

SCHEDULE 2

METHODS OF ANALYSIS

PART I

26a.

EXTRACTION OF TOTAL TRACE ELEMENTS

1 SCOPE

1. This method defines the procedure for extracting the following trace elements: total boron, total cobalt, total copper, total iron, total manganese, total molybdenum and total zinc. The aim is to carry out the minimum number of extractions, making use wherever possible of the same extract to determine the total level of each of the trace elements listed above.

2 FIELD OF APPLICATION

2. This procedure concerns fertilisers containing one or more of the following trace elements: boron, cobalt, copper, iron, manganese, molybdenum and zinc. It is applicable to each trace element, the declared content of which is more than 10%.

3 PRINCIPLE

3. Dissolution in boiling diluted hydrochloric acid.

(Note) The extraction is empirical and may not be quantitative depending on the product or the other constituents of the fertiliser. In particular, in the case of certain manganese oxides, the quantity extracted may be substantially smaller than the total quantity of manganese which the product contains. It is the responsibility of the fertiliser manufacturers to ensure that the declared content actually corresponds to the quantity extracted under the conditions pertaining to the method.

4 REAGENTS

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4.1. Diluted hydrochloric acid (HCl) solution, about 6M

Mix 1 volume of hydrochloric acid ($\rho = 1.18 \text{ g/ml}$) with 1 volume of water.

4.2. Concentrated ammonia solution (NH_4OH , $\rho = 0.9 \text{ g/ml}$)

5 APPARATUS

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5.1. Electric hotplate with variable temperature control.

5.2. pH meter

(Note) Where the boron content of an extract is to be determined, do not use borosilicate glassware. As the method involves boiling, teflon or silica is preferable. Rinse the glassware thoroughly if it has been washed in detergents containing borates.

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

6 PREPARATION OF THE SAMPLE

6. See Method 1.

7 PROCEDURE

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7.1. Test sample

Take a quantity of fertiliser weighing 1 or 2g depending on the declared content of element in the product. The following table shall be used to obtain a final solution which, after appropriate dilution, will be within the measuring range for each method. Samples should be weighed to within 1 mg.

Declared content of trace element in the fertiliser (%)	<10 – <25	<25
Mass of test sample (g)	2	1
Mass of element in the sample (mg)	<200 – <500	<250
Volume of extract V (ml)	500	500
Concentration of element in extract (mg/l)	<400 – <1 000	<500

Place the sample in a 250ml beaker.

7.2. Preparation of the solution

If necessary moisten the sample with a little water, add 10 ml of dilute hydrochloric acid (4.1) per gram of fertiliser carefully, in small amounts, then add about 50 ml of water. Cover the beaker with a watchglass and mix. Bring to the boil on the hotplate and boil for 30 minutes. Allow to cool, stirring occasionally. Transfer quantitatively to a 500 ml volumetric flask. Make up to volume with water and mix thoroughly. Filter through a dry filter into a dry container. Discard the first portion. The extract must be perfectly clear.

It is recommended that the determinations be carried out without delay on aliquot portions of the clear filtrate, if not the containers should be stoppered.

(Note) Extracts in which the boron content has to be determined.

Adjust the pH to between 4 and 6 with concentrated ammonia solution (4.2).

8 DETERMINATION

8. The determination of each trace element is to be carried out on the aliquot portions indicated in the method for each individual trace element.

Methods 26e, 26f, 26g, 26i and 26j cannot be used to determine elements present in a chelated or complexed form. In such cases Method 26c must be used prior to the determination.

In case of determinations by atomic absorption spectrometry (Methods 26h and 26k) such treatment may not be necessary.