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An International Refereed & Peer-Reviewed Research Journal on Chemistry

STUDY OF PROXIMATE ANALYSIS OF SOME MEDICINAL PLANTS FROM THE AREA OF KALINADI, BULANDSHAHR

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Seven Medicinal Plants were taken for their proximate analysis, various parameters such as fibres, fats, waxes, molsture, phenols Trepenoids, Alkaloids, Total ash and Acid insoluble ash were determined.

The results of this study will provide an useful information to health care officers, hutritionists and indurtrialists.

KEY WORDS: Medicinal Plants. Proximate analysis Ash.

Introduction

Each Medicinal Plant have its own nutrient composition. These nutrients are essential for the physiological function of human body. These nutrients play an important role for energy and life processes. There are very few reports on the proximate analysis of medicinal plants. Many studies have shown that alkaloids have been identified as the active secoundary metabolites of the plant[2-3]. Therefore determination of total alkaloids is very important related to the quality of medicinal plants[4]. This paper studies the proximate analysis of seven medicinal plant from the near by area of Kalinadi (river) Bulandshahr in Uthar Pradesh.

Materials & Methods

All the chemicals and regents were used analytical Grade Reagents and the solution were prepared in double distilled water.

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Experiment

Proximate chemical Analysis of each plants was determined using different Experimental methods :—

Proximate analysis : The moisture content was determined by Karl Fischer method. Acid insoluble contents and total ash analysis were determined by standard methods.

Sample Extraction : 5.0 gm of powder sample was weighed and kept in soxhlat apparatus for continuous extraction for 12 hours. Methanol (120 ml) and water (30 ml) in the volume ratio 4 : 1 was used as the extractant solvent then cooled and filterned through whatsman filter paper no. 41 in a pre-weighed beaker. The Extractant so obtained is used for the determination of crude fibres, fats and waxes.

Determination of crude fibres

The extractant was treated with 125 ml of ethyl acetate then filtered into a pre-weighed beaker and determined for the percentage of crude fibres. From Filtrate the fats and waxes are analysed as follows :

Determination of fats and waxes

The filtrate was evaporated to dryness on a water bath at 45°C. After evaporation of ethyl acetate, the beaker was allowed to cool in a desiccator then weighed the residue, which contains fats and waxes.

Determination of Phenols and Terpenoids

The filtrate obtained from the soxhlet extraction of sample was evaporated to 1/10th of its volume on a water bath at 70°C. It was acidified with 2M H_2SO_4. The acidified filtrate was extracted using 75 ml chloroform in a separating funnel. The chloroform layer was transferred to a Pre-weighed beaker and was evaporated to dryness on a water bath at 45°C cool at room temperature in a desiccator then weighed. It contains pheno and terpenoids Aqueous layer was used to determine alkaloids.

Determination of Alkaloids

The aqueous layer was neutralised with 2M NaOH for 10 pH. It was further extracted with 60 ml chloroform and methonal (20 ml) in the volume ratio 3 : 1 in a Separating funnel

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The Organic layer was transferred to a Pre-weighed beaker on a water bath at 45°C for the evaporation of the solvent, then cool in a desiccator and weighed. It containsalkaloids.

Results and discussion

The Proximate analyses of the various medicinal plants are given in Table 1 and 2.

Table 1

S.R.	Medicinal Plants	Fibres	Fats and waxes	Moisture content	Phenols and Terpenoids
1.	Azadiracta indica (Neem)	70.0	0.21	7.0	9.5
2.	Eugenia jambolana (Jamun)	75.5	0.11	7.8	3.7
3.	Phyllanthes emblica (Amla)	44.3	5.0	7.3	4.3
4.	Deiman tenuiflorum (Tulsi)	66.1	0.17	7.2	8.3
5.	Aegle marmelas (Bael)	80.5	0.10	8.3	4.12
6.	Memordica charantia (Karela)	62.0	2.5	4.2	4.9
7.	Curcuma amada (Adrak)	82.2	0.12	6.4	3.8

From Table 1 moisture content was found to be low and ranges from 6.4 to 8.3%. Low values of moisture content are good to increase the shelf life of plant samples, during storage, packaging, and avoids the growth of microorganisms which depends on their water content. The ash contents of plants sample phyllanthes emblica 5.0 is lower than the ash content of other samples. The variation in the ash contents may be due to mineral contents. In the sample result also show low fat which was required in preventing the samples stored for long period. The lipid content (fats and waxed) found very low for all plants samples except phyllanthus emblica 5.0 and Memordica charantia 2.5.

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The low fat content is good because of Low calorie value. All the plants samples studied are rich in crude fibre and varies from 44.3 to 82.2% which is useful for human health. The Azordica indica and ocimum tenuiflorum contains Significant amount of phenols and Terpenoids.

Table 2

S.R.	Medicinal Plants	Alkaloids	Total ash	Acid insoluble ash
1.	Azadiracta indica (Neem)	0.91	11.8	7.0
2.	Eugenia jambolana (Jamun)	0.20	9.1	2.0
3.	Phyllanthes emblica (Amla)	0.28	5.0	0.61
4.	Ocimun tenuiflorum (Tulsi)	0.80	18.5	8.5
5.	Aegle marelos (Bael)	0.73	15.5	11.6
6.	Memordica charantia (Karela)	0.22	12.0	4.2
7.	Carcuma amada (Adrak)	0.11	8.2	5.6

From Table 2 alkaloids content varies from 0.11 to 0.91%. The total ash and acid insoluble ash contents of the medicinal plants have been widely used as one of the factors enhance the quality.

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OPTICAL STUDIES IN SOME DOPED AND NONSTOICHIOMETRIC NA-K TARTRATE CRYSTALS

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It has been established that the doped versions of a few crystals show interesting properties including electrooptics. In the present studies, crystals of sodium potassium tartrate doped with nickel and nonstoichiometric versions have been studied. The crystals are grown with different concentration of nickel (0.1, 0.2 and 0.5% by weight) after determining the solubilities. It was observed that the stress optical constants increase with concentration of nickel upto a certain level and then decrease on further addition. Also there is a marked difference of piezooptcial constants for nonstoichiometric crystals.

KEY WORDS: Electro Optics/Tartrates/Crystal/

Piezoelectric

INTRODUCTION

Some of the ferroelectric crystals have been very interesting electrooptic materials. Among them mention may be made of lithium niobate and KDP. The aim of electrooptic material investigation has always been to somehow increase the electrooptic constants and thus drive the devices with less power. The ultimate goal in such investigations may be stated to be the ability to operate an electrooptic modulator with just a battery with this aim in view, the authors have been engaged in electrooptic investigation of materials over the past few years.

Sodium potassium tartrate, popularly known as Rochelle salt (RS), has been an important piezoelectric from the time of its discovery. Many of its properties have been investigated thoroughly (1-4). RS has been known to show many interesting properties. For example when an

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electric field is applied along X-axis and observation is made along YZ-axis, there is a large difference in the halfwave voltages (5) for the two polarities. Because of such interesting

behavior RS has been taken up for a thorough investigation as an electrooptic material. In the present report preliminary results obtained with nickel doped and nonstoichiometric crystals have been reported.

Experimental Details

Crystals were grown by slow evaporation at constant temperature. The growth rates were determined using a cathetometer. Morphological studies were conducted with a contact goniometer. The stress optical studies were done using a Babinet compensator and at sodium yellow wavelength. The crystals were prepared by cutting with MR cutter. All the results reported are at room temperature (25°C).

Table-1

Salt Dissolved in GMS				
Temp.°C	Pure	0.1% Ni	0.2% Ni	0.5% Ni
30	100.0	102.5	104.6	105.0
35	114.0	121.3	122.7	128.5
40	145.0	146.3	146.8	156.5
45	186.0	190.0	191.0	—

Table-2

Direction of *d*	Stress Optical Constant for (in units of Brewsters)							
Stress	Observ	Pure	0.1 Ni	0.2 Ni	0.5 Ni	2 : 8	4 : 6	2 : 8, 0.1Ni
(001)	(010)	2.62	3.72	2.91	2.63	3.05	2.15	3.19
(001)	(100)	0.81	0.98	0.97	0.78	1.32	1 : 08	1.04

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Results and discussion

From Table 1 it can be seen that the addition of nickel has increased the solubility of RS upto about 0.5%. The variation of solubility with temperature is as expected. It was observed that the growth rate has been much higher for 0.1% doping than for pure as well as for higher percentage of doping. Also, a great change was observed in morphology of the crystals. The angles ware found to be much different when doped with lithium. For example, angle a in pure salt is 135° while it is 152° for 0.5% nickel and 141° for 0.1% of lithium. X-ray data also has

shown similar changes. The most interesting aspect is the study of piezooptic properties. While for pure crystals for a stress along X-direction and an observation along Y-direction, the stress optical constant has been about 2.62 Brewsters, it changes considerably (even by about 40%) for crystals doped with nickel (Table 2). In fact it was found that for the two orientations studied the stress optical constant increases for with doping and then it decreases with further concentration of dopant. This is exactly the behavior that was observed in nickel doped KDP when electrooptic studies were carried out. Further, similar increase in the stress optical constant was observed when a nonstoichiometric crystal was doped with nickel. It was also observed from these investigations that as the content of sodium is increased, the stress optical constant increases. Further work in relation to other dopants and properties is in progress.

Acknowledgements

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STUDIES ON THE FORMATION OF POLYSACCHARIDES BY A NEW STRAN OF LEUCONOSTOC, SPP. BACTERIA

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A strain of *Leuconostoc* spp. culture isolate obtained from samples of cane juices showing viscous fermentation found to produce both levan and dextran polysaccharides. Stacey's media was found best for the formation of polysaccharides. Altering the Na^+/K^+ ratios in the Stacey's medium affected the formation of dextran and levan. Increasing the Na^+ ions concentration decrease the dextran content but not the levan and by increasing the K^+ ions there was decrease of both levan and dextran formation, Possibly the Na^+ / K^+ ratio affect the Glucosyl and Fructosyl transferase enzyme system of the culture.

KEY WORDS: Leuconostoc, Dextran, Levan

INTRODUCTION

Presence of polysaccharides such as dextran and levan in cane juices has been attibuted to the presence of microorganisms *e.g. Leuconostoc dextranicum*[1] and Leuconostoc *Levanicum*[2] respectively. The bacterial products are generally termed as slimes, gums, mucilages etc. and are polymers of reducing sugars formed from sucrose. Dextrans are polymers of D-glucose residues, which mainly consists of α -D (1→6) linkages and levans are polymers of fructose consists of β D (2→ 6) linkages.

S*mutans*[3], S. *Sanguis*[4] cultures are reported to contain both glucosyl and fructosyl transferases required in the production of dextrans and levan polysaccharides and are influenced by Na^+ and K^+

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ions concentration. in *Leuconostoc mesenteroides* sp. also, Jeanes et. al[1] observed formation of dextran and levan type polysaccharides under certain adverse conditions of fermentation.

The present studies describe the formation of dextran and levan polysaccharides by a new strain of *Leuconostoc* spp. culture isolate, obtained from cane juices showing viscous fermentation in factory juices.

MATERIALS & METHODS

DNS (3,5-dnitro salicylio acid) was A.R. E. Merck and dextranase was a gift from M/s.

Miles India Ltd., Baroda.

CULTURE :

The *Leuconostoc* spp. culture was local isolate from fermented cane juice samples showing viscous fermentation in factory juices. The bacterial culture was purified by enrichment and plating technique as described earilier[5]. It was maintained as running culture in Stacey's liquid medium and preserved on agar slants of MRS medium.

THIN LAYER CHROMATOGRAPHY[6,7] (TLC)

The polysaccharides dextran and levan were confirmed by TLC technique, using Butanol – 1: Glacial Acetic acid: and water (3:1:1) as solvent. The TLC plates were sprayed with 1– Nephthol – ethanol-sulphuric acid and heated at 110°C and with 1–Nephthol –ethanol – phosphoric acid spray reagents at 90°C for 10 min. For detection of dextran as pink spots and levan blue spots.

ESTIMATION OF POLYACCHARIDES, DEXTRAN AND LEVAN IN FERMENTED BROTH[8]

10–20 ml of fermented broth was centrifuged to remove the cells The supernatant was deproteinised by adding 1–2 ml of TCA (10%) and made 75% alcoholic by adding Absolute alcohol or 9 vols of methanol. The precipitate was recovered by decantation, washed with ethanol/methanol and dried.

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The dried precipitate was hydrolysed first with N/10 oxallic acid at 100°C for 1 hour to liberate fructose from levan. The remaining polysaccharide was reprecipitated, washed, dried and hydrolysed with N/10 acid sulphuric at 100°C for 1 hour to liberate glucose from dextran. The glucose and fructose in the hydrolysates was estimated by DNS[9] method, for total reducing sugar and by cysteine carbazole[10] method for fructose.

DEXTRAN HYDROLYSIS BY DEXTRANASE[11]

Aliquot quantities of precipitate obtained after the removal of levan by N/10 oxallic acid treatment was dissolved in 0.1 M 5.2 pH acetate buffer and treated with 2-5 units of dextranase at 50°C for one hour. The reducing sugars liberated was estimated by DNS method.

EFFECT OF DIFFERENT MEDIA ON THE PRODUCTION OF POLYSACCHARIDE

The isolated *Leuconostoc* spp culture was inoculated in different media 1 to 6 (given below) and the fermented broth was analysed for polysecchárides contents. dextran and levan as above after 72 hour of growth in the media at 23°C and 37°C temperature of incubation.

MEDIA USED :

These different media were used :

1. Sucrose-Yeast ext-Polypeptone Medium[12] :

Chemicals	gm%
Sucrose	5.0
Yeast ext.	0.5
Polypeptone	0.5
K_2HPO_4	0.1
$MgSO_47H_2O$	0.02
Na_2CO_3	4.0
pH	7.0

2. Sucrose-Yeast extract Medium[13] :

Sucrose	7.5
Yeast ext.	0.6

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K_2HPO_4	0.5
NaCl	0.1
$MgSO_4 7H_2O$	0.02
$(NH_4)_2SO_4$	0.6
pH	6.8

3. Sucrose-Peptone Medium[14] :

Sucrose	10.0
Peptone	0.1
Na_2HPO_4	0.2
KCl	0.5
pH	7.0

4. Sucrose-Corn Steepliquor Medium[15] :

Sucrose	2.0
Corn steep liquor	1.0
K_2HPO_4	1.0
pH	6.9

5. MRS Medium[16] :

Sucrose	10.0
Peptone	1.0
Beef ext.	1.0
Yeast ext.	0.5
Tween	0.1
K_2HPO_4	0.2
Tri Ammonium citrate	0.2

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Sodium Acetate (Anhy)	0.5
$MgSO_4$ $7H_2O$	0.02
$MnSO_4 4H_2O$	0.02
pH	7.0

6. Stacey's Medium[17] :

Sucrose	10.0
Micro cosnic salt	0.3
$FeSO_4$ $7H_2O$	0.001
Peptone	0.001
PABA	0.005
KCl	0.01
$MgSO_4$ $7H_2O$	0.01
K_2HPO_4	0.1
pH	7.6

EFFECT OF INOCULUM RATIO ON THE PRODUCTION OF LEVAN AND DEXTRAN :

The running *Leuconostoc* culture in Stacey's medium was inoculated in fresh Stacey's medium keeping varying ratios of inoculum (culture to media) from 6 to 50%. The fermented broth was analysed for polysaccharides after 72 hours of growth.

LEVAN AND DEXTRAN FORMATION IN STACEY'S MEDIUM WITH PROGRESS OF TIME :

The fermenting culture broth in Stacey's medium was analysed for pH, reducing sugars dextran and levan at regular intervals of 24 hours.

EFFECT OF ADDED NA^+ AND K^+ IONS ON THE FORMATION OF POLYSACCHARIDE IN STACEY'S MEDIUM :

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Na^+ and K^+ ion conc. in the stacey's medium was changed by adding extra quantities of Na_2HPO_4 and K_2HPO_4 salts and taken up for fermentation and analysis of polysaccharide contents of broth medium at 72 hrs. of fermentation.

Results :

TLC technique as adopted showed presence of both dextran and levan. Dextran was also confirmed by dextranase. Out of the six different media tried, only stacey's medium was found good for dextran and levan formation by the culture (Table 1). Dextran and levan both showed optimum temperature of 30°C ± 1°C for fermentation. There was no dextran formation from sucrose at 37°C, where as levan formation took place. Small amount of dextran content seen at 37°C in media. No. 4 may be due to presence of corn steep liquor. Dextran formation increased of inoculum ratio of culture used. Dextran yield obtained was highest at 50% of inoculum or 1:1 ratio of propagation in Stacey's medium. Levan formation was least affected by inoculum and an average of 10% concentration was found sufficiently good (Fig. 2), Dextran and levan formation was accompanied by release of reducing sugars from sucrose. Sugar contents decreased with the formation of polysaccharides for about 144 hour of growth (Fig 1.) and pH dropped to 4.

Dextran synthesis was found to be very sensitive to Na^+ and K^+ ion conc. of Stacey's medium. Altering the Na^+ & K^+ ratio of Stacey's medium affected the formation of dextran and levan. Increasing Na^+ ion conc. decreasing dextran formation appreciably but not the levan and by increasing the K^+ ions there was decrease of both dextran and levan formation.

Presence of Na^+ ions sightly favoured the formation of dextran at 37°C (Table 2).

Discussion :

The change over of polysaccharide formation from dextran to levan by *Leuconostoc* spp. bacteria seems to be affected by media constituents such as Na^+ & K^+ ions concentrations. Dextran synthesis seems to be very sensitive to pH and temperature effects and these conditions do not effect much on levan synthesis. It is possible that the Na^+/k^+ ratio affect the glucosyl and fructosyl transfersase-enzyme system of the culture. Similar views have been expressed by Keevil[4] and Nakamura[12] in streptococcus and Bacillus cultures.

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In sugarcane, though, dextran and levan polysaccharides are reported for sugar losses but there is no systematic data available on the role of Na^+ & K^+ ions concentrations. It is possible that depending upon soil and climatic conditions of cane field, the polysaccharides constituents in the cane brought to the sugar mills may change and need constant observation. Some methods described in this paper may be of use in keeping a watch over type of polysaccharides formed in sugar cane juices.

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Table 1

Effect of Different Media on formation of dextran & levan at 23°C & 37°C

(Mg/ml broth)

Media	Le van		Dextran	
Sl. No.	23°C	37°C	23°C	37°C
1.	0.56	0.21	Nil	Nil
2.	1.1	1.1	2.3	Nil
3.	1.17	0.87	0.47	Nil
4.	0.56	0.81	0.26	0.47
5.	2.04	1.05	0.45	Nil
6.	2.66	1.82	2.95	Nil

Table 2

Effect of added Na^+ & K^+ salts in Stacey's medium on the Formation of dextran and levan polysaccharides (Mg/ml broth)

Sl. No.	Media	Le van		Dextran	
		23°C	37°C	23°C	37°C
1.	Stacey's (control)	2.61	0.9	2.92	Nil
2.	,, Na_2HPO_4 0.25%	2.67	1.40	0.98	0.28
3.	,, +Na_2HPO_4 2.0%	2.44	1.71	0.69	0.26
4.	,, +K_2HPO_4 0.25%	0.90	0.55	0.96	Nil
5.	,, +K_2HPO_4 2.0%	0.48	0.48	0.35	Nil

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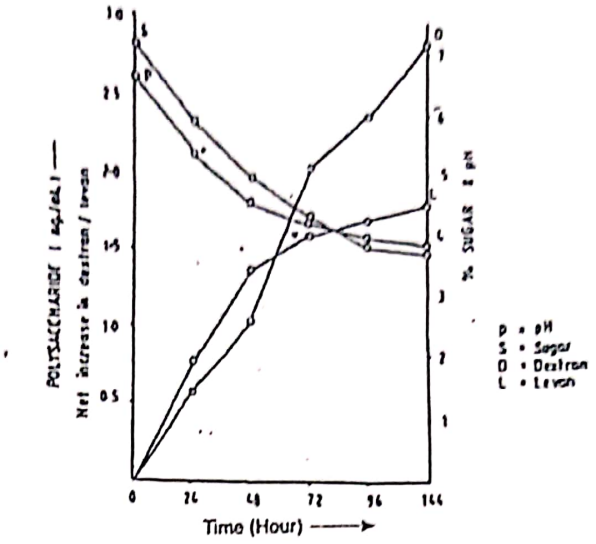

Fig.1. Levan and Dextran Formation in Stacey's Medium with process of time

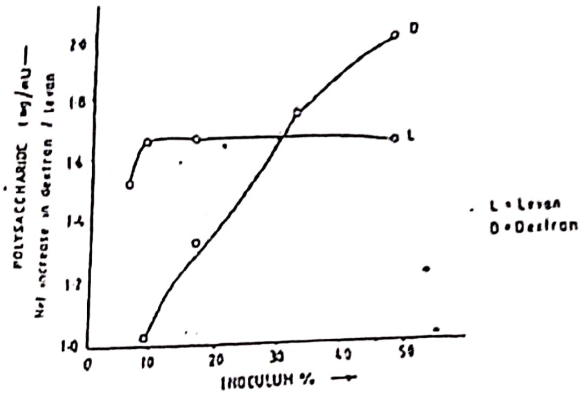

Fig. 2. Effect of Inocum Ratio on the Production of Dextran and levan.

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PIEZOOPTIC STUDIES IN MANGANESE DOPED TARTRATE CRYSTALS

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Sodium potassium tartrate crystals were doped with manganese and investigated their optical properties and constants are determined. It is found that

Crystals of mixed tartrates are of great interest for their electrooptic, acoustooptic and piezoelectric properties. The availability of the optical crystals of device quality and size has been a matter of investigation for laser devices. In the present paper, an attempt has been made to improve the crystals of sodium potassium tartrate to increase their optical properties.

For a long time sodium potassium tartrate is Observed for its interesting (1-4) properties. For example, when an electric field is applied along (100) direction and observation made along a direction equally inclined to (010) and (001) directions, there is a large difference in the halfwave voltages between the two polarities indicating a high contribution of nonlinear effects. Further, when these crystals were doped with nickel of suitable quantity, there was a marked increase in the Piezooptical constants (4) making it a better acoustooptical crystal. Because of such interesting results, sodium potassium tartrate doped with manganese has been taken up for a thorough investigation.

KEY WORDS: Crystals, sodium Potassium tartrates,

PREPARATION OF CRYSTALS

Sodium potassium tartrate crystals dopant with manganese are grown with slow evaporation at constant temperature. The dopant has been taken to be 0.1% and 0.2% by weight. The crystals obtained are light pink in colour and with a change in morphology compared to the pure crystals. The axes are identified by morphological, optical and X-ray methods. These Crystals, being very soft, are cut by hand with a hacksaw and are ground and polished as for other soft crystals. For the present investigation, two orientations which show

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marked difference in their stress optical behavior are taken. The stress is applied along (001) directions and obsessions along (010) and (100). The stress optical constants are determined using a Babinet compensator at sodium yellow wavelength at room temperature (30°C).

Results and discussion

The results observed are reported along with those of pure crystals in Table-I. There can be seen a marked increase in the piezooptic coefficients compared to the pure crystals for the two doping concentrations taken. It is observed that the material is a good acoustooptical crystal with 0.2% of manganese doping than 0.1% doping for the orientations chosen. This is in contrast to nickel doped crystals where the maximum efficiency was observed at 0.1% doping. The increase in piezooptic constants varies from about 5 to 130% for the studies undertaken.

Table -I

Direction of			Stress optical constant*		
Stress	Obs.	Doping percentage	0.1%	0.2%	Pure 3
(001)	(010)	7.30	2.80	3.71	2.70
(001)	(100)	7.83	1.13	1.82	0.91

*In units 10^{-13} cm^2/dy , nc

References

1. Jona F and Shirane G, Ferroelectric crystals, Macmillan, NY, 1962.
2. Cady WG, Piezoelectricity, Dover, NY. 1966.
3. Narasimhamurty TS, Phys Rev 186 945 (1969).
4. Gupta A. and KVR paper presented in the 3rd Ferroelectric and Dielectric Seminar, 1986.

SELF ATTESTED