

Hyperfine Interactions at ^{181}Ta in Hf_2Ni_7 and Zr_2Ni_7

M. Marszałek, H. Saitovitch^a, and P. R. J. Silva^a

H. Niewodniczański Institute of Nuclear Physics, 31-342 Kraków, Radzikowskiego 152, Poland

^a Centro Brasileiro de Pesquisas Físicas, 22290-180 Rio de Janeiro,

Rua Dr. Xavier Sigaud 150, Brazil

Reprint requests to Dr. Marta M.; E-mail: marszale@alf.ifj.edu.pl

Z. Naturforsch. **55 a**, 49–53 (2000); received September 11, 1999

Presented at the XVth International Symposium on Nuclear Quadrupole Interactions, Leipzig, Germany, July 25 - 30, 1999.

We report on a time differential perturbed angular correlations (TDPAC) study of the hyperfine interactions at ^{181}Ta in Hf_2Ni_7 and Zr_2Ni_7 . The samples were prepared by arc melting proper amounts of constituents together with a small amount of Hf containing radioactive ^{181}Hf atoms. A further heat treatment was necessary to obtain samples of the required crystal structure (monoclinic symmetry in the C2/m space group). As known, two non-equivalent lattice sites of Hf/Zr metal exist in this structure.

The PAC measurements were performed at 20 - 1123 K. Two quadrupole interactions were observed, corresponding to two possible crystallographic positions of the probe atom in the studied structure. The electric quadrupole interaction parameters at ^{181}Ta in Hf_2Ni_7 are $\nu_{Q1}(300\text{K}) = 586.7(65)$ MHz with $\eta_1 = 0.79(4)$ and $\nu_{Q2}(300\text{K}) = 466.8(41)$ MHz with $\eta_2 = 0.20(3)$, and in Zr_2Ni_7 they are $\nu_{Q1}(300\text{K}) = 498.4(22)$ MHz with $\eta_1 = 1.0$ and $\nu_{Q2}(300\text{K}) = 418.0(50)$ MHz with $\eta_2 = 0.35(3)$. The presence of a magnetic interaction, reported in the literature, was not confirmed.

Key words: Nuclear Quadrupole Interactions; Time Differential Perturbed Angular Correlations (TDPAC); Intermetallic Compounds; Hf-Ni System; Zr-Ni System.