anoxic conditions to reduce oxidation of the analytical sample during extraction;

— it defines the materials that are soluble in both alkali and acid as the Fulvic Fraction;

— it can differentiate products containing certain non-humic materials that some manufactures claim to contain humic substances;

— it further defines HFA as materials of low sulfur content[3] that bind to a hydrophobic resin at pH 1[4][5][6], instead the classical, and perhaps more common definition, for *fulvic acids* as materials that are defined as soluble in both acid and alkali solution. This stricter definition is necessary to distinguish HFA from mineral salts, polysaccharides, amino sugars, amino acids, proteins, acids, and carbohydrates that are extracted along with humic substances when using the "classical" method[1][4].

See Annex B for information on ISO/CD 19822 interlaboratory study.

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