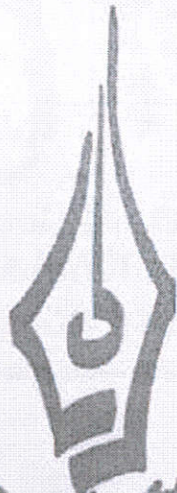




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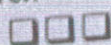
- or fraud callers and hackers for increase the trust on cashless transaction in India.
- Government should make to increase speed of internet connectivity and reduce the network connecting problems while making cashless transaction.
- After failing transaction immediately provides settlement by banks and service providers

Conclusion

After demonetization in India increased number of cashless transaction. Transparent economic development is need today therefore cashless transaction is secure and transparent. Government of India has to promote cashless transaction through various discount or incentive cash back offers are one of the important factor that Induce the common propels for the use of cashless transaction and discourages physical cash payments by the way of proper supervision of restrictions for using cash based transaction.

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Structural and Infra-red Analysis Of $\text{Ni}_{0.7+x}\text{Zn}_{0.3-x}\text{Fe}_{2-2x}\text{O}_4$ System.

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Abstract:- The structural properties and IR absorption spectra of Zr^{4+} substituted Ni-Zn ferrites having general formula $\text{Ni}_{0.7+x}\text{Zn}_{0.3-x}\text{Fe}_{2-2x}\text{O}_4$ ($x = 0.0, 0.1, 0.2, 0.3, 0.4, 0.5$) were prepared by standard double sintering ceramic technique. The X-ray analysis confirmed the single phase cubic spinal structure formation of the samples. The lattice constant was found increases with increase of Zr^{4+} ion substitution, which is attributed to ionic size difference of cations involved. IR spectra of all samples have been used to locate band positions, which are observed to lie near 400cm^{-1} and 600cm^{-1} . The bond length R_A and R_B were found to increase with composition.

Keywords:- Ferrites, Structural Properties, Cation distribution, Infra-red, force constant.

I. INTRODUCTION

Ferrites are widely used in many electronic devices. These are preferred because of their high electrical resistivity, chemical stability, mechanical hardness and reasonable constant, [1-4]. Ni-Zn ferrites are well known technological magnetic materials finding their applications in various electronic devices. The physical properties of Ni-Zn ferrites are very

sensitive to the method of preparation, the amount and the type of substitution [5]. The ferrites are commonly prepared by ceramic technique which involves high temperature sintering and prolong heating. This method produces particles of coarse nature. Spinel ferrites are compounds of iron oxides and some transition metal oxides and they exhibit important electrical and magnetic properties, which made them extensively useful in technological and industrial applications such as magnetic storage in microwave devices [6,7].

Nickel ferrite is a well known hard magnetic material with inverse spinel structure. The saturation magnetization and coercivity of nickel ferrite is higher than the other nickel, manganese spinel ferrites [8]. However, to our knowledge zirconium has not been substituted in nickel ferrite. Zirconium is a lustrous, grayish-white, soft, ductile and malleable metal which is solid at room temperature, though it becomes hard and brittle at lower purities. Zirconium is highly resistant to corrosion by alkalis, acids, salt water and other agents. Ni-Zn ferrites have high resistivity and low eddy currents. Therefore they could be considered as the most versatile ferrites. Ni-Zn ferrites have been commercially used in radio frequency circuits, high quality filters, rod antennas, transformer cores, read/write heads for high speed digital tape and operating devices [9]. Introducing small amount of foreign ion can change the electrical and magnetic properties of the ferrites [10]. Addition of tetravalent ions like Ti^{4+} , Ge^{4+} , Si^{4+} , Mn^{4+} influences the structural, magnetic and transition properties of the system.

In the present study, the effect of zirconium substitution in nickel ferrite formula $Ni_{0.7+x}Zn_{0.3}Zr_xFe_{2-2x}O_4$ ($x = 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6$), on structural properties of nickel ferrite synthesized by standard double sintering ceramic method are reported. Zirconium-containing compounds are used in many biomedical applications [11].

Experimental Details:- Polycrystalline

Ni-Zn ferrites having the chemical formula $Ni_{0.7+x}Zn_{0.3}Zr_xFe_{2-2x}O_4$ ($x = 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6$) were prepared by standard double sintering ceramic method using the appropriate quantities of A.R. grade ferric oxide (Fe_2O_3), Nickel oxide (NiO), Zinc Oxide (ZnO) and Zirconium dioxide (ZrO_2). The samples were pre-sintered for 24 hours in furnace at $500^\circ C$. Final sintering of the ferrite specimen was carried out for 24 hours at $1000^\circ C$. The X-ray diffraction patterns of all the samples were obtained on Philips diffractometer operated at 25KV and 20mA. IR spectra of all the samples were recorded on Perkin-Elmer IR spectrometer (Model No. 783) in the range $200-800cm^{-1}$ in KBr medium.

II. RESULT AND DISCUSSION

1.X-ray diffraction studies :

X-ray diffraction patterns of all the samples are recorded at room temperature represented in Fig 1.1. These figures show well defined peaks and (311) reflection appears to be more intense in all the samples. All the planes are allowed planes, which confirm the formation of single phase cubic spinel structure without appearance of any extra peaks. The Inter-planer spacing (d) values were calculated for the recorded peaks using Bragg's law and the lattice constant 'a' was calculated for each plane using the following relation 1.1.

$$a = d_{hkl} \sqrt{(h^2 + k^2 + l^2)} \quad 1.1$$

The average lattice constant 'a' may be obtained by calculating the average of the 'a' values for each diffraction plane. The variation of lattice constant with Zr^{4+} ion content is shown in figure 1.2. It is found that the lattice constant increases with increasing Zr^{4+} ion substitution. In the present system, the increase in a lattice constant of the composition with increase in Zr^{4+} content x is attributed to replacement of smaller ionic radius of Fe^{3+} (0.67\AA) by larger ionic radius of Zr^{4+} (0.80\AA) obeying Vegard's Law [12,13]. The

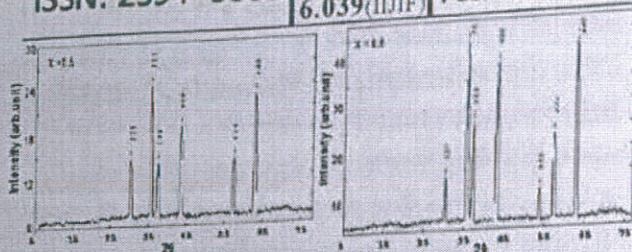


Fig. 1 XRD Patterns of $\text{Ni}_{0.7+x}\text{Zn}_{0.3}\text{Zr}_x\text{Fe}_{2-2x}\text{O}_4$ System ($x = 0.0$ to 0.6)

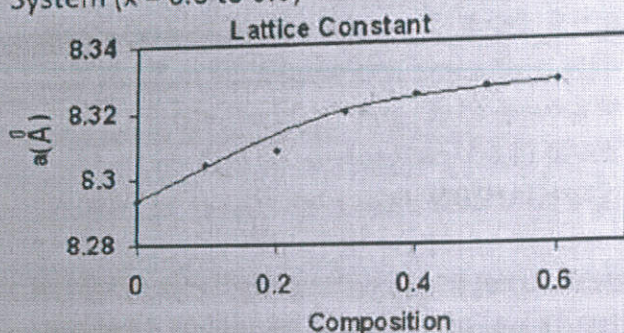


Fig. 2 : Variation of lattice constant 'a' with Zr⁴⁺ content x of the system Ni_{0.7+x}Zn_{0.3}Zr_xFe_{2-2x}O₄.

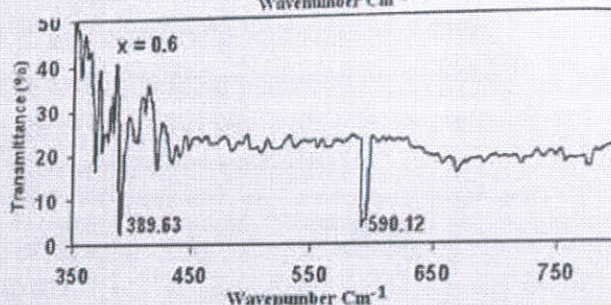
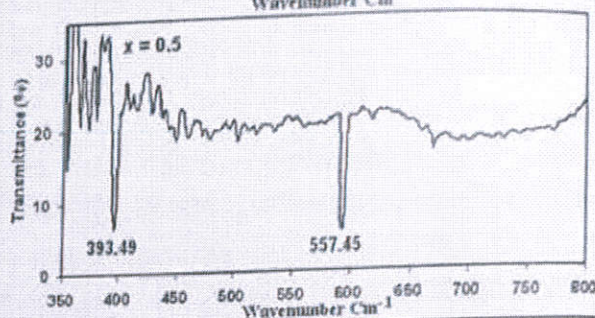
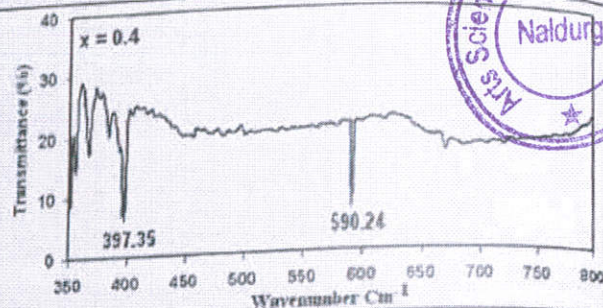


Fig.3 IR Spectra of the system $\text{Ni}_{0.7+x}\text{Zn}_{0.3}\text{Zr}_y\text{Fe}_{3-y}\text{O}_4$ for the sample $x = 0.0$ to 0.6

Table 1

Lattice constant (a), X-ray density (d_x), and particle size (t) of system $\text{Ni}_{0.7+x}\text{Zn}_{0.3}\text{Zr}_x\text{Fe}_{2-2x}\text{O}_4$.

Sr. No	Compound X	Lattice Constant
1	0.0	8.293
2	0.1	8.304
3	0.2	8.308
4	0.3	8.319
5	0.4	8.324
6	0.5	8.326
7	0.6	8.327

Table 2

Band position (n_1 and n_2), Force constant (K_0 and K_1) and Bond length (R_A and R_B) of the system

$\text{Ni}_{0.7+x}\text{Zn}_{0.3}\text{Zr}_x\text{Fe}_{2-2x}\text{O}_4$

Comp. x	Band position		Force constant		Bond length	
	ν_1 (cm ⁻¹)	ν_2 (cm ⁻¹)	$K_0 \times 10^5$ (dyne/cm)	$K_1 \times 10^5$ (dyne/cm)	R_A (Å)	R_B (Å)
0.0	603.74	418.57	1.0629	0.9346	0.4754	0.7533
0.1	617.24	416.64	1.0679	1.0840	0.4778	0.7560
0.2	617.24	414.71	1.0695	1.1156	0.4787	0.7570
0.3	615.31	406.99	1.0410	1.1764	0.4811	0.7598
0.4	590.24	397.35	1.0028	1.1735	0.4821	0.7610
0.5	557.45	393.49	0.9936	1.2025	0.4826	0.7615
0.6	590.12	389.63	0.9843	1.1753	0.4828	0.7618

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Geographical Aspects Of Maalgaon Watershed

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Introduction :

Geographers preferred water as their study to make up the geographic scene. They considered hydrologic cycle precipitation as the first phase. The geographers received sporadic attention to the land phases of the cycle.

The American study of hydrology taken under economic heads. The Geologist, meteorologists and engineers have been behaviour of water, tried to keep it during floods the work and study of hydrology taken place in the last of the 19th century. The American textbook on hydrology published two years later. The early neglected study of water by geographers resumed in the beginning of the contrary. Running water was the touch stone to an understanding of land forms.

II: Location :

Beed district located in the central part of the Marathwada region. Beed district lies between 18° 20' to 19° 27' north latitudes and 74° 57' to 76° 57' east longitude. This district has Majalgaon tahsil as the study area located to the north-east direction of Beed district. To the direction of east there is Parali tahsil and Prabhani district to the direction of west there is some part of Georai tahsil and Wadwani towards southern direction. Majalgaon is located in the centre of these Tahsil Godawari river is very important for Majalgaon taluka regarding crops and cultivation. Sindhphana river is so important because dam is on the river, Sindhphana unite Godawari at Manjra.