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Research Genius E Journal

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Multi Disciplinary E Journal of Research

CHIEF EDITOR

Dr. M.K.Patel
I/C Principal
Shri H.S.SHAH COLLEGE OF COMMERCE MODASA

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Editor's Column

The blast of knowledge at the universal hut due to scientific dynamics has without doubt redefined the very concept of new Era. The main set-up of education especially higher education-has become a subject of study and scrutiny for the scholars and practitioners who have a hunger desire to face change and challenges. It is because we, the creature beings, are brilliant with the faculty of option and a liberated will.

Unlike other type, we are not planned. We can make choices and use our free will to act and get our objectives. Inequities in learning opportunities, quality of educational military and level of learning success persist by gender, rural/town locality, ethnic backdrop, and socioeconomic status.

The quality of education and the aptitude to define and monitor this quality is absent in most upward countries. The means and span of education continue to be fine and curbed to past models of delivery, and the use of other channels continues to be informal and subsidiary. The increase in quantitative and qualitative demand for education is not in step by an raise in funds.

At this point in time, it is safe to situation that the split of views on the risk of change is marvelous. We, the publishers of Research Genius E Journal, are very much eager to view some aspect of these changes through academic article contributed by impressive scholar and social group. The nearby issue contains papers with decisive coming and scrutiny as well as orderly argument and reflection on various theme of language, prose, information technology, commerce and so on. We trust this will positively be helpful for the community who desire transform.

Chief-Editor

Dr. Mohanlal K.Patel

I/C Principal

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Specific problems of college students

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Shri S K Shah and Shri Krishna O M Arts College, Modasa

Introduction:

College students today face a unique set of challenges that can significantly impact their academic performance and personal development. These issues often arise from the demands of academic work, social pressures, financial concerns, and the transition to adulthood. Each of these aspects contributes to a complex environment that can lead to stress, anxiety, and other mental health concerns. Understanding the specific problems that college students encounter is crucial for providing the support and resources they need to thrive during this pivotal stage of their lives.

Review of Related Literature:

The challenges faced by college students have been widely studied across various disciplines, reflecting the multifaceted nature of their experiences. Research has consistently highlighted academic pressure as a significant source of stress for students, often exacerbated by high expectations from both self and others. Studies also emphasize the impact of financial strain, which can limit access to educational resources and contribute to anxiety. Social dynamics within college life, including relationships with peers and faculty, are another critical area explored in the literature, with findings suggesting that social support networks play a crucial role in student well-being. Additionally, the transition from adolescence to adulthood is a period marked by identity exploration and increased responsibility, which can lead to a variety of psychological challenges. Overall, the literature underscores the importance of addressing these issues through comprehensive support systems to foster student success.

Objectives:

(1) To investigate the impact of educational level (undergraduate vs. postgraduate) on the special problems faced by students.

(2) To analyze the differences in special problems encountered by male and female students.

(3) To assess how the habitat (urban vs. rural) influences the nature and intensity of special problems faced by students.

(4) To compare the special problems of students across different educational branches (humanities vs. science).

(5) To explore the interaction effects of education level, gender, habitat, and educational branch on the special problems of students.

Hypothesis:

H_1: There is a significant difference in the special problems faced by undergraduate and postgraduate students.

H_2: Boys and girls differ significantly in the special problems they encounter during their college education.

H_3: Urban and rural students experience significantly different special problems in their academic and personal lives.

H_4: Students in humanities and science streams face different types of special problems in their educational journey.

H_5: There is a significant interaction effect between education level, gender, habitat, and educational branch on the special problems faced by students.

Variable:

Independent variables : (1) Education level: Under graduate and Post Graduate (2) Gender : boys and girls (3) Habitat: urban and rural (4) Educational branch: Humanities and science

Dependent variables: special problems of students.

Sample: I have taken 100 sample by purposive sampling method based on independent variables.

Tools :

Student Problem Checklist (SPC) : Rao, B.V.S. (1989)

Statistical Analysis: I used ANOVA for data analysis.

Result and discussion:

Table : 1 ANOVA table for measuring independent variables

Sources of Variation	Sum of squares	df	Mean Square	F - value	P - Value
Education level	1500	1	1500	25.00	0.0001
Gender	800	1	800	13.33	0.0006
Habitat	500	1	500	8.33	0.0045
Education branch	1200	1	1200	20.00	0.0002
Educational level × Gender	200	1	200	3.33	0.0714
Educational level × Habitat	300	1	300	5.00	0.0273
Gender × Habitat	250	1	250	4.17	0.0430
Gender × Educational branch	100	1	100	1.67	0.1970
Habitat × Educational branch	150	1	150	2.50	0.160
Educational level × Gender× Habitat	100	1	100	1.67	0.1970
Error	5000	396	12.63		
Total	9600	407			

Discussion

Main Effects:

Education Level: The significant p-value (0.0001) indicates a strong effect of education level on the special problems faced by students. This suggests that undergraduate and postgraduate students experience significantly different types of problems.

Gender: The p-value (0.0006) shows a significant difference between boys and girls, implying gender-specific challenges.

Habitat: A significant p-value (0.0045) reveals that students from urban and rural areas face different issues.

Educational Branch: With a p-value of 0.0002, this indicates a significant impact of the educational branch on the nature of the problems.

Interaction Effects:

Education Level × Gender: The p-value (0.0714) is marginally above the 0.05 threshold, suggesting that the interaction between education level and gender might be relevant but is not statistically significant at the 5% level.

Education Level × Habitat: The p-value (0.0273) indicates a significant interaction, meaning that the impact of education level varies between urban and rural habitats.

Gender × Habitat: With a p-value of 0.0430, this interaction is significant, suggesting that the combined effect of gender and habitat influences the problems students face.

Gender × Educational Branch: The p-value (0.1970) indicates no significant interaction effect, suggesting that the impact of gender does not differ much between humanities and science students.

Habitat × Educational Branch: The p-value (0.1160) suggests that this interaction is not significant, implying that habitat does not significantly alter the problems faced in different educational branches.

Education Level × Gender × Habitat: The p-value (0.1970) indicates that the three-way interaction is not significant, meaning that the combined effects of education level, gender, and habitat do not strongly influence the special problems.

Conclusion : The ANOVA results indicate that education level, gender, habitat, and educational branch significantly affect the special problems faced by students. However, some interaction effects are less clear and may require further investigation to understand their practical implications.

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A comparative study on performance analysis of public and private sector banks in India

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ABSTRACT:

Public area banks and personal area banks is dominant player which have critical function in boom of Indian economic system. the prevailing research paper aimed to study and examine the monetary performance of decided on public and personal quarter banks in India all through 2019-20 to 2023 -2024. information of public zone banks (state bank of India, Punjab countrywide bank, Canara financial institution) and private sector banks (ICICI bank,HDFC financial institution, Axis financial institution) for 5 years, has been accumulated from their legitimate sites and annual record. This observe is primarily based on secondary facts and monetary ratios are used. some selected variables like assets, coins deposits and credit score deposits are taken to acknowledged the financial positions of decided on banks. The take a look at located that standard performances of private sector banks are higher than public region banks.

INTRODUCTION:

The Indian economic system is now on the brink of a prime transformation, with expectancies of coverage projects being applied. positive enterprise sentiments advanced consumer self assurance and extra managed inflation ought to help raise the financial growth. higher spending on infrastructure, fast implementation of projects and continuation of reforms will offer similarly impetus to boom. these types of translates right into a strong increase for banking quarter too, as rapidly developing enterprise turn to banks for their credit score needs, as a result helping them grow very rapid. also, with the improvements in generation, cellular and net banking offerings have come to the fore. Banks in India are focusing more and more to offer higher offerings to their customers and have also commenced upgrading their generation infrastructure, that can assist enhance consumer revel in in addition to give banks a

competitive side. The operations of all of the banks in India are controlled by way of the RBI. all of the Indian banks are governed by the RBI. This governing frame took over the purpose-potential of officially regulating the Indian banks in 1935. The reserve financial institution of India became introduced as the legit principal authority for the smooth supervision of the banking industry in India. Banks in India are categorized into 2 large categories particularly, Public quarter banks and private region banks. Public sector banks are controlled and managed through the authorities of India. Public quarter banks were serving the state for over centuries and widely recognized for his or her low-cost and great offerings. The banking sector in India is by and large ruled through the general public sector banks. the general public quarter banks in India alone account for approximately 78 percent of the entire advances within the Indian banking enterprise. The concept of personal banking changed into added about 20 years in the past. these are the banks that don't have any authorities stakes. The non-public banks are liable for a percentage of 18 percent of the Indian banking industry. non-public Banks have received quite a robust foothold within the Indian banking enterprise over the last few years particularly due to ideal use of technology.

KEYWORDS:

Public sector bank, personal region financial institution, performance evaluation,internet NPA, net earnings.

PUBLIC SECTOR BANKS:

Public region banks in India have a rich records relationship back to the pre-independence era. The state bank of India, mounted in 1806 as the bank of Calcutta, laid the inspiration for the banking machine. publish-independence, the government Nationalized main banks in two levels, in 1969 and 1980, to make certain economic inclusion and manipulate over the economy. Public sector banks performed a pivotal role in fostering financial improvement via channeling budget to precedence sectors. through the years, these banks have developed to conform to changing monetary

landscapes, incorporating technology and expanding their attain to cater to numerous banking wishes throughout the united states of america.

the general public area is that portion of an financial gadget this is controlled by using countrywide, kingdom or provincial, and neighborhood governments.It consists of national and neighborhood governments, their groups, and their chartered bodies.Public quarter reimbursement is a tough and complex problem regularly characterised by straw men and generalizations Public worker compensation is a matter of coverage debate and political controversy in states and towns around the u . s .. but

discussions of public zone pay are rarely knowledgeable by tough facts. Many public employees are under the affect that they may earn better pay and benefits "on the out of doors." and many non-public quarter employees admire public quarter pay and blessings, with out spotting that the common public employee is frequently more knowledgeable and experienced than the common worker outdoor authorities. government employees normally have a good sized component of their salaries in blessings together with medical insurance and pension blessings. employees in public quarter organisations have enjoyed activity security, which is regularly now not the case in personal zone. also, there is no denial that they've traditionally enjoyed quite a number benefits and perquisites that can not be easily monetized. The PSUs remuneration and human resource rules should match-into India's socioeconomic reality, that's a rustic this is stillpre-dominantly poor with lot of social and monetary inequities. to give identical opportunities and uplift humans from sure sections, the authorities has reserved posts in PSUs for-scheduled castes and scheduled tribes. most PSUs additionally have mandated to broaden broader infrastructure facilities in regions adjoining their centers. The junior and middle control personnel are, however, better off in PSUs than the ones inside the private zone because of those fringe benefits and greater identical distribution of reimbursement in PSUs. There are presently 12 public zone banks in India, and they play a important function inside the united states of america's economic zone.

the country's financial sector.

Here's a list of the 12 public sector banks in India:

State Bank of India (SBI)

Bank of Baroda

Punjab National Bank

Bank of India

Union Bank of India

Canara Bank

Bank of Maharashtra

Central Bank of India

Indian Overseas Bank

Indian Bank

UCO Bank

Punjab and Sind Bank

PRIVATE SECTOR BANKS:

private zone banks in India have a rich history rooted in economic reforms. The liberalization of the Indian economy inside the early Nineties marked a pivotal second, permitting non-public players to enter the banking quarter. the primary non-public bank, Housing improvement Finance company (HDFC) bank, started out operations in 1995. This pass aimed to decorate opposition, efficiency, and innovation in the banking industry, fostering a greater dynamic economic landscape. over the years, non-public zone banks have performed a important role in modernizing the banking zone, introducing advanced technology, and presenting various monetary services to cater to the evolving wishes of India's developing financial system.

The non-public region encompasses enthusiastic about-income organizations that aren't owned or operated with the aid of the government. the private quarter is the

segment of a national economic system owned, managed and managed by means of private individuals or companies.The non-public area has a goal of getting cash and employs more workers than the general public region. The personal area in India have verified its capability of increase and supplied first-rate opportunities of employment. Compensations end up worldwide in nature for similar or equivalent ability units, however, the boom degrees in compensation differed market to marketplace. HR businesses have made tries to apprehend the linkage and influencing factors of income escalation ranges as part of their ordinary exercise and projected short time period developments for one of a kind sectors/ industry. inside the non-public quarter, top management has to constantly try to reach better operational objectives, in an effort to contain a positive degree of chance and an worker has to be rewarded certainly the excessive salaries in the non-public quarter are often granted.handiest to a minuscule variety of employees who hail from the pinnacle-give up control colleges. and their remuneration, at instances, are not reflective of the industry common.

Here's a list of the Private sector banks in India:
Axis Bank
Kotak Mahindra Bank
Federal Bank
HDFC Bank
ICICI Bank
IndusInd Bank
IDFC FIRST Bank
RBL Bank
YES BANK
City Union Bank
DCB Bank
IDBI Bank

PERFORMANCE ANALYSIS:

A performance analysis of public and private sectors reveals that at the same time as personal sector entities regularly prioritize profit, public region entities prioritize public provider and social targets, with each sectors showing strengths and weaknesses depending at the context and metrics used for assessment.

FOLLOWING THE SELECTED THREE PUBLIC AND PRIVATE SECTOR BANKS IN INDIA.

Table:1

Net NPA of Public Sector Banks and Private Sector Bank (amount in crore)

PARTICULARS	2019-20	2020-21	2021-22	2022-23	2023-24
SBI	51871	36810	27965	21466	21051
PNB	27218	38575	34909	22585	6799
CANARA	18251	24442	18668	14349	11823
PUBLIC SECTOR BANKS	**97340**	**99827**	**81542**	**58400**	**39673**
HDFC	3542	4555	4408	4368	8091
AXIS	9360	6994	5512	3589	3247
ICICI	10114	9180	6961	5155	5378
PRIVATE SECTOR BANKS	**23016**	**20729**	**16881**	**13112**	**16716**

Table:2

Net Profit of Public Sector Banks and Private Sector Bank (amount in crore)

PARTICULARS	2019-20	2020-21	2021-22	2022-23	2023-24
SBI	14488	20410	31676	50232	61077
PNB	336	2021	3457	2507	8329
CANARA	-2236	2558	5678	10604	14554
PUBLIC SECTOR BANKS	**12588**	**24990**	**40811**	**63343**	**83960**

HDFC	26257	31117	36961	44109	64060
AXIS	1627	6589	13025	9580	24861
ICICI	7931	16193	23339	31897	40888
PRIVATE SECTOR BANKS	**35815**	**53898**	**73326**	**85585**	**129809**

C0NCLUSION:

To further decorate the tremendous developments found in both public and personal region banks, it's miles crucial to put in force centered strategies. Public quarter banks should focus on adopting some of the green danger management practices demonstrated with the aid of personal region opposite numbers. Strengthening asset excellent through non-stop vigilance on lending practices and proactive measures to decrease NPA. private region banks, even as celebrating their growing net income, should preserve a balanced increase strategy and keep away from overly competitive lending. each sectors ought to benefit from fostering collaboration to share a success chance management practices, contributing to the overall balance and profitability of the banking sector.The economic overall performance of decided on public area and private region banks evaluation using special parameters. the selected public zone banks that are country bank of India, Punjab countrywide bank and Canara bank and personal area banks are HDFC financial institution, AXIS financial institution and ICICI bank.The decline in total NPAs in both public and private banks indicates an development in asset first-rate. private fairness markets, exhibiting excessive returns, mirror robust financial health. Public quarter banks can draw stress from their private counterparts to in addition strengthen their monetary positions as they develop. ordinary, the advantageous trajectory of the banking sector indicates a resilient, improving financial environment, provided each sectors continue to be vigilant, adopt first-class practices and cooperate for mutual advantage that improve economic first-rate of banks.

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જાગરિયા લોકકથામાં ભાષાવિશેષતા અને વિશિષ્ટ શબ્દો

ડૉ. ઘનશ્યામભાઈ કે. તળપદા

આચાર્ય,

આદર્શ નિવાસી શાળા કુમાર ઉમરપાડા, મુ. ઉમરગોટ તા- ઉમરપાડા જિ. સુરત

જાગરિયા લોકકથામાં ભાષાવિશેષતા અને વિશિષ્ટ શબ્દો

લોકસાહિત્ય કથોપકંઠ પરંપરા ચાલી આવતું હોય છે, માટે તેમાં બોળીની અસર જીલાતી જોવા મળે છે. તેથી તેનાં કેટલાંક વિશિષ્ટ લક્ષણો જોવા મળે છે. જાગરિયા લોકકથામાં આવી ભાષાવિશેષતાઓ ચરોતરી બોલીનાં સંદર્ભે અહીં તપાસીએ.

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- "'સ'નો અઘોષ 'હ' થવો"[2]: 'દસ'નું 'દહ', 'માણસ'નું 'માણહ', 'સંતાવું'નું 'હંતાવું', 'સુખ'નું 'હખ', 'સગપણ'નું 'હાગપણ', 'સવાર'નું 'હવાર', 'સાચા'નું 'હાચા', 'સાચવજે'નું 'હાચવજે', 'સાત'નું 'હાત', 'સામે'નું 'હામે', 'સારી'નું 'હારી', 'સાથે'નું 'હાથે', 'સોપવું'નું 'હોપવું' વગેરે.
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- ક્યારેક મહાપ્રાણ 'ઘ'નો અલ્પપ્રાણ 'જ' બને છે. જેમકે,'ઘી'નું 'જી'

માન્ય ગુજરાતીનાં સંદર્ભમાં કેટલાક વિશિષ્ટ શબ્દો:

અંબર – ઢગલો

અગોવ – આગમવાણી

અછોડો – દોરડું

અછોડો – દોરડું, રાંઢુ

અમલમે – સમયે

અસનાન – સ્નાન કરવું

અહંકાર – અભિમાન

અહુર – રાત

આછ – આંખ

આરોપયા – આપ્યા, પહેરાવવું

આશરો – સહાય, સહાયક થવું

આહુ – આંસુ

એટો – ઈંટો

ઓઈકારો – હહણવું

કટમ – કુંટુંબ

કદવાડ – વિખવાદ

કને – પાસે

કસ્તી – દુ:ખ

કૈલાશમાં – આનંદમાં

કોટી – કરોડ

ખઈ – ખાવું, જમવું

ગજર – સમય

ગેટમાં પૂરવા – જેલમાં પૂરવા

ગોજારણ – પાપી

ઘરાક – ગ્રાહક

ચમ – કેમ, શા માટે

ચરો – ગૌચર જમીન

ચિતારો – ચિત્રકાર

ચેવો – કેવો

ચ્યાં – ક્યાં

ચ્યારે – ક્યારે

છરી – ચરી

છાબકું – પોશમાં સમાય તેટલું, અંજલી ભરાય એટલું

છેતર – ખેતર

જઉ – એ તરફ જવું

જગોએ – જગ્યા, સ્થાન

જગોતરી – જાર

જટા – લાંબા વાળ

જણશ – દાગીનો

જી – ઘી

જુગ – યુગ

જુદ્ધ – યુદ્ધ

જુધ્ધા – શક્તિશાળી

જોન – જાન(લગ્નની)

ડઈ – ડાહ્યો, સમજદાર

તાજમ – યાદ

તારા – તાળાં, તાળું

તેવાર - તહેવાર

તોય – તેમ છતાં

દઈત - રાક્ષસ

દહ – દસ(સંખ્યા)

દા'ડો – દિવસ

દાડાવાળ – નિયત દિવસ, ચોક્કસ દિવસ

દાડે – દિવસે

દારે – દાડ

દિ – દિવસ

દુવાર – યાદ કરવું

દેજ – દહેજ

દેનાર – આપનાર

નઈ – નહીં

નતા – ન હતાં

નથી – વ્યક્તિવાચક નામ

નાછીએ – નાખવું

નિધાન કરવું – સાબિતી આપવી

નીકર – નહીં તો

નેણ – આંખ

પચા – પચાસ

પટ – ઝડપથી

પટ દઈને – ઝડપથી

પત્યા – પિતા

પમધારે – પરમ દિવસે

પોકવા ન દે – જીતી ન શકવું, પહોંચી ન શકાય

ફાંસવું – તોડવું

બઉ – ખૂબ, વધારે

બામન – બ્રાહ્મણ

ભાગ – કરમ, નસીબ

ભાળવું – જોવું, દેખવું

ભૂળું – ખરાબ

ભોખડિયે – ઘૂંટણે પડી જવું

મઈ – અંદર

મોર કરવો – આગળ કરવું

મોસ – માસ

રંડાપો – વિધવાપણું

રાજી કરી દવ – ખુશ કરી દેવા

રેવંત – રથ

રોતી – રડવું

લૂંગડું – વસ્ત્ર, કાપડ

વખમી વેળાયું – સહી ન શકાય તેવા સમય

વરહ – નિશ્ચિત સમય

વલખાં મારવાં – ફાંફાં મારવાં

વસાયા – વસાવવું

વસિયા – રહેવું, વસવું

વસેલ – વસેલાં, રહેવું

વહોરવું – ખરીદી કરવી, ખરીદ કરવું

વાટ જોવી – રાહ જોવી

વાસના પડી જવી – જાણ થઈ જવી

વાહળ – પાછળ

વાહે – પાછળ

વેણ – વચન, વાણી

સંગાત – સાથે

સવરૂપ – સ્વરૂપ, સૌંદર્ય

સામગ્રી – તૈયારી

સેમાડે – સીમ વિસ્તાર

હંગાથ – સંગાથ

હંતાઈ – સંતાવું

હંદેહો – સંદેશો

હખ – સુખ

હગું – સગપણ કરવું

હરાપ – શાપ

હવાર – સવાર

હવાહો – એક સો પચ્ચીસ

હવાહો – સવા સો

હળપ – ઝડપ

હાંકળ – સાંકળ

હાંચા – સાચા

હાચવજે – સાચવવું, સંભાળ રાખવું

હાજા હમ – સાજા સમ

હાત – સાત

હાનમાં – ઈશારાથી હમજાવું

હાબદા કરવું – તૈયારી કરવું

હામો – સામે

હારી – સારી

હારે – સાથે

હાલી – ચાલી

હાલો – ચાલો

હોપવા – સોપવા

હોપી દ્યો - સોપી દો

હોપું – સોપવું

હોળમાં – કેડમાં, સાથે લીધેલો

પાદટીપ:

	ગ્રંથશીર્ષક	લેખક/સંપાદક	પૃ. નંબર
1.	ભાષા પરિચય અને ગુજરાતી ભાષાનું સ્વરૂપ	જયંત કોઠારી	૧૪૭
2.	એજન		૧૪૮
3.	એજન		૧૪૭
૪.	એજન		૧૪૮

What is IVF?

SMIT ARVINDBHAI BHARGAV
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PGT Biology

In vitro fertilization is a process in which oocytes are fertilize outside the body. IVF is a major treatment in infertility when other methods of assisted reproductive technology have failed. The process removing ova from the ovaries and enabling sperm fertilize them in a fluid medium. The fertilized ova (zygote) are then transferred to the patient's uterus with the intent to establish a successful pregnancy.

Sometimes, IVF is offered as a primary treatment for infertility in women over age 40. IVF can also be done if you have certain health conditions. For example, IVF may be an option if you or your partner has:

1) Fallopian tube damage or blockage

2) Ovulation disorders.

3) Endometriosis.

4) Uterine fibroids.

5) Previous tubal sterilization or removal

6) Impaired sperm production or function

7) Unexplained infertility.

8) A genetic disorder.

9) Fertility preservation for cancer or other health conditions.

Steps in IVF:

1) Hyper stimulation of ovary

2) Retrieval of oocyte

3) Oocyte culture

4) Preparation of sperm sample

5) Intracytoplasmic sperm injection

6) Embryo transfer

IVF lab :

➢ IVF lab divided into mainly two parts.

1) **ANDROLOGY**

2) EMBRYOLOGY

Andrology lab :

In andrology lab work on semen analysis, semen freezing, and sperm preparation.

: INSTRUMENTS :

1. Laminar airflow:

LAF provides a work area with an aseptic/sterile condition for the work area. LAF has a continuous displacement of air (provides streamline the flow of air) that passes through the HEPA filter that removes the particulates from the air.

2. Simple compound microscope:

A magnifying instrument that uses two types of lens to magnify an object with different zoom levels of magnification is called a compound microscope. A magnifying instrument that uses only one lens to magnify objects is called a simple microscope.

3. Centrifugation:

Centrifugation is a technique used for the separation of particles from a solution according to their size, shape, density, the viscosity of the medium, and rotor speed. The particles are suspended in a liquid medium and placed in a centrifuge tube. The tube is then placed in a rotor and spun at a defined speed.

4. Liquid nitrogen canister:

Liquid nitrogen is an atmospheric gas in liquidized form. It is a cryogenic fluid that can cause almost instant freezing when it comes in contact with living tissue. A liquid nitrogen tank keeps its materials well below the freezing point of water. Liquid nitrogen is cryopreservative of many human materials such as blood, egg, and semen.

5. Makler sperm counting chamber:

Makler reusable sperm counting chamber. The Makler sperm counting chamber can be used to perform a sperm count from an undiluted semen specimen during IVF and andrology related procedures. The number of spermatozoa counted in any strip of 10 squares of the grid indicates their concentration in millions/mL.

Liquefy the semen sample, nothing to add. The smaller chamber was designed specifically for the determination of sperm concentration and motility in undiluted semen. It has a reported depth of 0.01 mm. The grid area in the center of

the coverslip is 1mm* 1mm and is divided into 100 small squares, each of which is 0.1 mm * 0.1 mm—a 5µL volume of semen or sperm suspension was loaded into the chamber. The smaller chamber is easy to use and gain results fast and easy. For the calculation, no conversion factors are needed.

Fig 1.1: Makler sperm counting chamber

6. The improved Neubauer hemocytometer:

The improved Neubauer hemocytometer has two separate counting chambers, each of which has a microscopic 3 mm* 3 mm pattern of grid lines etched on the glass surface. It isused with a special thick coverslip (thickness number 4, 0.44mm), which lies over the grids and is supported by glass pillars 0.1 mm above the chamber floor. Each counting area is divided into nine 1 mm * 1 mm grids.

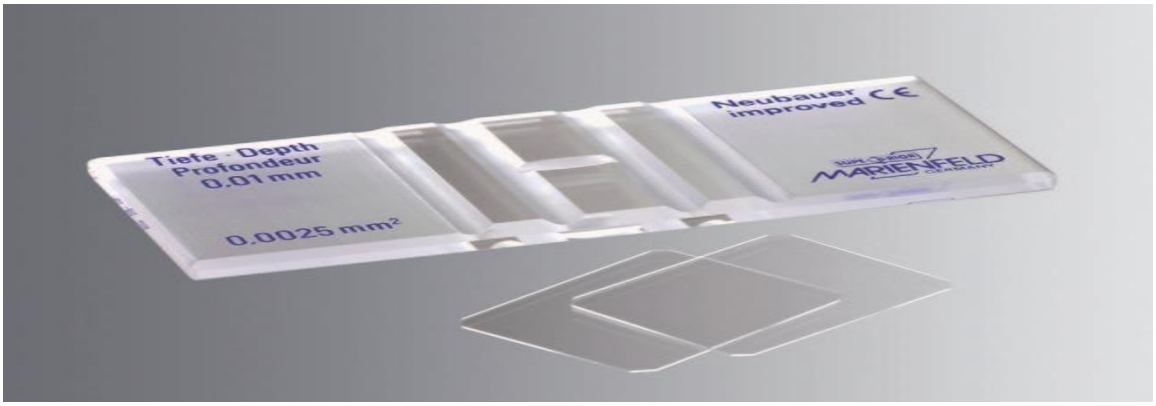

Fig 1.2: The improved Neubauer hemocytometer

7. Freeze:

Freeze is used in the lab for different media storage.

8. Semen container:

Semen container used for semen collection. Other instruments also used like Coverslip, Slide, Test tube, dropper, Micropipette, and microtip.

आधुनिक भारत में भ्रूणपरीक्षणऔरगर्भपात :

डॉ. कल्पना आर.पटेल
श्री कलजीभाई आर. कटारा आर्ट्स कॉलेज, शामलाजी

आज चिकित्सा विज्ञान इतनी अधिक प्रगति कर चुका है कि गर्भ के समय ही शिशु के लिंग आदि का पता आसानी से लगाया जा सकता है। 1970 में गर्भ-विज्ञान के एकाएक उस समय उछाल सा आ गया जब अल्ट्रासाउंड ग्राफ अर्थात 'ध्वनि तरंगों द्वारा प्राप्त चित्र' का प्रादुर्भाव हुआ। सीटोलॉजी, हिस्ट्रोलॉजी और रेडियो इम्यून रासायनिकी के विकास के कारण 'अल्ट्रासाउंड' तकनीक की सहायता से गर्भ में पल रहे शिशु के लिंग की जांच की जा सकती है ।

'अल्ट्रासाउंड' एक बेहद आसान सी प्रक्रिया है इसलिए इस तकनीक की सहायता सक भ्रूण के लिंग का पता मिनटों में लगा लिया जाता है। इस तकनीक के अंतर्गत उस महिला को मेज पर लिटा दिया जाता है जिसके भ्रूण का परीक्षण किया जाना होता हैं इसके बाद अल्ट्रासाउंड यंत्र का एक सिरा स्त्री के गर्भाशय पर टिका दिया जाता है। उस यंत्र में मूल रूप से क्रिस्टल होता है उच्च गति की ध्वनि तरंगों को प्रेषित करता है एक ट्रान्सड्यूसर, जो उन ध्वनि तरंगों की प्रतिध्वनि एकत्रित करता है। ये प्रतिध्वनियाँ कम्प्यूटर के द्वारा एकत्रित की जाती है जो गर्भ में पल रहे शिशु के चित्र के रूप में स्क्रीन पर पर अवतरित हो जाती हैं। वस्तुतः इस तकनीक में शिशु का चित्र, रेखीय चित्रण या क्षेत्रीय चित्रण के द्वारा बनता है।

इस अल्ट्रासाउंड तकनीक द्वारा शिशु के हृदय के वाल्व के खुलने और बंद होने की क्रिया तक को आसानी से देखा जा सकता है। शिशु के अल्ट्रासाउंड चित्र द्वारा स्पष्ट हो जाता है कि गर्भ में पल रहा अजन्मा शिशु भी हमारी तरह ही जीवित होता है, मानवजाति का ही एक सदस्य होता है। इस आश्चर्यजनक तकनीक की सहायता से भ्रूण के लिंग का पता लगाकर उसका गर्भपात करवा दिया जाता है। भ्रूण का गर्भपात एक बेरहम और अमानवीय प्रक्रिया होती है। इसमें लोहे व अन्य धातु उपकरणों से शिशु (भ्रूण) को कुचला जाता है, उसे नष्ट किया जाता है। गर्भपात के दौरान स्पैकुलम नामक यंत्र और सक्शन ट्यूब की सहायता से गर्भ में शिशु के चारों ओर उपस्थित तरल पदार्थ को चूसकर बाहर निकाल दिया जाता है। इसके बाद सक्शन ट्यूब से ही शिशु के छोटे-छोटे टुकड़े किए जाते हैं और टुकड़े-टुकड़े करके शिशु को बाहर निकाला जाता है। इसलिए सक्सन ट्यूब की सहायता से शिशु के सिर को निकालना संभव नहीं हो पाता है। इस समस्या के समाधान हेतु लोहे के सिर की एक चिमटी को गर्भाशय में डाला जाता है, उसके हाथ-पैर भी होते हैं और पूरा विकसित चेहरा भी। इसके अलावा इसका हृदय और मस्तिष्क भी पूरी तरह से कार्य कर रहा होता है।

कुछ लोग गर्भपात को शल्य क्रिया न मानकर साधारण सी एक सफाई मानते हैं लेकिन वास्तव में ऐसा नहीं है। अप्राकृतिक गर्भपात करवाने से गर्भवती स्त्री के स्वास्थ्य को गंभीर खतरा पैदा हो जाता है। इसके कारण अत्यधिक रक्तस्राव हो सकता है जिससे स्त्री की मृत्यु तक हो सकती है। अक्सर गर्भपात के कारण जनन अंग कमजोर हो जाते हैं जिससे भविष्य में गर्भधारण करना काफी मुश्किल हो सकता है।

कन्या-भ्रूण परीक्षण के मामले में सुप्रीम कोर्ट ने कड़ा रुख अपनाते हुए एक महत्त्वपूर्ण आदेश में 11 प्रमुख राज्यों के स्वास्थ्य सचिवों को तलब किया। अल्ट्रासाउंड क्लीनिकों को पंजीकरण और भ्रूण लिंग परीक्षण करने वाले अस्पतालों की जाँच करने के अपने आदेशों का अनुपालन न होने के कारण सुप्रीम कोर्ट को यह कदम उठाना पड़ा। तलब किए गए स्वास्थ्य सचिव हरियाणा, पंजाब, उत्तर प्रदेश, गुजरात, महाराष्ट्र, आंध्रप्रदेश, केरल, राजस्थान और बंगाल व दो अन्य राज्यों के थे।

अदालत ने स्वास्थ्य सचिवों को स्वयं उपस्थित होकर प्री-नेटन डायग्नोस्टिक टेकनिक्स रेग्यूलेशन एण्ड प्रीवेन्शन एक्ट (पीएनडीटी) का दुरुपयोग रोकने के लिए उठाए गए कदमों की विस्तृत जानकारी देने के आदेश दिए। कानून को लागू करने में स्वास्थ्य अधिकारियों की इच्छा पर गंभीर सवाल उठाते हुए जस्टिस एम.बी. शाह, जस्टिस बी.एन. अग्रवाल और जस्टिस अरिजित पसायत की खंडपीठ ने कहा कि यह राज्य सरकारों की विफलता का प्रतीक है।

राज्यों द्वारा दायर किए हलफनामों में इस बात के पुख्ता सबूत हैं कि इन राज्यों में बड़ी संख्या में अल्ट्रासाउंड क्लिनिक हैं, लेकिन उनमें बहुत कम ही पंजीकृत हैं और गैर पंजीकृत क्लीनिकों के खिलाफ भी कोई कार्रवाई नहीं की गई है। बहस का जवाब देते हुए केन्द्रीय स्वास्थ्य मंत्रालय के वकील ने कहा केन्द्र द्वारा जरूरी चेतावनी दिये जाने के बावजूद राज्यों के स्वास्थ्य विभागों ने कोई जवाब नहीं दिया और अदालत के आदेशों की अनुपालना में भी कोई रुचि नहीं दिखाई। अदालत ने 2001 की जनगणना में पुरुष महिला अनुपात में भारी असमानता पर गहरा क्षोभ जताते हुए भ्रूण हत्या रोकने में असफल रहने पर राज्यों और केन्द्रशासित प्रदेशों की खासी खिंचाई की।

पिछले कुछ समय से कन्या-भ्रूण के मामलों में तेजी से इजाफा हुआ है तो इसके अपने कारण हैं। इस प्रकृति के पीछे मूल रूप से हमारी सामाजिक सोच ही जिम्मेदार है। जन्म के समय से ही स्त्रियाँ हमारे समाज में प्रताड़ित होना शुरू हो जाती हैं। अपराध चाहे कोई भी करे लेकिन उसकी सजा अंततः स्त्री को ही मिलती है। बलात्कार महिला के खिलाफ होता है लेकिन समाज बलात्कारी के स्थान पर पीड़ित महिला को ही हिकारत की नजर से देखने लगता है। सामाजिक ताना बाना ऐसा हे कि बेटी को कभी विरासत का उत्तराधिकारी नहीं समझा जाता। धार्मिक संरचना ऐसी है कि दहेज एक आवश्यक संस्कार बन गया है। दहेज प्रथा रोकने में हमारी नाकामी के चलते आज कन्या-भ्रूण को बढ़ावा मिल रहा है। कुछ आधुनिक लोग सोचने लगे हैं कि बेटी के विवाह में लाखों रुपये खर्च करने से

बेहतर है कि चंद रुपये खर्च करके बेटी को कोख में ही समाप्त कर दिया जाए। पिछले कुछ समय से अखबारों में अवैध रूप से लिंग की जांच करने वाले के विज्ञापनों की बाढ़ सी आ गयी है। इनके विज्ञापनों में कहा जाता है कि '2 हजार खर्च करके 2 लाख बचाएँ' दरअसल यह मामला सीधे तौर पर स्त्रियों से जीने का अधिकार छीन लेने का है और इससे स्त्री के अस्तित्व पर भी सवालिया निशान लग गए है।

महत्त्वपूर्ण बात यह है कि इस अपराध की जड़ में अशिक्षा अथवा गरीबी मूल कारण नहीं है। दरअसल यह पूरी तरह से हमारी असंवेदनशीलता का नतीजा है। इस महापाप का एक बड़ा कारण शायद यह भी है कि स्त्रियाँ स्वयं स्त्री होने की हीनभावना से ग्रस्त है। आज भी अधिकतर गर्भवती स्त्रियाँ सिर्फ और सिर्फ पुत्र की कामना ही करती हैं। स्त्रियाँ बेटे पैदा करने में गर्व का अनुभव करती हैं और बेटी पैदा होने पर उन्हें शर्म आने लगती है।

तथ्य बताते हैं कि हमारी यहाँ अधिकतर कन्या भ्रूण हत्याओं के मामले पुत्र-प्राप्ति की चाह में होते हैं। बालिका भ्रूण हत्या का एक कारण लगातार छोटे होते जा रहे है। अब परिवार छोटे होते हैं और युगल के अलावा बस दो बच्चों को ही गुंजायश बची है। प्रत्येक युगल चाहता हे कि उसके कम से कम एक पुत्र अवश्य हो इसलिए पहली बार कन्या के जन्म लेने पर दूसरी बार युगल गर्भ में ही शिशु के लिंग का पता लगवा लेता है और यदि पुनः गर्भ में कन्या ही पल रहीं होती है तो युगल गर्भपात का अमानवीय निर्णय ले लेता है। सवाल यह उठता है कि यदि बाद में भी दुबारा लड़की ही गर्भ में आती रही तो क्या होगा। समाज किस प्रकार किसी तकनीक का दुरुपयोग करने लगता है यह अल्ट्रासाउंड तकनीक के उदाहरण से समझा जा सकता है। वास्तव में अल्ट्रासाउंड कराने का उद्देश्य गर्भ में पल रहे बच्चे के विकास के बारे में जानना होता है। अल्ट्रासाउंड द्वारा पता लगाया जाता है कि कहीं बच्चा असामान्य स्थिति में तो नहीं है या उसका विकास रुक तो नहीं गया है। लेकिन अब अल्ट्रासाउंड कराने का मुख्य उद्देश्य शिशु का लिंग पता करना मात्र रह गया है।

एक अनुमान के मुताबिक भारत में प्रत्येक वर्ष एक लाख से भी अधिक महिलाएँ गर्भ सम्बन्धी कारणों से मृत्यु का शिकार हो जाती है और अधिकतर मौतें कन्या भ्रूण का गर्भपात करते समय ही होती हैं। इस बारें में कोई सही आँकड़े उपलब्ध नहीं हैं कि प्रत्येक वर्ष कितनी महिलाएँ गर्भपात कराती हैं और कितनी महिलाएँ किसी सामाजिक या पारिवारिक कारणों से गर्भपात का निर्णय लेती हैं। वैसे पांच लाख से दो करोड़ गर्भपात सालाना के आँकड़े विभिन्न स्रोतों से मिलते हैं। 1994 में किए गए एक अध्ययन के अनुसार 1992 में देश में कुल एक करोड़ दस लाख गर्भपात कराए गए। यहाँ आश्चर्य की बात यह है कि देश में गर्भपात को कानूनी मान्यता मिले 20 वर्ष से अधिक समय हो चुका है लेकिन 1992 में हुए इन गर्भपातों में से केवल 0.6 प्रतिशत ही पंजीकृत गर्भपात

(एम.टी.पी.) थे। माना जाता है कि प्रत्येक 10 से 12 अवेध गर्भपातों के बाद एक पंजीकृत गर्भपात होता है।

अस्सी के दशक के अंत तक देश में भ्रूण के लिंग का पता लगाने की आधुनिक तकनीक लोकप्रिय होने लगी थी। पिछले पाँच साल में भ्रूण लिंग निर्धारण व फिर बालिका भ्रूण की हत्या में जिस कदर तेजी से बढ़ोत्तरी हुई है, उसने सभी को चिंता में डाल दिया है। पंजाब के स्वास्थ्य सेवा निदेशक ने स्वीकार किया था कि सूबे ने वर्ष 1997 में प्रति हजार पुरुषों का औसत गिरकर 751 रह गया है। आर्थिक रूप से सम्पन्न हरियाणा और दिल्ली भी इस आँकड़े से दूर नहीं हैं। उत्तर-पश्चिमी भारत तो खैर पुरुष सत्तात्मकता के लिए कुख्यात है, लेकिन ताज्जुब तब होता है, जब मणिपुर, केरल और असम जैसे राज्यों में बालिका भ्रूण की हत्या के मामले सामने आते हैं, जहाँ महिलाओं को शेष देश की अपेक्षा अधिकार संपन्न समझा जाता है।

पुत्र की चाह हर साल करीब चालीस लाख महिलाओं को अपने जीवन का खतरा उठाकर अवैध गर्भपात करवाने पर मजबूर कर देती है। इंडियन मेडिकल ऐसोसिएशन (आई.एम.ए.) के मुताबिक यह संख्या पचार लाख का आँकड़ा पार कर चुकी है। अखिल भारतीय जनसंख्या प्रभाग के मुताबिक प्रसव के पहले मौत के घाट उतारी जाने वाली बालिकाओं की संख्या चार से पाँच करोड़ के बीच है। लेकिन अगर सरकारी आँकड़ों पर विश्वास करेंगे तो पूरे देश में कुल 107 बालिका भ्रूणों की ही हत्या हुई। क्या ये आँकड़े हास्यास्पद नहीं हैं?

आमतौर पर गर्भपातका निर्णय महिला का नहीं होता है। लेकिन दहेज की कुप्रथा, पारिवारिक और आर्थिक कारण उसे इस अपराध के प्रति प्रेषित करते हैं। स्थिति तब और भी खतरनाक हो जाती है, जब पैसे की किल्लत के कारण महिलाएं बालिका भ्रूण की हत्या के लिए झोलाछाप डाक्टरों की मदद लेती हैं। कई बार यह जानलेवा भी साबित हो जाता है। जितनी ज्यादा गोपनीयता, उतनी ज्यादा फीस । वैसे गर्भपात कितनी ही कुशल चिकित्सक से कराया जाए, अपने दुष्परिणाम छोड़ ही जाता है। लिंग आधारित गर्भपात, गर्भके दूसरे चरण के दौरान ही होता है। इसमे जान जाने का खतरा सात से दस गुना अधिक हो जाता है। भारत में गर्भपात को कानूनी मान्यता होने के बावजूद हर साल करीब बीस हजार महिलाएँ इसी कारण से काल कवलित हो जाती हैं। भ्रूण के कम से कम 14 हफ्ते का हो जाने के बाद ही यह पता चल जाता है कि वह लड़का है या लड़की। 14 हफ्ते के बाद गर्भपात अत्याधिक खतरनाक होता है।

इस सबके पीछे कुल मिलाकर वही धारणा काम कर रही है, जिसने भारत में महिलाओं को दोयम दर्जे का नागरिक बना छोड़ा है। यूनिसेफ की रिपोर्ट के मुताबिक हमारे देश में बड़ी संख्या में अभिभावक बच्चियों को स्वास्थ्य केन्द्र तक ले जाने की जहमत नहीं उठाते जबकि लड़के के स्वास्थ्य का पूरा ध्यान रखा जाता है। उन्हें भोजन, शिक्षा, कपड़े और यहाँ तक कि स्नेह भी दोयम दर्जे का ही

व्यवहार मिलता है। समस्या जहाँ आर्थिक कारणों से जुड़ी है, वहीं महिलाओं में शिक्षा का कम प्रतिशत भी इसके लिए जिम्मेदार है। जनगणना के रुझान बताते हैं कि साक्षरता दर बड़ी है। देश में कुल 65 फीसदी लोग साक्षर हैं लेकिन महिलाओं की साक्षरता दर 54 फीसदी के निराशाजनक स्तर पर टिकी हुई है। हर पाँच में से सिफ दो महिलाएँ ही पढ़ना लिखना जानती हैं। 14 साल से कम उम्र की बालिकाओं में से 41 फीसदी स्कूल का मुँह तक नहीं देख पा रही हैं।

लिंगभेद पर आधारित पुरुष प्रधान समाज में स्त्रियों पर अत्याचार और यातना की कहानी जन्म के बाद, किशोरावस्था या युवावस्था में नहीं बल्कि गर्भ के अन्दर से ही शुरू हो जाती है। यूनिसेफ की एक रिपोर्ट के अनुसार एशिया में गर्भावस्था में बाल शिशुओं की अपेक्षा मादा शिशुओं का जीवन विश्व में मानदंडों के अनुसार बहुत की कम है। दिल्ली स्थित प्राची एजुकेशनल सोसायटी ने भी इस सम्बन्ध में एक सर्वेक्षण कराया। सर्वेक्षण में पाया गया कि भ्रूण हत्या और गर्भपात की सबसे अधिक शिकार मादा शिशु होती है। राष्ट्रीय महिला आयोग के सहयोग से दिल्ली की चार झुग्गी-बस्तियों, जवाहर कैम्प, आजाद कैम्प, जाफराबाद एवं टिगरी कॉलोनी में किए गए इस सर्वेक्षण में यह बात उभरकर सामने आई है कि अल्ट्रासाउंड जैसी आधुनिक चिकित्सा सुविधाओं का बड़े पैमाने पर दुरुपयोग किया जाता है। यह भेदभाव उसके खानपान, स्वास्थ्य, रहन-सहन एवं हर मामले में किया जाता है। इस तरह भ्रूण हत्या का गर्भपात की शिकार होने से जो मादा भ्रूण बच जाते हैं वे कमजोर और कम वजन की बच्चियों के रूप में पैदा होते हैं तथा उनके कुपोषित होने का खतरा बना रहता है।

आजादी के पांच दशक बाद दुनिया के सबसे बड़े लोकतंत्र भारत में कानूनी तौर पर भ्रूण की जाँच को अवैध घोषित किए जाने के बावजूद ऐसा लगातार खुलेआम हो रहा है। परिवार निदेशालय द्वारा प्रसव निदान तकनीक अधिनियम के लागू होने के लगभग 4 वर्ष बाद आज भी बड़े पैमाने पर देश भर के कस्बों, शहरों और महानगरों में निजी क्लिनिकों में गर्भावस्था के प्रारंभिक दिनों में भ्रूण परीक्षण हो रहे हैं और गर्भवती महिलाओं, उनके परिजनों और डाक्टरों की मिलीभगत से मादा भ्रूण की हत्याएँ की जा रही हैं। गर्भ के अन्दर ही नहीं, जन्म के तत्काल बाद नवजात मादा शिशुओं की हत्या के लिए भी तरह-तरह के हथकंडे अपनाए जाते हैं। भारतीय समाज के कई हिस्सों में आज भी पैदा होते ही नवजात मादा शिशुओं की हत्या कर दी जाती है। कुछ समय पहले फरीदाबाद (हरियाणा) के एक अस्पताल में लगातार तीसरी बेटी होने पर माँ ने अपनी नवजात बच्ची की गला घोंटकर हत्या कर दी। यह कुकृत्य अधिकांश मामलों में दाईयाँ, घर की बुजुर्ग औरतें या शिशु की माँ घर के मालिकों (निसंदेह पुरुषों) के दबाव में करती हैं। पिछले दिनों दिल्ली में ही एक पति ने अपनी पत्नी को सिर्फ इसलिए मार डाला कि उसके गर्भ में तीसरी दफा भी बेटी ही पल रही थी।

पिछले दिनों राजस्थान के एक गाँव में एक सौ पन्द्रह साल बाद आई एक बारात की खबर ने लोगों के रोंगटे खड़े कर दिये थे। परम्परागत राजपूतों के उस गाँव में लड़कियों को पैदा होते ही मार दिया जाता था। आज भी उस गाँव में गिनी-चुनी लड़कियाँ हैं। प्राप्त रिपोर्ट के अनुसार राजस्थान के बाड़मेर एवं जैसलमेर, तमिलनाडु के सेलम, बिहार के सीतामढ़ी, पूर्णिया, कटिहार एवं भागलपुर तथा हरियाणा एवं पंजाब के कुछ जिलों में मादा शिशु हत्या की घटनाएँ आम हैं। इन पर न तो कोई संताप होता है, न कोई इनका विरोध करता है। मादा भ्रूण एवं नवजात बच्चियों की धड़ल्ले से की जा रही हत्याओं के कारण देश में स्त्री-पुरुष अनुपात में लगातार कमी आ रही है। कुछ राज्यों में तो यह अनुपात काफी चिन्ताजनक स्थिति तक पहुँच गया है।

इस सम्बन्ध में प्राप्त सूचना के अनुसार राजस्थान के जैसलमेर के प्रति एक हजार पुरुषों के मुकाबले स्त्रियों की संख्या मात्र आठ सौ दस है। जबकि भाटी समुदाय में प्रति हजार पुरुषों की तुलना में केवल छः सो कुछ स्त्रियाँ हैं। इसी तरह बिहार के सीतामढ़ी जिले में दुभरा प्रखंड में नवजात शिशुओं की हत्या के कारण कम उम्र की लड़कियो की संख्या में भारी कमी आई है।

इतना ही नहीं पंजाब और हरियाणा जैसे सम्पन्न राज्यों में भी स्त्री पुरुष अनुपात कम है। हरियाणा के प्रति एक हजार पुरुषों में मात्र 876 है। संयुक्त राष्ट्र बाल कोष (यूनिसेफ) की एक रिपोर्ट के अनुसार एक पंजाबी घर में पाँच वर्ष की उम्र की लड़कियों के मरने की आशंका लड़कों की तुलना में दस प्रतिशत अधिक होती है। राजधानी दिल्ली की झुग्गी-झोपड़ियों में भी नवजात मादा शिशुओं की हत्या की दर अधिक है। दिल्ली की एक रिपोर्ट के अनुसार इस तरह ही हत्याएँ जहांगीरपुरी, मंगोलपुरी, सुल्तानपुरी एवं शकरपुर इलाके की झुग्गी-झोपड़ियों में ज्यादा होती हैं।

उल्लेखनीय है कि प्रसव पूर्व निदान तकनीक (विनिमय एवं दुरुपयोग निवारण) अधिनियम 1994 के अनुसार 1 जनवारी 1996 से गर्भस्थ शिशु (भ्रूण) की जाँच के लिए अल्ट्रासोनोग्राफी एकमिनोसेंटिसिस आदि जैसी प्रसव पूर्व निदान तकनीक का प्रयोग करने और भ्रूण के लिंग सम्बन्धी जानकारी देने पर प्रतिबंध लगा दिया गया है और इसका उल्लंघन करने वाले के लिए दंड का प्रावधान किया गया है। भारत में लिंगभेद को खत्म करने, महिलाओं को अधिकार देने, राजनीति एवं व्यवस्था में महिलाओं की भागीदारी बढ़ाने आदि को लेकर चल रहे विमर्श के बीच देशभर की महिला, बाल एवं स्वयंसेवी संगठनों तथा बुद्धिजीवियों की जिम्मेदारी है कि वे लिंग आधारित इन हत्याओं को रोकने के लिए आगे आए।

छोटे परिवार की चाह में शिशु लड़कियों को जन्म से पहले ही मारने की प्रवृत्ति तेजी से बढ़ रही है। 98 प्रतिशत गर्भपात शिशु लड़कियों का ही होता है। इतना ही नहीं, शिशु लड़कियों के इलाज में उपेक्षा बरती जाती है। पहली शिशु लड़की होने के बाद आमतौर पर दूसरी शिशु लड़की होने के लिए गर्भस्थ शिशु के लिंग की जाँच अल्ट्रासाउंड और एमनीओसिस पद्धति से की जाती है।

डाक्टरों का मानना है कि लड़की शिशु और लड़के शिशु के साथ अलग-अलग तरह का व्यवहार किया जाता है। शिशु अगर लड़का है तो उसको बीमारी से बचाने के लिए सभी तरह की कोशिशें की जाती हैं, उसको निजी अस्पतालों के आई.सी.यू. में भर्ती करवाया जाता है। घरवाले उसको बचाने के लिए कही से भी पैसे का इंतजाम करते हैं। दूसरी ओर लड़की के इलाज में लापरवाही बरती जाती है। 1991 के सर्वेक्षण के मुताबिक प्रति हजार पुरुष पर 927 महिलाएँ थीं। पुरुषों के मुकाबले महिलाओं की संख्या 0.5 प्रतिशत कम है। 1981 में किए गए सर्वेक्षण में प्रति हजार पुरुषों पर 934 महिलाएँ थीं। यहाँ पुरुषों के मुकाबले महिलाओं की आबादी 0.4 प्रतिशत कम थी। पूरे देश में पुरुषों के मुकाबले महिलाओं की आबादी कम थी पर पिछले सालों से उच्चमध्यमवर्ग भी अब लड़की शिशु के प्रति उचित व्यवहार नहीं कर रहा है। इससे समाज के बुद्धिजीवी वर्ग में चिंता तेजी से बढ़ी है। इस बारे में आम नागरिक को शामिल करके सोचा जाना चाहिए कि क्या किया जाए।

Ultrasonic study of molecular interactions in non electrolytic solutions acrylamide with equimolar mixture of ethanol with some secondary alkanols

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Abstract

In the current paper the Ultrasonic study of molecular interactions in non electrolytic solutions of acrylamide with primary alkanols was performed by authors. In the current manuscript The molecular interactions are studied in the light of variation of ultrasonic velocity (u), density(ρ),viscosity (η), isentropic compressibility (k_s), intermolecular free length (L_f), acoustic impedance (Z), molar volume (V_m), internal pressure (π_i), free volume (V_f), enthalpy (H), viscous relaxation time (τ) and relative association (R_A) presented their experimental results.

Key Word

Ultrasonic, molecular interactions, non electrolytic solutions, acrylamide with equimolar mixture, ethanol with some secondary alkanols

Introduction

Ultrasonic studies of electrolytic and non electrolytic solution have been attracting scientific community from long back due to the importance in living organism, industrial applications and wide spread presence in the nature as sea water. This chapter describes ultrasonic study of molecular interactions in the solutions of acrylamide with primary/secondary alkanols. Research survey reveals that very little quantity of work has been reported in the solutions of acrylamide.

The properties of liquid mixtures and solutions can be altered continuously within a reasonable range by varying the concentration till an optimum value of some desired parameter is attained. Mixed solvents find more practical applications in chemical, industrial and biological processes, because they provide a wide range of desired properties compared to their pure solvents. The measurement of speed of sound in liquids enables the determination of some useful acoustic and thermodynamic parameters that are found to be very sensitive to molecular interactions. Hence such measurements are useful to study the nature and strength of molecular interactions in solute - solvent solutions.

The molecular interactions are studied in the light of variation of ultrasonic velocity (u), density(ρ),viscosity (η), isentropic compressibility (k_s), intermolecular free length (L_f),

acoustic impedance (Z), molar volume (V_m), internal pressure (π_i), free volume (V_f), enthalpy (H), viscous relaxation time (τ) and relative association (R_A) as these parameters are generally studied in the solutions of organic solids.

In section molecular interactions in the solutions of acrylamide with equimolar mixture of ethanol and isopropyl alcohol (EIP)/isobutyl alcohol (EIB)/isoamyl alcohol (EIA) at the same temperature.are presented at 308.15K.

Experimental

In this section molecular interactions in the solutions of acrylamide (A) as solute with equimolar mixture of ethanol and isopropanol (EIP) / isobutanol (EIB) / isoamylalcohol (EIA) as solvent are presented at 308.15 K. The chemicals used in the present study are ethanol (99.9% purity) (Changshu Yangyuan Chemicals- China make), acrylamide (99%), isopropanol (99%), isobutanol (99%) and isoamyl alcohol (99%) (G.R Grade obtained from LOBA Chemicals, INDIA).

Equimolar mixture of EIP/EIB/EIA is prepared. This mixture is used in turn to prepare solution of A with EIP/EIB/EIA so that in the concentration range 0 -1m. The solutions are prepared by weight and kept in air tight bottles. The measured ultrasonic velocity (u), density (ρ) and viscosity (n) data for different concentrations of A in the equimolar mixtures of EIP/EIB/EIA are presented in table 7.B.1. The variations of these parameters with the concentration of A in the above said equimolar mixture is shown in figures 7.B.1. 7. B.3. From these figures it is clear that ultrasonic velocity, density and viscosity are found to increase non-linearly and monotonically with the concentration of solute. Such a variation, generally, indicate strong specific interactions between the molecules of the solutions studied. From these experimental results, acoustic and thermodynamic parameters such as isentropic compressibility (k_s), intermolecular free length (L_f); acoustic

Table 7.B.1 Variation of ultrasonic velocities(u), densities (ρ) and viscosities (n) of all the mixtures with concentration of acrylamide at 308.15 K

(ethanol+isopropanol)+acrylamide				(ethanol+isobutanol)+acrylamide				(ethanol+isoamylalcohol)+acrylamide			
Concentration mol.kg^{-1}	$\frac{u}{m.s^{-1}}$	$\frac{\rho}{kg.m^{-3}}$	$\frac{n}{10^{-3}N.s.m^{-2}}$	Concentration mol.kg^{-1}	$\frac{u}{m.s^{-1}}$	$\frac{\rho}{kg.m^{-3}}$	$\frac{n}{10^{-3}N.s.m^{-2}}$	Concentration mol.kg^{-1}	$\frac{u}{m.s^{-1}}$	$\frac{\rho}{kg.m^{-3}}$	$\frac{n}{10^{-3}N.s.m^{-2}}$
0.0000	1113.20	772.01	1.1332	0.0000	1141.00	784.29	1.4126	0.0000	1172.50	791.37	1.5743
0.1007	1114.90	774.55	1.1464	0.1010	1142.80	786.12	1.4277	0.1040	1174.40	792.45	1.5892
0.1997	1116.40	776.67	1.1571	0.2011	1145.80	787.59	1.4427	0.1982	1175.30	793.53	1.6021
0.3001	1120.20	778.49	1.1717	0.3004	1147.80	789.31	1.4562	0.3050	1176.60	794.96	1.6153
0.4006	1122.60	780.31	1.1827	0.4070	1149.90	791.23	1.4694	0.4024	1179.50	796.60	1.6314
0.5009	1123.90	782.39	1.1923	0.5112	1153.40	792.97	1.4855	0.5015	1180.20	798.30	1.6459
0.5998	1125.00	784.20	1.2012	0.6121	1155.00	794.12	1.4942	0.6040	1183.30	799.64	1.6645
0.6999	1125.80	786.19	1.2118	0.7080	1156.80	795.67	1.5044	0.6976	1184.70	801.00	1.6818
0.7953	1128.90	787.51	1.2257	0.8120	1157.50	797.34	1.5142	0.7940	1185.90	802.34	1.6996
0.8952	1132.40	790.39	1.2413	0.9160	1159.00	798.78	1.5239	0.9105	1187.80	803.33	1.7112
0.9930	1133.20	791.57	1.2480	1.0121	1160.10	799.99	1.5348	1.0110	1189.10	804.13	1.7215

Fig. 7.B.1 Variation of ultrasonic speed with concentration of acrylamide in equimolar mixture of ethanol + (isopropylalcohol (♦) / isobutylalcohol (•) /isoamylalcohol(Δ))

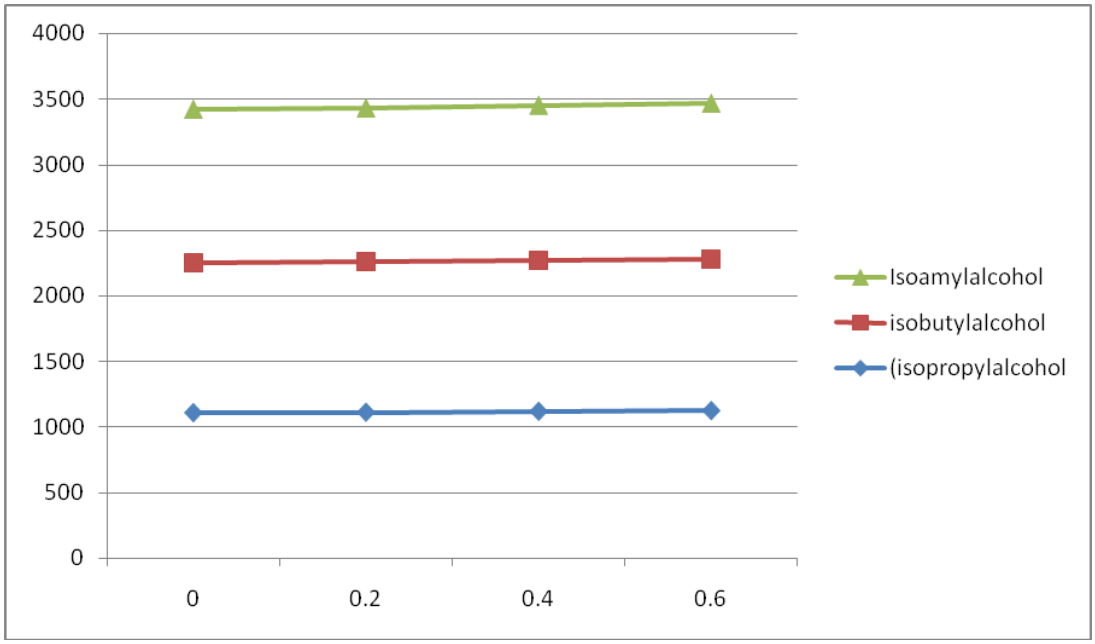


Fig. 7.B.2 Variation of density with concentration of acrylamide in equimolar mixture of ethanol+ (isopropylalcohol (♦) / isobutylalcohol (•) /isoamylalcohol(Δ))

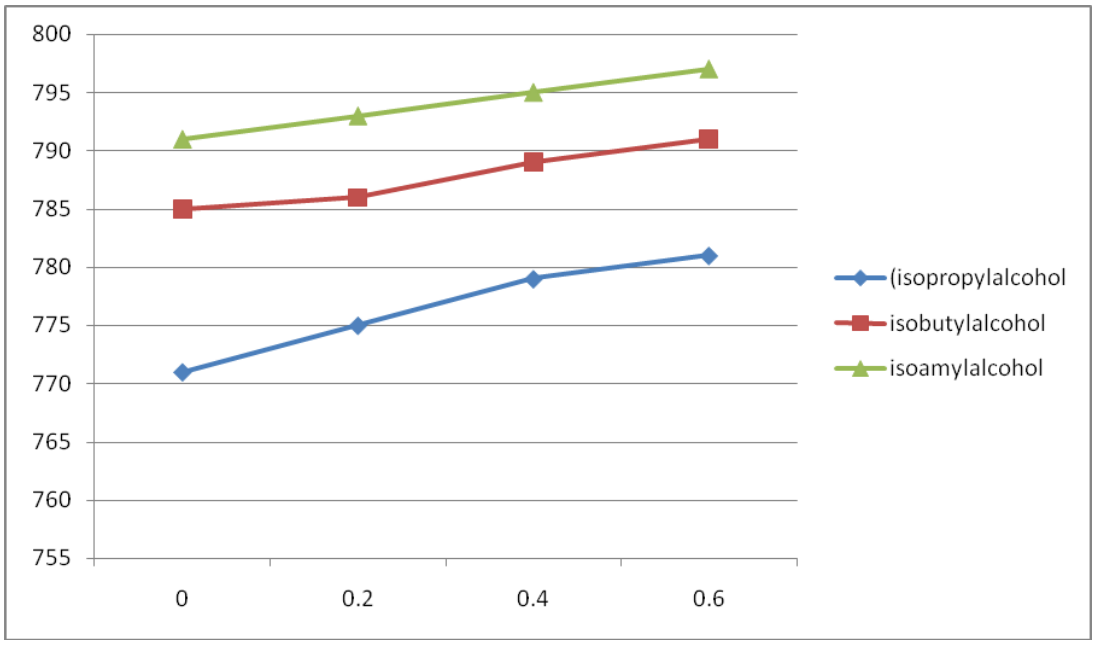
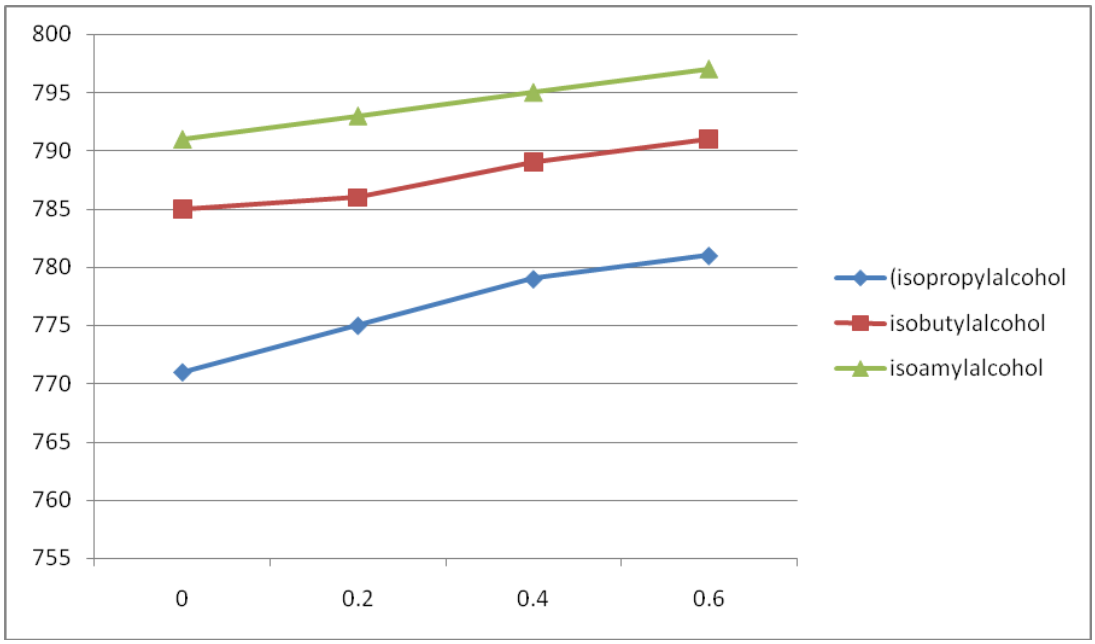


Fig. 7.B.3 Variation of viscosity with concentration of acrylamide in equimolar mixture of ethanol + (isopropylalcohol (♦) / isobutylalcohol (•) /isoamylalcohol(Δ))



impedance (Z), molar volume (V_m); internal pressure (π_i), enthalpy (H); and viscous relaxation time (τ), relative association (R_A) are evaluated for different concentrations in the equimolar mixture of EIP/EIB/EIA and are presented in tables 7.B.2 . 7. B.5 respectively.

Results and Discussion

The variation of isentropic compressibility with molality of solute in the solutions is shown in figure 7.B.4. The isentropic compressibility is decreased monotonically with increase in the molality of solute in all the solutions investigated. Generally, alcohols are associated through hydrogen bonding and they exhibit equilibrium between multimer and monomer species. When the solute is mixed with equimolar mixture of EIP/EIB/EIA, the oxygen atom of carbonyl (-C=O) group and the nitrogen atom of amide $(-CO-NH_2)$ group of the solute can interact with the protons of hydrogen group of alcohols through hydrogen bonding. Due to the existence of large dipole moment for solute molecules, dipole-dipole type interactions also take place between solute and solvent molecules. All these specific strong interactions give raise to a denser packing of molecules resulting in the decrease of isentropic compressibility. With the increase in molality of the solute, the molecules of the solution attain are found to more and more tightly bound configuration. The isentropic compressibility is the ease with which a system can be compressed. The similar observations that the raise in the molality of the solute results in the decrease of isentropic compressibility in different systems is reported.

The intermolecular free length is an important property that has an association with isentropic compressibility. It is clear that intermolecular free length

Table 7.B.2 Variation of isentropic compressibility (k_s), intermolecular free length (L_f) of all the mixtures with concentration of acrylamide at 308.15 K

(ethanol+isopropanol)+acrylamide			(ethanol+isobutanol)+acrylamide			(ethanol+isoamylalcohol)+acrylamide		
Concentration mol.kg^{-1}	$\frac{k_s}{10^{-10}Pa^{-1}}$	$\frac{L_f}{10^{-10}}m$	Concentration mol.kg^{-1}	$\frac{k_s}{10^{-10}Pa^{-1}}$	$\frac{L_f}{10^{-10}}m$	Concentration mol.kg^{-1}	$\frac{k_s}{10^{-10}Pa^{-1}}$	$\frac{L_f}{10^{-10}}m$
0.0000	10.4528	0.6771	0.0000	9.7938	0.6554	0.0000	9.1917	0.6349
0.1007	10.3867	0.6750	0.1010	9.7403	0.6536	0.1040	9.1495	0.6335
0.1997	10.3305	0.6731	0.2011	9.6712	0.6513	0.1982	9.1230	0.6326
0.3001	10.2366	0.6701	0.3004	9.6165	0.6495	0.3050	9.0865	0.6313
0.4006	10.1690	0.6679	0.4070	9.5582	0.6475	0.4024	9.0233	0.6291
0.5009	10.1186	0.6662	0.5112	9.4795	0.6448	0.5015	8.9934	0.6281
0.5998	10.0756	0.6648	0.6121	9.4395	0.6435	0.6040	8.9313	0.6259
0.6999	10.0358	0.6635	0.7080	9.3918	0.6418	0.6976	8.8951	0.6246
0.7953	9.9639	0.6611	0.8120	9.3608	0.6408	0.7940	8.8623	0.6235
0.8952	9.8664	0.6578	0.9160	9.3198	0.6394	0.9105	8.8231	0.6221
0.9930	9.8378	0.6569	1.0121	9.2881	0.6382	1.0110	8.7950	0.6211

Table 7.B.3 Variation of acoustic impedance (Z), molar volume (V_m) of all the mixtures with concentration of acrylamide at 308.15 K

(ethanol+isopropanol)+acrylamide			(ethanol+isobutanol)+acrylamide			(ethanol+isoamylalcohol)+acrylamide		
Concentration mol.kg^{-1}	$\frac{Z}{10^6 kg}.m^{-2}.s^{-1}$	$\frac{V_m}{10^{-5}m^3}.mo$	Concentration mol.kg^{-1}	$\frac{Z}{10^6 kg}.m^{-2}.s^{-1}$	$\frac{V_m}{10^{-5}m^3}.mol$	Concentration mol.kg^{-1}	$\frac{Z}{10^6 kg}.m^{-2}.s^{-1}$	$\frac{V_m}{10^{-5}m^3}.mo$
0.0000	0.8594	6.8769	0.0000	0.8949	7.6630	0.0000	0.9279	8.4809

0.1007	0.8635	6.8667	0.1010	0.8984	7.6540	0.1040	0.9307	8.4728
0.1997	0.8671	6.8601	0.2011	0.9024	7.6474	0.1982	0.9326	8.4643
0.3001	0.8721	6.8560	0.3004	0.9060	7.6383	0.3050	0.9353	8.4526
0.4006	0.8760	6.8498	0.4070	0.9098	7.6286	0.4024	0.9396	8.4383
0.5009	0.8793	6.8448	0.5112	0.9146	7.6208	0.5015	0.9421	8.4234
0.5998	0.8822	6.8414	0.6121	0.9172	7.6160	0.6040	0.9462	8.4125
0.6999	0.8851	6.8379	0.7080	0.9204	7.6112	0.6976	0.9489	8.4010
0.7953	0.8890	6.8343	0.8120	0.9229	7.6028	0.7940	0.9515	8.3898
0.8952	0.8950	6.8281	0.9160	0.9258	7.5953	0.9105	0.9542	8.3830
0.9930	0.8970	6.8215	1.0121	0.9281	7.5913	1.0110	0.9562	8.3776

Table 7.B.4 Variation of internal pressure (π_i), enthalpy (H) of all the mixtures with concentration of acrylamide at 308.15 K

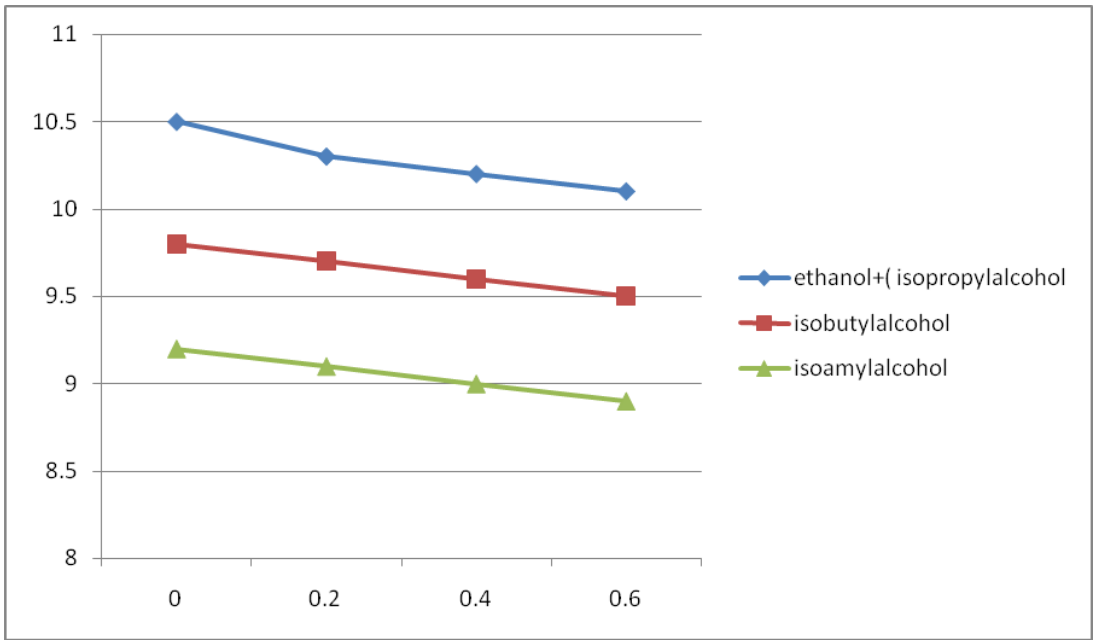
(ethanol+isopropanol)+acrylamide			(ethanol+isobutanol)+acrylamide			(ethanol+isoamylalcohol)+acrylamide		
Concentration mol.kg^{-1}	$\frac{\pi_i}{10^5}Pa$	$\frac{H}{J.mol^{-1}}$	Concentration mol.kg^{-1}	$\frac{\pi_i}{10^6}Pa$	$\frac{H}{J.mol^{-1}}$	Concentration mol.kg^{-1}	$\frac{\pi_i}{10^6}Pa$	$\frac{H}{J.mol^{-1}}$
0.0000	874.50	60137.82	0.0000	843.31	64622.87	0.0000	776.74	65874.14
0.1007	879.00	60357.68	0.1010	847.29	64852.17	0.1040	780.11	66097.01
0.1997	882.26	60523.77	0.2011	850.70	65056.23	0.1982	783.35	66305.15
0.3001	885.88	60736.03	0.3004	854.19	65245.50	0.3050	786.70	66496.62
0.4006	888.98	60893.10	0.4070	857.49	65415.04	0.4024	790.39	66694.96
0.5009	891.64	61030.53	0.5112	860.96	65611.49	0.5015	794.43	66918.66
0.5998	894.01	61162.48	0.6121	862.87	65716.27	0.6040	798.43	67166.10
0.6999	897.02	61337.41	0.7080	864.93	65831.60	0.6976	802.67	67432.41

0.7953	900.72	61557.48	0.8120	867.69	65968.72	0.7940	806.36	67652.68
0.8952	904.31	61747.24	0.9160	870.11	66087.99	0.9105	809.45	67856.16
0.9930	906.79	61856.54	1.0121	872.68	66248.24	1.0110	811.63	67995.41

Table 7.B.5 Variation of relaxation time(τ), relative association (R_A) of all the mixtures with concentration of acrylamide at 308.15 K

(ethanol+isopropanol)+acrylamide			(ethanol+isobutanol)+acrylamide			(ethanol+isoamylalcohol)+acrylamide		
Concentration mol.kg^{-1}	$\frac{\tau}{10^{-12}s}$	R_A	Concentration mol.kg^{-1}	$\frac{\tau}{10^{-12}s}$	R_A	Concentration mol.kg^{-1}	$\frac{\tau}{10^{-12}s}$	R_A
0.0000	1.5793	1.0000	0.0000	1.8446	1.0000	0.0000	1.9294	1.0000
0.1007	1.5877	1.0028	0.1010	1.8541	1.0018	0.1040	1.9387	1.0008
0.1997	1.5938	1.0051	0.2011	1.8604	1.0028	0.1982	1.9488	1.0019
0.3001	1.5992	1.0063	0.3004	1.8672	1.0044	0.3050	1.9570	1.0034
0.4006	1.6036	1.0079	0.4070	1.8727	1.0062	0.4024	1.9627	1.0046
0.5009	1.6086	1.0102	0.5112	1.8776	1.0074	0.5015	1.9736	1.0066
0.5998	1.6137	1.0122	0.6121	1.8806	1.0084	0.6040	1.9822	1.0074
0.6999	1.6215	1.0146	0.7080	1.8839	1.0099	0.6976	1.9946	1.0087
0.7953	1.6284	1.0153	0.8120	1.8899	1.0118	0.7940	2.0048	1.0100
0.8952	1.6329	1.0180	0.9160	1.8937	1.0132	0.9105	2.0131	1.0107
0.9930	1.6370	1.0193	1.0121	1.9007	1.0144	1.0110	2.0187	1.0114

Fig. 7.B.4 Variation of isentropic compressibility with concentration of acrylamide in equimolar mixture of ethanol + (isopropylalco(♦)/ isobutylalcohol (●) /isoamylalcohol(Δ))



is a predominant factor in determining the variation of ultrasonic speed in solutions. The inter dependence of freelength and ultrasonic speed has been evolved from a model for sound propagation by Eyring and Kincard . Figure 7.B.5 illustrates the variation of intermolecular free length with molality of A. From this figure, it is clear that the intermolecular free length shows similar trend as reflected by isentropic compressibility. According to sound propagation theory, the decrease in the value of isentropic compressibility and intermolecular freelength with increase in ultrasonic speed further strengthens the process of complex formation between the solute-solvent molecules through hydrogen bonding due to which structural arrangement is considerably altered. Figure 7.B.6 depicts the variation in molar volume with molality of solute in all the solutions. It is also seen that the molar volume of solution decreases with the increase of molality of solute in all the systems investigated.

When acoustic wave travels in a medium, there is a variation of pressure from particle to particle. When a plane ultrasonic wave is set up in a solution, then the pressure and hence density, refractive index of the solution show a periodic variation with distance from the source along the direction of propagation.The elastic properties of the medium are related to the parameter acoustic impedance.

The variation of acoustic impedance with molality of solute is shown in figure 7.B.7. It has been observed that the values of acoustic impedance increase with increasing molality of solute. In general, the increase of acoustic impedance indicates the existence of strong

specific interactions where as decrease of acoustic impedance exhibits dispersive forces are operating between the molecules in the solutions. In the present study, the observed increase of acoustic impedance with the molality of the solute increases the existence of strong specific interactions in all the systems studied. Such observation is in good agreement with the conclusions drawn from the variation of isentropic compressibility and intermolecular free length.

Fig. 7.B.5 Variation of intermolecular free length with concentration of acrylamide in equimolar mixture of ethanol + (♦)/ isobutylalcohol (•)/isoamylalcohol(Δ))

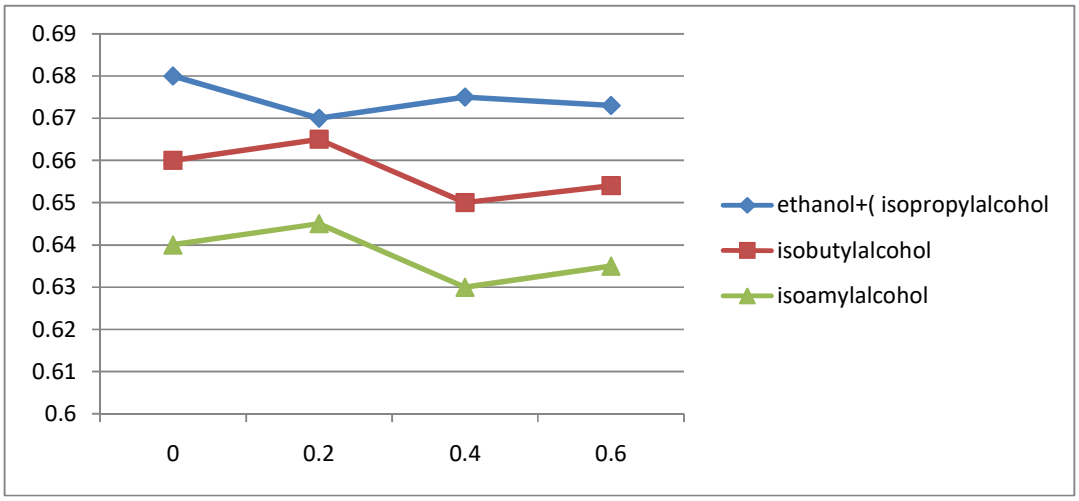


Fig. 7.B.6 Variation of molar volume with concentration of acrylamide in equimolar mixture of ethanol+ (♦)/ isobutylalcohol (•)/isoamylalcohol(Δ))

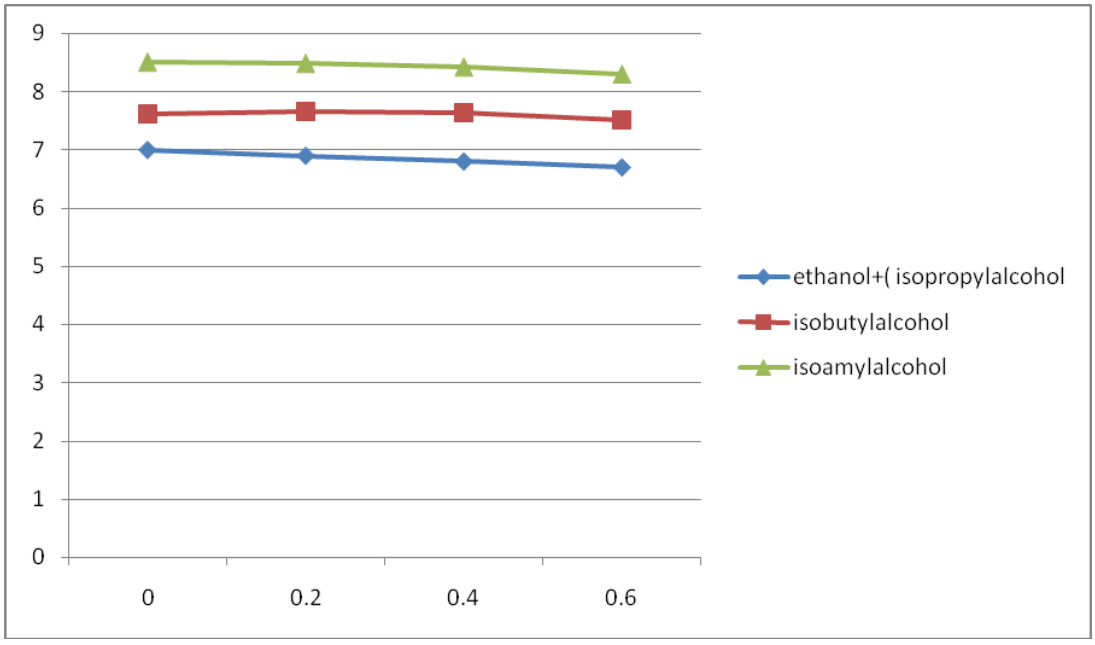
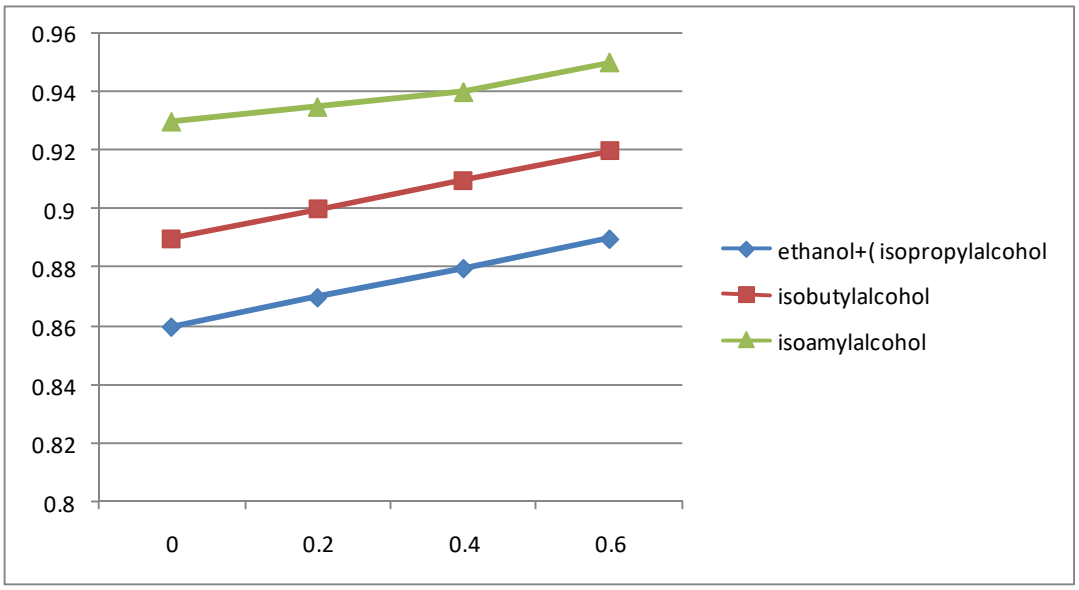


Fig. 7.B.7 Variation of acoustic impedance with concentration of acrylamide in equimolar mixture of ethanol + (♦) / isobutylalcohol (●) /isoamylalcohol(Δ))



The internal pressure is an important parameter in the study of thermodynamic properties of liquids. The internal pressure is the measure of cohesive force (resultant of attraction forces + repulsion forces) between the molecules. In order to assess the cohesive forces in the solutions, the internal pressure values are calculated for all the systems investigated. It is found that the internal pressure in solutions is greater than that of pure solvent, which shows that the intermolecular attraction forces between the molecules are stronger due to hydrogen bonding between the solute and solvent molecules. The variation of internal pressure with molality of solute is shown in figure 7.B.8. The internal pressure values are increased with the increase of molality of solute in all the systems studied. Such enhancement supports the existence of strong interactions between the solute and solvent molecules in the solutions studied. The enthalpy variation also supports the above discussion; its variation with the molality of solute is shown in figure 7.B.9.

Relaxation time is the time taken for the excitation energy to appear as translational energy and it depends on temperature and impurities. Figure 7.B.10 represents the variation of relaxation time with the molality of solute. It is noticed that, the relaxation time values are increased with the increase of molality of solute. This variation suggests that the solutions of higher molalities are more structured than the solutions of lower molalities in all the systems investigated.

The relaxation time is in the order of 10 -12 sec and is due to structural relaxation process. The variation of relative association with the molality of solute is shown in figure 7.B.11. The

relative association is increased monotonically with the raise in the molality of solute in a non-linear fashion. This variation suggests that molecules in the solution at higher molalities are more associated than the molecules of lower molalities of solute. From the above discussion it is observed that the solute may act as structure maker in the solutions studied. From the above discussion, it is concluded that the solute-solvent interactions are stronger in the case of equimolar mixture of EIP+A solution due to hydrogen bonding and dipole-dipole interactions exist between the solute-solvent molecules. The same conclusion can also be drawn from the steepness of the figures concerned.

From all the figures 7.B.1. 7. B.11 and the tables 7.B.1. 7. B.5 it is observed that from the variation of measured and derived properties with solute concentration the steepness of variation in the solution A+ equimolar mixture of EIP is highest and least in the solution of A+ equimolar mixture of EIA. This indicates that the solute-solvent interactions are stronger in the system equimolar mixture of EIP+ A and weaker in the system equimolar mixture of EIA+A among the three systems studied. As the carbon chain length increases in the solvent component the steric hindrance increases between the solute and solvent molecules. In the case of equimolar mixture of EIA+A system the effect of steric hindrance is maximum. Hence, the strength of specific interactions is weaker in case of equimolar mixture of EIA+A.

Fig. 7.B.8 Variation of internal pressure with concentration of acrylamide in equimolar mixture of ethanol+ (♦)/ isobutylalcohol (•) /isoamylalcohol(Δ))

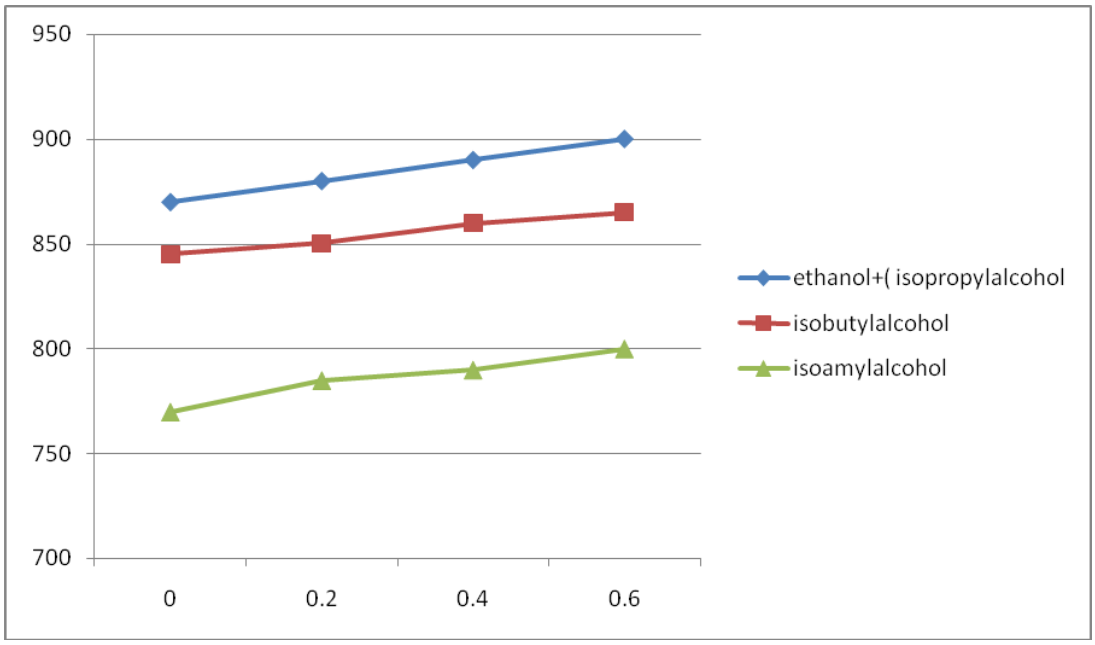


Fig. 7.B.9 Variation of enthalpy with concentration of acrylamide in equimolar mixture of ethanol + (♦)/ isobutylalcohol (•) /isoamylalcohol(Δ))

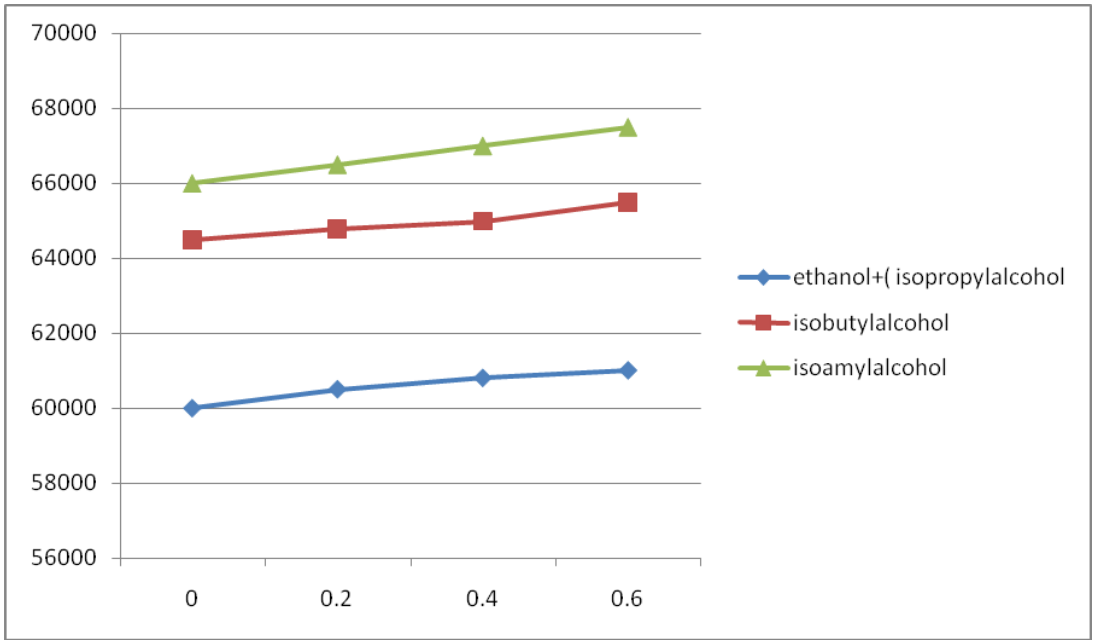


Fig. 7.B.10 Variation of relaxation time with concentration of acrylamide in equimolar mixture of ethanol+ (♦)/ isobutylalcohol (•) /isoamylalcohol(Δ))

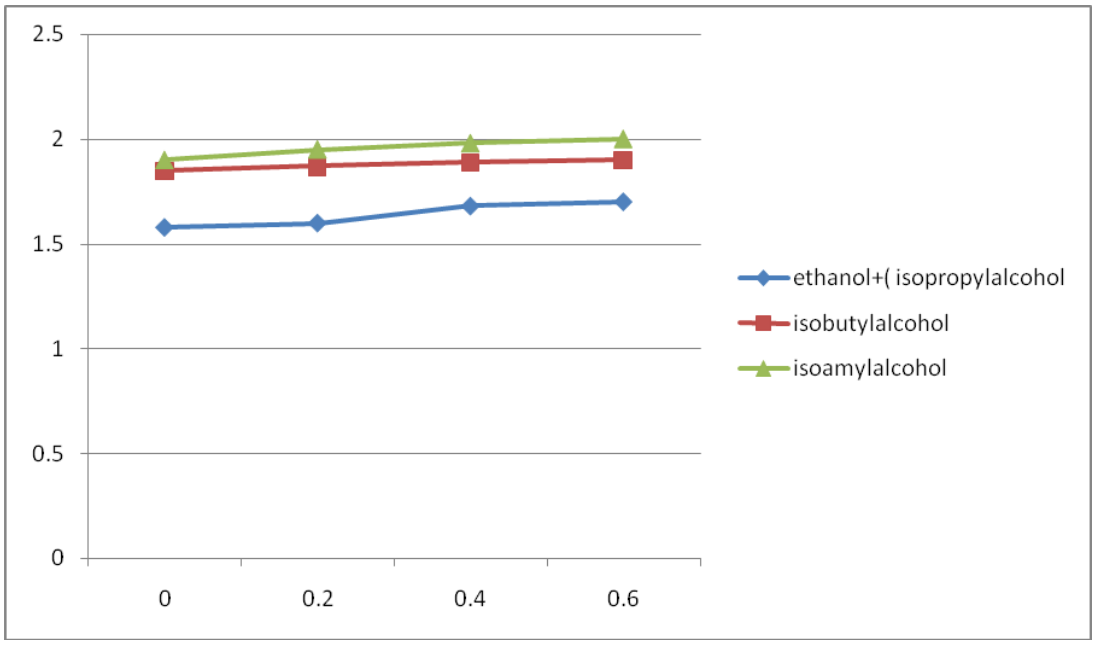
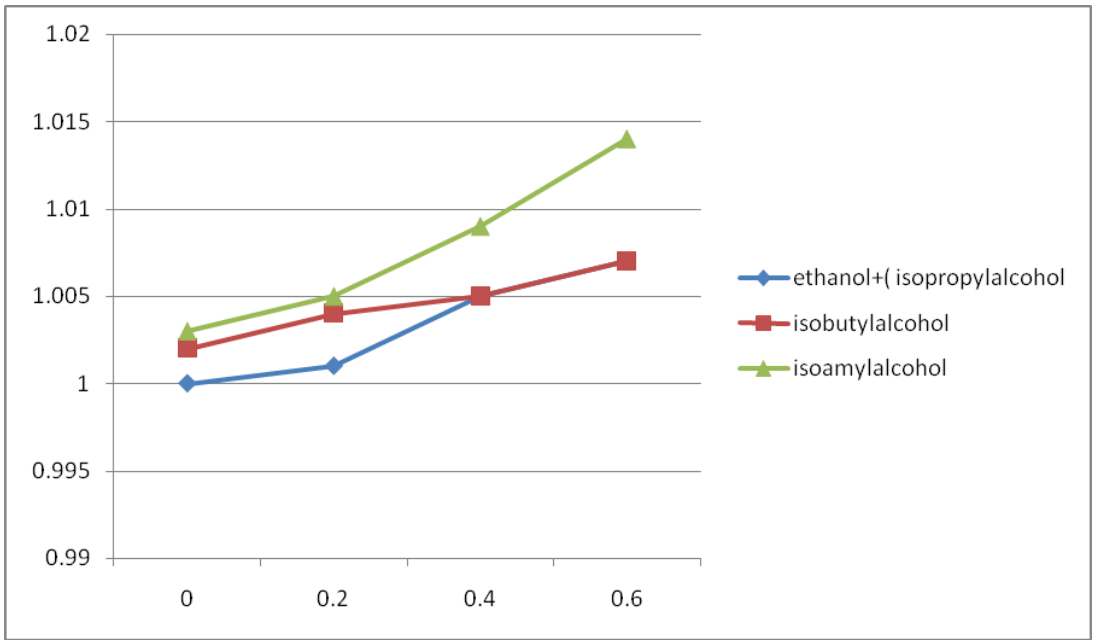


Fig. 7.B.11 Variation of relative association with concentration of acrylamide in equimolar mixture of ethanol+(♦)/ isobutylalcohol (•) /isoamylalcohol(Δ))



CONCLUSIONS

1. The ultrasonic velocities, densities and viscosities of solutions of acrylamide (A) as solute with equimolar mixture of ethanol and isopropanol (EIP)/isobutanol (EIB)/ isoamyl alcohol (EIA) as solvent are presented at 308.15K.

2. from these experimental results, acoustic and thermodynamic parameters such as isentropic compressibility (k_s), intermolecular free length (L_f); acoustic impedance (Z), molar volume (V_m); internal pressure (π_i), enthalpy (H); and viscous relaxation time τ relative association (R_A) are evaluated for different concentrations in the equimolar mixture of EIP/EIB/EIA.

3. From the studies carried out on the variation of properties with the molality of solute reveal the presence of specific interactions, hydrogen bond between the solute-solvent molecules.

4. The steepness in the variation of measured and computed physical properties indicates that steric hindrance is larger in the system of equimolar mixture of EIA+A and smaller in the case of equimolar mixture of EIP+A. From this observation it may be suggested that the interactions between the solute and solvent molecules are stronger in equimolar mixture of EIP+A and weaker in equimolar mixture of EIA+A system among the systems studied.

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