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Hybrid Iron Montmorillonite Nano-Particles as an oxygen scavenger

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**Title: Hybrid Iron Montmorillonite Nano-Particles as an oxygen scavenger**

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**Abstract (200 mots).** Iron nanoparticles supported on montmorillonite (MMT-Fe) were synthesized via the reduction by sodium borohydride of iron salts dissolved in a suspension of MMT. The MMT-Fe black powder collected after the evaporation of the solvent was analysed by Transmission Electron Microscopy, which revealed the formation of aggregates of metallic nanoparticles with an average size of  $57 \pm 17$  nm dispersed on the surface of MMT. According to the X-ray diffraction, no iron ions are intercalated in the interlayer spacing of MMT, and no other crystalline species are formed. <sup>57</sup>Fe Mössbauer spectroscopy evidences the formation of mainly zero valent iron in the form of iron boride. The O<sub>2</sub> absorption kinetic of the synthesized powders was found to follow a second-order law. The study of the O<sub>2</sub> absorption properties of as-synthesized, dried and stored (40 days) powders shows reaction constant (k), coefficient of proportionality (n) and O<sub>2</sub> absorption capacities of the same order of magnitude. The O<sub>2</sub> absorption capacity of the as-synthesized, dried and stored powders were found equal to  $0.20 \pm 0.01$ ,  $0.14 \pm 0.03$  and  $0.09 \pm 0.00$  g O<sub>2</sub> per g of iron, respectively. The initial absorption rate was found within the range  $[0.5 - 1.5] \% \text{ O}_2 \text{ min}^{-1} \text{ g}^{-1}$ .

**Keywords:** Iron nanoparticles; Iron boride; Montmorillonite; Oxygen absorption kinetics; modelling ; chemical synthesis, <sup>57</sup>Fe Mössbauer spectroscopy

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