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

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**Iron ores - Determination of radionuclides - Inductively coupled
plasma mass spectrometry**

铁矿石 放射性核素的测定 电感耦合等离子体质谱法

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Foreword

This document follows the rules of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents" Drafting. This document is Part 86 of GB/T 6730 "Iron Ore". See Appendix A for the published parts of GB/T 6730.

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Iron ore is the main raw material in the steel industry. Among the standard systems in the steel field, the standard system for determination of chemical composition of iron ore is one of the standard systems. It is a very important part and plays an important role in ensuring the quality of iron ore products. This series of method standards serve the production of iron ore production, trade and application, providing technical support for the high-quality development of my country's steel industry. GB/T 6730 includes a series of standards for the determination of chemical composition of iron ore, which respectively stipulates the moisture, total iron, and metal content in iron ore products. Iron, ferrous iron, silicon, aluminum, calcium, magnesium, sulfur, phosphorus, manganese, titanium, total rare earths, barium, chromium, vanadium, tin, copper, cobalt, nickel, zinc, niobium, bismuth, potassium, sodium, carbon, lead, arsenic, Determination of chemical components such as cadmium,

mercury, fluorine, chlorine, loss on ignition and combined water. In 1986, GB/T 6730 released 51 national standards for determination methods of chemical composition of iron ore for the first time. With the development of analytical technology in the field of iron ore development and actual production needs. After years of continuous revision work, a relatively complete standard system has been formed. GB/T 6730 Group Please see Appendix A for details of the document. Determination of radionuclides in iron ore Inductively coupled plasma mass spectrometry Warning

---Personnel using this document should have practical experience in regular laboratory work. This document does not address all possible security issues question. Users are responsible for taking appropriate safety and health measures and ensuring compliance with the conditions stipulated in relevant national regulations.

1 Scope

Part 86 of China's national series on the analysis of iron ores, determining uranium-238 and thorium-232 by inductively coupled plasma mass spectrometry. Natural radioactivity in iron ore is not a theoretical concern. Uranium and thorium occur in the accessory minerals of many ore bodies, and while their concentrations in the ore are low, the processing concentrates them - into the slags, the dusts and the refractory residues - and those materials are then used as aggregate, in cement, or stored in quantity. That is the pathway by which a legitimate industrial process produces what is technically enhanced naturally occurring radioactive material, and it is regulated as such in most jurisdictions. Measuring the nuclides by mass spectrometry rather than by counting their decay is far faster, since these isotopes have half-lives of billions of years and therefore very low activity per atom. This part applies to iron ore, concentrate, sinter and pellets, covering uranium-238 from 0.05 to 4.89 Bq/g and thorium-232 from 0.07 to 28.3 Bq/g.

This document describes the use of inductively coupled plasma mass spectrometry (ICP-MS) for the determination of the radionuclides uranium-238 and thorium-232 in iron ore. method. This document is applicable to the determination of radionuclides uranium-238 and thorium-232 in iron ore, iron concentrate, sinter and pellets. The measurement range is as follows As shown in Table 1. Table

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document.

GB/T 602 Preparation of standard solutions for determination of impurities in chemical

reagents

GB/T 4960.5 Nuclear Science and Technology Terminology Radiation Protection and Radiation Source Safety

GB/T 6682 Specifications and test methods for water used in analytical laboratories

GB/T 6730.1 Preparation of pre-dried samples for iron ore analysis

GB/T 8170 Numerical rounding rules and representation and determination of limit values

GB/T 10322.1 Iron ore sampling and sample preparation methods

GB/T 12806 Laboratory glassware single-marked volumetric flasks

3 Terms and definitions

The terms and definitions defined in GB/T 4960.5 and the following apply to this document.

3.1 nuclide A type of atom that has the same number of protons and neutrons and is in the same nuclear energy state.

3.2 radioactivityradioactivity The nuclide spontaneously emits particles or gamma rays, or emits X-rays after orbital electron capture, or undergoes spontaneous fission.