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GB/T 15923-2010

**Method for Chemical Analysis of Nickel Ores -
Determination of Nickel Content**

镍矿石化学分析方法

镍量测定

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Method for Chemical Analysis of Nickel Ores - Determination of Nickel Content

Caution: The operators using this Standard shall have practical experiences in the work in a normal laboratory. This Part has not indicated all possible safety problems. It's the due responsibility of the user to take appropriate measures for safety and health, and guarantee to comply with the conditions specified in relevant national laws and regulations.

1 Application Scope

This Standard specifies the atomic absorption spectrometric method for the determination of nickel content in nickel ores, in which an acidic solution is prepared after acid dissolution or alkali fusion separation.

This Standard applies to the determination of nickel in nickel ores.

The measuring range: 0.1% ~ 6.0% of nickel.

2 Normative References

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 6682, *Water for Analytical Laboratory Use - Specification and Test Methods*

3 Principle

After sample is decomposed by hydrofluoric acid, aqua regia and perchloric acid, use hydrochloric acid to dissolve salts (or use sodium peroxide and sodium hydroxide to melt ores, use water to extract and filter, and use hydrochloric acid to dissolve the sediment); in a hydrochloric acid medium of 5%, use the air-acetylene flame to measure the absorbance of nickel on the atomic absorption spectrometer at the wavelength of 352.5 nm; and calculate the nickel content.

Place specimen (7.1) into corundum crucible; add 4 g of sodium peroxide (4.1); use 1 g of sodium hydroxide (4.2) to cover the top; place into a high temperature furnace whose temperature has been raised to 650°C; maintain the temperature until fully melted (about 10 min); and take out for cooling. Place the crucible into a 200 mL beaker; add 100 mL of warm water; put on the watch glass; after the drastic reaction stops, add several drops of absolute ethyl alcohol (4.7); boil on the electric furnace for 3 min ~ 5 min; and take down for cooling. Filter; use hot sodium hydroxide solution (4.11) to wash the beaker and crucible and precipitate for 6 times ~ 8 times; use hot hydrochloric acid (4.9) to dissolve and precipitate in the original beaker; wash out the crucible; and place the solution on the electric hot plate to evaporate to dryness. Add 5 mL of hydrochloric acid (4.9) and a small amount of water to dissolve salts; use water to transfer into a 50 mL volumetric flask; dilute to volume; and shake up.

7.5 Preparation of calibration solution series

In a series of 50 mL volumetric flasks, add respectively 0.00 mL, 0.50 mL, 1.00 mL ... 10.00 mL of nickel standard solution (4.12); add 10 mL of hydrochloric acid (4.9); use water to dilute to volume; and shake up. The mass concentrations of the serial solution nickels are respectively 0.00 µg/mL, 5.00 µg/mL, 10.00 µg/mL ... 100.00 µg/mL.

7.6 Determination

Warning: Ignite or extinguish air-acetylene flame in accordance with the instructions to use of the atomic absorption spectrometer, in order to avoid causing possible explosion hazards!

Use the flame atomic absorption spectrometer to measure the absorbance of nickel in the calibration solution series, blank solution and test solution (7.4.1 and 7.4.2), at the wavelength of 352.5 nm, in accordance with the operating conditions of the instrument (refer to Annex A).

7.7 Plotting of calibration curve

Plot the calibration curve using the nickel content as the abscissa and the absorbance as the ordinate; and obtain the corresponding nickel content from the calibration curve.

8 Calculation of results

The nickel content, expressed with mass fraction $w(\text{Ni})$, value in %, is calculated in accordance with Formula (1):

$$w(\text{Ni}) = \frac{(\rho_1 - \rho_0)V \times 10^{-6}}{m} \times 100 \quad \dots\dots\dots (1)$$

where,

ρ_1 --the value of mass concentration of nickel in test solution, in µg/mL;

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