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Determination methods of soil bioavailable arsenic at the origin of agricultural products

农产品产地土壤有效态砷的测定方法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting is required.

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document is proposed by the Ministry of Agriculture and Rural Affairs of the People's Republic of China.

This document is under the jurisdiction of the National Technical Committee on Soil Quality Standardization (SAC/TC 404).

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Determination of available arsenic in soil of agricultural product production areas

1 Scope

This document describes a method for determining the available arsenic content in soils from agricultural product production areas using atomic fluorescence spectrometry.

This document is applicable to the determination of available arsenic in cultivated land (dry land, irrigated land and paddy field) soil.

The detection limit of the method in this document is 0.5 mg/kg.

2 Normative references

GB/T 36197

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 soil bioavailable arsenic

Arsenic in farmland soil can be absorbed by plants and pose a risk to agricultural product safety.

4 Principles of the Method

The phosphate ions in the ammonium dihydrogen phosphate solution were used to replace the arsenate ions in the dryland and irrigated land soil samples, and the effective Arsenic; or use dilute nitric acid solution to dissolve and extract the available arsenic in paddy field soil samples. Add thiourea to the leaching solution to reduce pentavalent arsenic to trivalent arsenic.

The valence arsenic is then reduced to arsenic by adding potassium borohydride, which is then introduced into a quartz atomizer for atomization and decomposition into atomic arsenic.

The arsenic hollow cathode lamp produces atomic fluorescence under the excitation of the emission light. The intensity of the fluorescence is proportional to the content of the measured arsenic element in the extract.

By comparing with the standard series, the arsenic content in the extract was obtained, and

the available arsenic content in the soil was calculated.

5 Reagents and Materials

Unless otherwise stated, only reagents of confirmed analytical grade and distilled or deionized water or water of equivalent purity were used in the analyses.

5.1 Ammonium dihydrogen phosphate extractant [c(NH4H2PO4)=0.05 mol/L]. Weigh 5.75 g of ammonium dihydrogen phosphate into a beaker and add 800 mL Transfer all the liquid in the beaker to a 1000 mL volumetric flask, dilute to the mark, and shake well.

5.2 Dilute nitric acid extraction agent [c(HNO3)=0.43 mol/L]. Take 30 mL of nitric acid and slowly pour it into a beaker containing 100 mL of water. Stir well.

Transfer all the liquid in the beaker to a 1000 mL volumetric flask, dilute to the mark, and shake well.

5.3 2% potassium borohydride (KBH4) 0.35% potassium hydroxide (KOH) solution. Weigh 0.35 g of potassium hydroxide into a beaker and add 10 mL Dissolve in water, weigh 2.00 g of potassium borohydride and put it into potassium hydroxide solution, stir until completely dissolved, and transfer all the liquid in the beaker to 100 mL Add to a volumetric flask, bring to volume, and shake well. Prepare immediately before use.

Note. This is a reducing agent solution.

5.4 (19) Hydrochloric acid (HCl) solution. Take 100 mL of hydrochloric acid and slowly pour it into a beaker containing 100 mL of water. Stir well and add 100 mL of water to the beaker.