Effect of CO2 concentration on the kinetics of the HYDRALOY C5 alloy

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The paper discusses the action and effect of a high concentration of carbon dioxide on the kinetics of the hydrogen absorption and desorption process from the metal hydride alloy Hydralloy C5. The alloy is the subject of research into the possibility of hydrogen separation from a mixture of synthetically generated gas with a majority representation of H_2, CO_2, CO and CH_4, such as syngas. The main attention is paid to the effect of CO2 concentration in the process of hydrogen storage into the alloy. Carbon dioxide, as an important oxidant and catalytic poison, greatly affects the kinetics of H_2 storage in a metal hydride alloy, while the rate of degradation of the alloy's properties increases with the increasing percentage of CO_2 in the mixture with hydrogen. The process of contamination of the alloy with carbon dioxide is accompanied by the chemical splitting of carbon dioxide into carbon monoxide and oxygen, which leads to the oxidation of the alloy grains, thereby limiting or significantly reducing the ability of the catalytic splitting of hydrogen and its storage in the intermetallic structure of Hydralloy C5.

This paper was written with the financial support from the VEGA granting agency within the project solutions No. 1/0626/20 and No. 1/0532/22 from the KEGA granting agency within the project solutions No. 012TUKE-4/2022 and with financial support from the granting agency APVV within the Project Solution No. APVV-15-0202, APVV-20-0205 and APVV-21-0274.