

# **THE NICKEL SULFIDE FIRE ASSAY PROCEDURE FOR DIFFERENT TYPES OF ROCKS IN THE DETERMINATION OF GOLD AND THE PLATINUM GROUP ELEMENTS BY INDUCTIVELY COUPLED PLASMA-MASS SPECTROMETRY**

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Preconcentration of gold and the platinum group elements by the nickel sulfide fire assay fusion procedure enables the determination of these elements by inductively coupled plasma-mass spectrometry simultaneously at low detection limits, making it the method of choice today. According to our experience, there are difficulties in the fire assay fusion of some rock types, the difficulty being that the fusion results in an inhomogeneous slag from which the nickel sulfide button does not separate completely. Two such rock types are black shale and magnetite-containing rocks. The reducing effect of the graphite of the black shale and the oxidising effect of the high oxygen content of magnetite seem to interfere with the formation of the nickel sulfide button. Nickel sulfide fire assay procedures were developed for black shales and magnetite-containing rocks. Oxidation of the graphite by roasting the sample prior to fusion and alternatively by adding an oxidant to the fusion flux help to overcome the problem in the case of black shale. For magnetite-containing rocks, adding a reducing agent, such as carbon to the fusion flux improves the result of the fusion. The modified fusion procedures for black shale and magnetite-containing rocks were tested on reference materials and the found PGE concentrations are reported.