MGV's L. V. H. College, Panchavati, Nashik-03
Best Practice
Department of Physics

Best Practice: Students paper publications and participation in workshops/ conferences etc.

Sr. No	Name of the students	Title of the Article/ Paper	Name of the journal	Vol. No. & PP / Month and Year	ISSN No.	UGC Journal No.
1	Kumavat Trilokchand Liladhar (9156595416)	The Young's Modulus of Cu, Al, Fe, Stainless Steel and Wood by using Y by bending of a bar technique	Journal of ultra scientist of physical sciences JUSPB-B	Vol 30 (5), 64-67 (2018)	2319-8052	An International open free access Peer Reviewed Research Journal of Physical Sciences
2		"Effect of thickness of Iron, Copper, Nickel, Aluminium and Brass on Modulus of Rigidity."	Ajanta International multidisciplinary quarterly research journal	Vol. 8, Issue-I, Jan-Mar 2019 Pp 94-98	2277-5730	UGC Listed 40776 & Peer Reviewed Refereed Journal
3	Sandhu Simaranpreet Kaur (9022009684)	"The effect of Temperature on the Viscosity of Glycerine, Water, Paraffin Oil".	Ajanta International multidisciplinary quarterly research journal	Vol. 8, Issue-I, Jan-Mar 2019 Pp 112-115	2277-5730	UGC Listed 40776 & Peer Reviewed Refereed Journal
4	K. S. Sonawane, Nikhil Davkhar	"Physical Properties of Zinc Sulphide (ZnS) thin film by Electrochemical Deposition"	Journal of emerging technology and innovative research JETIR	Vol. 6, I2019	2349-5162	UGC Approved (Journal No: 63975)
5	Ganesh Kande	The effect of temperature on specific rotation of optical active substance, sugar and acetic acid	Ajanta International multidisciplinary quarterly research journal	Vol. 8, Issue-I, Jan-Mar 2019 Pp 99-102	2277-5730	UGC Listed 40776 & Peer Reviewed Refereed Journal

Conference attended by the students:

Sr. No.	Name of the students	Name of the Programme	Name of Organizing Agency	Level	Title of the Paper / Talk	Duration Dates of Event
1	Kunal Sonawane & Nikhil Davkhar	106th Indian Science Congress- Future India: Science and Technology	Indian science congress, Phagwara, Jalandhar (Punjab)	International	Physical properties of ZnS thin film by electrochemical deposition	03-07 January 2019
2	Abhinay Mandwade &				Physical properties of CdS thin film	

	Abhishek More				by electrochemical deposition	
3	Ganesh Kande	“Characterization techniques in material science”	MGV’s M. S. G. College, Malegaon-camp.	State level workshop	The effect of temperature on specific rotation of optical active substance, sugar and acetic acid	4-5 Jan 2019
4	Simranpreet Kaur	“Characterization techniques in material science”	MGV’s M. S. G. College, Malegaon-camp.	State level workshop	“The effect of Temperature on the Viscosity of Glycerine, Water, Paraffin Oil”	4-5 Jan 2019
5	Sharma Abhishek Satyajit	Qualify the Physics Training and Talent Search (PTTS) Programme in June 2019.	Manipal Institute Technology	International		21^{st} to 10^{th} June 2019.

process with increase in weights the wire will get stretched till it breaks. Though this deformation is very small it is extremely important in engineering applications. The material whose Young's modulus is to be measured is to be taken in the form of a rectangular bar with small width and thickness and a large length. The three parameters i.e. length,breadth and thickness are chosen so that with moderate weights reasonable bending can be observed[1,8]. A traveling microscope would be necessary to observe the depression at certain weight. Young's modulus can be determined by various techniques but Y by bending of a bar have some advantages over others techniques such as easy, accurate, etc. From this method strain,stress can also be studied.

Material and technique to be Used:

The main reason for using this technique is it is very simple technique than other technique to determine Y. and require material for this technique are easily available. The values of Young's modulus of material is given in book but Young' modulus obtained by using Y by bending of bar in close agreement with standard values of Y of material. So we choose this technique. The material selected for this purpose are copper, aluminium, iron ,stainless steel and wood. The formula used to determine Young's modulus is

$$Y = mgl^3/4b\delta d^3$$

Where,

g=gravitational force in cm/sec^2

l=distance between two knife edges

m=mass

b= breadth of a bar

d=thickness of a bar

δ=depression for a particular mass in

The Apparatus used for this method is Traveling microscope, Vernier caliper, Micrometer screw gauge, Material bar, Meter scale. The given beam was placed on the two knife edge supports as shown in the fig 1. and the distance between two edges was about 40 cm. a weight hanger was kept suspended at the center of the beam and a pin was fixed vertically on the frame of the hanger. A microscope was used to view the tip of needle microscope was adjusted such that the pin just touches the horizontal cross wire. The reading of the microscope in the vertical scale was noted .in the same way reading for loading weights and unloading weights were recorded then by using above formula Young's modulus of different material bars were calculated[8].

Result and Discussion

It was observed that The Young's modulus of wood was Increased with Increasing thickness with 709 mm Hg atmospheric pressure in fig 2. It is linear relationship between Young's modulus and thickness of wood bar. The dimensions and the Y of the materials are given below .with the help of Y by bending method the calculated values of Y of aluminium, copper ,iron, stainless steel, wood are given in table 1.It is found that values of Y calculated are in close agreement with standard values

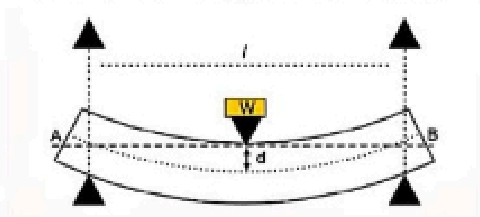

Fig 1: Y By Bending Method

gets elongated but when weight is withdrawn it regains its original position[1,8]. If we go on continuing the process with increase in weights the wire will get stretched till it breaks. Though this deformation is very small it is extremely important in engineering applications. The material whose Young's modulus is to be measured is to be taken in the form of a rectangular bar with small width and thickness and a large length. The three parameters i.e. length,breadth and thickness are chosen so that with moderate weights reasonable bending can be observed[1,8]. A traveling microscope would be necessary to observe the depression at certain weight. Young's modulus can be determined by various techniques but Y by bending of a bar have some advantages over others techniques such as easy, accurate, etc. From this method strain,stress can also be studied.

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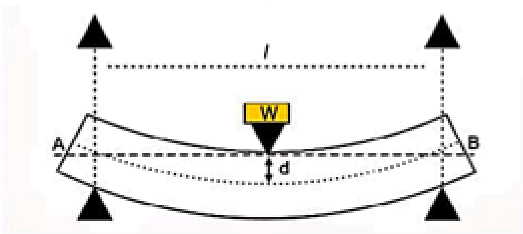

Fig 1: Y By Bending Method

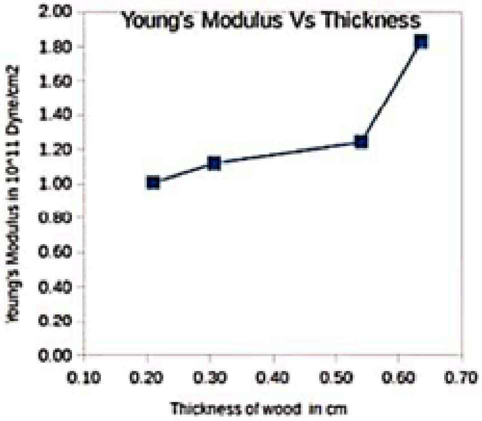

Fig 2: Thickness Vs Young's Modulus

Table 1: Determined values of Y

Materials	Length in 'cm'	Breadth in 'cm'	Thickness in 'cm'	Experimental values of youngs modulus in 'dyne/cm^2'	Standard values of youngs modulus in 'dyne/cm^2'
Aluminium	42	2.53	0.2055	6.099×10^{11}	7.50×10^{11}
Copper	44	3.10	0.1940	5.2891×10^{11}	12.40×10^{11}
Iron	42	3.21	0.1115	14.2128×10^{11}	19.90×10^{11}
Stainless steel	42	2.95	0.1270	13.2988×10^{11}	19.50×10^{11}
Wood	42	3.13	0.2100	1.0085×10^{11}	1.1×10^{11}
Wood 1	42	2.94	0.3070	1.1210×10^{11}	-
Wood 2	42	3.15	0.5400	1.2429×10^{11}	-
Wood 3	42	3.13	0.6355	1.8319×10^{11}	-

Conclusion

The Young's Modulus of aluminium, Iron, stainless steel, copper, wood were obtained successfully by Y by bending method. The young modulus of iron was found to be highest by Y by bending method. The Young's modulus of wood is going to increased with thickness of wood bar was successfully studied by y by bending technique. The future scope is very wide by using Y by bending of bar technique.

Acknowledgement

I express my deep sense of guidance and heartfelt thanks to my honorable guide Prof. J.A Borse for his help and encouragement during this work.

I wish to express my gratitude to Prof. N.G. Patil HOD of L.V.H.college Panchavati. Nashik.for providing the facilities of the institute and for their encouragement in this work. I am very much thankful to Prof. S.J. Patil for their encouragement help and suggestion during this project work. I am also thankful to Mr. Vishnu Khairnar for cooperation in physics Laboratory. There is no any funding source for this Research Project.

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15. Effect of Thickness of Iron, Copper, Nickel, Aluminium and Brass on Modulus of Rigidity

T. L. Kumavat
Department of Physics, HPT Arts, & RYK Science College Nashik., Maharashtra, India.
J. A. Borse
Department of Physics, Mahatma Gandhi Vidyamandir's Loknete Vyankatrao Hiray College, Panchavati, Nashik, Maharashtra, India.
N. G. Patil
Department of Physics, Mahatma Gandhi Vidyamandir's Loknete Vyankatrao Hiray College, Panchavati, Nashik, Maharashtra, India.
S. J. Patil
Department of Physics, Mahatma Gandhi Vidyamandir's Loknete Vyankatrao Hiray College, Panchavati, Nashik, Maharashtra, India.
K. B. Bhamare
Department of Physics, Mahatma Gandhi Vidyamandir's Loknete Vyankatrao Hiray College, Panchavati, Nashik, Maharashtra, India.

Abstract

The modulus of rigidity was determined of different metals of different radius by simple Torsional Pendulum method. Torsional pendulum works on the basic principle of forward and backward rotations. The modulus of rigidity of iron was found highest i.e.6.9503x10^{11} dyne/cm^2. Different metals wires with different radii were taken and it was observed that the modulus of rigidity did not change with thickness of metal wires since the modulus of rigidity depends on strength of metal and not on size and shape of metal. The modulus of rigidity of brass was found to be lowest i.e. 2.3031x10^{11} dyne/cm^2.

Keywords: Torsional pendulum, Moment of Inertia, Thickness of metal wire

Introduction

Torsional pendulum was used to determine the modulus of rigidity of Iron, Copper, Brass, Aluminum and Nickel [9]. This method is advantageous and had a wide application in scientific field and metallurgical engineering. Material scientist and applied physicists use this concept in special ways. Understanding the modulus of rigidity will help to select the correct material to use for construction under many circumstances. In rotational motion, moment of inertia (M.I) plays the same role as mass in translational motion [9]. Examples are found everywhere therefore, it becomes necessary to measure M.I. of different objects about different torsional pendulum is one such apparatus using which one can measure M.I. of a disc(Id),a ring(Ir0 and hence one can determine the modulus of rigidity. Torsional pendulum is usually a thin wire, one end of which is fixed while the other end is attached to the center of a disc, capable of undergoing oscillations about the vertical wire [10]. A ring with a small slit can be inserted and kept on the top of the disc. To measure the period of oscillations a stop clock would be required. Torsional pendulum works on the phenomenon of rotation and the reverse rotation due to the twist in the wire. Formulae used are

1. M.I of ring $I_r = M(r_1^2+r_2^2/2)$ gm/cm^2
2. M.I of disc $I_d= I_rT_0^2/(T_1^2-T_0^2)$ gm/cm^2
3. Modulus of rigidity of material of the wire $\eta=8\pi I_d l/T_0^2 r^4$

Where l is length of wire in cm, M is mass of the ring in gm, r_1 is inner radius of ring in cm, r_2 is outer radius of ring in cm, r is radius of wire in cm, T_0 is period of disc in sec, T_1 is period of disc+ring in sec. A torsional pendulum, or torsional oscillator, consists of an extended mass suspended from a thin rod or wire. A body suspended by a thread or wire which twists first in one direction and then in the reverse direction, in the horizontal plane is called a torsional pendulum. The first torsion pendulum was developed by Robert Leslie in 1793. When the mass is twisted about the axis of the wire, the wire exerts a torque on the mass, tending to rotate it back to its original position. If twisted and released, the mass will oscillate back and forth, executing simple harmonic motion.

Materials and Technique to be used

In this method to determine modulus of rigidity, first moment of inertia of ring and moment of inertia of disc is calculated. We selected iron, aluminum, brass, copper, and nickel as experimental materials. In this method the wire was fixed firmly at the top on the rigid support while the other end was attached to the center of a disc, the wire was thin and the disc was heavy. The diagram of torsional pendulum is shown in figure (1). To measure the oscillations, the disc was set into oscillations and the period of oscillations was measured using digital clock. After that ring was added and the period of oscillations was measured. Then by using above formulae modulus of rigidity of different material was calculated.

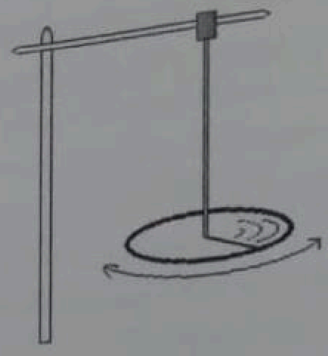

Fig1: Torsional Pendulum

Result and Discussion

Modulus of rigidity of different materials such as aluminum, copper, iron, brass, and nickel wire were determined by using torsional pendulum method. The wire of different thickness for this purpose was obtained from electric store Nashik. It was found that experimental values of modulus of rigidity were matched with standard values. The modulus of rigidity was found to be constant with different thickness of metal wires. From table 2 it was confirmed that the modulus of rigidity depends on strength of material and not on thickness. The strength of materials, also called mechanics of materials, is a subject which deals with the behavior of solid objects. Iron has highest modulus of rigidity i.e. 6.9503×10^{11} dyne/cm^2 and lowest modulus of rigidity was of brass i.e. 2.2031×10^{11} dyne/cm^2.

Table1: The Values of Modulus of Rigidity

Material	Length cm	Radius cm	I_r gm/cm^2	I_d gm/cm^2	Determined values of modulus of rigidity dyne/cm^2	Standard values of modulus of rigidity dyne/cm^2
Iron	113.8	0.02375	4904.49	4074.78	6.9503×10^{11}	7.7×10^{11}
Copper	130.1	0.02750	4904.49	3758.96	5.3438×10^{11}	4.55×10^{11}
Brass	130.1	0.02575	4904.49	3865.39	2.2031×10^{11}	3.5×10^{11}
Aluminum	92.3	0.0100	4904.49	2890.45	3.2000×10^{11}	2.6×10^{11}
Nickel	130.1	0.02750	4904.49	3635.39	6.3607×10^{11}	7.6×10^{11}

Table2: Effect of Thickness of Metal on Modulus of Rigidity

Material	Radius of wire cm	Modulus of Rigidity dyne/cm^2
Iron	0.02375	6.9503×10^{11}
	0.02800	6.9504×10^{11}
	0.03120	6.9503×10^{11}
	0.03640	6.9503×10^{11}
Nickel	0.02750	6.3607×10^{11}
	0.02822	6.3606×10^{11}
	0.02941	6.3607×10^{11}
	0.03011	6.3607×10^{11}
copper	0.02450	5.3438×10^{11}
	0.02750	5.3439×10^{11}
	0.02842	5.3439×10^{11}
	0.02931	5.3440×10^{11}
Aluminium	0.0100	3.2000×10^{11}
	0.0112	3.2001×10^{11}
	0.0124	3.2000×10^{11}
	0.0132	3.2001×10^{11}
Brass	0.02575	2.3031×10^{11}
	0.02662	2.3032×10^{11}
	0.02722	2.3032×10^{11}
	0.02842	2.3032×10^{11}

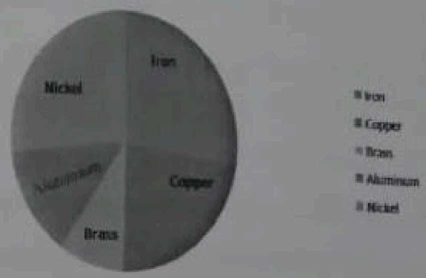

Fig.2: Piechart of modulus of rigidity with different metals

Conclusion

From above table it is found that the modulus of rigidity of various materials were calculated by torsional pendulum method and modulus of rigidity of iron was found to be higher i.e. 6.9503×10^{11} dyne/cm^2 than the other material such as aluminum, brass ,copper, nickel. The modulus of rigidity of metal does not change with thickness of wire.

Acknowledgement

I express my deep sense of guidance and heartfelt thanks to my honorable guide Prof. J.A Borse for his help and encouragement during this work. I wish to express my gratitude to Prof. N.G. Patil HOD of L.V.H. College Panchavati, Nashik for providing the facilities of the institute and for their encouragement in this work. I am very much thankful to Prof. S.J. Patil and Prof. K. B. Bhamare for their help and suggestions during this work.

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18. The Effect of Temperature on the Viscosity of Glycerine, Water, Paraffin Oil

S. N. Sandhu
Department of Physics, LVH College Panchavati, Nashik, India.
J. A. Borse
Department of Physics, LVH College Panchavati, Nashik, India.
J. M. Shewale
Department of Physics, LVH College Panchavati, Nashik, India.
K. B. Bhamare
Department of Physics, LVH College Panchavati, Nashik, India.
C. G. Dighavkar
Department of Physics, LVH College Panchavati, Nashik, India.

Abstract

The Viscosity of liquids such as glycerine, water, paraffin oil, ethyl alcohol and acetone was determined by simple co-axial cylinder type rotational viscometer. The pH of given solution was measured. All solution was of acidic in nature and directly filled in cylinder for measuring viscosity. It was observed that the viscosity of solution decreased with their temperature. The viscosity of glycerin was found 3.93 pas. at room temperature and it was found 2.79 pas. at 80°C. Similarly the viscosity of water, paraffin oil was found to decrease i.e. 2.745 pas, 2.648 pas at 80°C respectively. As per FT-IR analysis the functional group was more in glycerin as compared to water so viscosity of glycerin was found higher than water.

Keywords: Co-axial cylindrical viscometer, Viscosity, Temperature, FT-IR.

Introduction

The Viscosity is very important property for any liquid that opposes the relative motion between two surfaces of liquid [2]. The viscosity is a measure of fluid resistance to flow it along the motion. It describes the internal friction of moving liquid. A fluid with large viscosity resists motion because its molecular makeup and no. of functional group present gives it a lot of internal friction. A fluid with low viscosity flows easily because its molecular make up and less no. of functional group present in sample [3]. A good example of viscosity is liquid flowing through a straw. Water with low viscosity will flow more easily than honey which has a high viscosity. Because honey consists of more complex molecular structure while water consists of simple hydrogen and oxygen bond [2]. When liquid is heated up its molecules become excited and begin to move. The energy of movement is enough to overcome the forces that bind the molecules together, allowing the liquid to become more fluid and decreasing its viscosity. As temperature of liquid increases its surface tension decreases [7].

Experimental Work

Two cylinders whose cylindrical surfaces consist of the lines those pass through concentri c circles in a given plane and are perpendicular to this plane. Two pans are used to place the weights. A coaxial cylinder viscometer is described for the absolute measurement of shearing stress vs. velocity gradient up to high values of gradient. Principal features of construction are: bottomless cylindrical shearing surfaces, very small annular clearance, rigid mechanical alignment of the cylinders, and a pressure-feeding system. Typical experimental results are presented for viscous Newtonian fluids, a commercial paint, and a varnish.

Fig: 1. Coaxialcylindrical Type Rotating Viscometer

Viscometer is a device in which the viscosity of fluids is measured. A coaxial cylindrical rotational viscometer is such a type which works on the principle that a solid (inner) cylinder is rotated inside a hollow cylinder which contains test sample which is to be measured. The torque experienced by the solid cylinder due to viscous effect of the test sample is measured and hence viscosity can be calculated. By rotating the spindle or inner cylinder at different speeds, shear dependent behavior can be analyzed, permitting analysis of time-dependent fluids, easy operation, stable performance, easy maintenance, appÿcable to measure the viscosity of various fluids such as engine oil, water, kerosene, petroleum oil, paint, printing ink etc. The viscosity of solution is determined by given equation

$$\eta = gd\,(b^2-a^2)mt_0/\,8\pi^2 a^2 b^2 l$$

where, η = viscosity of liquid, a = radius of drum, b = radius of cylinder, d = diameter of pulley, m = mass of each pan, l = length of liquid in cylinder and t_0 = period (t/10)

Result and Discussion

The Viscosity of glycerine, water, paraffin oil and ethyl alcohol was found to decrease with increasing temperature as shown in Table:1. The viscosity of glycerine was measured 3.93 pas. at room tempertre 28°C. When glycerine was heated at 80°C, viscosity decreased to 2.79 pas. This change in viscosity is due to bond stretching in functional group by increasing temperature is shown in fig:2.

In water the viscosity was found to 3.115 pas. at room temperature & it decreased 2.745 pas. due to bond stretching and bending vibration of molecules is shown in fig:3.

As per Fig:3 and 4 it is confirmed that viscosity of water is lower than ethyl alcohol due to large no. of functional group present in ethyl alcohol as compared to water.

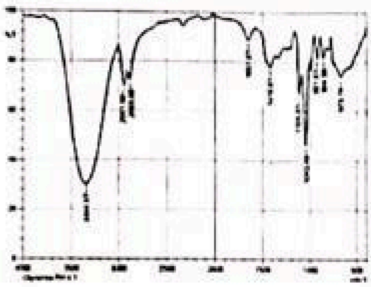

Fig:2. FT-IR of Glycerine

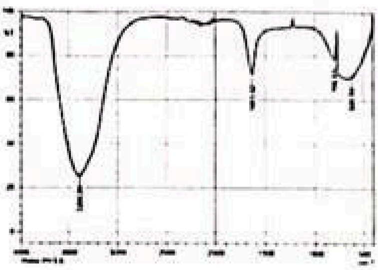

Fig:3. FT-IR of Water

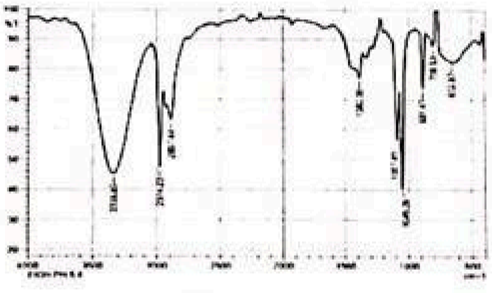

Fig: 4. FT-IR of Ethyl Alcohol

Sr. No.	Viscous Liquids	Viscosity at room temeperature (28°C) Pas.	Viscosity at given temperature (80°C) Pas.
1	Water	3.115	2.745
2	Glycerine	3.93	2.796
3	Paraffin oil	3.818	2.648
4	Acetone	3.004	-
5	Ethyl Alcohol	2.78	-

Table: 1.Viscosity with Temperature

Conclusions

It is confirmed that the viscosity of glycerin, water, paraffin oil, was found to decrease with increasing temperature of solution. Viscosity of water is lowest than glycerin and ethyl alcohol due to less no. of functional group bonding as per FT-IR analysis.

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Physical Properties of Zinc Sulphide (ZnS) thin film by Electrochemical Deposition

K.S.Sonawane[1], N.A.Davkhar[2], J.A.Borse[3] J.M.Shewale[4], A.V.Patil[5], C.G.Dighavkar[6]

Department of Physics[1, 2, 3, 4, 5,6] L.V.H.College Panchavati, Nashik. India.

Abstract

ZnS thin films deposited by two electrode electrochemical deposition using the two electrode system on stainless steel substrates from aqueous solution containing 0.3 N Zinc sulphate ($ZnSO_4 \cdot 2H_2O$) and 0.2 N sodium thiosulphate ($Na_2S_2O_3$). The 2 % Triethanolamine was used as a complex agent for complex form of ZnS materials. The Thickness of ZnS thin film was increases up to certain time after that it was found fall by co- deposition with deposition time. The voltage for deposition corresponding current density was optimized by polarization curve method. The good quality adherent films of ZnS were obtained at 1700 mv in two electrode system. The thickness of film was measured by mass difference method. The chemical bonding of functional group of deposited material was studied by IR spectral analysis.The Chemical Composition of ZnS analysed by EDAX.The Structural characterization and surface morphology was studied by XRD, SEM respectively.

Keywords: ZnS, Electrochemical Deposition, IR, EDAX, SEM

Introduction:

Thin films have attracted much interest because of their varied application such as semi conducting devices, photovoltaic, optoelectronic devices, radiation detectors, laser materials, thermoelectric devices, solar energy converters [3]. The Interest in the use of solar cells for low-cost energy conversion has lead to an extensive research in the field for novel and suitable thin film semiconductor materials. Recent investigation has shown that layered type semi conducting cadmium chalcogenide group (CdSe, ZnS, CdTe) which absorb visible and near [6].IR light are particularly promising materials for photo electrochemical solar energy conversion. The ZnS thin film is used as window layer for CdS/CdTe solar cell because band gap energy of window layer should be less [1]. The band gap energy of ZnS material is 3.92 ev [8]. Many workers investigated the ZnS crystal. The structural, optical and Electrical characterization of electrodeposited ZnS thin films have been investigated [7]. Many workers have been succeeded in depositing thin film of ZnS by electrochemical deposition technique by two electrode system on stainless steel.

Material and Method:

The thin films of ZnS were deposited by pulsed electrochemical deposition technique by two electrode system on stainless steel substrate. The stainless steel plates were used as the working electrode in two electrodes system with graphite as the counter electrode and stainless steel plate was the working electrode. The electrolyte was prepared by mixing solution of $ZnSO_4$ (0.3M), $Na_2S_2O_3$ (0.2M), the ratio of 1:1 respectively. The Triethanolamine of 2% was used for complex form of ZnS materials and well polycrystalline in nature [7]. The pH of electrolyte solution was varied by dilute HCL.double distilled water was used for preparation of aqueous solution of above precursor chemicals. Before deposition the substrate were thoroughly cleaned with double distilled water. The distance between the working electrode and counter electrode way kept constant as 1 cm during deposition of materials. From visual observation it was observed that a formation of uniform and well adherent reddish yellowish film of ZnS take place. [8] The detailed growth kinetics was studies by changing the deposition parameters such as the pH of electrolytic bath and deposition time (min). The chemical bonding of functional groups were analysed by FT-IR technique. The Thin film of ZnS was further characterized by XRD, SEM.

Result and Discussion:

The concentrations of Zinc sulphate (ZnSO4), Sodium thiosulphate (Na2S2O3), were 0.3 N and 0.2 N Respectively. The films were grown at the optimized deposition potential of 1700 mV with respect to the current density 4 mA/ cm^2.is shown in graph 1.When an electric field is applied between the working and counter electrode a fine ZnS thin film formation occurs on the surface of the substrate. The process of film formation is observed to be time dependent. From graph 2 the thickness of film increases with deposition time. The thickness of deposited materials were determined by mass difference method. The thickness of film was found 200 μm at 25 min as deposition time. The deposited film has been dried for further study. The current density varied from 2 to 4 mA/ cm^2 during deposition. The film deposited at current density 4 mA/cm^2 was found to be uniform thick. And well adherent to substrate. For other higher and lower values of current density thickness of film was less as compared to 4 mA/cm^2.The PH of electrolytic bath is varied from 2 to 5 by adding dropwise dil 0.1 N HCl with measured thickness of film was found 200 μm and PH=3 was optimized.

FT-IR Analysis:

The FT-IR spectrum is used to understand and analyze more elegantly the structure and molecular arrangements of thin films. Type of functional groups present in the substance is indicated by the absorption that occurs at various frequencies [3]. Figure 4, shows the FT-IR spectra of ZnS thin films in the range of 400-4000 cm−1.The vibrational frequencies of functional group have been presented in Table I. The absorption band of H_2O molecule, 1664 cm $^{-1}$ due to presence of water molecule in bending mode. The absorption peaks were obtained at1134, 1080, 1024 cm^{-1} shows sulphate ion stretching and 813,767,588 cm^{-1} shows presence of, N-H, and C-H bending respectively.

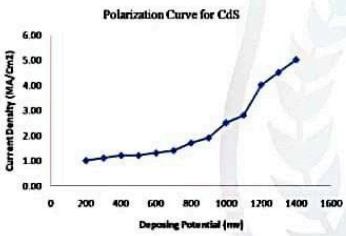


fig 1: deposing potential vs current density

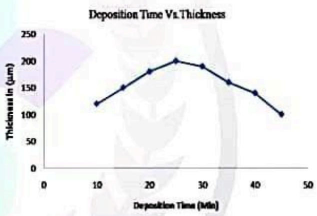
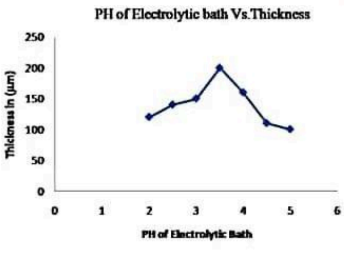
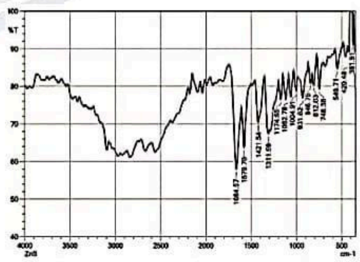


fig 2: deposition time vs thickness of film





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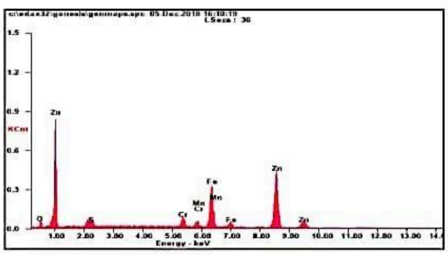

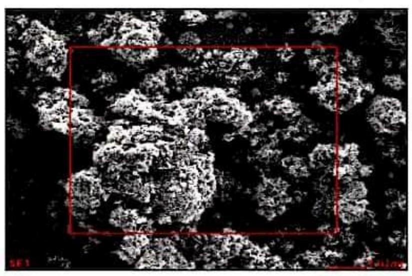

Fig5: EDAX of ZnS thin film and Image of thin film portion for EDAX analysis

Table:1 Elemental composition of ZnS thin film

Element	Wt%	At%
OK	05.57	18.17
SK	02.60	04.22
CrK	04.35	04.36
MnK	02.61	02.47
FeK	22.44	20.95
ZnK	62.44	49.82
Matrix	Correction	ZAF

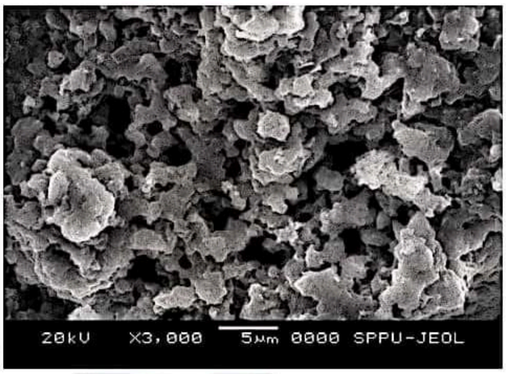

Fig 6: SEM image of ZnS thin film

Fig 5 shows the EDAX analysis of ZnS thin film it has been confirmed the film deposited with Rich composition of Zn relative to S hence it was found n-type conductivity of film.the ratio was Zn:S=62.44:2.60 .it showed in Table 1 and fig 6 showed SEM of ZnS thin film was deposited uniformly and well adherent.

Conclusion:

The ZnS film was successfully deposited on stainless steel substrate by pulsed electrodeposited technique by two electrode deposition system .the deposing potential was optimized at 1700 mv with current density 4 mA/ cm^2 .the thickness of film was optimized 200 μm at 25 min.the ZnS thin film was found n-type conductivity it has been confirmed by EDAX analysis in fig 5.it showed the composition of Zn was rich relative to S..the ZnS thin film deposited uniformly with polycrystalline in nature it has been characterized by SEM analysis in fig6.

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T. Y. B. Sc. student participated in Science National congress held at Jalandhar, 2019

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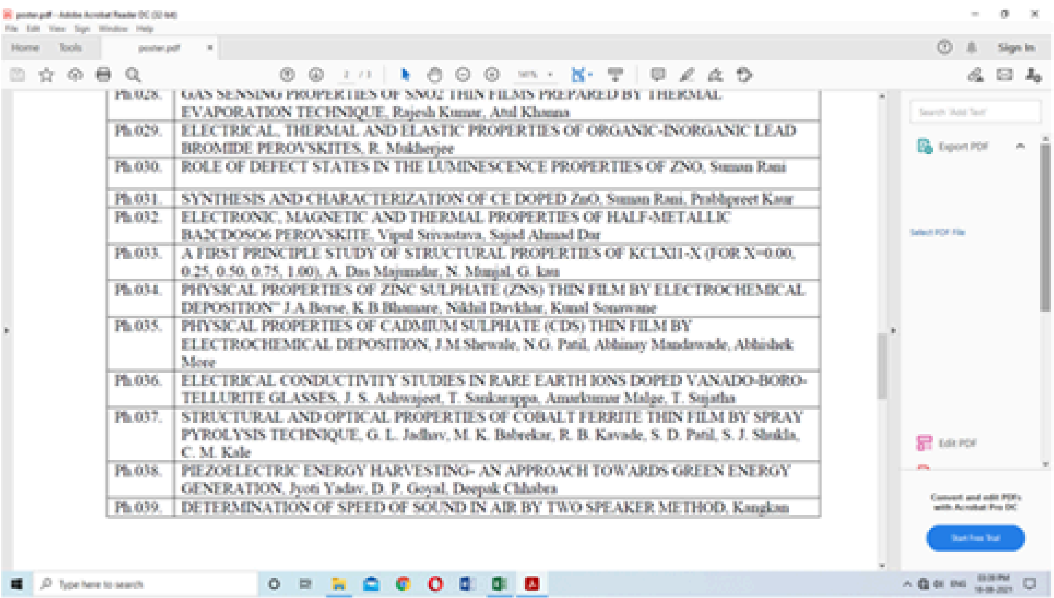

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Ph.034

Physical Properties of Zinc Sulphate (ZnS) thin film by electro-chemical deposition"

J.A.Borse1, K.B.Bhamare2, Nikhil Davkhar3 , Kunal Sonawane4

L.V.H.College Panchavati, Nashik-422003 (M.S.)
Correspondence e-mail: jaborse@gmail.com

Abstract

The Zinc Sulphate thin film was prepared by simple electrochemical deposition technique on stainless steel plate as a substrate. The Substrates were cleaned by double distilled water and acetone for best adherent. The Thickness of ZnS thin film found to increases with deposition time. The voltage optimization was studied by polarization curve method with different current density. The measurement of growth kinetic of thin film with different PH of electrolytic bath. The resistivity was measured by four probe method.

Keywords : Zinc Sulphate, Electrochemical Deposition, Resistivity, Conductivity, Polarization curve

Ph.035

Physical Properties of Cadmium Sulphate (CdS) thin film by electrochemical deposition

J.M.Shewale1, N.G.Patil2, Abhinay Mandawade 3 , Abhishek more4

L.V.H.College Panchavati, Nashik-422003 (M.S.)
Correspondence e-mail: janshewa@gmail.com

Abstract

The Cadmium sulphate thin film was prepared by simple electrochemical deposition technique on stainless steel plate as a substrate. The Thickness of CdS thin film found to increases with deposition time. The voltage optimization was studied by polarization curve method and measured growth kinetic of thin film with different PH of electrolytic bath.The resistivity was measured by four probe method.

Keywords : Cadmium Sulphate,Electrochemical Deposition, Resistivity, Conductivity, Polarization curve

16. The Effect of Temperature on Specific Rotation of Optical Active Substance Sugar and Acetic Acid

G. K. Kande
Department of Physics, L.V.H. College, Panchavati, Nashik, India.

C. G. Dighavkar
Department of Physics, L.V.H. College, Panchavati, Nashik, India.
N. G. Patil
Department of Physics, L.V.H. College, Panchavati, Nashik, India.

Abstract

The Optical active substances Sugar (20%) and acetic acid (1N) were prepared in aqueous bath. The Specific rotation of sample was measured by basic polarimeter technique with different bath temperatures. The specific rotation of sugar solution and acetic acid was found 65.47 ^{0}, 10.71 ^{0} at room temperature respectively. Specific rotation was measured at different temperature and it was found that specific rotation of substance was going to increase with temperature.

Keywords: Optical Polarimeter, Specific Rotation, Temperature, FT-IR

1. Introduction

Polarimetry is one of the important instrumental methods employed in analysis. These measures the rotation of the polarized light as it passes through an optically active compound. This technique involves the measurement of change in the direction of vibration of polarized light when interact with an optically active compound. A substance is said to be optically active if it rotates the plane of the polarized light. Polarimetry is an instrumental analytical method using rotation of polarized light by some substances as a measure of their concentration in a solution. Polarizer can also be used for identifying light polarization, as an analyzer. A device consisting of two sequence polarizers, which is supplied with a circular scale, is called polarimeter. The light source side polarizer changes natural light into linearly polarized light [3].

Many crystals and dilutions have the ability to rotate the plane of the linearly polarized light which is spreading through them. Such substances are called optically active. This property comes from unsymmetrical structure of the molecule or the crystal lattice. Rotation of the polarization plane occurs in the substances where crystal lattice or molecules cannot mirror image of one match [2]. Such objects are called chiral. Their asymmetry is resulting from a lack of mirror symmetry. Optically active substances are Quartz Crystals, Sugar, Camphoric and Nicotine Dilutions, Acetic Acid, etc. The temperature is effects on the solutions and their properties [6].

2. Experimental Work

Material and Methods

The polarimeter technique is used to measure the specific rotation of optically active substance of sugar and acetic acid with concentration 20% and 1N respectively. In this method we prepared aqueous bath of optically active substance of Sugar and acetic acid. Initially, The 20% concentration Sugar solution was made (20 gm of sugar is added to the 100 ml of water) and then filled in polarimeter glass tube of length 2.1 decimeter by removing air bubble. The filled polarimeter glass tube inserted between polarizer and analyzer as shown in **figure 1**. The monochromatic light of sodium vapour lamp was used as a source.

When plane-polarized light passes through the crystals, the velocity of left-polarized light is different than right-polarized light, thus the crystals are said to have two refractive indices i.e. Double refracting Construction: It consists of a monochromatic source S which is placed at focal point of a convex lens L. Just after the convex lens there is a Nicol Prism P which acts as a polarizer. H is a half shade device which divides the field of polarized light emerging out of the Nicol P into two halves generally of unequal brightness. T is a polarimeter glass tube in which optically active solution is filled. The light after passing through T is allowed to fall on the analyzing Nicol A which can be rotated about the axis of the tube. The rotation of analyser can be measured with the help of a scale is shown in **figure 2**.The Reading on the verniers through the distilled water V_1=90 and V_2=300 this was reference reading. Then measured specific rotation of solution by equation Specific Rotation, $\alpha = \theta/lc$, θ=Angle of rotation, l=Length of polarimeter in dm, C=Concentration of solution or normality of liquid.

Fig: 1 Optical Polarimeter Set up

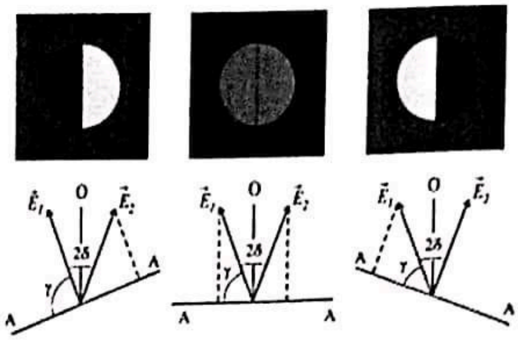

Fig: 2 Half shade of effect

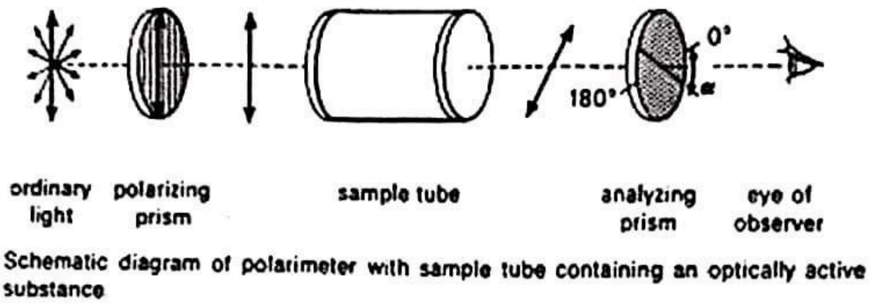

Fig.3: Basic Block diagram of Polarimeter

3. Result and Discussion

Figure 4 shows the Specific rotation of sugar solution (20%) and acetic acid (1N) was found to increase with increasing temperature at different values of specific rotation. The specific rotation of sugar solution (65.47^0) and acetic acid (10.71^0) was found at room temperature. **Figure 5** shows FT-IR of Sugar Solution, the peak at 3392 cm^{-1} assigned due to water stretching vibration, 1643 cm^{-1} due to water bending vibration and 1055 cm^{-1},1001 cm^{-1} due to C-O bond .

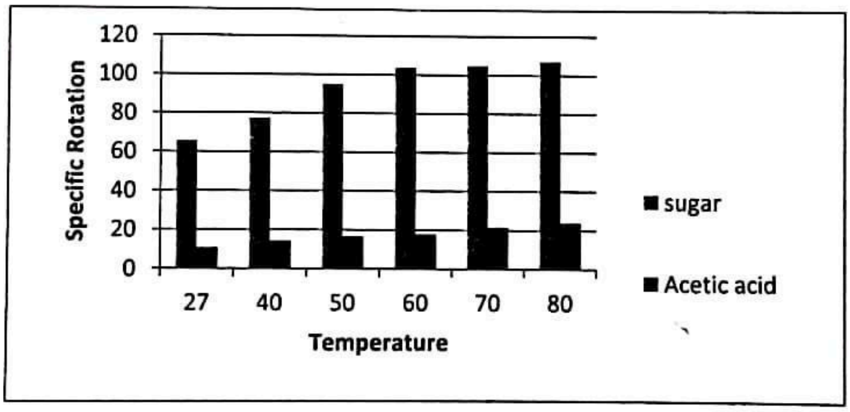

Fig. 4: Specific Rotation Vs Temperature of Solution Bath

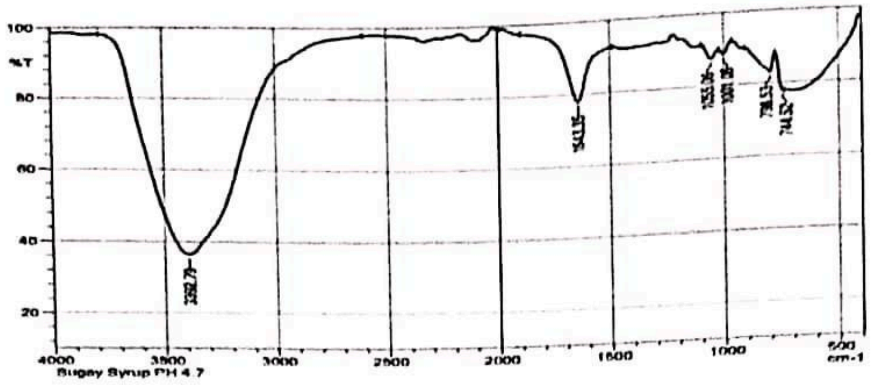

Fig.5: FT-IR of Sugar Solution

Table 1: Specific rotation with different Temperature

Sr. No.	Temperature °C	Sugar solution (specific rotation) at 20% conc.	Acetic Acid (Specific rotation) at 1N.
1.	27	65.47	10.71
2.	40	77.38	14.28
3.	50	95.23	16.66
4.	60	103.57	17.85
5.	70	104.76	21.42
6.	80	107.14	23.80

Conclusion

The specific rotation of optically active substance sugar was found rapidly increases with increasing temperature as compared to specific rotation of acetic acid.

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सायन्स कॉंग्रेसमध्ये हिरे महाविद्यालय

पंचवटी : लोकनेते व्यंकटराव हिरे महाविद्यालयातील भौतिकशास्त्र विभागातील तृतीय वर्ष (टीवायबीएस्सी फिजिक्स)चे चार विद्यार्थी अभिनय मांडवडे, अभिषेक मोरे, निखिल डावखर, कुणाल सोनवणे यांनी पंजाबमध्ये ३ ते ७ जानेवारीला झालेल्या पोस्टर अॅन्ड पेपर प्रेझेंटेशनमध्ये सहभाग घेतला. त्यांच्या सोबत प्रा. डॉ. जे. एम. शेवाळे उपस्थित होते. तसेच मालेगाव येथील महाराजा सयाजीराव गायकवाड येथे मटेरियल कॅरक्टरायझेशन टेक्निक वर्कशॉपमध्ये गणेश कांदे, सिमरणप्रित कौर संधू, त्रिलोकचंद कुमावत यांनी सहभाग घेऊन मल्टिडिस्प्लिनरी यूजीसी विद्यापीठ अनुदान आयोगाकडून मान्यताप्राप्त जर्नलमध्ये तीन संशोधन पेपर प्रसिद्ध केले. प्राचार्य डॉ. सी. जी. दिघावकर आणि सायन्स विभागप्रमुख प्रा. डॉ. एन. बी. पवार यांनी अभिनंदन केले.