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A study of the Interaction of Hydrogen Atoms with Impurities in Transition Metals

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The interaction between hydrogen atoms and impurities, both diluted in transition metals, is being investigated by the time differential perturbed angular correlation of gamma rays using the ^{181}Ta probes formed after the β decay of ^{181}Hf, diluted in the metal matrices. It is expected that substitutional atoms with larger radii than that of the host metal, but otherwise similar in chemical nature, will atract hydrogen atoms[1]. In the case of Ti it was observed that the hydrogen atoms are not bound at the probe atoms at temperatures above 77 K. The observed result thus can be interpreted as the trapping energy being very small, enabling the diffusion of hydrogen at the measured temperatures. Similar investigations are now being carried out with other metallic matrices, such as palladium, for which a larger binding energy for hydrogen atoms at the Hf traps is expected[1].

1. A.I.Shirley and C.K.Hall. Acta metall. 32(1), 49 (1984)