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Catalytic supports of CeO_2 doping with copper: Synthesis and Evaluation

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Abstract – Recently the development of nanostructured materials has gained prominence in the area of catalysis for the petrochemical industry principally in obtaining the high purity hydrogen gas. The results of this study show the achievement of a very suitable material to be used as catalytic support for implementation in the reaction of selective oxidation of CO, showing the presence of segregated phases formed by the dopant element (Cu), which have the potential to act as catalytic active sites certainly increase the catalytic performance of the material analyzed.

It was discovered that ceria (CeO_2) has several orders of magnitude more regarding the catalytic activity when compared with other oxides deposited on catalytic media for various types of redox reactions, due to its high oxygen storage capacity [1]. Other studies have shown that catalysts supported on CeO_2 are very active for complete oxidation of CO, and other catalytic reactions, showing a catalytic activity compared to noble metals such as Au [2]. Among the several preparation methods, the combustion reaction has been successfully used for the synthesis several types of nanosized powders materials, with high surface area, chemical homogeneity and purity [3]. In this context, the catalytic supports of CeO_2 doped with 0.1 and 0.5 moles of Cu were obtained by combustion reaction method and were characterized by X-ray diffraction and scanning electron microscopy (SEM).

Fig. 1 presents the X ray patterns of the C1 and C5 catalytic supports as obtained. The XRD analysis of the powders showed crystalline, with secondary phases presence, with an crystallite sizes of the 57nm to C1 support and 49 nm to C5 support, evidencing the nanometric character of the samples. The synthesis temperatures were 781 and 674℃ for the supports C1 and C5, respectively. Like the temperature reached by the synthesis by combustion reaction for the obtainment of the support C1 was larger than for the support C5 obtainment, that provoked that increase in the average size of your cristallite.The micrographs illustrated in the Figures 2a and 2b show the presence of porous and soft agglomerates composed of small quasi-spherical particles in sub micrometric scale. These agglomerates exhibit an irregular morphology with flake like structures.

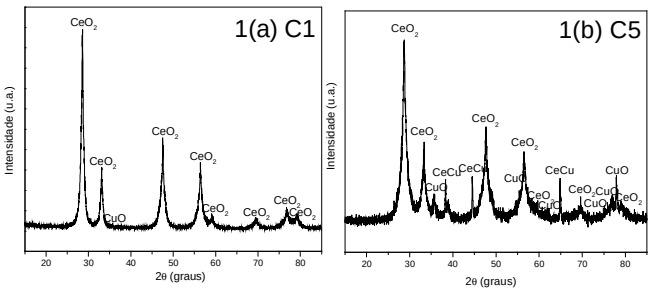

Figure 1: X ray diffraction patterns of the catalytic supports C1 and C5 obtained by combustion reaction.

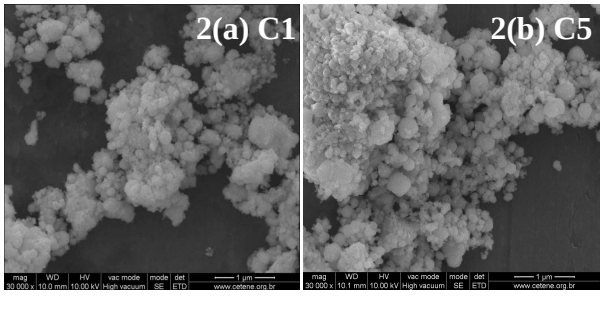

Figure 2: Micrographs obtained by SEM of the catalys supports C1 and C5 obtained by combustion reaction.

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