

Investigation of Physical Properties of Cr³⁺ Substituted Mn-Zn Spinel Nanoferrite prepared by sol-gel Autocombustion Method

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ABSTRACT

A sol-gel autocombustion method was used to prepare Cr³⁺-substituted Mn-Zn spinel nanoferrite. The structural parameters of the prepared nanoferrite were examined using X-ray diffraction. It was found that Cr³⁺ influenced the crystallite size (37 nm to 13 nm) and lattice dimension (8.3197 Å to 8.3588 Å). FTIR was used to analyze the function group (Fe-O), and it was confirmed that Cr-Mn-Zn spinel nanoferrite was formed in the fingerprint region (400-600 cm⁻¹). The force constant at the respective sites was used to determine the strength of the bond at tetrahedral and octahedral sites. The prepared nanoferrites showed a smooth M-H loop, indicating a soft magnetic ferrite material. The coercivity (56.45 Oe -86.27 Oe), magnetic saturation (0.64 emu/g to 16.32 emu/g), and retentivity (0.02 emu/g to 2.24 emu/g) showed multidomain and pseudo-single domain characteristics of the prepared nanoferrite. The recorded lower dielectric loss of the prepared nanoferrite by Impedance Analyser at high frequency favourable for high-frequency applications of Cr-Mn-Zn spinel nanoferrite.

Keywords: Mn-Zn spinel ferrite, XRD, FTIR, VSM

Role of Butylated hydroxyanisole (BHA) and Butylated hydroxytoluene (BHT) as Preservatives: A Review

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ABSTRACT

BHA (butylated hydroxyanisole) and BHT (butylated hydroxytoluene) are synthetic antioxidants commonly used as preservatives in cosmetics, including lipsticks and moisturizers. These are widely used as a preservative in food, food packaging, cereal, baked goods, chewing gum, meats, butter, dehydrated potatoes, animal feed, cosmetics, pharmaceuticals, rubber, and petroleum products. Fatty or oily foods treated with BHA and BHT taste better for longer because they include chain-breaking antioxidants that quench free radicals. BHA is classified as a category 2B carcinogen by the International Agency for Research on Cancer (IARC), meaning it is 'possibly carcinogenic to humans'. There are several animal researches on mice and rats showing that BHA and BHT may increase the risk of cancer. Using them every day can have an adverse effect on skin and do the opposite of what you need to achieve. Studies show that it interferes with hormone function. Long-term exposure to high doses of BHA and BHT are toxic in mice and rats, causing liver, thyroid and kidney problems and affecting lung function and blood coagulation along with showing adverse effects on reproductive and hormone function. Thus it is best to avoid using products with these synthetic preservatives and minimize using cosmetics containing these harmful preservatives. Read labels to avoid BHA and BHT, choose food products that do not contain artificial preservatives, instead eat fresh food avoiding packaged food or at least food without artificial preservatives when you can. Thus, in the present review study the BHA and BHT are showing adverse effects on health.

Keywords: BHA (butylated hydroxyanisole), BHT (butylated hydroxytoluene), rats and mice, carcinogen, toxicity, reproductive dysfunction.