A Study on phytoplanktonic diversity of Pothara river, near Khambada, Maharashtra

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Abstract:

The Pothara river is one of the lotic ecosystem in the Chandrapur district. The river was studied for a period of two year from Feb. 2014 to Jan 2016 for phytoplankton community structure. Collections were taken on monthly basis to investigate the abundance and diversity of phytoplankton. In the present investigation, the phytoplankton was represented by 34 algal species. A limited number of these recorded throughout the year, while others were distributed in different seasons mainly in winter and summer seasons. During winter season, Chlorophyceae was the most dominant group followed by Basillariophyceae. On other hand, Cyanophyceae and Euglenophyceae were most dominant during summer season. Certain species like Pediastrum sp., Chlorella sp., Oedogonium sp., Oscillatoria sp., and Euglena sp. were recorded throughout the year. Chlorella, Oscillatoria, Anacystis, and Nitschia were found to be good indicators of water pollution.

Keywords: Pothara river, Phytoplanktonic diversity, Physico-chemical parameter rskhambada.

Introduction

Water will be the main agenda, principle motivation and significant source of economy in 22nd century (Ingale et al., 2018). Water is most important component of all living organism but water pollution is one of the most serious problem faced by living organism. The growth and diversity of aquatic microflora in river system is influenced by several physico-chemical parameters. Phytoplanktons are the primary producer and constitute the first level in aquatic food chain for all aquatic animals thus it play key role in water quality, quantity. During bio-monitoring, the species compositions of planktons reflect water quality and pollution level in an ecosystem (Mengzen et al. 2014). Most of the planktons are cosmopolitan and their distribution mainly depends on physicochemical as well as climatic condition (Joshi 2011). Phytoplanktons are microscopic organism, autotrophic primary producer playing key role in fisheries as first level organism in food chain for all aquatic animals both in lotic and lentic water ecosystem (Meshram et al. 2019).

Small rivers play an important role for forming the water resource in river basin. In India, the water quality and biodiversity of large rivers are studied mostly. Hydrobiology and limnology of small rivers are rarely studied in recent years. Therefore more attention is

Nutritive Evaluation of Some Small Indigenous Fishes from Warora Taluka, (M.S.) India

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Abstract

Biochemical analysis of seven small indigenous fishes had been done to evaluateproximate composition of proteins, lipids and carbohydrates. In the present investigationfishes selected for the study were *Garramullya, Rasboradaniconius, Salmophasiabalookee, Puntius sophore, Puntius ticto, Rita rita*and *Glassogobiusgiuris*. The biochemical composition of the various fishdisplaysdisparities depends on seasonal variation, migratory behavior, sexual maturation, feeding cycle etc. All the fishes studied were the source of high protein and low fat with small amount of carbohydrates.Significant changes ofnutritional values ($p \leq 0.05$) were observed during this study.

KEYWORDS: Fishes, Nutritive value, Proteins, Carbohydrates, Lipids.

Introduction

In recent years the nutritional importance of aquatic food has increased factually because of scientifically recognized beneficial effects of eating aquatic food. It is estimated that around 60% people in developing countries depends on fish for over 30%of their animal protein supplies (Sujatha *et al*., 2013).

According to FAO (1991) report, fish normally contains 72% water, 19% protein, 8% fat, 0.5% calcium, 0.25% phosphorus and 0.1% vitamin A, D, B and C etc. Fishes are the good supplement for cereals grains because nutritional point of view man cannot survive on bread diet alone; additionallywholly cereal grains has low protein mass with poor eminence. Cereals particularly low in lysine and methionine which are essential amino acids while fish protein comparatively rich in these amino acids and it contain all other essential amino acids which are required for balanced diet (Talat and Azmat, 2006). Human body needs proteins for its growth and maintenance (Hermann, 2014). Fish is an admirable source of high virtue animal protein.

The role of lipid in cellular metabolism is versatile and plays three main functions i.e. energetic, structural, and bioeffector role. Fish lipid contains polyunsaturated fatty acids (PUFA), especially ω-3 fatty acids that are essential for good health. Fish oil is the best-known food source key ω-3 fatty acids, which includes Eicosapentaenoic acid (EPA) and Docosahexanoic acid (DHA). The mainadvantage of ω-3 is the lessening of platelet activity (blood clotting) and plaque formation, which in turn can prevent heart attacks. Human coronary artery diseases, improvement of retina, brain development, decreased incidence of breast cancer, rheumatoid arthritis, multiple sclerosis, asthma, psoriasis, inflammatory bowel diseases and regulation of prostaglandin synthesis (Kotilla*et al.,* 2012).

Small indigenous fish species (SIS) are the fishes which have maximum height not more than 25 centimeter (Roos*et al*., 2003). In the past SIS were considered as weed fish and eradicated from fish culture pond. Small fishes have less price as compare with big fishes.

Current Study of Physicochemical parameters and Plankton Biodiversity with respect to Fish Production in Nawargaon Lake, Th. Maregaon, Dist. Yavatmal, (M.S.). India

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ABSTRACT

Nawargaon Lake has rich number of species and biodiversity of aquatic animals. The Nawargaon Lake is principal fresh water body located within Maregaon tahsil in Yavatmal District of Maharashtra. Now a day lake is degraded by both natural and anthropogenic activities, which deteriorate their quality of lake water. Due to increased human population, industrialization, use of fertilizers and man-made activity water is highly polluted with different harmful contaminants. It is necessary that the quality of drinking water should be checked at regular time interval. Limnological parameter and plankton diversity are important criterion for determining the suitability of water for irrigation and drinking purpose. The water remained moderately alkaline (pH 7.6) while electrical conductance (0.2846ms/cm), TDS (224.5mg/l), chloride (145mg/l), hardness(137.25mg/l) and alkalinity(205.19mg/l) showed low mean values. Average dissolved oxygen levels were at 4.56mg/l while average nitrate and phosphate levels were 2.50mg/l and 3.48mg/l respectively. On the basis of water quality parameters in general, Nawargaon Lake was not found to be eutrophic. A high rate of primary production (405.044mgc/m2/hr), diversity of phytoplankton(42forms), zooplankton(98forms) and fish (15species) were also observed during the study period. Nawargaon Lake has greatest importance for humankind. The specific status of limnological characteristics and diversity of plankton in Nawargaon Lake have been studied through seasonal survey in two annual cycles(2018-19 and 2019-20) and annual survey of fishes in two annual cycles.

Keywords*: Phytoplankton. Limnological characteristics, Biodiversity, Nawargaon Lake, Eutrophic, zooplankton.*

INTRODUCTION

Plankton is the most sensitive floating community which is being the first target of water pollution, thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. The measurement of planktons productivity helps to understand conservation ratio at various trophic level and resources as an essential input for proper management of lake. Some notable studies on phytoplankton and zooplankton diversity have been made by Rao and Choubey, 1990[1]; Mishra et al.,2010[2].

Fishes occupy all three levels such as primary, secondary and tertiary consumer of food web in aquatic ecosystem. Man being the top carnivore in this food system as it is a very good source of protein. Fish protein is supposed to be cheapest. The production of million calories would take 15-20-man days by fishing and 56-man days by beef farming. The investigations on the Indian fresh water fishes have mainly been restricted to taxonomy[3].

Biological production in any aquatic body gives direct correlation with its physico-chemical status which can be used as trophic status and fisheries resources potential[4]. Life in aquatic environment is largely governed by physico-chemical characteristics and their stability. These characteristics have enabled biota to develop many adaptations that improve sustained productivity and regulate lake metabolism.

In the rural area of Maharashtra so far as aquatic food is concerned the fish plays an important role in the delicious food preferred by the common people for locally available fishes found in the nearby fresh water bodies for nutrition among the essential food constituents. Natural stagnant fresh water bodies provide a self-employment for poor fisherman and social, economic conditions of various places in Yavatmal district.

Various types of fishes are found in the Nawargaon lake available for the local rural poor fisherman for their fulfilment of basic needs of life by selling in the weekly market of nearby places and get money. In the Nawargaon lake found locally available fish species for weekly market easily get the common people food requirement in Maregaon Taluka, District Yavatmal.

METHODOLOGY

Study Area:Nawargaon Project and Dam's Official Designation is "Nawargaon, D-03119". Locally also known as "Nawargaon Lake". Nawargaon Dam was constructed as part of irrigation projects by Government of Maharashtra in the year 1997. It is built on and impounds Nirguda River. The dam is an Earth-fill Gravity Dam. Purpose of the dam is for irrigation. Live storage capacity is 12.475 MCM. Now a days almost all water bodies make for good picnic spots. Nawargaon lake is also a popular Tourist attraction for its scenic beauty.

Sampling and Analysi
Physico-chemical Analysis:
During the study, water samples were collected at seasonal interval during 2018-19 and 2019-20 using clean 1L-polyethylene bottle for analysis of water variables in the laboratory from pre-selected station of the Lake. The water quality parameters such as air and water temperature, pH, depth of visibility, alkalinity (Carbonate and bicarbonate), dissolved oxygen and primary productivity were measured in the field itself. LCD portable digital multistep thermometer of -50C to 150C range was used to measure water temperature, digital pH meter was used for measuring hydrogen ion concentration(pH), depth of visibility was measured by a standard Secchi disc of 20cm diameter, Total Dissolved Solids were estimated by digital (Hold) TDS meter and results are expressed in ppm or mg/l. However, for the electrical conductivity, nitrate nitrogen, orthophosphate, silicates and fluorides samples were brought to laboratory in bottles of 500 ml. capacity and analysed within 24 hours. There physico-chemical parameters were analysed following Standard Method[5]. Prior to this, the samples were secured in refrigerator. Conductivity was measured by 'Systronics' direct reading conductivity meter(308), ELICO ion analyser LI 126 was used for determining fluoride ions in the water. Primary productivity was estimated using light and dark bottle method. Methods stated by [5] were followed for water analysis.

Plankton Analysis:

For Plankton study, samples were collected from surface water, littoral region and bottom mud. For qualitative analysis, the plankton samples were collected by towing Hensen's standard plankton net with uniform speed. The net was made of no. 25 bolting silk. The plankton sample so collected was fixed in 70% ethyl alcohol. For quantitative estimation of the zooplankton, 50 litres of surface water was filtered through a small plankton net made up of the bolting silk number 25. Sub-samples of small quantities (10ml) were taken and counting chamber under a C.Z. Inverted microscope. Zooplankton numbers were expressed as individuals per litre. Identification of zooplankton was done after [6].

Fishes Analysis:

For the study of ichthyofauna, fishes were collected with the help of local government contractor and some illegal fishermen from the lakes and identified after [7].

RESULTS AND DISCUSSION

Results of Limnological study are summarized in **Table No.1**. Air temperature varied between 23C in winter 2018-19 to 38.9C in summer 2019-20. Water temperature was observed to be highest during summer 2019-20 (34.7C) and lowest during winter 2018-19 (19.5C). The overall average value of air and water temperature was 31.25C and 27.68C respectively. A good synchronization between temperature and dissolved oxygen was seen. Temperature showed a significant inverse relationship with dissolved oxygen. Such an inverse relationship has also been observed [8].

In the present study, average turbidity was 123.33cm with maximum of 147.7cm in summer 2018-19 and minimum 85.5cm in monsoon 2019-20. These varying trends reveal that during monsoon season water was turbid, pH fluctuated between 7.2 to 8.4. The minimum pH was recorded in monsoon 2018-19 which was mainly attributed to rain water after a long dry period, and maximum pH was recorded during summer 2019-20. Sharma noted pH range of 7.7 to 8.7 and 7.4 to 9.2 in LakePichhola and Fatehsagar

respectively. Sumitra et al observed values between 8.3 to 9.3 of Lake Pichhola while noted a wide range of pH (6.4 to 9.1) in different water bodies in and around Udaipur.

According to the study, Nawargaon Lake characterized by low levels of dissolved oxygen with average value of 5.65mg/l. The highest oxygen value of 7.2mg/l was observed in winter season of 2018-19 and lowest value of 4.4mg/l was observed in summer 2019-20. The peak value during winter was also observed [8-10]. Dissolved oxygen shows a significant negative relation with temperature, alkalinity, total hardness, electrical conductance, nitrate, phosphate, chloride, silicate and turbidity. The observed high value of dissolved oxygen in winter due to the high solubility at low temperature and less degradation of organic matter. During the study, the highest value of total alkalinity was in summer 2018-19 (239mg/l) and lowest value was observed in winter 2019-20 (149mg/l). Total alkalinity shows a positive relationship with temperature, turbidity, pH, total hardness, TDS, conductivity, chloride, nitrate, phosphate, silicate and humidity. The average value of total hardness during the study was 170.16mg/l with lowest value of 138mg/l during monsoon 2018-20 and highest value of 221mg/l during summer 2019-20. This increase in total hardness during summer period is due to higher photosynthetic activity, free carbon dioxide is utilized and bicarbonates are converted into carbonates and precipitated as calcium salts thus increasing hardness[11].

Electrical conductance was high during summer season, whereas winter and monsoon season didn't show much variation. The summer season of 2018-19 showed highest value of 0.47mS/cm of conductance and lowest value of 0.34mS/cm was observed in winter 2019-20. Seasonal variations in the conductivity may be due to the increase concentration of salt because of discharge effluent and organic matter. In the present study, Total Dissolved Solid (TDS) ranged between 209mg/l to 275mg/l with lowest during winter 2019-20 and highest during summer 2018-19 respectively. Higher concentration of TDS also due to the discharge sewage and organic matter by the interference of human.

Chloride concentration varied between 129mg/l noted during monsoon 2018-19 to 215mg/l during summer 2019-20. Higher chloride concentration during the summer because high temperature and consequent evaporation. In rainy season, lower concentration of this factor due to dilution. According to the study, rich contents of nitrates were observed, with maximum of 3.95mg/l during summer 2018-19 and minimum of 2.66mg/l during monsoon2019-20. This can be attributed to high evaporation which increases the concentration during summers. Nitrate showed positive relation with temperature, pH, alkalinity, total hardness, TDS, electrical conductivity, chloride, phosphate, silicate, fluoride and productivity, and negative relation with dissolved oxygen. Present study observed maximum orthophosphate content of 3.55mg/l during summer 2019-20 and minimum of 2.05mg/l during monsoon 2018-19. Higher values of phosphate during summer months were also reported [8]. Higher phosphate content during summer because of high temperature can evaporate water and increases concentration. The value of silicate ranged between 0.05 to 0.122mg/l with maximum during summer 2018-19 and minimum during monsoon 2019-20. Silicate showed negative correlation with dissolved oxygen and fluoride. Domestic sewage, human activity, industrial effluent and rock weathering and add to phosphate content in water.

In the present study, the values of fluoride varied between 1.5 to 3.47mg/l, with maximum value during summer 2019-20 and minimum during monsoon 2019-20. According to WHO [12], permissible limit for fluoride in drinking water is 1.0 mg/l. Fluoride showed positive correlation with turbidity, pH, dissolved oxygen, hardness, nitrate, phosphate. Trophic status of an ecosystem depends upon rate of energy flow which may be assessed by estimating primary production. Nawargaon Lake had a minimum value of humidity as 76mgc/m2/hr in monsoon 2019-20 and maximum value of 227mgc/m2/hr in summer 2018-19. Sharma[8] also recorded high winter productivity in their studies on tropical freshwater bodies in comparison to summer.

The phytoplankters constitutes bulk of primary producers and are the base of food chain in any water body. The phytoplanktonic community of water body during the present study was represented by six groups namely Chlorophyceae, Bacillariophyceae, Desmidiaceae, Xanthophyceae, Myxophyceae and Dinophyceae. Total 58 forms were identified and out of these 28 belonged to Chlorophyceae, 11 to Bacillariophyceae, 9 to Myxophyceae, 4 to Dinophyceae, 3 to Desmidiaceae and 3 to Xanthophyceae in the water of Nawargaon Lake.The most prominent phytoplankters during the study were *Oedogonium sp*., *Volvox sp*., *Ulothrix sp*. and *Pediastrum sp*. from group Chlorophyceae. While *Microsystis sp*. and *Coccochlaris sp*. dominated Myxophyceae. The present results may be reasoned as the lake was filled with new water after a long dryness. Baghela observed the dominance of Chlorophyceae in Oligotrophic Lake Jawai Dam. The total phytoplankton diversity represented in form of Menhinick's index was observed to be 0.71**(Table 2 and 4).**

Nawargaon Lake harbour diverse taxonomic groups of zooplankton representing Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda. During present investigation, 9 forms of protozoans belonging to 8 genera and 9 species were reported. Rotifers were represented by 20 genera and 40 species. Along with these, 29 species of Cladocerans belonging to 12 genera, and 10 genera and 11 species belonging to Copepoda are enlisted. Besides these, 5 species of Ostracoda were also recorded. After including occasional zooplankters like insects and their larvae, crustacean larvae, spiders and mites total 104 forms of zooplankters were recorded. According to the Menhinick's index of diversity, Rotifers indicated highest diversity throughout the study period followed by Cladocerans, Protozoans, Copepods, Ostracods, Insects and others **(Table 3 and 4, Fig. 1,2,3 &4).**

In the present investigation, 15 species of fishes belonging to 6 family and 13 genera were reported from Nawargaon Lake. (Table 5)

Table 1. Physiological Parameters of Nawargaon Lake during (2018-2020)

Parameters	Year 2018-2019			Year 2019-2020		
	Winter	Summer	Monsoon	Winter	Summer	Monsoon
Air Temp.(^{o}C)	25.3	37.4	29.9	23	38.9	33
Water Temp.(^{o}C)	19.5	33.1	28.9	20.2	34.7	29.7
Turbidity (NTU)	142.5	97	147.7	132.3	85.5	156
Humidity (mgc/m2/hr)	165	121	223	188.4	76	227
pH	7.4	7.9	7.2	7.6	8.4	7.9
D.O.(mg/l)	7.2	5.2	5.7	6.2	4.4	5.2
Alkalinity(mg/l)	149	139	189	208	210	191
Hardness(mg/l)	155	179	159	169	221	138
TDS (mg/l)	209	275	219	235	247	212
Conductivity (mg/l)	0.34	0.47	0.37	0.39	0.41	0.36
Chlorides (mg/l)	157	215	129	143	198	177
Nitrates(mg/l)	2.79	3.95	2.66	3.54	3.44	2.69
Phosphates(mg/l)	2.67	3.33	2.15	2.54	3.55	2.05
Silicates(mg/l)	0.07	0.122	0.05	0.049	0.08	0.059
Fluorides(mg/l)	3.44	1.5	2.05	3.45	3.47	2.41
Phytoplankton density (no./l)	908	804	798	821	761	891
Zooplankton density (no./l)	73	77	66	85	58	77

Table 2: Biological Diversity of Phytoplanktonic Groups Based on Menhinick's Index in the Nawargaon Lake

Phytoplanktons	Year 2018-2019			Year 2019-2020		
	Winter	Summer	Monsoon	Winter	Summer	Monsoon
Chlorophyceae	0.48	0.57	0.33	0.51	0.52	0.56
Desmidiaceae	0.19	-	0.21	0.27	0.21	0.16
Xanthophyceae	-	-	-	0.26	-	0.34
Myxophyceae	0.26	0.37	0.08	0.41	0.30	0.53
Dinophyceae	0.38	0.24	-	0.15	-	-
Bacillariophyceae	0.22	0.31	0.30	0.32	0.24	0.51

Table 3: Biological Diversity of Zooplanktonic Groups and Based on Menhinick's Index in the Nawargaon Lake

Zooplanktons	Year 2018-2019			Year 2019-2020		
	Winter	Summer	Monsoon	Winter	Summer	Monsoon
Protozoans	1.52	1.90	1.74	2.27	2.22	2.00
Rotifers	2.67	3.54	3.94	3.22	2.94	3.61
Cladocerans	2.60	2.69	2.78	2.41	3.24	2.67
Copepods	2.13	1.77	1.35	1.51	2.31	2.00
Ostracods	-	1.42	1.00	0.71	1.16	1.00

Table 4: Total Diversity of Phytoplanktonic and Zooplanktonic Groups Based on Menhinick's Index in the Nawargaon Lake during (2018-2020)

Planktons	Year 2018-2019			Year 2019-2020			Average
	Winter	Summer	Monsoon	Winter	Summer	Monsoon	
Phytoplanktons	0.68	0.73	0.47	0.78	0.64	0.93	0.71
Zooplanktons	4.59	5.34	3.3	4.64	5.59	5.17	4.72

Table 5: List of Fishes Occurred in Nawargaon Lake during (2018-2020)

No.	Fishes	2018-19	2019-20
1	*Catla catla*	+	+
2	*Notopterus notopterus*(Pallas)	+	+
3	*Cirrhinus cirrhinus* (Bloch)	+	+
4	*Ctenopharyngodonidella* (Val.)	+	+
5	*Labeo gonius* (Ham-Buch)	+	+
6	*Labeo rohita* (Ham-Buch)	+	+
7	*Puntius sarana* (Ham-Buch)	+	+
8	*Puntius ticto* (Ham-Buch)	+	+
9	*Chela cachius* (Ham-Buch)	-	+
10	*Garragotyla* (Gray)	-	+
11	*Aorichthys seenghala* (Sykes)	+	+
12	*Mystus cavasius* (Ham-Buch)	+	+
13	*Heteropneustes fossilis* (Bloch)	+	+
14	*Xenentodon cancila* (Ham-Buch)	+	+
15	*Gambusia affinis* (Baird and Girard)	+	+
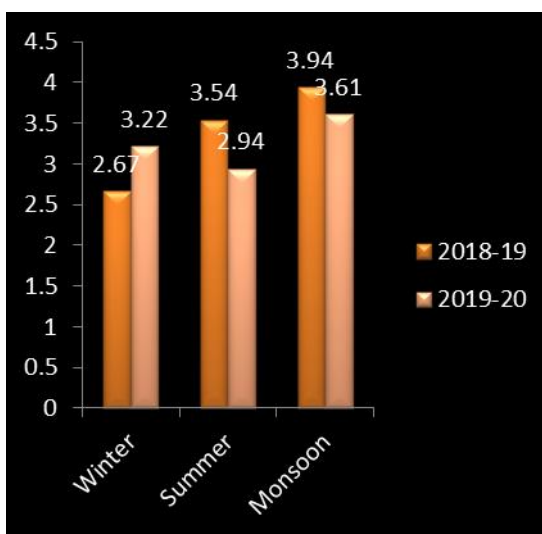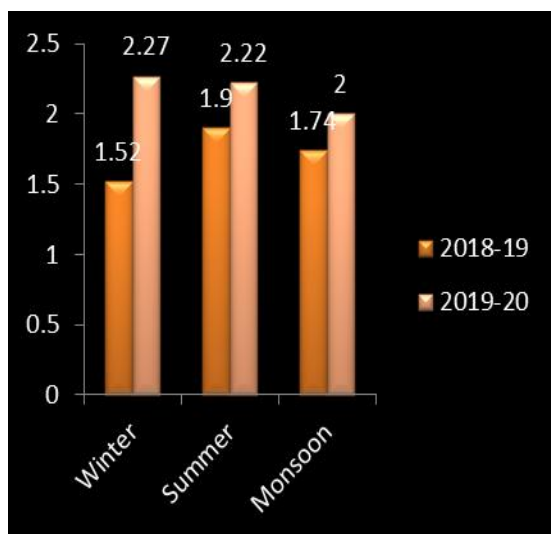
Figure 1 : Diversity Of Protozoan at Nawargaon Lake. **Figure 2**: Diversity of Rotifers at Nawargaon lake
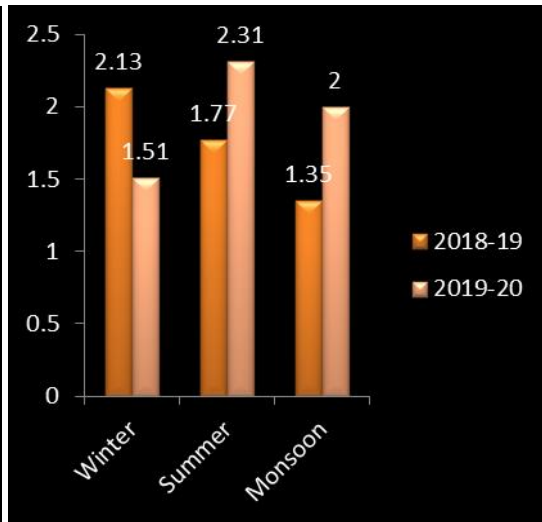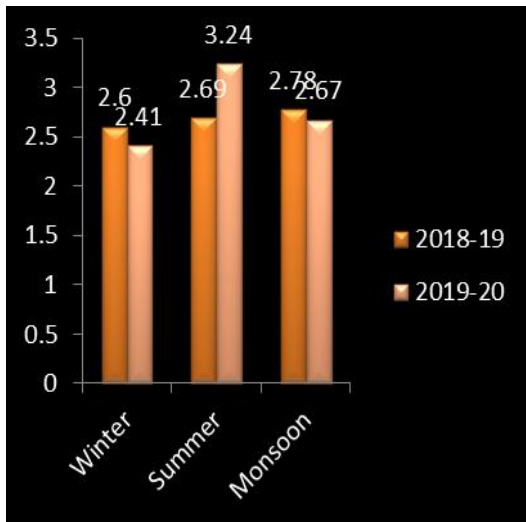
Figure 3: Diversity of Cladocerans at Nawargaon Lake. **Figure 4:** Diversity of Copepods at Nawargaon Lake.
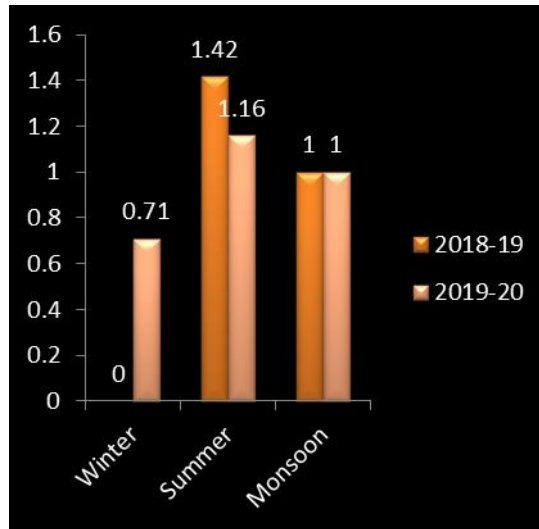
Figure 5: Diversity of Ostrcods at Nawargaon Lake.

CONCLUSION

From the present study, it may be concluded that all the physico-chemical parameters are at nearly permissible limit at all stations. The overall lake is not considered to be more polluted. The lake having rich diversity of flora and fauna. The lake is precious to all aquatic life. Therefore, it is suggested that the immediate measures are necessary to be initiated to avoid further contamination of lake due to anthropological activities. At present the lake water is suitable for fish culturing and irrigation purpose.

Conflicts of interest: The authors stated that no conflicts of interest.

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Damage Diversity of *Shorea robusta* plant against major pest *Hoplocerambyx spinicornis* in Pachmarhi Protected forest areas of Madhya Pradesh, India.

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ABSTRACT

The present investigation regarding "Damage Diversity of *Shorea robusta* plant against major pest *Hoplocerambyx spinicornis* in Pachmarhi protected forest areas of Madya Pradesh, India". The study was conducted in Pachmarhi Protected forest areas. *Hoplocerambyx spinicornis* (Coleoptera: Cerambycidae), commonly known as Sal borer is the only known Indian representative of its genus and one of the most pernicious pest of sal that commits very serious depredations in the forest. Sal forests (Protected) in Pachmarhi areas occupy about 524.37km² area. Sal forests are well known to harbour maximum biodiversity and being semi-evergreen, they constitute an important ecosystem, which provides cool and calm environment. A wide range of Non-Timber Forest Products found in these forests which apart from timber, are source of livelihood for millions of people living in and around forests.

Keywords: Diversity, Damage of Sal, Sal borer, Nature Conservation.
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INTRODUCTION

Sal is a fairly large tree with majestic shining foliage. It is widely distributed from Sri-Lanka and India through Myanmar and other countries of South East Asia up to Philippines. It is considered to be native of North East India (Kulkarni, 1956)[1]. Sal forests in India occupy about 105,790 km² area in two distinct regions, viz. northern and central region.

Sal forests are well known to harbour maximum biodiversity and being semi-evergreen, they constitute an important ecosystem, which provides cool and calm environment. During 1950-55, about 100,000 adult insects were killed and 56,500 trees were felled. In 1959-62, the epidemic surfaced in Mandla and Dindori forests in which 2 million beetles were killed and 350,000 affected trees were felled. Studies by Chatterjee and Thapa, (1964)[2] had confirmed this pest to be endemic to Dindori-Mandla sal forests. During 1979-1982, borer attack was observed in sal forests of Hoshangabad in which about 50,000 tress were felled. Due to the repeated attacks, sal borer operations have been included in the Working Plan (Bajpayee, 1983)[3]. Till date, over 20 epidemics have been recorded in the country throughout the range of sal distribution. The latest epidemic during 1996-2001 was one of the worst in the series of outbreaks. The affected trees ha^{-1} in Dindori Forest Divisions were as high as 50 and the larvae in some trees were counted upto 1500/tree (Dwivedi, 1998)[4]. Sal forests of Dindori, Mandla, Shahdol, Balaghat, Bilaspur, Rajnandgaon and Surguja districts were affected by the borer in about 5,000 km^2 area. In the worst affected Dindori and Mandla forest of Central Circle, Jabalpur, borer attack was first noticed in December, 1995. Trap-tree operation was carried out in 1996 rains in which 2.16 million beetles were killed and 14,478 trees were felled as trap. Besides this, 40,343 affected trees of all categories were also felled removed from coupes due for working. In 1997 rains, trap-tree operation was again carried out in which 15.17 million beetles were trapped which indicates favourable climatic conditions for multiplication of insect beyond proportion. During October, 1917 to January, 1998,

783,720 affected trees of category I to VI have been removed. Widespread reports on the epidemic have drawn the attention of public at large. Opinions against the large-scale felling were expressed from different quarters.

METHODOLOGY

The present sal borer field surveys were conducted during January to April 2019 with the help of forest department Pachmarhi. It is located between latitude 22°27'14.5''N and 78°23'26.02''E. The total area covered by Pachmarhi is 4981.72 km^2. Out of which the core zone covers 1555.23 km^2. It comprises three protected areas viz. Satpura National Park (524.37 km^2), Bori (485.72 km^2) and Pachmarhi (439.15 km^2) Sanctuary and area of RF & PFs (105.99 km^2). The buffer zone is extended in an area of 1785.58 km^2 and transition zone comprises of 1640.91 km^2 area; Moist Peninsular Sal Forest (3C / C2e); South Indian Sub-Tropical Moist Deciduous Forest (3B); Southern Dry Mixed Deciduous Forest (3C / C3) and Southern Tropical Dry Deciduous Forest (5A). Practically, all the well-watered valleys of the south and especially in the Banjar and Motinala forests, *Shorea robusta* grows in rich profusion, unmixed with any other species, in the reserve forest. For authentication and proper verification of the plant they selected and marked, the study was undertaken in the areas where felling carried out of sal-borer infestation. The site selection was carried out to represent the compartments which previously studied by Mishra *et al.* (2000)[5] in Dindori forest region. The compartments were sampled by laying out nested quadrates (10x10m) for Trees.

Table: Shorea robusta infestation against Hoplocerabyx spinicornis

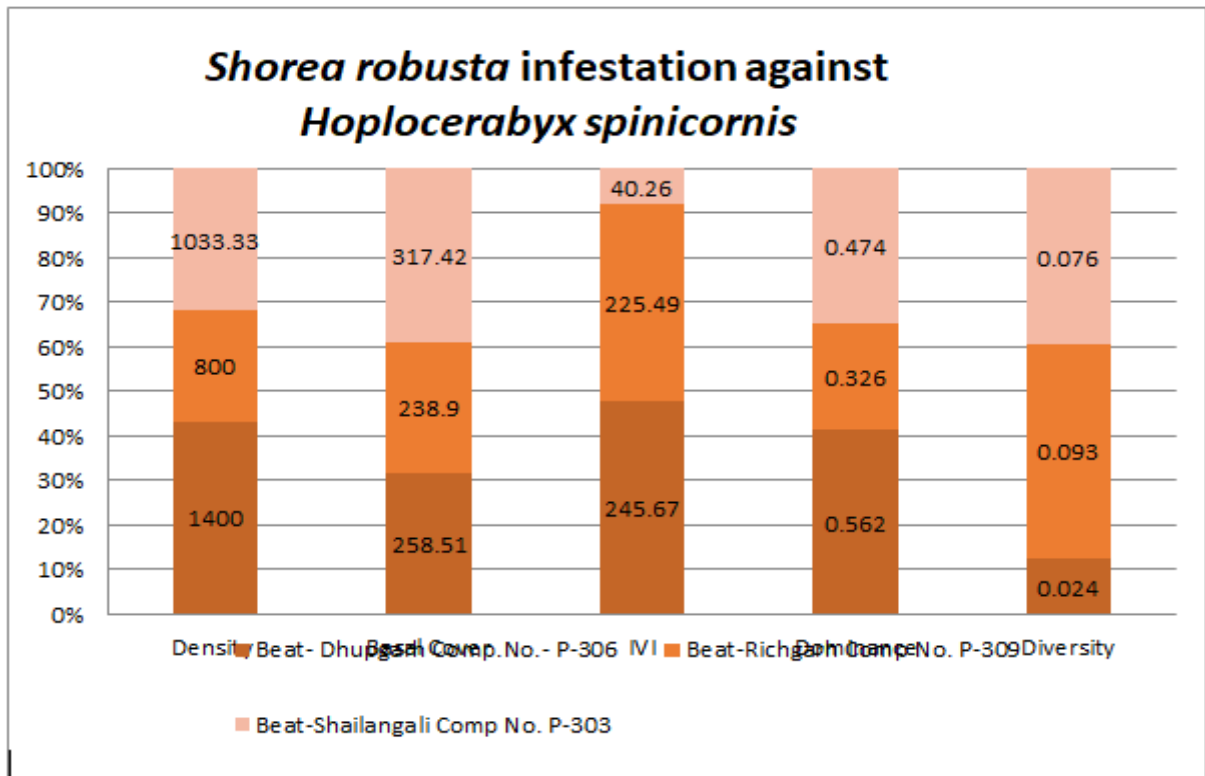| Areas	Species Name	Density	Basal Cover	IVI	Dominance	Diversity
Range- W. Pachmarhi Beat- Dhupgarh Comp.No.- P-306	*Shorea robusta*	1400	258.51	245.67	0.562	0.024
Range- W. Pachmarhi Beat-Richgarh Comp No. P-309	*Shorea robusta*	800	238.90	225.49	0.326	0.093
Range- West Pachmarhi Beat-Shailangali Comp No. P-303	*Shorea robusta*	1033.33	317.42	40.26	0.474	0.076

Fig. Damage of *Shorea robusta* plant by *Hoplocerambyx spinicornis* in Pachmarhi forest areas

RESULTS AND DISCUSSION

Pachmarhi biosphere reserve includes protected forest zone known as Wild Life Sanctuary. It is located between forest in the district is classified as 3C/2e (i) Moist Peninsular High-Level Sal Forests. The present study was conducted in heartwood borer affected *Shorea robusta* forest of Pachmarhi, Dhupgarh, Richgarh and Shailangali beat in West Pachmarhi ranges. Borer-affected compartments were selected from the sites previously studied by Mishra et al. (2000)[5] at Dindori Forest Division for the study. Accordingly, three compartments were selected under three stratified group.

CONCLUSION

The present study describes the status of Damage diversity of *Shorea robusta*, Remedial felling was carried out in the compartments to remove the infested trees. Compartments for the present study were selected on the intensity of felling, moderate, heavy. It was found that density of plant was medium in all compartments, indicating sufficient number of adult trees in the community. Establishment of the seedlings is depending on locality factors and canopy opening. The sal borer infestation has long lasting impact on sal forest, moderate infestation may alter the growth rate of the population but heavy infestation may lead to change community structure and composition.

Conflicts of interest: The authors stated that no conflicts of interest.

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ULTRASONIC STUDY OF MOLECULAR INTERACTION IN THE MIXTURE OF AQUEOUS POTASSIUM HYDROXIDE WITH N, N-DIMETHYL FORAMIDE AT DIFFERENT TEMPERATURES

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ABSTRACT

An analysis of different thermodynamic properties as a function of temperature provides valuable information about their characteristics. The concentration and temperature dependence of acoustic and volumetric properties of multi component liquid mixtures has proved to be a useful indicator of the existence of significant effect resulting from intermolecular interactions. The thermo-physical parameters such as density (ρ), ultrasonic velocity (U) and viscosity (η) have been measured at 4 MHz frequency in the ternary mixtures of aqueous potassium hydroxide with N, N-dimethyl foramide over entire range concentration (v/v) at temperature 298K-308K using ultrasonic Pulse overlap technique. The experimental data have been used to calculate acoustical parameter namely adiabatic compressibility (β_a), free length (L_f), free volume (V_f), internal pressure (π_i), relaxation time (τ) and Gibb's free energy (ΔG. The present paper represents the nonlinear variation of ultrasonic velocity and the thermo-acoustical parameters lead to dipole- ion interaction between dimethyl foramide and 1N aqueous potassium hydroxide is stronger than dipole- ion interaction between water and aqueous potassium hydroxide.

Keywords: Ultrasonic velocity, acoustical parameters, molecular interactions, ternary mixtures, normality (1N), aqueous potassium hydroxide (aq. KOH) and dimethyl foramide (DMF).

1. Introduction

The ultrasonic study of liquid plays an important role in understanding the nature and strength of molecular interactions[1-3]. A large number of studies have been made on the molecular interaction in liquid systems by various physical methods like, Raman Effect, Nuclear Magnetic Resonance, Ultra Violet and ultrasonic method[4-6]. In recent years ultrasonic technique has become a powerful tool in providing information regarding the molecular behavior of liquids and solids, owing to its ability of characterizing physio-chemical behavior of the medium. The ultrasonic velocity data for ternary liquid mixtures have been used for by many researchers[7-11]. In present paper we have reported the ultrasonic velocity, density, and viscosity of 1N aqueous potassium hydroxide with N, N-dimethyl foramide at different temperature over the entire range of concentrations of aqueous KOH in DMF. From these experimental values, number of thermodynamics parameters, namely adiabatic compressibility (β_a), free length (L_f), free volume (V_f), internal pressure (π_i), relaxation time (τ) and Gibb's free energy (ΔG) have been calculated. The variations of these parameters with concentrations were found to be useful in understanding the nature molecular interactions between the components.

2. Experimental

The ultrasonic velocity in the liquid mixtures have been measured using a Pulse echo overlap technique working at frequency 4 MHz with an overall accuracy of $\pm$ 0.1 ms^{-1}, an electronically digital operated constant temperature water bath

has been used to circulate water through the double walled measuring cell made up of a steel containing the experimental solution at the desired temperature. The density of pure liquids and liquid mixtures was determined using a 10 ml specific gravity bottle with an accuracy of $\pm$ 0.1 Kgm^{-3}. An Ostwald's viscometer was used

for the viscosity measurement of pure liquids and liquid mixtures with accuracy 0.001 NSm^{-2}. The viscometer was calibrated before used. The time of flow of water (t_w) and time flow of solution (t_s) was measured with digital stop watch having an accuracy $\pm 1 \times 10^{-6}$ NSm^{-2}.

3. Results & Discussion

Table 1 - Density (ρ), Velocity (U) and Viscosity (η) of the ternary systems Aqueous KOH + Dimethyl foramide at different temperature.

Vol. % of Aq.KOH in DMF	ρ (Kgm^{-3})			U (ms^{-1})			$\eta*10^{-3}$ (NSm^{-2})		
	298K	303K	308K	298K	303K	308K	298K	303K	308K
00	958.02	957.06	955.60	1416.00	1373.28	1364.00	0.893	0.794	0.718
10	975.35	972.53	968.64	1504.00	1433.80	1411.20	1.33	1.19	1.05
20	994.57	991.55	988.84	1536.00	1496.00	1480.00	1.67	1.49	1.34
30	1009.65	1005.61	1002.08	1564.00	1512.00	1488.00	2.04	1.79	1.57
40	1025.34	1022.10	1018.54	1592.96	1575.92	1543.92	2.23	1.95	1.71
50	1027.47	1020.77	1020.77	1630.00	1622.00	1610.00	2.03	1.77	1.57
60	1031.01	1025.85	1023.09	1652.00	1625.60	1614.00	1.78	1.57	1.39
70	1038.91	1035.95	1032.28	1665.60	1637.60	1620.80	1.54	1.34	1.20
80	1047.71	1044.55	1041.07	1628.00	1624.00	1604.00	1.34	1.16	1.04
90	1050.45	1047.18	1043.80	1592.00	1572.00	1556.00	1.15	0.975	0.843
100	1058.04	1055.89	1055.42	1590.00	1598.00	1612.00	1.05	0.914	0.799

The experimental values of density, velocity and viscosity of 1N aqueous potassium hydroxide with N, N-dimethyl foramide over entire range concentration (v/v) at temperature 298K-308K using Pulse echo overlap technique are shown in table-1.It is observed that density increases with increase in concentration (vol. %) of aqueous potassium hydroxide in dimethylforamide. Increase in density decreases the volume indicating association in component molecules. The density of ternary liquid mixture may be increase due to structural reorganization indicating the closed packed structure of the molecular cluster. This makes the liquid medium less compressive. Increasing temperature of the mixtures decreases its density (ρ). The decrease in density (ρ) with increase in temperature indicates decrease in cohesive force. The increasing temperature has two opposite effects namely structure formation and destruction of structure. Thus increase of temperature favors increase of kinetic energy and volume expansion and hence decrease of density.

It is also observed that ultrasonic velocity increases with increase in concentration (vol. %) of aqueous potassium

hydroxide in dimethylforamide up to 70%, indicating association in the constituent molecules. The association in the constituent molecules may involve due to stronger ion-dipole interaction between K^+ of potassium hydroxide & dimethylforamide than ion-dipole interaction between K^+ of potassium hydroxide & water. Since size of dimethylforamide is more as compared to size of water molecule. Hence higher the size more will be polarizibility. The process may lead to strong interaction forces. However, when concentration goes higher (above 70%), the ultrasonic velocity gradually decreases indicating stiffness of the mixture decrease and hence dissociation in the constituent molecules. This is due to number of dimethylforamide molecules decreases and hence more polarize molecules are not available for strong ion-dipole interaction between K^+ of potassium hydroxide and dimethylforamide. This process may lead to weak interaction. As temperature of the mixture increases, velocity decreases because of less ordered structure and more spacing between the molecules.

It is observed that viscosity increases with increase in concentration (vol. %) of

potassium hydroxide in dimethylforamide up to 40%, indicating strong molecular interaction. The viscosity gives the strength of molecular interaction between interacting molecules. However, as the concentration goes higher (above 40%), viscosity decreases, indicating weak molecular interaction between the constituent molecules. Increase in temperature of the mixture, increases disorder of the medium and hence entropy increases. As entropy increases, viscosity of the ternary mixture decreases.

Table 2- Adiabatic compressibility (βa), free length (L_f) and free volume (V_f) of the ternary systems Aqueous KOH + Dimethyl foramide at different temperature

Vol. % of Aq.KOH in DMF	$\beta a *10^{-10}$ (m^2N^{-1})			$L_f *10^{-10}$ (m)			$V_f *10^{-7}$ (m^3mol^{-1})		
	298K	303K	308K	298K	303K	308K	298K	303K	308K
00	5.205	5.540	5.624	0.4517	0.4707	0.4766	1.4087	1.605	1.8450
10	4.527	5.001	5.183	0.4213	0.4472	0.4576	0.7560	0.8356	0.9723
20	4.261	4.506	4.616	0.4087	0.4245	0.4318	0.4892	0.5574	0.6459
30	4.049	4.349	4.507	0.3984	0.4171	0.4267	0.3254	0.3749	0.4450
40	3.843	3.939	4.118	0.3881	0.3969	0.4079	0.2514	0.3012	0.3564
50	3.663	3.710	3.779	0.3789	0.3852	0.3907	0.2535	0.3082	0.3637
60	3.553	3.685	3.752	0.3732	0.3839	0.3893	0.2606	0.3062	0.3638
70	3.469	3.599	3.687	0.3688	0.3794	0.3859	0.2622	0.3178	0.3675
80	3.601	3.629	3.733	0.3757	0.3810	0.3883	0.2445	0.2997	0.3506
90	3.756	3.864	3.956	0.3837	0.3931	0.3998	0.2184	0.2741	0.3354
100	3.738	3.705	3.646	0.3828	0.3849	0.3838	0.1706	0.2111	0.2617

From table-2 it is observed that adiabatic compressibility (β_a) decreases with increase in concentration (vol. %) of aqueous potassium hydroxide in dimethylforamide up to 70%, indicating strong intermolecular interaction between aqueous sodium hydroxide and dimethylforamide. This shows associating tendency of the component molecules. This is because of the fact that dipole-dipole interaction of pure dimethylforamide is weaker than ion-dipole interaction of water and potassium hydroxide. As the concentration (vol. %) of aqueous potassium hydroxide increases up to 70%, the dipole-dipole and ion-dipole interaction between dimethylforamide and aqueous potassium hydroxide becomes predominant which leads to a more compact structure and decreased adiabatic compressibility. This leads to weak interaction and hence dissociating tendency of the component molecules. It is also observed free length decreases with increase in concentration of aqueous potassium hydroxide in dimethylforamide up to 70%. The decrease in free length is a result of dipole-dipole and ion-dipole interaction between dimethylforamide and aqueous potassium hydroxide indicating association. This leads to significant interaction between solvent and solute. As the concentration (vol. %) of aqueous potassium

hydroxide in dimethylforamide goes higher (above 70%), the intermolecular free length slightly increases indicating weak interaction among the constituent molecules. Above 70% concentration, the slight increase in free length is due to number of dimethylforamide molecules less and hence more polarized dimethylforamide molecules are not available for strong ion-dipole interaction. This leads to significant weak interaction.

It is observed that free volume decreases (V_f) and internal pressure (π_i) increases with increase in concentration (vol. %) of aqueous potassium hydroxide in dimethylforamide indicating association in the molecules of the component liquids. The decrease in free volume with increase in concentration suggests that the molecules arrange themselves in such a way that the void space is less available showing that compressibility decreases. This ordered structural arrangement decreases the entropy. It was observed that the variation in the free volume values show exactly in the reverse trend as that of internal pressure. Further, the decrease in free volume and increase in internal pressure with increase in concentration (vol. %) clearly show the increasing magnitude of interactions. Such behavior of free volume and internal pressure generally indicate the association through dipole-dipole interaction or

hydrogen bonding between dimethylforamide and water. This suggests that both solute- solute and solute solvent interaction exist in the system. If the temperature is rise, there is reduction in molecular interaction as they move away from each other. This reduces the cohesive force. Thus increase in free volume and decrease in internal pressure occurs with rise in temperature.

Table 3- Internal pressure (π_i), relaxation time (τ) and Gibb's free energy of the ternary systems Aqueous KOH + Dimethyl foramide at different temperature.

Vol. % of Aq.KOH in DMF	π_i*10^6 (Nm^{-2})			$\tau*10^{-12}$ (S)			$\Delta G*10^{-20}$ (KJ/mol)		
	298K	303K	308K	298K	303K	308K	298K	303K	308K
00	529.43	515.07	499.28	0.6199	0.5865	0.5389	0.4514	0.4446	0.4261
10	694.67	681.35	655.72	0.8027	0.7907	0.7291	0.5462	0.5559	0.5406
20	859.79	835.34	805.92	0.9483	0.8954	0.8225	0.6073	0.6022	0.5863
30	1057.4	1022.88	979.69	1.0987	1.0380	0.9444	0.6612	0.6575	0.6386
40	1245.19	1189.46	1140.52	1.1409	1.0250	0.9389	0.6750	0.6528	0.6364
50	1339.78	1273.78	1222.38	0.9892	0.8754	0.7924	0.6228	0.5938	0.5721
60	1447.14	1390.74	1331.48	0.8417	0.7714	0.6951	0.5636	0.5467	0.5225
70	1598.17	1521.22	1469.86	0.7142	0.6408	0.5899	0.5034	0.4776	0.4603
80	1841.13	1745.62	1680.32	0.6414	0.5630	0.5152	0.4639	0.4294	0.4090
90	2192.56	2062.65	1955.88	0.5756	0.5026	0.4452	0.4243	0.3871	0.3537
100	2835.65	2683.63	2537.09	0.5227	0.4517	0.3886	0.3889	0.3473	0.3022

From table-3 it is observed that relaxation time increases slightly with increase in concentration (vol. %) of aqueous potassium hydroxide in dimethylforamide up to 40% indicating high stability. The stability of the mixture depends on the size of component molecules. Higher the size of the molecule more will be polarizibility and hence greater will be the molecular interaction. Therefore relaxation time increases. As the concentration goes higher (above 40%), the relaxation time slightly decrease indicating less stability. It is observed that initially Gibb's free energy increases with increase in concentration (vol. %) of aqueous potassium hydroxide in dimethylforamide up to 40%, indicating the mobility of the molecule is low i.e. highly ordered due to outstanding salvation. Such solution generally absorbs more ultrasonic energy. The increase in Gibb's free energy also suggests the need of shorter time for the co-operative process to take place or for the rearrangement of molecules in the mixture. As the concentration goes higher (above 40%), the Gibb's free energy slowly decreases, indicating increases mobility of the mixture hence disorder increases. This leads to the higher entropy and hence salvation decrease. Since salvation is directly proportional to size of the molecule

4. Conclusion

The decrease in adiabatic compressibility and free length up to 50% for the system- aqueous potassium hydroxide + dimethyl sulfoxide is due to strong association, whereas the increase in adiabatic compressibility and free length above 50% for the systems is due to dissociation in the constituent molecules. The ion-dipole interactions between K$^+$ of potassium hydroxide and dimethyl foramide are found to be responsible for association in the ternary liquid mixture. The ion-dipole interactions between K^+ of potassium hydroxide and water molecules are found to be responsible for dissociation in the liquid mixtures.

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Thermodynamic Study of Binary mixture of Butanol and n-Heptane at Different Temperatures and Concentration.

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ABSTRACT

An analysis of different thermodynamic properties as a function of temperature provides valuable information about their characteristics. The concentration and temperature dependence of acoustic and volumetric properties of multi component liquid mixtures has proved to be a useful indicator of the existence of significant effect resulting from intermolecular interactions. The thermo-physical parameters such as density (ρ), ultrasonic velocity (U) and viscosity (η) have been measured at 2 MH$_Z$ frequency in the binary mixtures of Butanol and n-Heptane over entire range concentration at temperature 298K-308K using ultrasonic Pulse overlap technique. The experimental data have been used to calculate acoustical parameter namely adiabatic compressibility (β_a), free length (L$_f$), free volume (V$_f$), internal pressure (π_i), relaxation time (τ) and Gibb's free energy (ΔG. The present paper represents shows the nonlinear variation of ultrasonic velocity and the thermo-acoustical parameters lead to In the present study the dipole-dipole interaction of pure 1-Butanol molecule is stronger than induced dipole –induced dipole interaction of pure n-Heptane molecule.

Keywords: Ultrasonic velocity, acoustical parameters, molecular interactions, binary mixtures, concentration in mole fraction, Butanol and n-Heptane.

INTRODUCTION

The ultrasonic study of liquid plays an important role in understanding the nature and strength of molecular interactions [1-3]. A large number of studies have been made on the molecular interaction in liquid systems by various physical methods like, Raman Effect, Nuclear Magnetic Resonance, Ultra Violet and ultrasonic method [4-6]. In recent years ultrasonic technique has become a powerful tool in providing information regarding the molecular behavior of liquids and solids, owing to its ability of characterizing physio-chemical behavior of the medium. The ultrasonic velocity data for binary liquid mixtures have been used for by many researchers [7-11]. In present paper we have calculate the ultrasonic Density (ρ), Velocity (U) and Viscosity (η) of the binary mixture of Butanol and n-Heptane over entire range concentration at temperature 298K-308K using ultrasonic Pulse overlap technique. From these experimental values, number of thermodynamics parameters, namely adiabatic compressibility (β_a), free length (L_f), free volume (V_f), internal pressure (π_i), relaxation time (τ) and Gibb's free energy (ΔG) were calculated. The variations of these parameters with concentrations were found to be useful in understanding the nature molecular interactions between the components.

METHODOLOGY

The ultrasonic velocity in the liquid mixtures have been measured using a Pulse echo overlap technique working at frequency 2MHz with an overall accuracy of $\pm$ 0.1 ms^{-1}, an electronically digital operated constant temperature water bath has been used to circulate water through the double walled measuring cell made up of a steel containing the experimental solution at the desired temperature. The density of pure liquids and liquid mixtures was determined using a 10 ml specific gravity bottle with an accuracy of $\pm$ 0.1 Kgm^{-3}. An Ostwald's viscometer was used for the viscosity measurement of pure liquids and liquid mixtures with accuracy 0.001 NSm^{-2}. The viscometer was calibrated before used. The time of flow of water (t_w) and time flow of solution (t_s) was measured with digital stop watch having an accuracy $\pm 1 \times 10^{-6}$ NSm^{-2}.

RESULTS AND DISCUSSION

The experimental measured values of density (ρ), ultrasonic velocity (U), viscosity (η) and thermodynamic parameters like adiabatic compressibility (β_a), intermolecular free length (L_f) and free volume (V_f) of binary liquid mixtures (1-Butanol + n-Heptane) at temperature range 298K-308K and at frequency 2MHz are presented in **table-1&2**. Internal pressure (π_i), relaxation time (τ) and Gibb's free energy(ΔG) of binary liquid mixtures (1-Butanol + n-Heptane) at temperature range 298K-308K and at frequency 2MHz are presented in **table-3**.

Density is an important concept with respect to buoyancy, purity and packaging. It varies with temperature and pressure. It is observed that density increases with increase in molar concentration of 1-Butanol in n-Heptane. Increase in density decreases the volume, indicating association in component molecules. The density of binary liquid mixture may be increase due to hydrogen bonding is predominant in case of 1-Butanol. Increasing temperature of the mixture decreases its density (ρ). The decrease in density (ρ) with increase in temperature indicates decrease in cohesive force.

Ultrasonic velocity is the speed in which sound propagates in a certain materials. It is observed that ultrasonic velocity increases with increase in molar concentration of 1-Butanol in n-Heptane, indicating the increase in stiffness of the mixture and hence association [12]. The association in the constituent molecules may involve due to dipole-dipole interaction or hydrogen bonding is predominant in case of 1-Butanol. The association due to stronger dipole-dipole interaction of pure 1-Butanol than the induced dipole – induced dipole interaction of pure n-Heptane molecule.

The viscosity is a physical property in understanding the structure as well as molecular interaction occurring in the aqueous system. Entropy measures the disorder of medium. It also depends on the temperature. Higher the disorder more will be entropy. It is observed that viscosity increases with increase in molar concentration of 1-Butanol in n-Heptane indicating strong molecular interaction. The

viscosity gives the strength of molecular interaction between interacting molecules. Increase in temperature of the mixture increases disorder of the medium and hence entropy increases. As entropy increases, viscosity of the binary mixture decreases.

Adiabatic compressibility is a measure of intermolecular association or dissociation or repulsion. It is observed that adiabatic compressibility decreases with increase in molar concentration of 1-Butanol in n-Heptane indicating strong intermolecular interaction between 1-Butanol and n-Heptane. This also shows associating tendency of the component molecules. This is because of the fact that dipole-dipole interaction of pure 1-Butanol stronger than the induced dipole – induced dipole interaction of pure n-Heptane molecule. The observed decrease of adiabatic compressibility with increase in concentration indicates the enhancement of degree of association in the component molecules. The decrease in free length is a result of dipole-dipole and induced dipole – induced dipole interaction between 1-Butanol and n-Heptane indicating association.

Table 1: The experimentally measured values of density (ρ), ultrasonic velocity (U) and viscosity (η) with respect to mole fraction of Butanol at temperature range 298K-308K and at 2MHz frequency.

Mole Fraction (X)	ρ (Kgm^{-3})			U (ms^{-1})			η*10^{-3} (NSm^{-2})		
	298K	303K	308K	298K	303K	308K	298K	303K	308K
0.0	657.98	655.43	650.61	1112	1100	1092	0.342	0.315	0.282
0.1	667.09	665.55	657.68	1080	1056	1020	0.378	0.340	0.285
0.2	676.20	672.63	665.76	1084	1060	1044	0.384	0.358	0.322
0.3	690.38	684.77	677.88	1120	1072	1052	0.434	0.391	0.353
0.4	695.44	691.85	684.95	1128	1084	1056	0.452	0.415	0.373
0.5	705.56	703.99	700.11	1144	1092	1084	0.528	0.483	0.439
0.6	720.74	715.11	711.22	1152	1100	1096	0.681	0.611	0.540
0.7	734.92	730.28	727.39	1164	1108	1100	0.696	0.626	0.570
0.8	752.12	746.47	740.52	1180	1116	1104	0.715	0.642	0.582
0.9	760.22	758.61	754.66	1188	1148	1124	0.724	0.653	0.594
1.0	784.52	779.85	773.86	1232	1196	1156	0.868	0.770	0.684

TABLE-2: - Calculated values of adiabatic compressibility (βa), free length (L_f) and free volume (V_f) with respect to mole fraction of Butanol at temperature range 298K-308K and at 2MHz frequency.

Mole Fraction (X)	βa *10^{-10} (m^{2}N^{-1})			L_f*10^{-10} (m)			V_f *10^{-7} (m^{3}mol^{-1})		
	298K	303K	308K	298K	303K	308K	298K	303K	308K
0.0	12.29	12.60	12.88	0.6941	0.7101	0.7216	6.622	7.383	8.615
0.1	12.85	13.47	14.61	0.7098	0.7341	0.7684	5.254	5.941	7.355
0.2	12.58	13.23	13.78	0.7024	0.7275	0.7461	4.947	5.311	6.081
0.3	11.54	12.70	13.32	0.6728	0.7129	0.7338	4.149	4.542	5.132
0.4	11.30	12.30	13.09	0.6656	0.7014	0.7272	3.776	4.044	4.569
0.5	10.82	11.91	12.15	0.6515	0.6902	0.7007	2.921	3.117	3.560
0.6	10.45	11.55	11.70	0.6402	0.6799	0.6876	1.928	2.113	2.536
0.7	10.04	11.15	11.36	0.6274	0.6679	0.6775	1.810	1.969	2.240
0.8	9.548	10.75	11.07	0.6118	0.6559	0.6690	1.690	1.825	2.080
0.9	9.320	10.00	10.48	0.6044	0.6325	0.6509	1.594	1.764	1.970
1.0	8.397	8.960	9.660	0.5737	0.5988	0.6250	1.216	1.394	1.581

Table 3: Thermo-acoustic parameters like, internal pressure (π_i), relaxation time (τ) and Gibb's free energy (ΔG), with respect to mole fraction of Butanol at temperature range 298K-308K and at 2MHz frequency.

Mole Fraction (X)	π_i*10^6 (Nm^{-2})			τ *10^{-12} (Sec.)			ΔG *10^{-20} (KJ/mol)		
	298K	303K	308K	298K	303K	308K	298K	303K	308K
0.0	199.34	194.96	187.32	0.561	0.530	0.485	0.4152	0.4068	0.3863
0.1	221.16	215.52	202.41	0.648	0.612	0.556	0.4677	0.4605	0.4380
0.2	232.00	229.56	221.53	0.644	0.632	0.592	0.4658	0.4725	0.4620
0.3	254.09	249.32	241.69	0.668	0.662	0.628	0.4791	0.4902	0.4846
0.4	268.54	265.95	257.85	0.681	0.681	0.651	0.4863	0.5004	0.4977
0.5	301.21	299.28	289.95	0.763	0.767	0.711	0.5278	0.5449	0.5314
0.6	358.08	351.25	334.8	0.949	0.943	0.842	0.6079	0.6216	0.5955
0.7	379.26	372.38	361.63	0.931	0.931	0.864	0.6009	0.6170	0.6050
0.8	401.57	395.94	383.27	0.910	0.921	0.860	0.5923	0.6129	0.6033
0.9	421.67	413.88	404.16	0.899	0.872	0.831	0.5880	0.5924	0.5906
1.0	482.05	466.58	452.38	0.972	0.920	0.882	0.6166	0.6127	0.6129

The free volume (V_f) and internal pressure is a measure of intermolecular attraction between the component molecules. It is observed that free volume decreases (V_f) and internal pressure (π_i) increases with increase in molar concentration of 1-Butanol in n-Heptane, indicating association in the molecules of the component liquids. It was observed that the variation in the free volume values show exactly the reverse trend as that of internal pressure.

In the present system, it is observed that free volume decreases and internal pressure increases. Further, the decrease in free volume and increase in internal pressure with increase in clearly show the increasing magnitude of interactions. This suggests that both solute- solute and solute solvent interaction exist in the system. If the temperature is increased, there is reduction in molecular interaction as they move away from each other. This reduces the cohesive force. Thus increase in free volume and decrease in internal pressure occurs with increase in temperature.

In the present case relaxation time, which is in the order of 10^{-12} s is due to structural relaxation process and in such situation it is suggested that the molecules get rearranged due to co-operative process. It is also observed that relaxation time increases with increase in molar concentration of 1-Butanol in n-Heptane,

indicating high stability. Therefore relaxation time increases.

Gibb's free energy measures mobility of the medium. Higher the mobility of the medium, higher will be the entropy lower will be the free energy. It is observed that Gibb's free energy increases with increase in molar concentration of 1-Butanol in n-Heptane, indicating the mobility of the molecule is low i.e. highly ordered, due to outstanding salvation. Increasing value of Gibb's function suggests.

CONCLUSION

The non-linear variation of ultrasonic velocity and adiabatic compressibility with concentration in the liquid mixture is due formation of hydrogen bond or due to London desperation forces in the constituent molecules. The non –linear increase in internal pressure with concentration of binary liquid mixture indicates association in the molecules of the component liquid. The dipole-dipole interaction of pure 1-Butanol molecule is stronger than induced dipole –induced dipole interaction of pure n-Heptane molecule.

Conflicts of interest: The authors stated that no conflicts of interest.

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2019-20.

Significance of Hydration Process of Sugars and Pseudo-sugar in Sweet Taste Chemoreception at 298 K.

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ABSTRACT

Densities (ρ) of dextrose, fructose and myo-inositol have been measured in concentrate aqueous solution, concentration range 0.1-0.9 M at 298 K. From the density data, the apparent molar volume (Φv) partial molar volume (Φ_v^o) and apparent specific volume (ASV) were calculated. From these parameters, results were correlated with hydration process of solute and its chemoreception properties. From ASV values, it is concluded; sugars and pseudo-sugar which are under studied are sweet in taste.

Keywords: Apparent molar volume, Partial molar volume, *ASV*, Sugar, Myoinositol, Pseudo-sugar.

INTRODUCTION

Molecular volume is very important property regarding to the biological perspective. Enzymes have active sites which bind with specific substrates. Minute change in the volume of substrate deviates the physiological path way of biological system. Molecular volumes of stimulus molecules are associated to other significance factors such as compressibility, hydrophobicity and surface tension [1]. The hydration of solutes with water may affect accession to, binding with receptor sites and affect their taste properties. So it is very important to understand the nature of sweeteners-water hydration interactions [2, 3].

RESEARCH ARTICLE

To determine physical parameters of different edible oils.

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ABSTRACT

Different oil samples of various brands were collected from local market and analyzed for Physico-Chemical parameters like surface tension(γ), density(ρ), viscosity(η) and refractive index(n). By observing the obtained results, it can be concluded that coconut oil is of good quality.

Keywords: Physico-Chemical, viscosity, free fatty acids.

INTRODUCTION

Various cooking oils are being used since ancient times of history. The earliest of Man, who lived in Paleolithic era, consumed animals along with their fats with scarce availability of dairy, fruits, vegetables and nuts even though cooking was discovered [1]. Agriculture started just 10,000 years ago where the staple food changed from animal food to plant based cereals and pulses [2]. Even then for many years, animal fats like lard and tallow were used for cooking. The various arrays of vegetable cooking oil started early in last century with introduction of electricity, where the previously used source for lamps such as cotton seed oil lost its galore and entered to the kitchens of humans [3]. Various other vegetable oils like palm, coconut, sunflower, saffflower, rice bran, and canola oils hit the markets with claims of various nutritional benefits, but offered none [4].

In a study, researchers studied the cases of 458 patients who had experienced a coronary event. Of these men, 16 percent who had replaced animal fats with omega-6 polyunsaturated fats found in corn, sunflower and safflower oil died from heart disease

In contrast, only 10 percent of those who did not substitute their fats died as a result of a coronary event [4].In the modern medical literature, usage of oils and its relation to disease is the one of the most debated issue and it is still going on [5]. A slow but steady shift from vegetable oils to animal fats is taking place widely in the world due to knowledge of inherent health benefits in animal fats over vegetable oils. Such awareness has yet not reached the rural parts of India as a result they are still consuming refined vegetable oils for cooking [6]. The question of high prevalence of Diabetes, Hypertension and Heart disease attributed to vegetable oils is still a mystery to be solved.

The commonly used cooking oils in rural India are refined sunflower oil, Palm oil, Ground nut oil, Sesame oil, Coconut oil and others [7]. Many literature quotes refined Sunflower oil is one of the healthiest and cheapest oils compared with that of other oils [8]. Even though other refined vegetable oils are as harmful as sunflower oil due to its omega 6 fatty acid consumption and oxidation [9].

Edible oils play an important role in the body as carriers of essential fatty acids (EFA). They are needed for the synthesis of prostaglandins which have many vital functions to perform in the body. By maintaining good diet, we can control health issues like diabetes, cholesterol, blood pressure, etc.

Several factors affect the edible oil quality such as agronomic techniques, seasonal conditions, sanitary state of drupes, ripening stage, harvesting and carriage systems, method and duration of storage, and processing technology and it is determined by different analytical methods in order to assess the stability of oil and to avoid possible adulterations. Oils and fats are important parts of human diet and more than 90 per cent of the world production from vegetable, animal and marine sources is used as food or as an ingredient in food products. Oils and fats are a rich source of dietary energy and contain more than twice the caloric value of equivalent amount of sugar. [10] Different oil samples of various brands where collected and analyzed for physico-chemical parameter studies.

INSTRUMENTS USED FOR PARAMETERS ANALYZED

METHODOLOGY

Chemistry laboratory inside the college department was identified for this work. Sterilized & disinfected sample bottles were used for sampling purpose. Analysis of various parameters were carried out in the laboratory as per referred literature. Analysis of oil samples were done to investigate its utility in eating or other purposes.

Following different physico-chemical parameters were tested for monitoring quality of Oil.

1. **Density**
2. **Surface tension**
3. **Viscosity**
4. **Refractive index.**

Oil samples were collected in sterile bottles from different shops.

RESULTS AND DISCUSSION

Since, oil is an important ingredient in our diet, it is important to consume healthy oil. Hence, I was curious to study oils. Some oils were collected from home and some from shops of different brands. The different types of edible oil were Coconut oil, Mustard oil, Soyabean oil, Sunflower oil and Palmolean oil.

I have studied the different physico-chemical parameters which I could perform in our college laboratory were density, surface tension, viscosity and refractive index.

It was found that the parameters showed slightly different values for each parameter which are as follows-

Density
Oils with the density of lower values are highly appreciable to consumers. The results tabulated in Table 1 show that at room temperature of 25°C highest and lowest values of the densities are 0.9683 g/ml and 0.901 g/ml for Deshi/Ghani mustard oil and Mustafa soybean oil, respectively. This is because, the π bonds that make the bonding more rigid androtation between C-C bonds becomes more strenuous [7].

Sr.no.	Studied Parameter	Method Used
01.	Density	Density Bottle
02.	Surface Tension	Stalagmometer
03.	Viscosity	Ostwald Viscometer
04.	Refractive Index	Abbe's Refractometer (Mod.AR-10, mvtex Ind.)

Sr. no.	Parameters	Coconut oil	Mustard oil	Soyabean oil	Sunflower oil	Palmolean oil	Distilled water
1	Density (g/ml)	0.9096	0.9131	0.9130	0.9130	0.9125	0.9977
2	Surface tension (dyne/cm)	27.413	70.195	67.732	66.681	78.273	72.8
3	Viscosity (N/m^2)	4.355	6.2379	5.5443	4.90515	4.5467	10.08
4	Refractive index	1.452	1.472	1.476	1.471	1.468	1.335

Oils with the density of lower values are highly appreciable to consumers. The results tabulated in Table 1 show that at room temperature of 25°C highest and lowest values of the densities are 0.9683 g/ml and 0.901 g/ml for Deshi/Ghani mustard oil and Mustafa soybean oil, respectively. This is because, the π bonds that make the bonding more rigid androtation between C-C bonds becomes more strenuous [7].

Oils with the density of lower values are highly appreciable to consumers. The results tabulated in table show that at room temperature of 25° C. Highest and lowest values of the densities are (0.9131 g/ml) and (0.9096 g/ml) for Mustard oil and Coconut oil respectively.

This is because, the pi (π) bonds that make the bonding more rigid and rotation between C-C bond becomes more strenuous[11]. It means that the Mustard oil is denser than Coconut oil, this is because it contains higher amount of fats compared to Coconut oil.

Surface Tension
High Surface Tension of oil means less spreading of oil over the surfaces and consequently more energy loss. Surface tension of Palmolean oil (78.273dyne/cm) is highest and least for Coconut oil (27.413 dyne/cm). It is shows that Palmolean oil contains more fat as compared to Coconut oil.

Viscosity
The viscosity of edible oils is a function due to the fatty acid's composition in different oils[12]. The viscosity of Mustard oil (6.2379 N/m^2) is highest and is least for Coconut oil (4.355 N/m^2). It shows that oil sample i.e. Mustard oil contains more fat than Coconut oil.

Refractive Index
The refractive index value of Soyabean oil (1.476) is highest and the least is for Coconut oil (1.452), it is shows that oil sample of Soyabean contain more fat than Coconut oil.

CONCLUSION

The observations conclude that we should consider the physicochemical properties for selecting a good type of edible oil. The study shows that the oil with low density values and lower viscosities are ones with low free fatty acid content which are good quality of attributes of ideal edible oils.

Conflicts of interest: The authors stated that no conflicts of interest.

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Synthesis and Spectroscopic Studies of Bis-γ Pyrones

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Abstract: The Baker-Venkataramn transformation using NaOH in dimethylsulphoxide (DMSO) 77 have been employed for the coversions of ester (o-aroyloxy/heteroaroyloxyacetophenones) into the corresponding bis β-diketones. A novel class of 2, 8-bis(aryl/heteroaryl) pyrano [3, 2-γ] chromene-4, 6-diones have been synthesized. Bis-β diketones obtained undergoes cyclisation to achieve 2, 8-bis(aryl/heteroaryl) pyrano [3, 2-γ] chromene-4, 6-diones with impressive yields. Reaction mechanism for their formation have been elucidated. 4, 6- Diacetylresorcinol was obtained by the acylation of resorcinol. The structures of these compounds were confirmed by IR, NMR and Mass spectral studies.

Keywords: 4, 6-Diacetyl resorcinol, Bis β-diketones, Pyrones, Spectral analysis.

I. Introduction

γ-Pyrone based natural products constitute a large class of biologically active compounds. The first isolation of the structurally rather simple γ-pyrone poppy acid from Papaver somniferum by F. W. Sertürner in γ-pyrone natural products were isolated. Most of these were derived from marine organisms in which they seem to play an important role as allomones or defense compounds [1-2] Chromones and their derivatives of different oxidation level are well known naturally occurring oxygen-containing heterocyclic compounds which perform important biological functions. They possess important biological activities, such as anti-tumor, anti-hepatotoxic, antioxidant, anti-inflammatory, anti-spasmolytic, oestrogenic and antibacterial activities [3-7] 2-Styrylchromones are one of the scarcest classes of natural chromones. Chromones [8] exhibit important biological as well as pharmacological activities [9]. Flavonoids [10] are the chromones that are also most abundantly in nature. Some chromones are also reported as anti-HIV agents. Khellin [11] Fig. 1 and 2, 4-thiazolidenedione [12] Fig. 2 are the chromones that are used as antispasmodic agent, in the treatment of anginapectoris and antidiabetic agent that improve peripheral insulin resistance in type-II diabetic patients respectively.
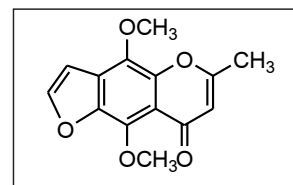
Fig. 1
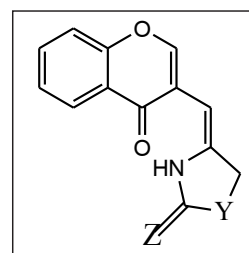
Fig. 2

The results indicate that compounds having dimethyl-aminomethyl in the 3-position are most active. Substitution in the benzene ring caused improvement in activity only in the case of 6-hydroxy and 6- or 7-alkoxy groups. Compound [13] was about as effective as Fuadin against *Schistosoma mansoni* when introduced intraperitoneally into infected ma number of alkylaminomethylchromanones Fig. 3 were synthesized and tested against *Endamoeba histolytica* and *Schistosoma mansoni* [14].
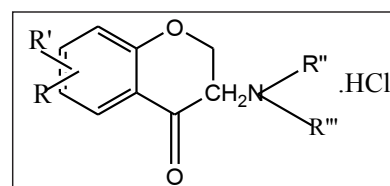
Fig. 3

The structure of the antibiotic novobiocin (I) has been reported [15-16]. Alcoholic hydrochloric acid cleavage the glycosidic linkage in novobiocin forming the methyl glycoside of 3-O carbamylnoviose 1*z and the aglycon, novobiocic acid (II) Fig. 4 [17].

INSILICO MOELCULAR DOCKING STUDIES OF NOVEL BIS B-DIKETONES AS A ANTICANCERAL AGENTS

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ABSTRACT

In *silico* molecular docking analyses analysis of bis heterocyclic compounds as potential inhibitors of protein farsenyltransferase and its potential applications as anti-cancer agents. Computationally 4,6-bis(5- aryl/heteroaryl -4H-pyrazol-3-yl)benzene-1,3-diols was found to have maximum affinity for the active sites of enzyme with protein farnesyltransferase (FTase) as a promising drug target.

Keywords : Bis heterocyclic compounds**,** *in silico* dockings farnesyltransferase (FTase)

INTRODUCTION

Drug development requires detailed information about the biological activity of the pharmacological compounds against selected targets. The application of computational methods to study the formation of intermolecular complexes has been the subject of intensive research during the last decade. It is widely accepted that drug activity is obtained through the molecular binding of one molecule (the ligand) to the pocket of another, usually larger, molecule (the receptor), which is commonly a protein [1-10] . Dibenzoylmethane (DBM) **1**, a _-diketone structural analogue of curcumine, has received attention in recent years because of its potent anticarcinogenic activity against 7, 12-dimethylbenz[a]anthracene (DMBA) induced mammary tumorigenesis tested in several animal models.

1   **2**
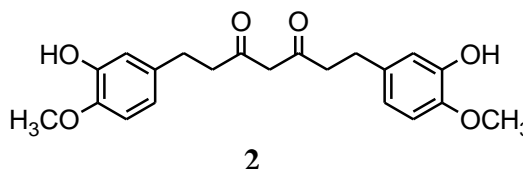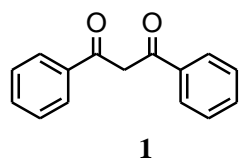
The said inhibitory effect of curcumin analogue on FTAS provides the root for the molecular docking experiments to docks the newly synthesized 4.6-bis(5- aryl/heteroaryl -4H-pyrazol-3-yl)benzene-1,3-diols **.** The pyrazole derivative **2** of curcumin 3, 5-bis [β-(4-acetoxymethoxyphenyl) ethyl] pyrazole , has been reported as a more potent anticanceral activity. Furthermore, it also possesses inhibitory activity against a panel of human tumor cell lines, including epidermoid carcinoma of the nasopharynx (KB), lung carcinoma (A549) and renal cancer (CAKI-1). Also, this derivative is a new candidate as an anti-angiogenic agent [11-30] .

PRESENT WORK

The present work deals with insilico analysis of bis heterocyclic compounds as potential inhibitors of protein farsenyltransferase and its potential applications as anti-cancer agents.The inhibition of tipifarnib on farnesyltransferase (FTase) provides the basis of molecular docking experiments to dock some newly synthesized bis heterocyclic compound: 4,6-bis(5- aryl/heteroaryl -4H-pyrazol-3-yl)benzene-1,3-diols (ch-4), with protein farnesyltransferase (FTase) as a promising drug target. Hence this work is a study of some newly bis heterocyclic

compounds as with the inhibitors of PFT with known IC50 values (nM) obtained from BindingDB.

Docking search algorithm (MolDock SE) has been employed to dock some series of bis heterocyclic compounds into the catalytic sites of FTase. Docking calculation of CFDM descriptors into the 3D model of the catalytic sites of enzyme. MolDock SE algorithm performs better usually the case when the ligand has lots of internal degrees of freedom (many torsion angles).

EXPERIMENTAL

The newly synthesized6-bis(5- aryl/heteroaryl -4H-pyrazol-3-yl)benzene-1,3-diols (**3a-h**) endowed with farnesyltransferase (PFT) inhibitors each compound was energy minimized using and the docking calculations were performed using CFDM descriptors into the 3D model of the catalytic site of protein farnesyl transferase (PFT) in complex with inhibitor Tipifarnib from PDB (Id: 1SA4). Docking search algorithm (MolDock SE) implemented in Molegro virtual docking has been successfully employed to dock inhibitors into the catalytic site of the FTAs and to well correlate the obtained binding free energies with the inhibitory activities of compounds **fig.1**. RMSD of the best scoring pose (based on Rerank Score in MVD) of tipifarnib

SYNTHESIS AND CHARACTERIZATION OF NOVEL CLASS OF 2,8-BIS(ARYL/HETEROARYL) PYRANO[3,2-γ]CHROMENE-4,6-DIONES

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Abstarct
The Baker –Venkataramn transformation using NaOH in dimethylsulphoxide (DMSO)77 have been employed for the coversions of ester(o-aroyloxy/heteroaroyloxyacetophenones) into the corresponding bis β-diketones. A novel class of 2,8-bis (aryl/heteroaryl) pyrano[3,2-γ]chromene-4,6-diones have been synthesized . Bis- β diketones obtained undergoes cyclisation to acheieve 2,8-bis(aryl/heteroaryl) pyrano[3,2-γ]chromene-4,6-diones with impressive yields . Reaction mechanism for their formation have been elucidated .

Keywords: , Baker venkatramann , Bis- β diketones ,bis- γpyrones .

Introduction

γ-Pyrone based natural products constitute a large class of biologically active compounds. The first isolation of the structurally rather simple γ-pyrone poppy acid from Papaver somniferum by F.W. Sertürner in γ-pyrone natural products were isolated. Most of these were derived from marine organisms in which they seem to play an important role as allomones or defense compounds Chromones and their derivatives of different oxidation level are well known naturally occurring oxygen-containing heterocyclic

compounds which perform important biological functions. They possess important biological activities, such as anti-tumor, anti-hepatotoxic, antioxidant, anti-inflammatory, anti-spasmolytic, oestrogenic and antibacterial activities[10-14]. 2-Styrylchromones are one of the scarcest classes of natural chromones. Hormothamnione **7** and 6-desmethoxyhormothamnione **8** are the first and to the best of our knowledge the only naturally occurring styrylchromones isolated from the marine crytophyte *Chrysophaeum taylori* [15-16].

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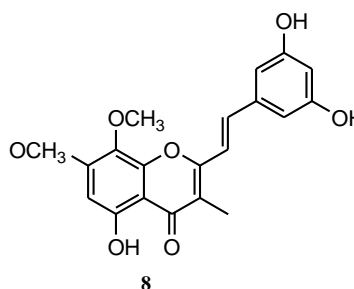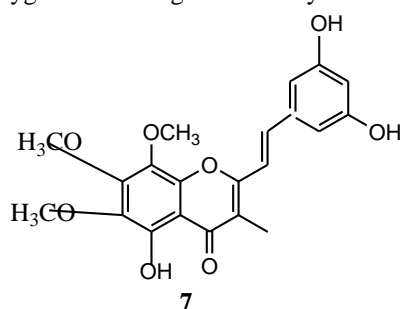
Chromones[17] exhibit important biological as well as pharmacological activities[18]. Flavonoids[19] are the chromones that are also most abundantly in nature. Some chromones are also reported as anti-HIV agents. Khellin[20] **9** and 2,4-

thiazolidenedione[21] **10** are the chromones that are used as antispasmodic agent, in the treatment of anginapectoris and antidiabetic agent that improve peripheral insulin resistance in type-II diabetic patients respectively.

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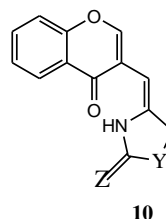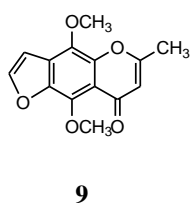
Synthesis and characterization studies of Bis- isoxazoles

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Abstract--**The Baker –Venkataramn transformation using NaOH in dimethylsulphoxide (DMSO)77 have been employed for the coversions of ester(o-aroyloxy/heteroaroyloxyacetophenones) into the corresponding bis β-diketones .Bis- β diketones obtained undergoes cyclisation to achieve bisisooxazoles with good yields.An efficient method was developed for synthesisingisoxazoles.. These were characterised by FT-IR, ^{1}H NMR spectroscopy**.

Keywords--bisβ-Diketones, bis-isoxazoles, Spectral analysis.

I. INTRODUCTION

Isoxazoles are aromatic compounds which forms an important class of five –membered heterocycles associated with bioilogical activities[1-4]. Some of pharmaologically important isoxazoles include the antibiotics oxacillin[5], cloxaciline[6], dicloxacillin and floxacillin[7] are markedly resistant to cleavage by penicillinase and are potent inhibitors of the growth of most penicillinase producing staphylococci.
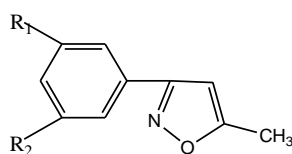
Fig.1

A naturally occurring isoxazole, e.g; an antibiotic cycloserine[8] (4-amino-3-isoxazolelidinone) **2** is used as antituberculosis drug.

Isoxazole derivatives involve substances with analgesics and local anesthetic activity. The novel isoxazole derivative,GIT-27NO **2**, generated by modifying the parental anti-inflammatory compound VGX-1027, is generated by direct linking of NO to the original compound.[9-11]Determined by cell specificity, NO released from the compound, in association with reactive oxygen species, selectively affected MAP kinases pathways and promoted differenttype of programmed cell death.

A Novel Synthetic route to Bis –Isoxazoles.

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ABSTRACT

Heterocyclic Bis- β diketones have been synthesized from ester(o-aroyloxy/heteroaroyloxyacetophenones) by a base catalysed baker venkatramann transformation with NaoH in DMSO. A novel class of 4,6-bis(5-aryl/heteroaryisoxazol-3-yl) benzene-1,3-diols have been synthesized . Bis- β diketones obtained undergoes cyclisation to acheieve 4,6-bis(5- aryl/heteroaryisoxazol-3-yl) benzene-1,3-diols with impressive yields . Reaction mechanism for their formation have been elucidated .

Keywords: Baker venkatramann , Bis- β diketones ,bis-isoxazoles.

INTRODUCTION

Isoxazoles are aromatic compounds which forms an important class of five –membered heterocycles associated with bioilogical activities[1-4]. Some of pharmaologically important isoxazoles include the antibiotics oxacillin[5], cloxaciline[6], dicloxacillin and floxacillin[7] are markedly resistant to cleavage by penicillinase and are potent inhibitors of the growth of most penicillinase producing staphylococci.

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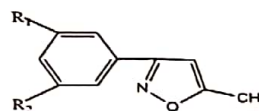
Some hydroxamic derivatives 3-(5)-phenoxymethyl isoxazoles exhibit α - and β –adrenolytix activity 3-halogen -5-phenyl-5-halogenisoxazoles **2** are reported as potent anthelminitics.[8]

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Role of Finance in Economic Growth and Development

C.K.Jiwane

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Abstract

The country's financial system is of huge use and plays a vital role in shaping the nation's economic development. Financial system, economic growth and development are closely linked. The economic growth of each country depends on the role of financial institutions and ultimate financial development. Policymakers and the economy generally agree that financial development contributes to financial institutions. Economic growth and development is the main goal of every country that contributes to its development, but there are some obstacles, such as increasing the population, illiteracy, and political instability that hinder their economic growth. The size and growth of capital in the economy depends only on the efficiency and intensity of the operations and activities carried out in the financial institution.

Key words: - Financial system, financial development, economic growth, economic development.

Introduction

The financial system is perhaps the most important institutional and functional instrument for economic transformation. Finance is the bridge between the present and the future, and whether the mobilization of savings or its effective, efficient and equitable allocation of investment is the access by which the financial system performs its functions that determine the pace of achieving broader national goals.

The development of any country depends on the economic growth achieved by the country over a period of time. Economic growth covers investment and production as well as the size of GDP in any country.

Financial system features

Financial system features are as follows

1. The financial system provides an ideal link between depositors and investors, which encourages savings and investments alike.

2. The financial system facilitates the expansion of financial markets across space and time.

3. The financial system promotes the effective allocation of financial resources for socially desired purposes and economic productivity.

4. The financial system affects both the quality and the pace of economic development.

Financial system functions

1. Encourage savings:

The financial system encourages savings by providing a wide range of financial assets as valuable stores backed by financial market services and brokers of all kinds. For the wealthy, all of this provides ample portfolio options with attractive combinations of income, safety and return. With financial progress and innovations in financial technology, the scope for portfolio selection has been improved. Therefore, it is widely believed that the savings-income ratio is directly related to both financial assets and financial institutions.

Issue and Problems in Rural Development Programmesin India.

C.K.Jiwane,
Asso.Prof Anand Niketan College,Warora.

Abstract:

Rural development generally refers to the process of improving the quality of life and economic well-being of people living in relatively isolated and sparsely populated areas. Mahatma Gandhi national law to guarantee rural employment. National Mission for Rural Livelihoods, Integrated Watershed Development Program, Indira Oasujana, National Program for Rural Drinking Water, Nirmal Bharat Abhyan, Nirmaris Spices that were considered to eradicate poverty and unemployment in the countryside, by generating demand for the productive workforce in villages. It provides an alternative source of livelihood that will have an impact on limiting migration, restricting child labor, alleviating poverty, and making villages capable of self-sufficiency by creating productive assets like road construction, cleaning water tanks, soil and water conservation, etc. It is considered the largest anti-poverty program in India ..

Key words: rural development, economic development, employment guarantee, social and physical infrastructure.

Introduction

There are 610 regions in India, 600,000 villages, about 900 million people living in rural areas of the country. Half of them are at least less than 25 years old. These rural residents can be characterized by collective poverty, low levels of literacy and income, high levels of unemployment, malnutrition and health status. In order to address these specific problems, a number of rural development programs are being implemented to find opportunities to improve the quality of life of these rural people.

Rural development goals:

The goals set by the government in the sixth five-year plan for rural development are.

A) Improving productivity and wages for rural people.

B) To ensure quick and increased job opportunities

C) Demolition of unemployment and a marked decrease in underemployment

D) Ensure that the disadvantaged standard of living is raised

E) Providing basic needs, primary education, health care, clean drinking water, rural roads, etc.

Basic elements of rural development:

Subsistence life:

To survive, people have certain basic needs. These basic necessities include food, shelter and clothing. Besides, health care and security facilities are also important needs. Providing these basic necessities to all people is vital for economic growth, and it is a prerequisite for development.

Respect my self:

Every person and every nation is looking for a basic form of self-respect, dignity and honor. The absence or denial of self-esteem indicates a lack of development initiatives.

freedom:

Freedom refers not only to political or belief freedom, but also to freedom from ignorance and superstition. A person must be free from all bonds and live in harmony with nature.

Rural development plans in India

Mahatma Gandhi National Plan to Guarantee Rural Employment:

The plan aims to enhance the living security of people in rural areas by ensuring 100 days of paid work in the fiscal year of a rural family whose adult members volunteer to do unskilled manual work.

The national mission of rural livelihoods:

Impact of Demonetization on Indian Economy

C.K. Jiwane

Department of Commerce Anand Niketan College, Warora.

Abstract

On November 8, 2016, the Indian government declared that the 500 and 1000 rupee notes will be stripped of their status as legal tender the whole country was stunned. This decision caused sensation in the whole country. Removing the legal tender status of a unit of currency is a drastic intervention into an economy because it directly affects the medium of exchange used in all economic transactions. It can help stabilize existing problems. The RBI will issue Two thousand rupee notes and new notes of Five hundred rupees which will be placed in circulation from 10th November 2016. Notes of one Hundred, Fifty, Twenty, Ten, Five, Two and One rupee will remain legal tender and will remain unaffected by this decision. This move is expected to cleanse the formal economic system and discard black money from the same. Demonetization is one of the big steps initiated by Government in addressing the various issues like black money, counterfeit currency, corruption, terrorism etc. The negative impact of demonetization was felt across the all segments of economy, especially agriculture and industry. The worst impacted were segments that relied on high-volume cash transaction, such as organized and unorganized retail. The impact was felt at both the firm level as well as at the consumer level.

Keywords: Demonetization, Indian economy, Impact, black money, corruption, digital India.

Introduction:

Demonetization is the act of stripping a <u>currency</u> unit of its status as <u>legal tender</u>. It occurs whenever there is a change of <u>national currency</u>. The current form or forms of money is pulled from circulation and retired, often to be replaced with new notes or coins. Sometimes, a country completely replaces the old currency with new currency. The government had urged people to create bank accounts under Jan Dhan Yojana. They were asked to deposit all the money in their Jan Dhan accounts and do their future transaction through banking methods only. The government initiated was a tax declaration of the income and had given October 30, 2016 deadline for this purpose. Through this method, the government was able to mop up a huge amount of undeclared income.

Objectives of Demonetization

1. It is an attempt to make India corruption free.
2. It is done to curb black money.
3. To control escalating price rise.
4. To stop funds flow to illegal activity.
5. To make people accountable for every rupee they possess and pay income tax return.
6. It is an attempt to make a cashless society and create a Digital India.
7. To crack down the terrorism and Fatalism.
8. To combat Inflation.
9. To promote cashless Economy.
10. To Eradicate counterfeit currency

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Rural Employment Generation Schemes: An Evaluation.

C. K. Jiwane
(Asst.Prof.) Anand Niketan College, Warora

Introduction

India is a land of agriculture more than 70% of its population resides in rural region and agriculture is the main source of income of this major part of the population. However, the development and advancement in agriculture did not keep pace with rapid growing population. The unemployment in rural region can be classified into two ways; regular unemployment and seasonal unemployment. The First farm labour Enquiry commission says that during 1950-51 a male labour got 200 days of employment a year while a female labour was entitled employment of 141 days a year. It means that male and female labours are empty handed for 165 and 224 days a year respectively.

The most recent initiative under the wage employment programmes is the launch of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in 2006. Initially implemented in 200 districts, during the financial year 2006-2007, it was extended to 330 districts and finally to 615 districts during the financial year 2007- 2008.

Keyword: Rural, Employment, Programme

Employment Guarantee Scheme of Maharashtra.1972

EGS began its working in Maharashtra on 1st May 1972. It seems EGS helped much tackling the rural unemployment, migration of rural population in search of employment. EGS stopped the migration from villages to cities by engaging rural population in works of EGS.

. Training Rural Youth for Self-Employment (TRYSEM) 1979

To provide technical skills to rural youth and to equip them to take up self-employment in the fields of agriculture and allied activities, industries, services and trade the scheme TRYSEM was launched by Government in August 15, 1979.

Integrated Rural Development Programme (IRDP) 1980

To face the problem of poverty and unemployment, Government launch the programme "Integrated Rural Development Programme (IRDP) in 1978-79, covering 2,300 developments blocks and extended to all the 5011 blocks in 2nd October, 1980. IRDP envisages the integration of methodology and approach of both beneficiary oriented programmes as well as area development programmes.

National Rural Employment Program (NREP) 1980

The objective was to strengthen rural support structure. Construction of wells, irrigation projects, Village Lake, small irrigation dams, rural roads, school, balwadies, panchayat offices, and houses were done this programme.During Sixth Five Year plan (1980-85) 17750 lacks human-days employment was fixed. Interestingly, the objective of this programme was to create employment of 15000 human-days employment was created during the period. During the first four years of Seventh Five year plan (1985-89) 2,940 crores were spent on this program 13380 human –days employment was created during this period. During 1988-89 and 1989-90 3,316 crores was the allocation of fund for this programme which resulted in the creation of 14770 human-days employment.

Rural Landless Employment Guarantee Program (RLEGP) 1983

RLEGP was introduced on August 15, 1983, with the objective of improving and expanding employment opportunities for the rural landless with a view to providing guarantee of employment to at least one member of every landless household up to 100 days in a year and creating durable assets for strengthening the infrastructure so as to meet the growing requirements of the rural economy.

ग्रामीण विकास —एक अर्थनिती

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सारांश

सध्या जागतिक आर्थिक अर्थव्यवस्थेच्या पार्श्वभूमिवर सरकार आणि बाजारपेठ यांचे परस्परसंबंध कसे असावे जेनेकरून बाजार अपयशी होणार नाही. बाजार यत्रणा सरकार हे एकमेकाना पर्यायी आहेत की पूरक कल्याणकारी अर्थव्यवस्था कशी आणता येईल, भाववाढ रोखण्यासाठी उपाय, रोजगार वाढीसाठी सुरु असलेली जगभरातील चर्चा इत्यादींवर काळात उपाय सागितले आहे.एकीकडे शेतकरी शेतीकजनि दुक्काळाने हैराण झाले तर दुस-या बाजूने आपल्या देशातील मंदिराभध्ये पैसाचा महापूर आलेला आहे. या भारतामध्ये साधारणपणे ५ लाख ७५ हजार मोठी मंदिरे आहेत तर ६ लाखाच्या जवळपास लहान मंदिरे आहेत. या सर्व मंदिराचे एकूण वार्षिक उत्पन १३ लाख कोटी रूपये इतके आहे. ही सर्व रूपये जर शेतक-याच्या शेतीसाठी जर वापरली तर जमीन, संपत्ती वितरणामध्ये फार मोठी विषमता दिसून येणार नाही व गरिबी कमी होण्यास मदत होईल आणि जीएसटी सारखे कर लावण्याची सरकारला गरजही पडणार नाही. जर या दुरदृष्टीचा देशाच्या विकासासाठी उपयोग केला तर भारत श्रीमंताच्या यादीत प्रथम कमाकावर येईल.

गृहितक

शासनाच्या योजना,डॉ.बाबासाहेब आबेडंकराचे आर्थिक विचार,जागतिकीकरणात शेतक.याच्या समस्या व अर्थव्यवस्येत सरकारची भूमिका

प्रस्तावना

गेल्या अनेक वर्षापासुन शेतक.यांच्या आत्महत्या सुरू आहेत. विदर्भात आणि त्याही परिचम विदर्भात त्या मोठया संख्येने होत आहेत. ही फार दु:खाची आणि शरमेची बाब आहे. शेतकरी आत्महत्या का करतात? या कारणाचा शोध घेणे गरजेचे आहे. या समस्येवर उपाय म्हणुन शासनाने विदर्भासाठी पॅकेज जाहीर केले तरीही आत्महत्या सुरूच आहेत. याचा अर्थ, या पॅकेजच्या पलीकडे शेतक-याचे दु:ख आहे. भारतीय अर्थव्यवस्था कृषीप्रधान अर्थव्यवस्था म्हणुन गणली जाते. भारतातील एकुण लोकसंख्येपैकी ७६टक्के लोकसंख्या ही कृषी आणि कृषी आधारित उद्योगातील अवलंबुन आहे, देशाच्या राष्ट्रीय उत्पनामध्ये केवळ एकटया कृषीक्षेत्राच्या आपले पारंपारिक स्वरूप सोडुन आधुनिकतेकडे वाटचाल करीत आहे. जागतिकीकरण,खाजगीकरण आणि उदारीकरणाच्या काळात राज्यानी बाजारीकरणाचे धोरण स्विकारलेले आहे. त्यासाठी शेतकरीही प्रयत्नशील झाला आहे.शेती भारतीय अर्थव्यवस्थेना "आत्मा" आहे. भारताच्या लोकसंख्येपैकी जवळपास ७० टक्के लोकांचा प्रमुख व्यवसाय शेती आहे. भारत हा खेड्यांचा देश आहे. खेड्यातील ८० टक्के लोकांना शेतीतुन रोजगार प्राप्त होतो त्यामुळे रोजगार शास्वतीच्या बाबतीत शेतीचा नंबर वरचा आहे. शेती हे देशातील लोकसंख्येच्या अन्नधान्याच्या बाबतीत उपजिवीकेचे प्रमुख साधन आहे. म्हणुनच शेतीला भारतीय अर्थव्यवस्थेचा "कणा" आहे असे संबोधले जाते.

ग्रामीण विकासासाठी शासनाने राबविलेल्या योजना

रोजगार हमी योजना

रोजगार हमी योजना राबविणारे 'महाराष्ट्र' हे देशातील पहिले राज्य आहे. कै.वि.स. पात्रे यांना या योजनेचे प्रवर्तक मानले जाते. त्याच्या समितीच्या शिफारशीवरून ही योजना महाराष्ट्रात सुरू झाली.बीज स्वरूपात अशा प्रकारची योजना १९६५ पासुन महाराष्ट्रातील काही मर्यादित भागात राबविली गेली असली तरी या योजनेस ख.न्रा अर्थिने रोजगार हमी योजनेचे स्वरूप १९७२–७३ व १९७३–७४ मधील महाराष्ट्रात जो अमुतपूर्व दुक्काळ पडला त्यावर मात करण्यासाठी या अभिनव योजनेचा प्रारंभ करण्यात आला.या योजनेमुळे शेतमजुरांची रोजगारासाठीची वणवण थांबली.तसेच मजुरांना स्थानिक पातळीवरच रोजगार मिळू लागल्याने त्यांचे शहराकडे जाणारा लोंढाही आपोआपच थांबला.

ग्रामीण भागातील श्रमाची कामे करणाच्या अकुशल मजुगंनी बेकारी दूर करणे व असे करीत असताना ग्रामीण भागाचा विकास साधने हा या योजनेचा गामा होय. २६ जॉनेवारी १९७८ रोजी रोजगार हमीचा कायदा संमत करण्यात आला व या योजनेस कायदयाचे स्वरूप प्राप्त झाले. कायदयाने ग्रामीण भागातील अकुशल मजुरांना रोजगार हमी देण्याची बांधिलकी स्वीकारणारे महाराष्ट्र हे भारतातील पहिलेच राज्य ठरले. महाराष्ट्राची ही अभिनव योजना आज राष्ट्रीय स्तरावरील रोजगार योजनांगी ही जननी ठरली आहे.

भारतीय अर्थव्यवस्था : स्थिती व दिशा
Indian Economy : Condtion & Direction

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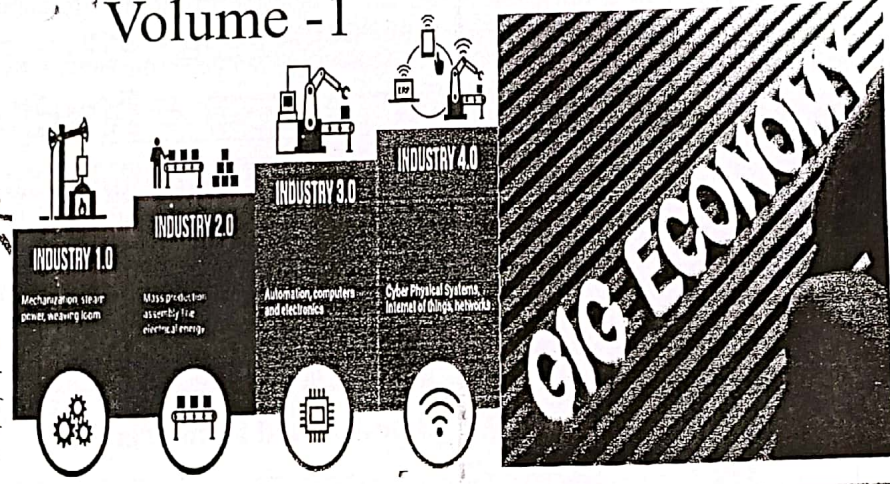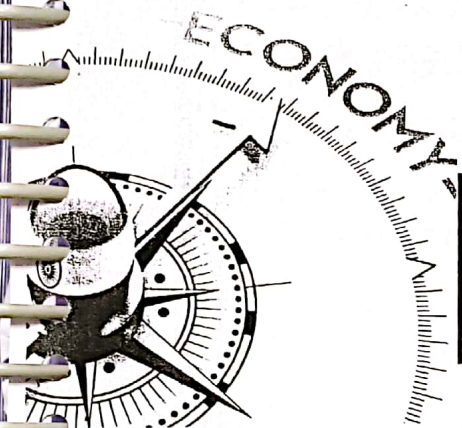
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Solvent Extraction and Spectrophotometric Determination of zinc (II) with N,N'-Bis (salicylaldehyde) ethylenediamine [salen].

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ABSTRACT

A method for solvent extraction and spectrophotometric determination of zinc (II) with N, N'-Bis(salicylaldehyde) ethylenediamine (salen) has been studied. The method is based on formation of Zn-N,N'-Bis(salicylaldehyde) ethylenediamine (salen) complex. Here Zn act as metal and N,N'-Bis(salicylaldehyde) ethylenediamine (salen) act as ligand .The absorption spectra of Zn(II)-salen complex extracted at different pH and it was found to be maximum at pH 7 and measured against reagent blank .The light yellow Zn(II)- N,N'-Bis(salicylaldehyde) ethylenediamine (salen) complex solution show maximum absorption at 410 nm .

Keywords: Solvent extraction, Spectrophotometer, Zinc, N, N'-Bis(salicylaldehyde) ethylenediamine (salen) , pH .

INTRODUCTION

Introduction and historical aspects of Solvent Extraction: Solvent or liquid-liquid extraction is based on the principle that a solute can distribute itself in a certain ratio between two immiscible solvents, one of which is usually water and the other an organic solvent such as benzene, carbon tetrachloride or chloroform. In certain cases the solute can be more or less completely transferred into the organic phase. The technique can be used for purpose of preparation, purification, enrichment, separation and analysis, on all scales of working, from microanalysis to production processes.

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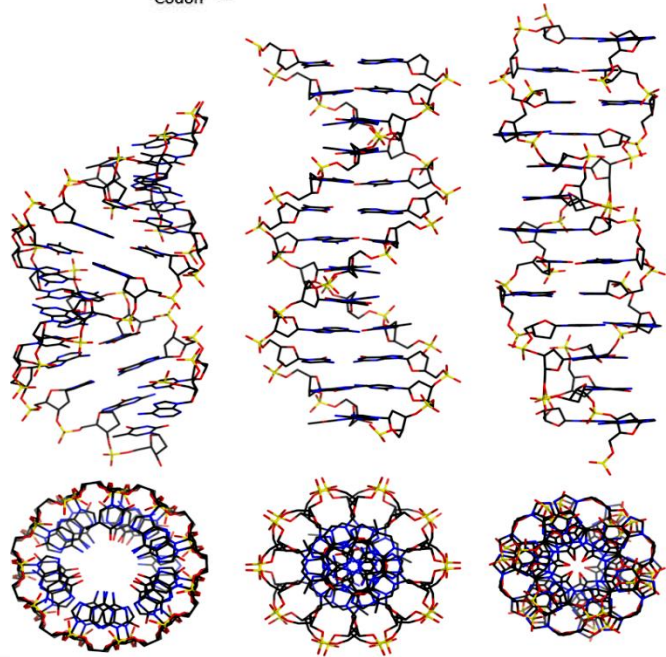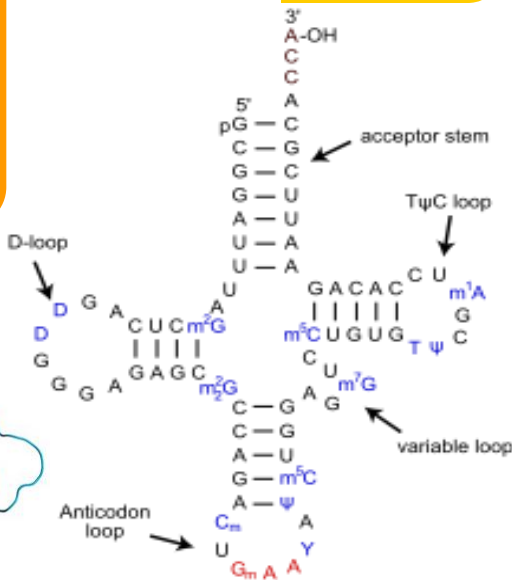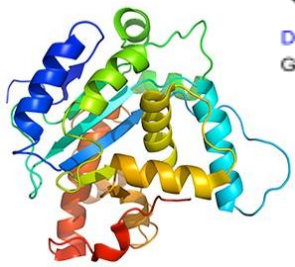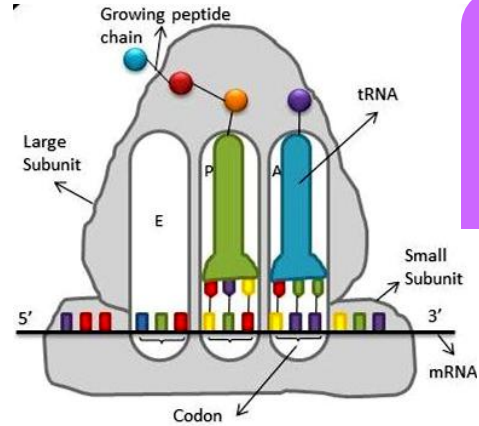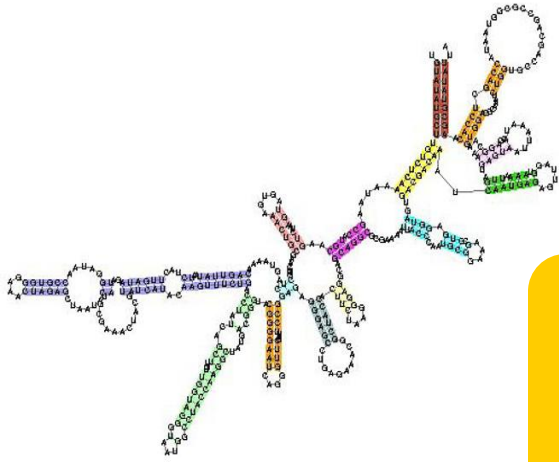
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