GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 73.060.10

D 31

GB/T 24586-2009

Iron Ores - Determination of Apparent Density, True Density and Porosity

铁矿石 表观密度、真密度和孔隙率的测定

Issued on: October 30, 2009 **Implemented on: May 1, 2010**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;

Standardization Administration of the People's Republic of China.

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Warning: personnel using this Standard shall have practical experience in formal laboratory work. This Standard does not point out all possible safety issues. The user shall undertake the responsibility of adopting appropriate safety and health measures; guarantee the compliance with the conditions stipulated by relevant national laws and regulations.

1 Scope

This Standard specifies the determination method of apparent density, true density and porosity of iron ores.

This Standard is applicable to the determination of apparent density, true density and porosity of pelletized iron ores.

2 Normative References

Through the reference in this Standard, the clauses of the following documents become clauses of this Standard. In terms of references with a specified date, all the subsequent modification sheets (excluding the corrected content) or revised versions are not applicable to this Standard. However, the various parties that reach an agreement in accordance with this Standard are encouraged to explore the possibility of adopting the latest version of these documents. In terms of references without a specified date, the latest version is applicable to this Standard.

GB/T 8170 *Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values*

GB/T 10122 *Iron Ores (sinter and pellets) - Sampling and Sample Preparation for Physical Testing*

GB/T 10322.1 *Iron Ores - Sampling and Sample Preparation Procedures* (GB/T 10322.1-2000, idt ISO 3082:1998)

3 Apparent Density

3.1 Principle

After immersing water into the pores of the pelletized iron ores, respectively weigh the

3.5.2 Place the sample into the test basket; immerse the test basket that contains the sample into distilled water; shake the test basket to remove bubbles. After placing it still for 20 min, record the sum of the mass of the sample and the test basket as m_2, see Figure A.3 in Appendix A.

3.5.3 Remove the pelletized iron ores from the distilled water; place them independently of each other in a pair of absorbent sponges (3.3.2). Then, use hands to gently squeeze the sponge, so as to absorb the distilled water attached to the test sample. Weigh and record its mass as m_3.

NOTE: use fresh surface of gauze.

3.5.4 Re-immerse an empty test basket into water; record the mass of the test basket in water as m_4.

3.5.5 Measure the temperature of water in the container. Use the table in Appendix B to obtain the density of distilled water at this temperature.

3.6 Calculation of Apparent Density

Use Formula (1) to calculate the apparent density ρ_a of the test sample.

$$\rho_a = \frac{m_1}{m_3 - (m_2 - m_4)}\rho_1 \qquad \cdots\cdots(1)$$

Where,

ρ_a---apparent density, expressed in (g/cm^3);

m_1---mass of sample in the air, expressed in (g);

m_2---sum of mass of sample and test basket in water, expressed in (g);

m_3---mass of web bulb in the air, expressed in (g);

m_4---mass of test basket in water, expressed in (g);

ρ_1---density of distilled water at test temperature, expressed in (g/cm^3).

4 True Density

4.1 Principle

Add the sample into a container of already-known volume. Seal the container, then, inlet a certain amount of helium gas. Use a pressure sensor to measure the pressure in the container, then, diffuse the gas in the container to another container of already-known pressure and volume. Use a pressure sensor to measure the equilibrium

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