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Preparation of different nanocrystalline gamma alumina support using cationic surfactant

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In this research two different nanocrystalline gamma alumina were synthesized by the sol-gel method using cationic surfactant. Aluminium isopropoxide, hexadecyltrimethyl ammonium bromide and nitric acid have been used as raw materials for support preparation and two calcination temperature of 600 and 700°C selected for alumina synthesis. The samples were characterized by X-ray diffraction (XRD), N_2 adsorption (BET) and transmission electron microscopy (TEM). The XRD patterns of the prepared samples at different temperature indicated that with increasing the calcination temperature the intensities of the peaks slightly increased, which showed the high thermal stability of the prepared gamma alumina support. Both supports showed type IV isotherm according to the IUPAC classification. The BET surface area decreased with increasing calcination temperature. The size of particles ,which calculated by BET data and also by the Scherrer equation, showed increasing the particle and crystal sizes with increasing the calcination temperature. The TEM results revealed different structure for the synthesized gamma alumina samples with the changes in calcination temperatures. The TEM images for both supports also confirmed the nanocrystallinity of the synthesized γ -Al_2O_3 samples.

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Characterizations and performances of Ni-supported on diatomite catalysts for dry reforming of methane reaction

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The development of stable catalysts involving innovative materials and active phases other than noble metals (e.g., transition metals) is a contemporary issue for the industrialization of reforming reactions. This particularly concerns the reaction of methane with carbon dioxide (Dry Reforming of Methane, DRM) whose interest is to produce, from two widely available greenhouse gases (CH_4 and CO_2), a synthesis gas (SynGas, H_2:CO=1:1) perfectly suitable for the subsequent production of higher and useful hydrocarbons (olefins, gasoline) by Fisher-Tropsch synthesis. The purpose of this work is the application of widely accessible "green" inorganic solids in DRM for subsequent energy production. In this context, diatomite earths, submitted to different commercial treatments, were used as catalytic supports for the dispersion of 5 wt.% nickel using the two solvents method (cyclohexane/water). In spite of their low cost and wide availability, these natural porous solid powders were never tested before as supports for metallic species, in particular Ni, in DRM. Structural (by XRD), textural (by N_2 sorption isotherms) and morphological (by SEM) properties of the supports as well as of the impregnated samples, will be presented. The dispersion was analyzed according to the origin of the diatomite powder. Catalytic performances of Ni/diatomites, after *in situ* pretreatment under H_2, were compared to those obtained with a reference catalyst, prepared similarly, over an Aerosil 300 (no strutural porosity) silica support. A special attetion was paid on the type (regenarable, non-destructive and destructive) and amount of carbon species developped in the course of the reforming reaction.

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