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# EFFECT OF MILLING ON THE STRUCTURAL, MAGNETIC AND CATALYTIC PROPERTIES OF ZINC FERRITE SYNTHESIZED BY MICROWAVE COMBUSTION METHOD

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Zinc ferrite nano-crystals were successfully synthesized from its stoichiometric metal nitrates and glycine mixtures, using a microwave assisted combustion method. The as prepared sample was subjected to high energy ball milling for different periods of time. Structural and magnetic properties have been investigated by XRD, FTIR, VSM and Mössbauer spectroscopy. Results revealed that the as-prepared sample is a monophase zinc ferrite possesses high crystallinity. A minor of α-$Fe_2O_3$ phase is detected after milling. The average crystallite size of the as prepared (AP) $ZnFe_2O_4$ powder is about 27 nm. This value decreased with milling time reach to around 9 nm after 330 min. FTIR spectra showed two absorption bands in the zinc ferrite structure related to octahedral and tetrahedral sites in the range of 400-600 $cm^{-1}$. The room temperature Mössbauer spectra of the samples are representing the coexistence of both ferrimagnetic ordering and superparamagnetic phases. The magnetic measurement at room temperature confirmed the ferrimagnetic behavior of the samples. The saturation magnetization value of the as prepared $ZnFe_2O_4$ is 47 emu/g was observed and its value decreased to 29 emu/g after 330 min of mill. The catalytic activity for the as prepared and milled samples was carried out using dehydrogenation – dehydration of isopropyl alcohol. The results revealed that the samples are active and highly selective towards the formation of acetone and propene.

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