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

**GB/T 47310-2026**

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**Determination of total silicon, aluminium, iron, potassium, sodium, calcium,  
magnesium, manganese, phosphorus, titanium and sulfur in soil -  
Monochromatic excitation energy dispersive X-ray fluorescence spectrometry**

**土壤全量硅、铝、铁、钾、钠、钙、镁、锰、磷、钛、硫的测定 单波长激发-能量色散X射线荧光光谱法**

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## Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was 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/TC404). This document was drafted by: Nanjing Institute of Soil Science, Chinese Academy of Sciences; and the Center for Supervision and Protection of Cultivated Land Quality and Farmland Engineering, Ministry of Agriculture and Rural Affairs. Nanjing Jiangning District Agriculture and Rural Affairs Bureau, Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Agricultural Quality Standards, Chinese Academy of Agricultural Sciences In conjunction with the Institute of Testing Technology, the Environmental Protection Research and Monitoring Institute of the Ministry of Agriculture and Rural Affairs, and the Institute of Agricultural Environment and Sustainable Development of the Chinese Academy of Agricultural Sciences, Sichuan Provincial Farmland Quality and Fertilizer Work Station, Nanjing University of Information Science and Technology, Nanjing University, Jiangsu Provincial Geological Survey Institute, Jiangsu Provincial Quality and... Standardization

Research Institute, Jiangsu Provincial Environmental Science Society, Beijing Anke Huisheng Technology Co., Ltd., and Environmental Planning Institute of the Ministry of Ecology and Environment. The main drafters of this document are. Shen Renfang, Gong Hua, Zhang Min, Ma Changbao, Zheng Lei, Wang Hong, Mao Xuefei, Xu Yaping, Huang Yaorong, Shan Hong, and Feng Zhaozhong. Sun Tao, Guo Zhiying, Chang Qing, Hou Yueli, Chen Le, Teng Fei, Dai Lihong, Jin Qi, Shi Hongwei, Chen Hong, Huang Jinli, Li Ming, Zhang Mengqun, Liu Xiaojing Wang Min, Shi Qian, Huang Rong, Yin Huilin. Total soil composition. silicon, aluminum, iron, potassium, sodium, calcium, magnesium, manganese, phosphorus, titanium. Determination of sulfur using single-wavelength excitation-energy dispersion X-ray fluorescence spectroscopy Warning

---Personnel using this document should have practical experience working in a formal laboratory. This document does not address all possible safety issues. Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

## 1 Scope

GB/T 47310-2026 is the Chinese national standard covering eleven major elements of a soil measured in one go by XRF - with monochromatic excitation, which lowers the background enough to make the light elements measurable. It replaces a shelf of separate wet chemical methods with a single instrumental one. First edition, in force since 1 October 2026. It was issued on 31 March 2026 and takes effect on 1 October 2026, as a first edition. The document is under the responsibility of the Ministry of Agriculture and Rural Affairs. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document describes the determination of soil silicon (Si), aluminum (Al), iron (Fe), potassium (K), sodium (Na), calcium (Ca), magnesium (Mg), manganese (Mn), and phosphorus. Single-wavelength excitation-energy dispersive X-ray fluorescence spectrometry of P, Ti, and S elements. This document applies to soil containing silicon (Si), aluminum (Al), iron (Fe), potassium (K), sodium (Na), calcium (Ca), magnesium (Mg), manganese (Mn), phosphorus (P), and titanium. Total determination of Ti and sulfur (S).

## 2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

## NY/T 1121.1 Soil Testing - Part

### 3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4. Method Principles Primary X-rays generated by an X-ray tube are focused onto the surface of a soil sample by a hyperboloid curved crystal monochromator, and the inner-shell electrons of the target element are... Excitation generates holes, and outer electrons transition from high-energy orbitals to low-energy orbitals, releasing the characteristic X-ray fluorescence of the element. Energy dispersive X-ray fluorescence is detected. The detector distinguishes and detects the characteristic X-ray fluorescence of different elements. This intensity is then calculated and corrected using the fundamental parameter method and correlated with the elemental composition of the sample. The mass fraction is directly proportional. A calibration curve is established by analyzing soil standard samples/standard substances, and the characteristic fluorescence of the target element is determined based on the detected fluorescence. The mass fraction of the target element in the sample was calculated based on the radiation intensity. The fundamental parameter method is a theoretical calculation of matrix effects, inter-elemental absorption enhancement effects, fluorescence yield, and spectral line fraction in X-ray fluorescence. The calculation method involves iteratively fitting the calculated spectrum with the measured spectrum from the detector to obtain the net intensity or elemental content of X-rays in the sample.

### 5 Reagents and Materials

5.1 Hydrogen (H<sub>2</sub>). Hydrogen (not less than 99.999%).

5.2 Helium (He). Helium (not less than 99.999%).

5.3 Boric acid (H<sub>3</sub>BO<sub>3</sub>). analytical grade.