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NICKEL FERRITES AND ITS CATALYTIC PROPERTIES

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Borohydrides are a group of compounds with high hydrogen content. The use of borohydrides in fuel cells (FC) is possible on the basis of two action principles: indirect and direct. A third principle is also possible: mixed action. Fuel cells with a hydrogen-air proton exchange membrane (B-PEMFC) belong to the group of indirect elements. Generation of electric power in these systems includes two stages: 1) catalytic (including acidic) hydrolysis of borohydride with evolution of gaseous hydrogen, 2) subsequent electrochemical oxidation of hydrogen at the anode. Such elements are called "indirect borohydride fuel cells (IBFC)". In a direct borohydride fuel cell (DBFC), electricity is generated by direct electrochemical oxidation of the borohydride ion on the catalytically active anode.

The aim of the presented work was synthesis and investigation of the catalytic properties of nickel ferrites in the hydrolysis reaction of sodium borohydride.

Experimental samples of nickel ferrites were synthesized by the co-precipitation method of corresponding nitrates. Precipitated hydroxides were dried at 110 ^{o}C and calcined at 400, 500 and 600 ^{o}C. Obtained samples were named NF*-400-Air NF*-500-Air NF*-600-Air.

The catalytic activity of synthesized oxide systems was studied in a model liquid phase catalytic process of decomposition of sodium borohydride. The initial concentration of sodium borohydride was C_0 = 0.17 mol/dm^3, the process temperature was 60 °C; catalyst's weight was 0.1 g, the volume of the test solution was 15 cm^3. The results of catalytic studies in the form of kinetic dependencies are presented in Fig.1.

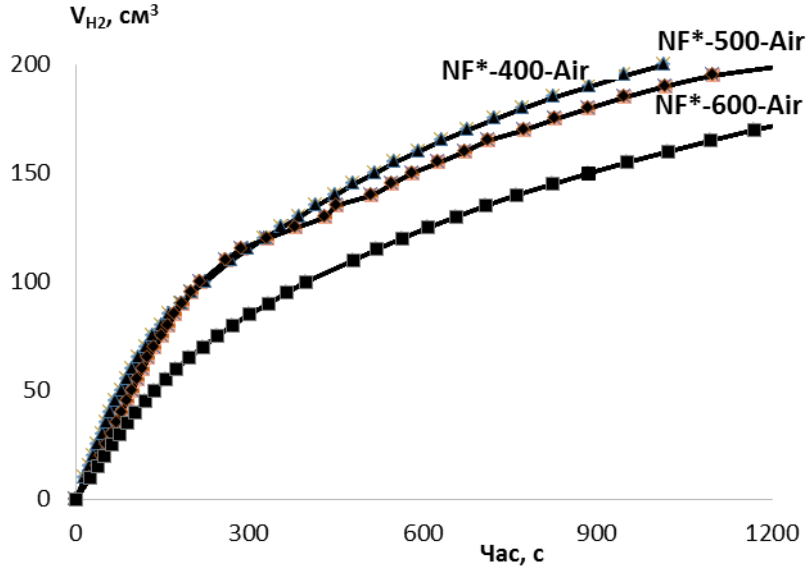

Fig. 1. The rate of hydrogen emission by $NaBH_4$ hydrolysis of at nickel ferrites presents.

The presented kinetic dependences of sodium borohydride decomposition prove the high catalytic activity of synthesized samples. Nickel ferrites obtained at lowest temperature illustrates the highest catalytic activity and vice versa nickel ferrites obtained at highest temperature illustrates the lowest catalytic activity.