



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 22105.3-2008

**Soil quality - Analysis of total mercury, arsenic and lead
contents in soils - Atomic fluorescence spectrometry - Part 3:
Analysis of total lead contents in soils**

土壤质量 总汞、总砷、总铅的测定 原子荧光法 第3部分：土壤中总铅的测定

Issued on: June 27, 2008

Implemented on: October 1, 2008

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China;
Standardization Administration of China**

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2 Principles

The hydrochloric acid-nitric acid-hydrofluoric acid-perchloric acid total digestion method is used; the lead in the digested sample reacts with the reducing agent (potassium borohydride) to generate volatile lead hydride (PbH₄). The argon is used as a carrier to introduce the hydride into an electrothermal quartz atomizer for atomization. Under the irradiation of a special lead hollow cathode lamp, the lead atoms in the ground state are excited to a high-energy state; when deactivated and returned to the ground state, they emit fluorescence at a characteristic wavelength. The fluorescence intensity is proportional to the content of lead, and finally, the content of lead is quantitatively calculated according to the standard series.

3 Reagents

Unless otherwise specified, the reagents used in this part are analytical reagents, and the test water is deionized water.

3.1 Hydrochloric acid (HCl): rho=

1.19 g/mL, guarantee reagent.

3.2 Nitric acid (HNO₃): rho=

1.42 g/mL, guarantee reagent.

3.3 Hydrofluoric acid (HF): rho=

1.49 g/mL, guarantee reagent.

3.4 Perchloric acid (HClO₄): rho=

1.68 g/mL, guarantee reagent.

3.6 Potassium borohydride (KBH₄): guarantee reagent.

3.7 Potassium ferricyanide (K₃Fe(CN)₆): guarantee reagent.

3.8 Hydrochloric acid solution (1+1): Take a certain volume of hydrochloric acid (3.1) and add the same volume of water to prepare the solution.

3.9 Hydrochloric acid solution (1+66): Take

1.5 mL of hydrochloric acid (3.1), add water to make up to 100 mL and mix well.

3.10 Nitric acid solution (1+1): Take a certain volume of nitric acid (3.2) and add the same volume of water to prepare the solution.

3.11 Oxalic acid solution (100 g/L): Weigh 10 g of oxalic acid, dissolve it in water and dilute it to 100 mL.

3.12 Potassium ferricyanide solution (100 g/L): Weigh 10 g of potassium ferricyanide (3.7), dissolve it in water and dilute it to 100 mL.

3.13 Reducing agent [2% potassium borohydride (KBH₄) + 0.5% potassium hydroxide (KOH) solution]: Weigh

0.5 g of potassium hydroxide (3.5), put it into a beaker, and dissolve it with a small amount of water; weigh

2.0 g of potassium borohydride (3.6), put it into the potassium hydroxide solution, dissolve it and dilute to 100 mL with water; prepare this solution for current use.

3.14 Carrier solution: Take 3 mL of hydrochloric acid solution (3.8), 2 mL of oxalic acid solution (3.11), and 4 mL of potassium ferricyanide solution (3.12), put them into a beaker, dilute the solution to 100 mL with water, and mix well.

3.15 Lead standard stock solution: Weigh 0.5000 g of spectroscopically pure metal lead, add a small amount of (1+1) nitric acid solution (3.10) a few times, and if necessary, heat it until the lead dissolves completely. Transfer the solution to a 500 mL volumetric flask, dilute to the mark with water, and shake well. The concentration of lead in this standard solution is

1.00 mg/mL (the able organizations can directly purchase the standard stock solution from the department recognized by the country).

3.16 Lead standard intermediate solution: Pipette

10.00 mL of lead standard stock solution (3.15) into a 1000 mL volumetric flask, dilute to the mark with the hydrochloric acid solution (3.9), and shake well. The concentration of lead

in this standard solution is 10.00 µg/mL.

3.17 Lead standard working solution: Pipette

--- The End ---

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