Appendix C

Theses Abstracts:

Abstract

Negative Ion Survey Using Accelerator Mass Spectrometry

Ph.D. Thesis 1992

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Accelerator mass spectrometric methods have been used sucessfully in the detection of Ca^-, Sr^-, Ba^-, La^-, Ce^-, Pr^-, Nd^-, Sm^-, Eu^-, Gd^-, Tb^-, Dy^-, Tm^-, Yb^-, Lu^-, and Hf^-. The elements Zn, Cd, Hg, Ho, and Er, have also been studied and no detectable signal could be attributed to their atomic negative ions.

Using the published (experimental) Ca^- binding energy, the binding energies of Sr^- and Ba^- were estimated to be 110 meV and 170 meV respectively.

Dy^- was observed to be dissociated by the electric fields of the accelerator. Lower limits on the binding energies of the detected lanthanide negative ions have been placed based on their yields, and similar upper limits on the binding energies of the undetected ones have also been estimated.

Ambiguities surrounding the AMS method in the detection of the above ions have been identified and resolved. This adds to the versatility of AMS, especially as a promising tool in atomic spectrometry.

University of Petroleum and Minerals

SEARCH FOR ISOBARIC ANALOGUE STATES IN ^{57}Co VIA THE REACTION $^{56}Fe\ (p,\gamma)^{57}Co$

BY

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ABSTRACT

The $^{56}Fe(P,\gamma)^{57}Co$ reaction has been studied over the proton energy range of Ep=3694-3855 keV. Four resonances were observed at Ep=3720, 3727, 3774 and 3793 keV. Decay schemes were established for the four resonances, and angular distributions were measured at Ep=3720, 3774 and 3793 keV. A $J^{\pi}=9/2^{+}$ has been assigned for the resonances at Ep=3720 and 3727 keV, and $J^{\pi}=5/2^{+}$ has been assigned for the resonances at Ep=3774 and 3793 keV.

In this work it was concluded that the two resonances at E_p=3720 and 3727 keV (E_x=9682 and 9689 keV) are fragments of an isobaric analogue state in ^{57}Co corresponding to the $g_{9/2}$ at E_x=2455 keV in ^{57}Fe. Moreover, it was concluded that the two resonances at E_p=3774 and 3793 keV (E_x=9734 and 9753 keV) are two fragments of an isobaric analogue state in ^{57}Co corresponding to the $d_{5/2}$ at E_x=2506 keV in ^{57}Fe.

Levels at E_x=4586 and 4675 keV in ^{57}Co are identified as the antianalogue states ($T^{<}$) corresponding to the $g_{9/2}$ and $d_{5/2}$ isobaric analogue states respectively.