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SYNTHESIS AND CHARACTERISATION OF MAGNESIUM OXIDE(MGO) BY CO-PRECIPITATION METHOD

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ABSTRACT

Metal oxide nanoparticles are remarkable materials that possess unique characteristics such as chemical stability, high photocatalytic activity, and high electric permittivity. The material is therefore used in a wide range of applications, such as in optical, electrical, and electronic devices, as well as in antiseptic, antibacterial, environmental, semiconductor, and catalytic applications. The current study's goal is to synthesize and characterize magnesium oxide nanoparticles (MgO). These nanoparticles are created utilizing a simple chemical process known as the Chemical Co-Precipitation method and Magnesium Nitrate acts as the core precursor. With the aid of scanning electron microscopes, EDX, and Fourier transform infrared Imaging, the morphology, elemental composition, and functional group of the metal oxide nanoparticles were determined.

Keywords: MgO, Co-precipitation, FESEM, EDX, FTIR.

I. INTRODUCTION

Nanoparticles are particles ranging in size from 1 to 100 nanometers that have attracted the interest of scientists in recent years due to their unusual electrical, physical, magnetic, chemical, and optical properties. [1]. Nanoparticles exhibit a variety of properties when compared to bulk materials [3]. Magnesium oxide is an inorganic material with outstanding thermal stability, surface reactivity, heat resistance, and chemical resistance [3]. MgO is an important material with a large band gap that is used in a range of applications such as catalysis and superconducting anti-bacterial action against food-borne infections [2]. (7.8 eV). MgO nanoparticles have been working to reach high adsorption.[4] MgO has the simplest oxide structure, known as the Rock-Salt structure, and is alkali resistant [3]. To manufacture nanostructured MgO, various physicochemical processes such as sol-gel calcination, chemical precipitation, and hydrothermal and microwave production have been applied.[5] The co-precipitation approach, which is the simplest method, was used to create MgO nanoparticles.

II. SYNTHESIS

MATERIALS

Mg(NO3)2.6H2O (magnesium nitrate hexahydrate), NaOH (sodium hydroxide), deionized distilled water, and Ethanol was purchased from Sigma Aldrich and without purification.

PREPARATION OF NANOPARTICLES

MgO nanoparticles are synthesized by the co-precipitation method. By taking, the equivalent amount of molar ratio of Mg(NO3)2.6H2O and NaOH were dissolved in distilled water in separate beakers and kept under a magnetic stirrer for 30 minutes. Then, add NaOH solution dropwise to Mg(NO3)2.6H2O solution under stirring conditions. A milky white precipitate is formed then the precipitate is washed, dried, and calcinated at 80°C for 12h finally MgO nanoparticles are formed.

III. CHARACTERIZATION

Magnesium ferrite nanoparticles were characterized by FTIR, FESEM&EDX. Fourier Transform Infrared Spectroscopy (FTIR) identifies the functional group of the material. Field emission scanning electron microscopy (FE-SEM) recorded the morphological function of the given nanoparticles. The Energy Dispersive X-ray (EDX) revealed the presence of elements that present in the specimen.

IV. RESULTS AND DISCUSSION

FESEM (Field emission scanning electron microscopy):

The morphologies of the MgO nanoparticles were examined by SEM at various magnifications, as shown in Figure (1a,1b). The magnesium oxide nanoparticles shown in Figure (1a,1b) are characterized by an uneven

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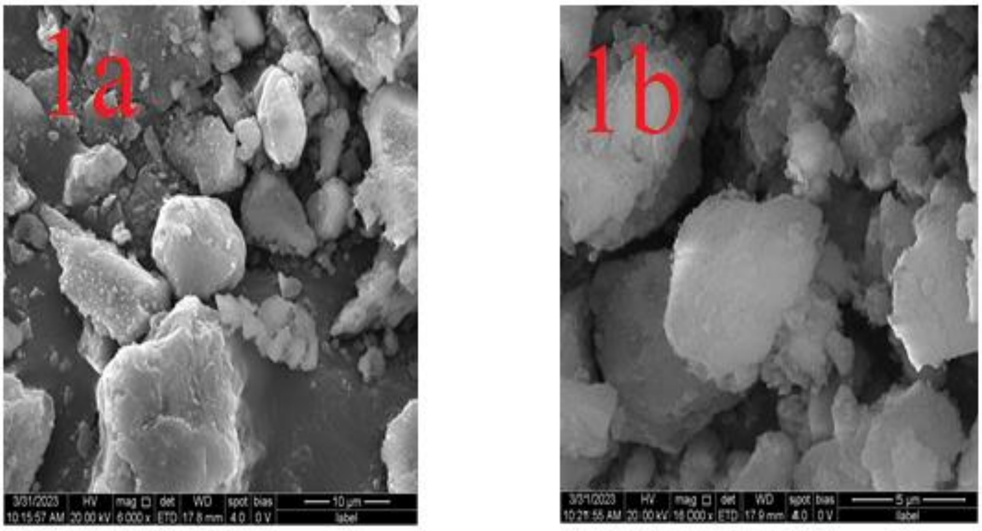
distribution of spheres and the presence of either one single particle or a cluster of particles, indicating aggregated magnesium oxide nanoparticles. Spherical nanoparticles in the powder appear to be slightly agglomerated, as evidenced by the closed view. A surface roughness of significant magnitude was observed on MgO nanoparticle aggregates.



FIG(1a,1b): SEM image of MgO

EDX (Energy Dispersive X-ray):

Nanoparticle composition and purity were determined using energy-dispersive X-ray spectroscopy (EDX) Figure (2) shows the EDX spectrum of MgO, which shows that it only contains Mg and O.

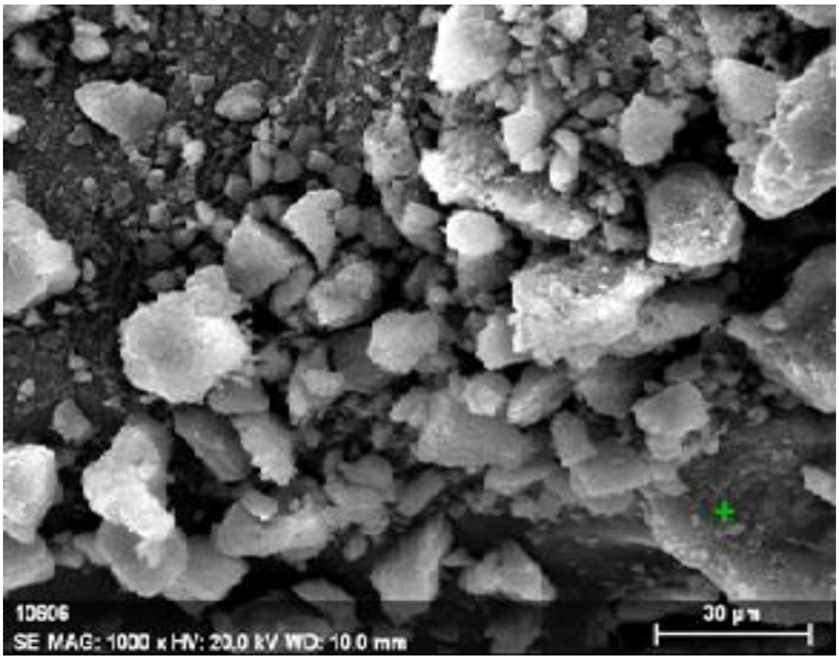


Fig (2) EDX of MgO

FTIR (Fourier Transform Infrared Spectroscopy):

An IR spectrum for the annealed sample generated by the co-precipitation process is shown in Figure (3). It is characterized by a board spectrum between 880 and 950 cm1, which corresponds to the band of metal-oxygen vibration. There is a board at 1350cm1 due to the stretching frequency of H-O-H.

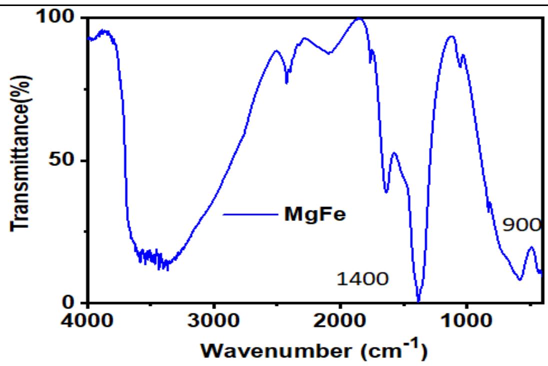


Figure (3) FTIR peak of MgO.

V. CONCLUSION

The current study emphasized a biogenic approach for preparing that was both eco-friendly and convenient. Several spectroscopic techniques, including IR, SEM, and EDX, were used to characterize the magnesia nanoparticles. Pharmaceutics, mechanical, and biotechnological applications will have substantial use for MgO nanoparticles in the future.

VI. REFERENCES

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