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Determination of Au and Pt in Geological Samples by Graphite Furnace Atomic Absorption Spectrometry with Concentrate and Extraction by Foam Plastics and Thiourea

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中文摘要:

泡沫塑料常用于富集常规地质样品中的铂族元素, 而富集后往往用高温灰化法解脱, 此法操作繁琐, 温度过高易使铂配合物分解为王水难以提取的不溶性残渣, 导致测试结果不稳定、效率低; 单独使用20 g/L硫脲溶液解脱, 测试结果的重现性差。本文对此方法进行改进, 采用50%王水封闭溶解试样, 氯化亚锡还原, 聚氨酯泡塑富集, 20 g/L硫脲-20%盐酸溶液解脱, 石墨炉原子吸收光谱法测定金和铂。在盐酸-氯化亚锡体系中, 吸附温度为20℃, 振荡时间为30 min时, 金和铂的回收率均在95%以上, 金和铂的检出限分别为0.23 ng/g和0.39 ng/g, 精密度(RSD, n=10)分别为1.8%~10.3%和1.3%~13.3%。经国家一级标准物质验证, 测定值和标准值基本相符。该方法泡塑解脱时无需高温灰化, 用王水多次提取, 在100℃沸水浴中即可一次完成, 样品处理快捷。与高温灰化法相比, 提取温度大为降低, 分析流程简单, 显著提高了单次测样量, 且干扰小、空白值低, 可以满足除王水难溶的铂矿种外大部分地质样品快速测定的需要。

英文摘要:

Extraction by foam plastics is a common method to determine platinum group elements (PGEs) for most geological samples, however, the high temperature ashing method conducted to release Au and Pt, has complex processing. According to the insoluble residues for Pt in aqua regia, produced by the high temperature ashing method, the analysis results are unstable and produce low recovery rates. The unsatisfactory duplicate results were yielded by the sole use of 20 g/L thiourea as the elution solution. In this paper, this method was improved by decomposing the samples in 50% aqua regia in a closed system, reduced by $SnCl_2$ and concentrated by foam plastics then eluted by 20 g/L thiourea solution-20% hydrochloric acid. Au and Pt were continuously determined by Graphite Furnace Atomic Absorption Spectrometry. The adsorption efficiency was stable under the oscillation time and the absorption temperature of 30 min and 20℃, respectively. The recovery rates of Au and Pt were both greater than 95%. The detection limits of the Au and Pt were 0.23 ng/g and 0.39 ng/g with RSD of 1.8%-10.3% and 1.3%-13.3% (n=10), respectively. The method has been verified by determination of national first grade standard material with satisfactory results. The extraction of foam plastics avoided the high-temperature ashing by being extracted several times with aqua regia and one time in 100℃ water bath which greatly simplified the chemical procedure. Compared with high-temperature ashing, the extraction temperature was greatly reduced, the analysis process was simple and the number of samples was significantly increased for each batch with less interferences and low blanks. The improved method met the needs of various testing of geological samples except for the insoluble Pt minerals by aqua regia.

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