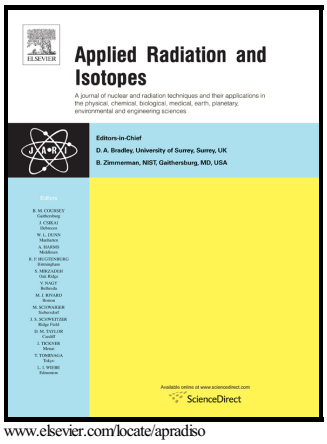
Measuring the noble metal and iodine composition of extracted noble metal phase from spent nuclear fuel using instrumental neutron activation analysis

R.I. Palomares, K.J. Dayman, S. Landsberger, S.R. Biegalski, C.Z. Soderquist, A.J. Casella, M.C. Brady Raap, J.M. Schwantes



www.elsevier.com/locate/apradiso

PII: S0969-8043(15)00023-8
DOI: http://dx.doi.org/10.1016/j.apradiso.2015.01.022
Reference: ARI6893

To appear in: *Applied Radiation and Isotopes*

Received date: 18 May 2014
Revised date: 28 September 2014
Accepted date: 21 January 2015

Cite this article as: R.I. Palomares, K.J. Dayman, S. Landsberger, S.R. Biegalski, C.Z. Soderquist, A.J. Casella, M.C. Brady Raap and J.M. Schwantes, Measuring the noble metal and iodine composition of extracted noble metal phase from spent nuclear fuel using instrumental neutron activation analysis, *Applied Radiation and Isotopes,* http://dx.doi.org/10.1016/j.apradiso.2015.01.022

Measuring the Noble Metal and Iodine Composition of Extracted Noble Metal Phase from Spent Nuclear Fuel Using Instrumental Neutron Activation Analysis

R. I. Palomares[1], K.J. Dayman[1], S. Landsberger[1], S.R. Biegalski[1], C.Z. Soderquist[2], A.J. Casella[2], M.C. Brady Raap[2], and J.M. Schwantes[2]

[1]University of Texas at Austin
Nuclear Engineering Teaching Lab
Austin, Texas, USA 78712

[2]Pacific Northwest National Laboratory
Richland, Washington, USA 99354

Abstract

Masses of noble metal and iodine nuclides in the metallic noble metal phase extracted from spent fuel are measured using instrumental neutron activation analysis. Nuclide presence is predicted using fission yield analysis, and radionuclides are identified and the masses quantified using neutron activation analysis. The nuclide compositions of noble metal phase derived from two dissolution methods, UO_2 fuel dissolved in nitric acid and UO_2 fuel dissolved in ammonium-carbonate and hydrogen-peroxide solution, are compared.

1. Introduction

Augmentation of nuclear power production in the U.S. relies heavily on the management of spent nuclear fuel (SNF). At present, all SNF from U.S. power reactors is destined for on-site storage until long-term solutions are implemented. Research on the transport, storage, and reprocessing of SNF is ongoing. As burnup codes provide