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文章摘要

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熔融制样X射线荧光光谱法测定珍珠岩矿中主量元素

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Determination of Major Elements in Perlite by X-ray Fluorescence Spectrometry with Fusion Sampling Preparation

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中文关键词：珍珠岩 主量元素 四硼酸锂-偏硼酸锂(质量比67:33) 熔融制样 X射线荧光光谱法

英文关键词：perlite major elements lithium tetraborate-lithium metaborate (mass ratio of 67:33) fusion sampling X-ray Fluorescent Spectrometry

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中文摘要：

珍珠岩矿的化学成分对其膨胀特性有重要影响,是珍珠岩矿的重要质量指标,目前大多采用容量法、重量法、分光光度法、原子吸收光谱法等传统方法对各化学成分进行测定,操作复杂,而且不能满足主量元素同时测定的要求.本文采用熔融法制样,建立了X射线荧光光谱同时测定珍珠岩矿中主量元素(Si、Al、Fe、Ca、Mg、Ti、K、Na)的分析方法.样品制备试验结果表明,试样与四硼酸锂-偏硼酸锂(质量比67:33)混合熔剂稀释比为1:10,熔融温度为1050℃时,样品熔融完全,制备的熔片满足分析方法的要求,且克服了珍珠岩矿高温熔矿时由于膨胀不均匀而导致硅元素测量结果偏低的问题.通过仪器测量条件的优化,以国家标准物质和自制校准样品拟合校准曲线,并进行基体效应校正,实际矿石样品测量结果与化学分析法的测定值基本吻合.方法检出限小于0.05%,精密度(RSD,*n*=12)小于1.5%.本方法与经典分析方法相比,简便高效、绿色环保、精密度高、准确度好,一次熔矿能够同时测定珍珠岩矿中全部主量元素,满足了珍珠岩矿快速分析测试的需要.

英文摘要:

Chemical composition, an important quality index for perlite, has great influence on the expansion characteristics of perlite. At present, the component analysis of perlite is mainly traditional chemical methods such as capacity, weight, Spectrophotometry and Atomic Absorption Spectrometry. These methods are not only complicated, but it is also impossible to determine the analysis results of all target elements simultaneously. The X-ray Fluorescence Spectrometry (XRF) method for determining major elements of Si, Al, Fe, Ca, Mg, Ti, K and Na in perlite has been established with fusion sampling preparation and is described in this paper. The perlite samples were fused with lithium tetraborate-lithium metaborate (mass ratio of 67:33) as the fusing reagent, the mixed solvent dilution ratio was 1:10 and the fusing temperature was 1050℃. The results show that these experimental conditions satisfy the requirements of analysis and overcome the problem of lower measurement results of silicon due to uneven expansion when fusing perlite samples at high temperature. After the instrument parameters were optimized, working curves were established and the matrix effect was corrected by using various national standard materials and self-made perlite management samples. The determination values obtained by using the XRF method are in good agreement with those measured by traditional chemical methods. The method detection limit is lower than 0.05% and the method precision degree(RSD, *n*=12) is lower than 1.5%. Compared with classical analysis methods, the XRF method has many advantages such as high efficiency, is environmentally-friendly, has high precision and accuracy, and is simple to conduct. The results show that the major elements in perlite can be determined rapidly and simultaneously by the XRF method with one time fusion sampling preparation.

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