ABSTRACT

The adsorption of hydrogen at room temperature on cobalt samples was studied with thermal
desorption spectroscopy. Desorption from cobalt foil was studied using a mass spectrometic method in an ultra high vacuum system,
while desorption from cobalt powder was studied in a microreactor system using a thermal conductivity detector. Two
hydrogen desorption peaks are observed in both cases. These states correspond to the β_1 and β_2 states observed in most transition metals. An activation energy of 4–5 kcal/mol is obtained for the β_1 state while an energy of 12–19 kcal/mol for the β_2 state. These two states are observed for complete hydrogen coverage on polycrystalline samples, independently of surface orientation. The hydrogen desorption peaks can be fitted with near Gaussian curves which facilitates the analysis of the curves to obtain activation energies. A tentative explanation of the appearance of these two states is offered based on surface atomic morphology.