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RESEARCH ARTICLE

GREEN SYNTHESIS AND CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES USING CASSIA ARTICULATE FLOWER EXTRACT

Srimeena S. and Nithya S

Department of Chemistry & Physics, Nadar Saraswathi College of Arts & Science for women.

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Abstract

Zinc oxide (ZnO) nanoparticles were prepared by using green synthesis method. The prepared nanoparticles were characterized by using Fourier transform infrared spectroscopy (FTIR). The wave number 828 cm^{-1} indicated the presence of the zinc oxide nanoparticles. The average crystallite sizes were calculated by applying sheer equation on the base of XRD powder patterns of all samples and found to be in the range 38.11 nm. This is order in nanosize. In accordance with the SEM image would like that rock in shape.

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Introduction:-

ZnO is an inorganic compound with the formula ZnO. It usually appears as yellow powder nearly. Insoluble in water [1]. The powder is widely used as an additive into numerous materials and products including plastics, ceramics, glass, cement, rubbers, lubricants, paints, ointments, adhesives, sea lands, pigments, foods, batteries, fire retardants etc [2]. ZnO is present in the earth crust as mineral zincates however most ZnO used commercially is produced synthetically. Zinc oxide (ZnO) nanopowders are available as powders and dispersions [3]. These nanoparticles exhibit antibacterial, anti-corrosive, antifungal and UV filtering properties.

Experimental Procedure:-

Preparations of Zinc Nanoparticles

The synthesis nanoparticles 50 ml of cassia articulate flower extract was taken and boiled to 60°C using a stirrer heater. 5g of zinc nitrate was added to the solution as the temperature reached 60°C . The mixture is then boiled in 1 hour and then the mixture collected in a 100ml beaker and heated in an air heated furnace at 150°C for 5 hours. A yellow colored powder was obtained and this was carefully collected and packed for characterization purposes. The material was mashed in a mortar-pestle so as to get a finer nature for characterization.

Results And Discussion:-

Vibrational Studies:

Fourier Trans Form Infrared Spectroscopy:

The synthesized ZnO powder was further supported by FTIR spectra.

Corresponding Author:- Srimeena S

Address:- Department of Chemistry & Physics, Nadar Saraswathi College of Arts & Science for women.

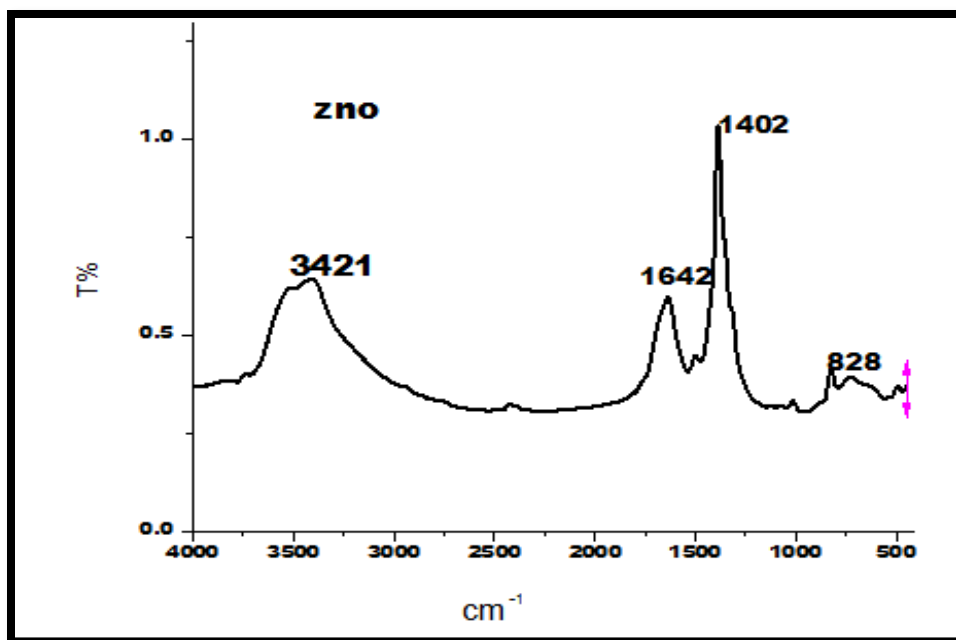


Fig 1:- FTIR spectrum of (Zno) nano particle.

The FTIR Spectrums of the (Zno) samples are shown in fig (1). The absorption peak at very large band around 3421cm^{-1} is attributed to the stretching of O-H stretch, The small absorption peaks at C-O stretch bend 1642cm^{-1} . The strong absorption peak between 828 cm^{-1} - 842 cm^{-1} indicate the (ZnO) nanoparticles.[4]

Structural Studies:-

X-ray diffraction:

It shows that XRD pattern of the zinc oxide nanoparticle obtained by green synthesis method. The major phase corresponds to the (200), (220), (221) lattice plane. The (hkl) values are agreed well with the standard card of ZnO powder sample (JCPDS file no: 772414). The crystallite average size D of the prepared nanopowder can be calculated by using Debye Scherer's formula

$D = \kappa \lambda / \beta \cos \theta$ Where λ is the wavelength of X rays used (1.54060\AA), β is the full width at half maximum (FWHM) $= 0.24, 0.78, 1.18$ and θ is the angle of diffraction. The crystallite average size of prepared nanopowder is found to be around 38.11 nm which is order in nanosized. [5].

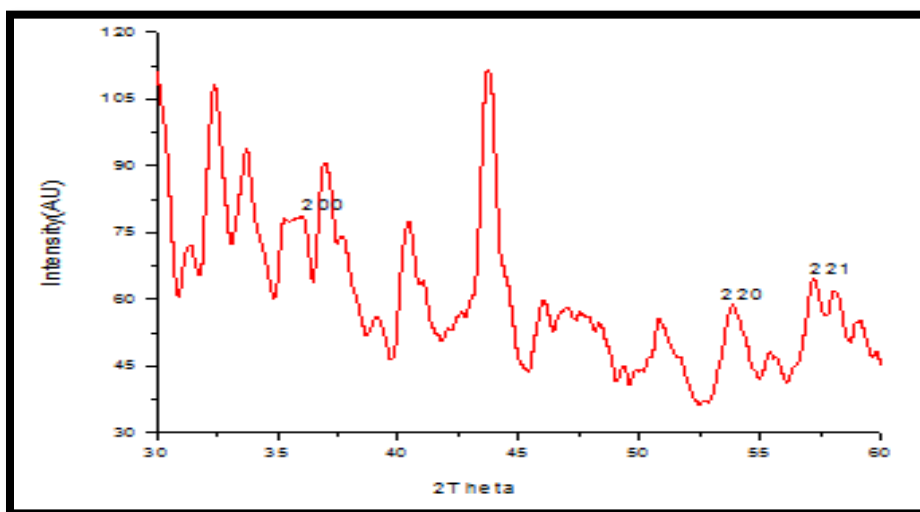


Fig 2:- XRD Pattern of (Zno) nano particle.

Morphological Studies:-**Scanning Electron Microscope:**

SEM studies were revealed to visualize the size and shape of zinc oxide nanoparticles and show the typical bright-field SEM microscope of the synthesized zinc oxide nanoparticles. In this study, it was appeared with that most of rock in shape. [6]

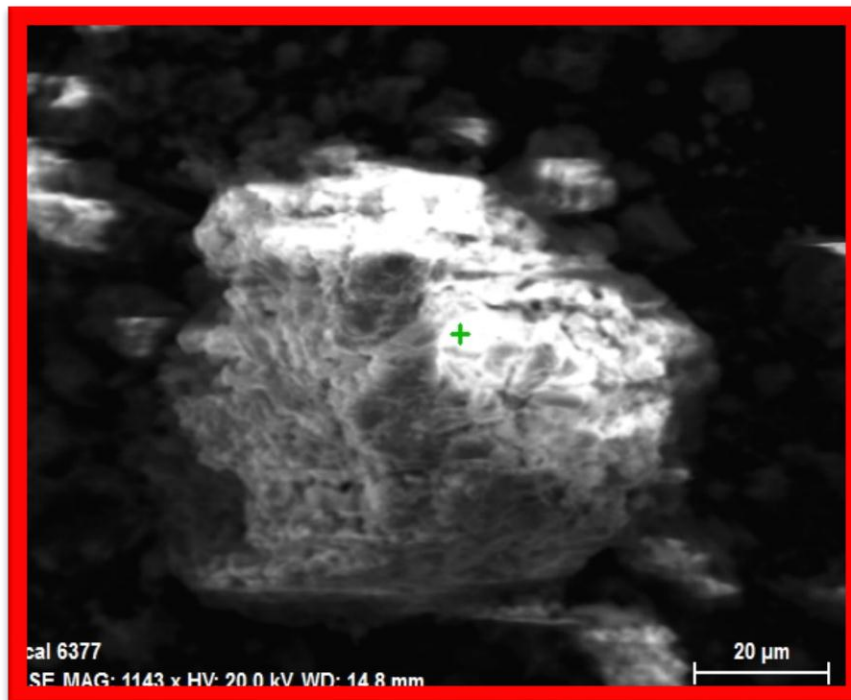


Fig 3:- SEM image of (ZnO) nanoparticles.

Edax (Energy Dispersive X-Ray Spectroscopy):

If confirm the structure element of aqueous extract of cassia articulate zinc oxide nanoparticles by green synthesis was carried

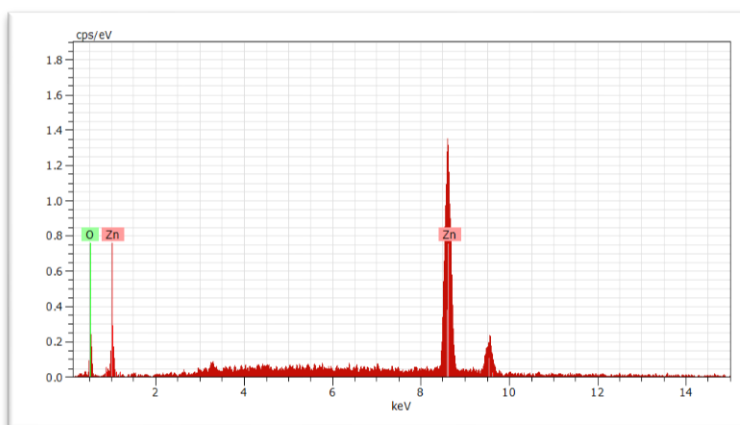


Fig 4:- EDAX image of (ZnO) nanoparticles.

Conclusion:-

Fourier transforms infrared spectroscopy (FTIR). The wave number 828 cm^{-1} indicated the presence of the zinc oxide nanoparticles. The average crystallite sizes were calculated by applying sheer equation on the base of XRD

powder patterns of all samples and found to be in the range 38.11 nm. This is order in nanosized. In accordance with the SEM image would like that rock in shape. The EDX indicated the presence of (Zr, Cl, and O). ZnO nanoparticles are prepared with help of the green synthesis method by using flower extract of Cassia Auricular. Green synthesis method is simple, non toxic.

References:-

1. Pai AR, Kavita S, S.Sh. Raj, and Sasidharan S. Green synthesis and characterization of silver nanoparticles using fresh leaf extract of Morinda citrifolia and its antimicrobial activities studies. *Int. J. Pharm. Pharm. Sci.* 2015; 7(3), 459-461.
2. Saranyadevi K, Subha V, Ravindran RSE and Rangnathan S. Green synthesis and characterization of silver nanoparticles leaf extract
3. El. D.S.A. Tahar AA, Elzatahry D.M. A. Dhayan, AI-E.M. Addullah and S.A. Deyab and Saleem. Synthesis and characterization of magnetite zeolite nano composite. *Int. J. Electrochem.* 2011; 6, 6177-6183.
4. Jianet. al., A study of ZnFe₂O₄ nanoparticles modified by ferric nitrate. *J Mag Magn Mater* 2013; 330: 96-100.
5. Alagummuthu G, Kirubha R. Green synthesis of silver nanoparticles using Cissus quadrangularis plant extract and their antibacterial activity. *Int. J. Nano Mat Bio.* 2012; 2 (3): 30-33.
6. Sundaravadivelan C, Nalini M. Bio larvicidal effect of phylosynthesized silver nanoparticles using *Pedilanthus tithymaloides* (L) plant stem extract against the degree vector *Aedes aegypti* (Diptera).