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## Effect of Zn-substitution on the structural and magnetic properties of Mn-Zn ferrites synthesized from spent Zn-C batteries

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### Abstract

The present study aimed at the production of manganese-zinc ferrites through the recycling process of spent Zn-C batteries. Firstly, the spent Zn-C batteries were dismantled, crushed and leached in nitric acid and the composition of the acid solution was analyzed using atomic absorption spectroscopy. Secondly, stoichiometric amounts of metal nitrates were used to adjust the metallic concentration and prepare respective Mn<sub>1-x</sub>Zn<sub>x</sub>Fe<sub>2</sub>O<sub>4</sub> ferrites (x=0.20,8) through the urea auto-combustion method. The obtained ferrites were examined by X-ray diffraction and Fourier transform infrared for crystalline phase identification, transmission electron microscopy for particle size and morphology and vibrating sample magnetometer for magnetic properties. The obtained structural and magnetic properties such as lattice parameter, infrared band positions saturation magnetization and coercivity were used to estimate the proper cation distribution of the system. The magnetic measurements showed that the change in the values of saturation magnetization with increasing Zn-content can be described according to the cation distribution while, that in the coercivity values can be explained on the basis of the magneto-crystalline anisotropy. (c) 2013 Elsevier B.V. All rights reserved.

### Keywords

**Author Keywords:** Zn-C battery; Urea auto-combustion; Mn-Zn ferrites; VSM; Recycle

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