Online ISSN: 0975-5861
Print ISSN:0975-5861

Global Journal

of Researches In Engineering : C

Chemical Engineering

DISCOVERING THOUGHTS AND INVENTING FUTURE

Volume 11
Issue 7
Version 1.0

Highlights

- Tubular Technologies
- Physico-Chemical
- Carbon Sequestration
- Chemical Analysis

Global Journal of Research in Engineering : C
Chemical Engineering

Global Journal of Research in Engineering : C
Chemical Engineering
Volume 11 Issue 7 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

*(A Delaware USA Incorporation with "Good Standing"; **Reg. Number: 0423089**)*

Sponsors: *Open Association of Research Society*
Open Scientific Standards

Publisher's Headquarters office

Global Journals Inc., Headquarters Corporate Office, Cambridge Office Center, II Canal Park, Floor No. 5th, ***Cambridge (Massachusetts)***, Pin: MA 02141 United States
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Open Association of Research Society, Marsh Road, Rainham, Essex, London RM13 8EU
United Kingdom.

Packaging & Continental Dispatching

Global Journals, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investers@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Including by Air Parcel Charges):

For Authors:
22 USD (B/W) & 50 USD (Color)
Yearly Subscription (Personal & Institutional):
200 USD (B/W) & 250 USD (Color)

Editorial Board Members (HON.)

Dr. Bart Lambrecht
Director of Research in Accounting and FinanceProfessor of Finance
Lancaster University Management School
BA (Antwerp); MPhil, MA, PhD (Cambridge)

Dr. Carlos García Pont
Associate Professor of Marketing
IESE Business School, University of Navarra
Doctor of Philosophy (Management), Massachusetts Institute of Technology (MIT)
Master in Business Administration, IESE, University of Navarra
Degree in Industrial Engineering, Universitat Politècnica de Catalunya

Dr. Fotini Labropulu
Mathematics - Luther College
University of ReginaPh.D., M.Sc. in Mathematics
B.A. (Honors) in Mathematics
University of Windso

Dr. Lynn Lim
Reader in Business and Marketing
Roehampton University, London
BCom, PGDip, MBA (Distinction), PhD, FHEA

Dr. Mihaly Mezei
ASSOCIATE PROFESSOR
Department of Structural and Chemical Biology, Mount Sinai School of Medical Center
Ph.D., Etvs Lornd University
Postdoctoral Training,
New York University

Dr. Söhnke M. Bartram
Department of Accounting and FinanceLancaster University Management SchoolPh.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)

Dr. Miguel Angel Ariño
Professor of Decision Sciences
IESE Business School
Barcelona, Spain (Universidad de Navarra)
CEIBS (China Europe International Business School).
Beijing, Shanghai and Shenzhen
Ph.D. in Mathematics
University of Barcelona
BA in Mathematics (Licenciatura)
University of Barcelona

Philip G. Moscoso
Technology and Operations Management
IESE Business School, University of Navarra
Ph.D in Industrial Engineering and Management, ETH Zurich
M.Sc. in Chemical Engineering, ETH Zurich

Dr. Sanjay Dixit, M.D.
Director, EP Laboratories, Philadelphia VA Medical Center
Cardiovascular Medicine - Cardiac Arrhythmia
Univ of Penn School of Medicine

Dr. Han-Xiang Deng
MD., Ph.D
Associate Professor and Research
Department Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical NeuroscienceNorthwestern University
Feinberg School of Medicine

Dr. Pina C. Sanelli
Associate Professor of Public Health
Weill Cornell Medical College
Associate Attending Radiologist
NewYork-Presbyterian Hospital
MRI, MRA, CT, and CTA
Neuroradiology and Diagnostic Radiology
M.D., State University of New York at Buffalo,School of Medicine and Biomedical Sciences

Dr. Roberto Sanchez
Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University

Dr. Wen-Yih Sun
Professor of Earth and Atmospheric SciencesPurdue University Director
National Center for Typhoon and Flooding Research, Taiwan
University Chair Professor
Department of Atmospheric Sciences, National Central University, Chung-Li, TaiwanUniversity Chair Professor
Institute of Environmental Engineering, National Chiao Tung University, Hsin-chu, Taiwan.Ph.D., MS The University of Chicago, Geophysical Sciences
BS National Taiwan University, Atmospheric Sciences
Associate Professor of Radiology

Dr. Michael R. Rudnick
M.D., FACP
Associate Professor of Medicine
Chief, Renal Electrolyte and Hypertension Division (PMC)
Penn Medicine, University of Pennsylvania
Presbyterian Medical Center, Philadelphia
Nephrology and Internal Medicine
Certified by the American Board of Internal Medicine

Dr. Bassey Benjamin Esu
B.Sc. Marketing; MBA Marketing; Ph.D Marketing
Lecturer, Department of Marketing, University of Calabar
Tourism Consultant, Cross River State Tourism Development Department
Co-ordinator , Sustainable Tourism Initiative, Calabar, Nigeria

Dr. Aziz M. Barbar, Ph.D.
IEEE Senior Member
Chairperson, Department of Computer Science
AUST - American University of Science & Technology
Alfred Naccash Avenue – Ashrafieh

Contents of the Volume

Global Journal of researches in engineering
Chemical engineering
Volume 11 Issue 7 Version 1.0 December 2011
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4596 Print ISSN:0975-5861

Expandable Tubular Technologies 'Technology Gaps and the Way Forward'

By Aladeitan, Yetunde Mariam, Adejoh, Adu Zakariah
University of Abuja, Nigeria

Abstract - Expandable tubular technologies (ETT) enable operators to explore in remote geologic regions and exploit reserves once considered unprofitable if drilled with conventional technology. In the past few years ETT has moved from a concept to a commercially viable way to solve variety of well challenges. In comparison to conventional well construction, expandable tubular technology has the potential of reducing the cost of well construction significantly and to give life to existing wellbores through capabilities for selective water shut-off, damaged casing and tubular repair by cladding .Results from practical application of ETT using various techniques have indicated that it can be applied in well bore construction, remediation and completion, all of which are main segments in well constructions. ETT's application to multilateral wells can be achieved successfully with the use of formed metal technology. Some noticeable gaps associated with ETT include connections, corrosion, collapse, expansion force and annular sealing. Solutions are however being provide to eliminate these shortcomings.

Keywords : *Expandable tubular technologies, Expandable tubular,slotted expandable tubular, solid expandable tubular, annular sealings, material selection, pressure intensifiers,swelling elastomers and multilateral well junction stability*

GJRE Classification : *FOR Code: 050299*

Strictly as per the compliance and regulations of :

Expandable Tubular Technologies 'Technology Gaps and the Way Forward'

Aladeitan, Yetunde Mariam [α], Adejoh, Adu Zakariah [Ω]

Abstract - Expandable tubular technologies (ETT) enable operators to explore in remote geologic regions and exploit reserves once considered unprofitable if drilled with conventional technology. In the past few years ETT has moved from a concept to a commercially viable way to solve variety of well challenges. In comparison to conventional well construction, expandable tubular technology has the potential of reducing the cost of well construction significantly and to give life to existing wellbores through capabilities for selective water shut-off, damaged casing and tubular repair by cladding .Results from practical application of ETT using various techniques have indicated that it can be applied in well bore construction, remediation and completion, all of which are main segments in well constructions.

ETT's application to multilateral wells can be achieved successfully with the use of formed metal technology. Some noticeable gaps associated with ETT include connections, corrosion, collapse, expansion force and annular sealing. Solutions are however being provide to eliminate these shortcomings.

Keywords : Expandable tubular technologies, Expandable tubular,slotted expandable tubular, solid expandable tubular, annular sealings, material selection, pressure intensifiers,swelling elastomers and multilateral well junction stability.

I. Introduction

The concept of expandable tubing is not particularly regarded as a new one. In fact it is said to have been used for many years in the boiler industry as a core technology, (Benzie et al, 2000). The use of expandable tubing in downhole applications back to the late 1800's (Benzie et al, 2000).Expandable tubing nevertheless became more prominent in the oil and gas industry due to the increasing pressure to provide reasonably priced oil from mature fields such as the north sea and in high cost areas such as deepwater in order to meet the increasing demand for hydrocarbons which has continuously been upward over the years.

It is interesting to note that despite the rapidly evolving technologies, important issues that challenge the oil and gas industry include conservation of hole size, economic feasibility of crude production and maximisation of well life. It seems therefore that the development of expandable tubular technologies (ETT) which is although short but fast paced and commenced by Shell, in the 1980's so as to overcome the telescopic nature of well designs which has been a limitation since wells were first drilled in the mid-nineteenth century was envisioned by Shell engineers as a technology that would eventually result in a single-diameter wellbore that would deliver well cost savings in the order of 30% to 50% long term, (Wright 2003). ETT was initiated by the need to reduce the cost of drilling wells, to enable operators to access reservoirs that could otherwise not be reached economically without the use of expandable wellbore tubulars and to increase the production of tubing constrained wells. Furthermore, the significant losses of internal diameter experienced by operators in the course of normal drilling process, during re-entry and deepening of existing wells, or during installation of additional casing string to remediate well problems are largely curtailed through ETT. Other reasoning underpinning the development of ETT includes its proven ability to improve safety; and minimise environmental cuttings handling and drilling rig footprints.

Since the development of expandable tubular technologies, its application has moved rapidly from a deepwater technology to a technology that has been embraced by operators in many basins. As at present only 22% of the installations have been in deepwater whilst more than 65% of its utilisation been on land. (Wright 2003)

In comparison to conventional well construction which requires telescoping of the well size from the well head down to the reservoir thereby resulting into large expensive surface casing, wellhead trees and other operating equipment, this method can result in an unworkable small hole size at the required depth. Expandable tubular technology has the potential of reducing the cost of well construction significantly and to give life to existing wellbores through capabilities for selective water shut-off, damaged casing and tubular repair by cladding. ETT therefore allow operators to explore in remote geologic regions and exploit reserves once considered unprofitable if drilled with conventional technology.

A common practice in the process of ETT is the use of "specially designed pigs or mandrels" to expand tubular diameter in order to reduce well tapering while preserving borehole sizes. This way the life of mature field is increased by internally cladding existing wellbores to isolate troublesome zones. Expandable pipe or tubulars therefore shares the ability for expansion after downhole installation. In simple terms,

Author [αΩ] : Faculty of Engineering, Chemical Engineering Dept., University of Abuja, Nigeria.
E-mail : yetty76@yahoo.com, E-mail : grewbuller2010@gmail.com

the process involves expanding the steel by cold working it downhole to the desired diameter. Expandable technologies refer to both **slotted and solid expandable tubular**, associated tools and accessories, and systems used to expand the specially manufactured pipe.

In summary, the technological development of expandable was driven from a business perspective by offshore high-pressure/high temperature activities (Stewart 1999) and initiated by a need to:

- Increase depth and reach capability of well designs to access reservoirs, which are impossible or difficult to reach (e.g. high pressure zones, deepwater environments and troublesome subsalt zone) with the use of conventional well design.
- Reduce the cost of drilling by a large percent.
- Increase the production capability of tubing constrained wells.

II. Fundamentals of Expandable Tubing

The five major components of the expandable solid tubing system are the expansion cone, threads, material, annular seal and expansion mechanisms. Each one of them affects the performance of the other components. The basic principle is such that when expanded tubing is forced over the expansion cone during expansion process, the expansion cone radius and angle as well as the material characteristics would determine the amount of surplus expansion and the amount of the subsequent relaxation of the material expanded. Combination of expansion cone radius, materials, guage tolerance of the openhole or casing within which the tubing is to be expanded all determine the expansion forces and tolerances, or fit of the final expanded product in the wellbore.

The two major types of expandable tubular are expandable slotted tubular and expandable solid tubular.

Expandable slotted tubulars (EST) are usually made from steel; they have slots which are in an overlapping periodic pattern, cut in axial direction. Unlike expandable solid tubular (SET), EST require a much lower expansion force , the slots open and the plastic deformation is concentrated around the fingers at the end of the slots. EST technology has been made available to the industry through conventional service companies like Petroline. The expansion principle is based on bending the metal strips between 2 overlapping slots, and expansion forces are consequently low (approximately 10 tonnes). Bending the strip allows the slots to open into diamond shape resulting in an increased pipe diameter while wall thickness remains the same; the length is reduced by about 2%. Expandable slotted tubular technologies are a metal - to –rock expansion which has 3 major applications i.e. expandable sand screen system; alternative borehole liners and expandable completion liners.

Expandable solid tubulars are wellbore tubulars that are produced from ductile steel of conventional strength. Its ductility is as such that its diameter can be increased by tens of percent downhole. Expandable solid tubulars (SET) can also be made of titanium or aluminium because of their ductile nature.

III. Principles of Solid Tubular Expansion

For a solid tubular to expand, a conventional material selection criteria like corrosion resistance and strength is required. The ductility of the material from which it is made should be able to sustain tens of percent of plastic deformation and should be able to strike a balance with regards to expansion and post expansion processes. It is worth noting that the metallurgical process that increases strength in the solid tubulars tends to reduce its ductility. As a result a suitable alloy compositions and heat treatment procedures have to be chosen to ensure a combination of high ductility and strength of the expandable well bore tubular. The basic piece of equipment that underlies solid expansion technology is a mechanical expansion device known as an expansion cone (Stewart et al) which is propagated through downhole tubulars using hydraulic pressure. Cone movement expands the tubulars to the desired internal and external diameters in a plastic-deformation process known as cold-forming. To ease the expansion process, the inside diameter of the tubing must be lubricated to allow the expansion cone to move smoothly through the tubing thus minimising the chance of galling and reducing frictional force. Below are some expected capabilities of downhole expansion:

- Expand long section of tubulars at high rates.
- Maintains integrity of expanding tubulars connections.
- Achieve constant diameter and wall thickness of the expanded tubular over whole length of expanded section.
- Expansion of tubular to desired diameter without damaging or bursting the tubular.
- Maintaining hydraulic capabilities of the expanded tubular to provide sufficient resistance to burst and collapse loads in service.

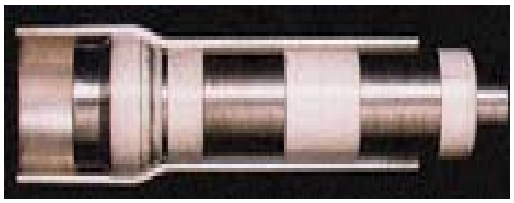


Fig 1 : Early expansion cone used to expand solid expandable tubulars (Fillipov et al 1999)

Table 1: illustrates the differences between expandable solid tubular and expandable slotted tubular

	Expandable slotted tubular	Expandable solid tubulars
Slots	Consists of periodic overlapping slots cut in axial direction	No Slots present
Expansion force	Less force	Higher expansion force
Wall thickness after expansion	reduces	constant
Tubular length after expansion	Reduces	constant
Concentration of plastic deformation	Finger at the end of the slots	Entire wall thickness

IV. Well Design with Expandable Tubular

Because the production capacities of most wells are halved through the use of production tubular, the constructions of large wells are therefore design to install relatively small production casings which results in pronounced telescopic profile of conventional well designs and thereby offering limited scope for major reductions in the cost of well construction.

It is obvious that in order to reduce well construction costs by tens of percent the implementation of radically new well designs are required. Expandable wellbore tubulars forms the basis of one such concept.

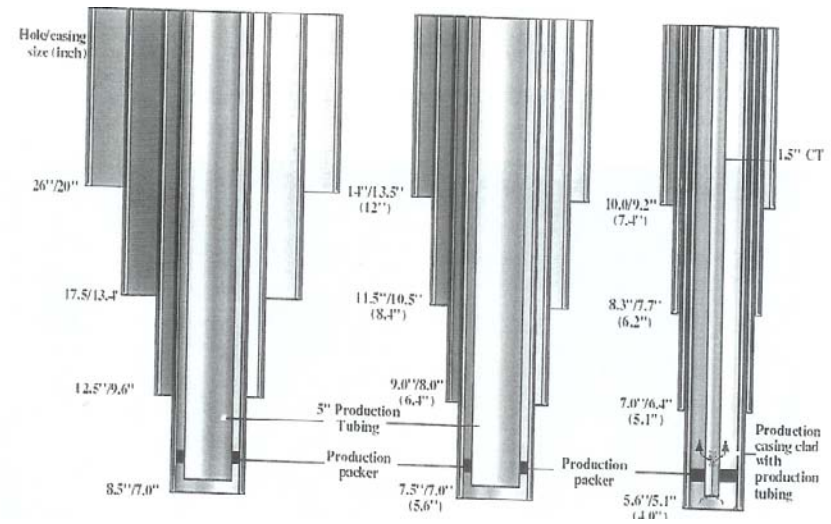


Fig 2 : a comparison of well designs with the same production capability.(Stewart et al 1999)
Left: Conventional telescopic well design
middle: Well design with casing expanded by 25% in outer diameter.
Right: Well design with expanded casing and clad production

V. Applications of Expandables

There are various applications for expandable tubing. Some of these applications include casings, liners sand screens etc. Even though expandable products are unique and very interesting in their concept and installation, they have little value if cost effective applications are not the end result of the development of this technology. The application of the technology in the subsurface environment has the potential of significantly reducing surface and subsurface costs and increasing the return on investments of the operating companies. Probably the most important advantage of expandable technology is that it is an "enabling" technology considering the fact that currently certain wells cannot be drilled to their objectives without solid expandable tubular technology. Expandable tubular technology can be applied in these three main application segments.

(i) Well bore construction; (ii) Remediation and (iii) Completions

Well bore construction: Expandable tubing can be used in the open liner hole as a temporary drilling liner or as permanent liner tied back to the previous casing string. Where a contingency liner is required, temporary liners can be used. A good example of these may include deepwater and high pressure wells where there is very low tolerance between the formation pressure and fracture pressure. In this case the temporary liner used allows the operator to reach total depth without losing hole size. Expandable tubing can thus be used as a permanent liner and include a tie back into the previous liner or casing thereby replacing the conventional liner hanger.

Remediation: Application of ETT for remediation purposes deals with the repairing of casing, production

tubing or sand screens, it can also be used for sealing off perforations. In which case the solid tubing are expanded inside the casing to seal leaks or in the repair of corroded or eroded sections of casing or tubing. In remediation process, "clads" whether light weight or heavy weight can be used to shut off perforations in cased hole and also used to shut off non-producing zones in the sand screens or to repair damaged sand screens.

Completions: Sand exclusion mechanism was one of the first commercial usages of expandable tubing well completions. In sand exclusion mechanism, the slotted tubing is expanded against the sand face, this mechanism is an improvement over the conventional sand exclusion mechanism because of the higher productivity and this is possible because of the larger effective in-flow area provided by the expandable screen, and the reduced chance of premature screen failure given the close tolerance between the expanded screen and the sand face.

VI. Gap Analysis

In order to reveal the weakness and strength of expandable tubular technologies, a gap analysis is conducted so as to have a better understanding of the dynamics of the exploration and production competitive environment and to develop ways of staying ahead in the area of technological development. The gap between the conventional technology and the already existing expandable tubular technologies would be identified, after which suggestions would be provided to close the existing gap by developing a process of change and ways of managing the process of change from the already existing technologies to the improved technologies. Thereafter, the process of change is monitored so as to ensure that the same gap does not appear again and, if possible to open a favourable gap with the competition. (Ambrosini et al 1998)

Some pertinent issues arising from the literature, practical application of expandable tubular technologies which can be considered as a gap and therefore worth analysing are as follows:

a) Connections

Most connections available are not gas tight connections i.e. there are always gas leakages from the connection and would therefore be a worthwhile issue to analyse in order to find suitable solution to this apparent set of expandable tubular technologies.

b) Collapse

This is a very important issue in the oil and gas industry. Although expandable tubulars are made of highly ductile material to enable it expand however, its main problem is the post expansion characteristics of the expandable tubular i.e. the strength and wall thickness, the collapse of tubular increases after expansion, this make it weak to withstand pressure exerted on it. The material used to make the tubular can also be altered so as to reduce the collapse of the post expanded tubular.

c) Expansion force

The fact that very high pressures are required to expand the tubulars and the cost of generating the required pressure can be very high and therefore makes it imperative to find a good solution and one such good solution that can be applied is the use of pressure intensifiers to increase the applied pressure. By so doing only the pressure applied to the pressure intensifier will be needed and this pressure is in turned increased. This method can help cut cost in the oil and gas sector.

d) Corrosion

Since the oil and gas industry place so much emphasis on safeguarding exploration and production equipment from quick and immediate corrosion, the implication of expandable tubulars during expansion as the cone rubs against the tubular is such that metal is been removed and deposited. This phenomenon is known as galling. The exposed surface where metal removal has taken place now becomes susceptible to corrosion. Corrosion can be very expensive and cost the oil and gas industry millions of dollars. A way of saving cost and combating this problem is to electroplate the metal surface with chrome in order to prevent galling and consequently preventing corrosion to takes place.

e) High temp high pressure well

Unfavourable conditions like high temperature and high pressure can pose a lot of problems like tubular collapse, corrosion amongst others.

f) Multilateral wells junction stability

Expandable tubular technology can be applied successfully in well completion but there are a few issues that can complicate the process. A very crucial issue to be considered is sealing of the multilateral junction. Depending on the construction method, the junction can offer either or both mechanical integrity (a barrier between formation and well bore pressure)(Ohmer et al 2001). The ultimate goal is a junction with full mechanical and hydraulic integrity provided by the casing itself, without the aid of cement. Multilateral junction connectivity failures have been identified as a recurring risk when deploying junctions featuring casing windows in unstable formations. When a junction experiences a connectivity problem, usually because unstable formations induce mechanical loads, solids can intrude and expected junction geometry can deteriorate. Borehole stability has been the subject of study for more than two decades now because of a great number of problems associated with the construction of petroleum boreholes and the subsequent production or injection of fluids, (Fuentes, J.A et al 1999). If two cylindrical bodies intersect at a very shallow angle, the junction geometry amplifies pre-existing mechanical stresses that are generated in the course of drilling and production operations. This

phenomenon suggests that the geo-mechanical forces at a junction may be a root cause of junction collapse.

VII. Conclusions and Recommendations

The foregoing analysis indicates that the development of expandable tubular technology was in part driven from a business perspective and also initiated by a need to increase depth and reach capability of well designs to access reservoirs, which are impossible or difficult to reach (e.g. high pressure zones, deepwater environments and troublesome subsalt zone) with the use of conventional well design; to reduce the cost of drilling by a large percent and to increase the production capability of tubing constrained wells. The potential benefits of expandable tubing extend far beyond the advantages outlined above. In practice this technology has replaced the conventional technology in wellbore construction and this may not be unconnected to its advantages.

Whilst expandable tubular technology promises to be an enabling technology that leads to standardised well and allows the concept of disposable exploration well to be realised, it is however associated with varied problems. Nevertheless, the technology could be advanced further and improved upon.

There are various areas in which the technology of expandable tubular technology can be improved and they include the following;

a) Annular sealing

The use of expanding cements for improving the sealing efficiency of annulus cementing has been considered for a long time as a possible solution to the existing problem of leakages and fluid loss. This is important because environmentally compatible, safe and economical production from oil and gas wells depends in an essential manner on flawless cementation of the installed casing string whose function is the prevention of fluid and gas flow through the annuli among other items. The requirements of annulus cementing can be satisfied only if the cement ensures an impermeable bond between the casing string and the surrounding rock and exhibits sufficient compressive and shear bond strength until the ultimate plugging of the well. Gas and fluid motions in the annulus are continual but often slow processes which are consequently detected late or not at all. It is not uncommon for migration from the payzone to build-up at the wellhead. In practice, definite effects of leakage can occur in comparatively short liner cementation in gas wells and in combination with insufficient sealing of the liner hanger, the gas often can easily penetrate into the production tubing. The formation of voluminous Ca $(OH)_2$ and Mg $(OH)_2$ crystals on the surface of the cement particles which resulted in matrix expansion by more than 10% even under a hydrostatic pressure of 120Mpa and at borehole temperatures up to 175°C. Calcium oxide(CaO) and magnesium oxide(MgO) additives exhibit effective matrix expansion, even under hydrostatic pressures up to 120Mpa. The improved shear bond strength values of such cements indicate effective bonding of the cement at the interfaces with the casing and formation, and that superior sealing action can thus be achieved. The permeability studies on the system comprising the hardened cement paste and steel pipe essentially confirm this conclusion (Ghofrani and Plack 1993).

b) Swelling elastomers

Swelling elastomers are used extensively throughout the industry (Braas et al 2003). A swelling elastomer has been identified as a potential method of increasing the sealing OD range of openhole clad. The swelling is based on contact between the elastomer and has the potential of doubling the seal thickness after downhole deployment. The swelling rate downhole is determined by pressure and temperature as well as the composition of wellbore fluids. Fast rates of swelling are preferred, to reduce waiting time to a minimum before the seal becomes effective. Swelling rates should however not be too fast, as this might prevent running the OHC to depth.

Fig 3 : Swelling elastomers. Original thickness: steel 4mm, rubber 3.6mm (left); 66% swelling (middle); 118% swelling (right), (Braas et al 2003).

Better annular sealing can also be achieved chemically by the use of production chemistry processes which affect the formation. A good example of this is the use of permeability modifier to modify the permeability of the formation in order to prevent fluid loss.

c) Galling prevention

This can be done by thin dense chrome plating. It is achieved by chrome plating the tubular in thickness ranging from 0.000025 to 0.0005 (0.000635-0.0127 mm). The electro-alloy thin dense plating process is an alternative to standard chrome plating, which may develop tiny cracks and thereby allow a corrosive liquid or gas to penetrate to the base metal and attack it. Thin dense chrome is hard chrome which is so thin and it has not yet built up enough stress to cause cracking and therefore has good corrosion resistance. It uniformly deposits dense, high chromium, non-magnetic alloy on the surface of any metal without measurably changing the micro-inch value of the base metal. This process of chrome plating offers design engineers an efficient means of improving the performance of the expansion process of expandable tubulars. In addition to preventing galling it perform the following functions.

- Lengthens service life
- Increases lubricity
- Permits use of similar opposing surface
- Results in significant savings in time, labour and replacement parts.

Among other things it is characterised by:

- Remarkable wear resistance
- Extremely low coefficient of friction
- Smooth sliding properties
- Excellent anti-seizure characteristics
- Beneficial corrosion resistance.

The plating can be applied in thickness ranges from 0.000025 to 0.0005 inch with a tolerance of (+/_) 10%. The precision electro-chemical deposition takes place in a special fluoride bath to assure a positive, lasting bond between the base metal and the surface. The minimum deposition thickness prevents hydrogen build-up that often plagues plating. This deposition takes place at low temperatures, generally less than 140°F, and is applicable to all ferrous and non-ferrous metals without causing distortion. A uniform electro-alloy can be applied to the internal and external surfaces of metal parts having varied configurations. The plating's main attribute in wear resistance is its low coefficient of friction which means less drag and therefore less heat is generated as the expansion cone rubs against the expandable tubular. It is applicable to virtually any environment ranging from –425°F to greater than 1150°F ambient. It can be used to treat base metal for improved performance, or it may be combined with a less expensive base metal as a substitute for corrosion resistant steel, thereby generating considerable savings in material cost. The three important advantages which are put to use in a wear situation are that it is very hard; it is very slippery; and it is resistant to most industrially corrosive environment.

d) Pressure intensifiers

In this case the hydraulic pressure intensifiers can be used to increase the pressure applied to the expansion cone in order to expand the expandable tubular, they are used for creating pressures up to 100,000psi. Since generation of such high pressure onshore or offshore will involve the use of very special pumps which are very expensive. A very good way to reduce cost is to use pressure intensifiers during the deployment of the expansion cone down the expandable tubular. This way a lower pressure can be easily generated by the pumps and in turn could be multiplied by the pressure intensifier. Pressure intensifiers are used for creating pressure greater than those ordinarily obtained directly from either hand operated pumps or motor driven pumps, while it is unintended for high volumetric capacity, their simplicity of design makes them an economic means of obtaining high pressure

e) Material selection

Material selection is a very important factor for solid tubular expansion. A low yield material with high ductility is selected to ease the expansion process. The required energy use to expand a solid tube is approximately proportional to its yield strength. Similarly, the expansion ratio, which is the ratio of the post expansion outside diameter of the pre-expanded outside diameter, is also approximately proportional to the expansion force for a given material. The preferred range of yield strengths is between 40,000psi and 70,000 psi. It is important that the manufacturing quality of the material needs to be of a higher specification than conventional API tubing, particularly with respect to allowable defects, wall thickness, yield strength, ductility and uniformity along the length and the circumference of the tubing. During the expansion process, the material strength increases since the expansion process is a cold working of the material. However, the collapse strength of post expanded material is less than that of the pre-expanded material. This is due to a combination of factors which includes the increase in diameter, reduction in wall thickness and material changes due to the cyclic working e.g. expansion decreases the collapse rating of tubular goods, probably as a result of Baushinger effect. The Baushinger phenomenon occurs when the plastic flow in one direction (expansion) lowers the applied stress at which plastic flow begins in the reverse direction (collapse) (Choi H.J. 2009). The test data for grade L-80 indicate that, if the pre-expansion and post-expansion dimensions are the same, collapse resistance should decrease by about 30% as a result of the expansion process. Collapse test data on 5 ½ inch x 17lb/ft grade L-80 show that post-expansion collapse resistance was near or slightly below the minimum required by API Bulletin 503. Fortunately, studies have shown that a significant portion of material's initial collapse resistance can be recovered in situ through a special process under development. For example, application of this process to 20% expanded L-80 casing resulted in a 48% increase in post expansion collapse resistance. The expansion process appears to have no detrimental effects on burst strength. Burst pressure of expanded L-80 casing meets or exceeds general formulae expectations, and the fracture surface of all samples tested has shown ductile fracture behaviour. (Choi H.J.2009).

Since the collapse strength of the post expanded material is less than the collapse strength of the pre-expanded material, it implies that the low collapse strength of the post expanded material will constitute a major problem. A very good way to increase the collapse strength of the post expanded material is to increase the wall thickness of the pre-expanded solid tubular. By so doing, after expansion, the post expanded material will have a higher collapse strength and therefore prevents the solid expandable tubular from collapse.

Selection of the proper materials for the mandrel or pig assembly is very crucial. The working piece, the cone is subjected to high interfacial stresses as it expands the pipe. The shape of the cone and lubrication of the cone that interface with the tubular product are also critical to successful performance.

Materials for the components of the expansion assembly are chosen for sufficient strength, ductility, impact toughness, and resistance to galling, wear, and environmental cracking.

The performance of standard grades of steel tubulars after its subjection to permanent expansion (up to 20%) was previously unknown. Initial laboratory experiments included flaring tests, much more meaningful than tensile tests for determining the suitability of the various API 5CT grades for expansion. Seam-Welded products were the initial expansion studies because their wall thickness is more easily controlled.The knowledge of post expansion mechanical properties is imperative for the accurate service rating of the tubular product under evaluation. Post expansion strength, ductility, impact toughness, collapse, and burst have been studied for selected sizes of pipe and compared to the same values for the pipe as received. The data show that the expansion process does, indeed affect the mechanical properties of the material. Ultimate tensile strength tends to increase, and elongations tend to decrease, with expansion- natural results of cold-working the metal.

The convergence of a number of technologies will further advance the technology and application of expandable tubing, an example of this convergence is the use of formed metal technology in multilateral wells, this in turn create the desire to begin the process of designing fit for purpose wells using expandables as the enabling technology. The continued use of expandable products and the rapid development of a broader range of solutions will lead to the use of expandables more and more on a well design basis rather than on a contingency basis.

References Références Referencias

1. Ambrosini, V., Johnson, K. & Scholes (1998) Exploring Techniques of Analysis and Evaluation in Strategic Management.
2. Benzie, S., Burge, P. & Dobson, A (October 2000) Towards a Mono-Diameter Well-Advances in Expanding Tubing Technology. SPE 65184
3. Braas, J.C.M., Aihevba, C.O., Van Noort, R.H. & Baaijens, M.N. (2003) Water production Management – PDO's Successful application of Expandable Technology . SPE 81489
4. Fillipov.A, Mack.R, Cook.L, York.P, Ring.L & Mccoy.T (1999) Expandable tubular solutions. SPE 56500.
5. Fuentes, J.A., Economies, N.J., and Carbonell, R.S.: " Stability of junctures for Multilateral/Multibranched Wells," paper SPE 57279 presented at the 1999 SPE Improved Oil Recovery Conference, Kuala Lumpur, Malaysia, 3-6 October.
6. Ghofrani Reza and Plack, H (1993) " CaO and or MgO Swelling Cements: A Key for Providing Better Annular sealing? SPE/IADC 2569.
7. Hogg,W.C, Mann.T.A., Helmer,K.M., Pieroni, A.R.(1999) Use of Formed Metal Technology to Provide Low-Risk Solution to High-End Multilateral Completion Challenges. SPE 56669.
8. Choi H.J. (2009), Material selection for smart well completions with conjunction with Expandable Casing Technology.
9. Ohmer, H., Brockman, M., Gotlib, M., Varatharajan, P., (2001). Multilateral junction Connectivity Discussion and analysis
10. Stewart.R.B, Marketz.F, Lohbeck, Fischer.F.D, Daves.W, Rammerstorfer.F.G & H.J. Bohm,(1999) Expandable Wellbore Tubulars. SPE 60766-MS
11. Wright, T. R. (February 2003), Expandable Tubular Technology: Transforming the force of Well Construction and Completion by Gulf Publishing Company, available online at www.worldoil.com (Accessed February 15, 2004).

This page is intentionally left blank

Global Journal of researches in engineering
Chemical engineering
Volume 11 Issue 7 Version 1.0 December 2011
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4596 Print ISSN:0975-5861

Physico-Chemical Characteristics of Water from Hand Dug Wells in Tudun Wada, Kaduna-Nigeria

By Abdullahi, M. E, Abdulkarim, B. I, Adejoh, A. Z
University of Abuja, Nigeria.

Abstract - Physico - chemical characteristics of water from five different hand dug wells in Tudun wada, Kaduna-Nigeria (Mando road, Rigasa road, Jada road, ungwan sanusi and Faskari road) in Tudun wada, Kaduna were investigated. The results of the physical parameters (pH, temperature, turbidity, conductivity and total dissolved solids) of the water samples analyzed suggest the suitability of the water for domestic and other uses. However, results from the analysis of the chemical properties such as total hardness, sulphates, chloride and nitrates give values above the world health organization standard for drinking water quality for some wells.

Keywords : *Hand dug well, Physico-chemical characteristics, water quality.*

GJRE Classification : *FOR Code: 050299*

Strictly as per the compliance and regulations of :

Physico-Chemical Characteristics of Water from Hand Dug Wells in Tudun Wada, Kaduna-Nigeria

Abdullahi, M. E[α], Abdulkarim, B. I[Ω], Adejoh, A. Z[β]

Absrtact - **Physico - chemical characteristics of water from five different hand dug wells in Tudun wada, Kaduna-Nigeria (Mando road, Rigasa road, Jada road, ungwan sanusi and Faskari road) in Tudun wada, Kaduna were investigated. The results of the physical parameters (pH, temperature, turbidity, conductivity and total dissolved solids) of the water samples analyzed suggest the suitability of the water for domestic and other uses. However, results from the analysis of the chemical properties such as total hardness, sulphates, chloride and nitrates give values above the world health organization standard for drinking water quality for some wells.**

Keywords : Hand dug well, Physico-chemical characteristics, water quality

I. Introduction

According to WHO (2007) about 1.1 billion people lack access to an improved drinking water supply. In most cities, towns and villages in Nigeria, valuable man-hours are spent on seeking and fetching water, often of doubtful quality from distant sources (Efe et al., 2005). Tudun Wada is a densely populated district of Kaduna, in north western Nigeria. The high population density, poor sanitation habits and lack of enforcement of environmental sanitation laws have contributed immensely to the pollution of water sources. This problem of acute water supply have resulted in proliferation of hand dug wells with some located within the proximity of soakaways and pit latrines.

The quality of a water resource depends on the management of anthropogenic discharges as well as the natural physico-chemical characteristics of the catchments areas (Efe etal, 2005; Saba and Baba, 2004). Also, depending on the geology of an area, underground waters are typically rich in dissolved solids especially carbonates and sulphates of calcium and magnesium. Other ions may also be present including chlorides and bicarbonates (wikipedia, 2010; Fair and Geyer, 1957). Hence, it is necessary to obtain physico-chemical characteristics of water so as to monitor water quality and to determine the type of treatment that may be required before use (Odigure and Adeniyi, 2001). Therefore, the main objective of this research is to ascertain the quality of water samples from hand dug wells in Tudun Wada, Kaduna and to recommend measures that would enhance good water quality.

Author[αΩβ] : Department Of Chemical Engineering, University Of Abuja
E-mail[α] : evutimohd@yahoo.com, E-mail[Ω] : balisa76@yahoo.com,
E-mail[β]: grewbuller2010@gmail.com

II. Experimental Proceedures

The water samples were obtained from five different wells from different parts of Tudun Wada, Kaduna. This includes Mando road, Rigasa road, Jada road, ungwan sanusi and Faskari road denoted as well 1, well 2, well 3, well 4 and well 5 respectively. The well water samples were collected using sterilized plastic containers and were covered to avoid contamination.

III. Analysis of Well Water Samples

pH, temperature, dissolved oxygen and conductivity were measured immediately at the point of sample collection to avoid changes over time. A mercury thermometer was used to determine the temperature of the samples while a digital pH meter (model ELE 3071) was used to measure the pH of the samples. METRO HM 644 conductivity meter was used to measure electrical conductivity. The turbidity of the samples was also determined using a turbidity meter. To determine the total dissolved solids (TDS), about 100 ml of each sample was filtered, and the weight of the filtrate was measured in clean dried evaporating dish of known initial weight. The filtrate was evaporated to dryness on a hot water bath and then cooled in desiccators for about 10 minutes and weighed with its content using an electronic weighing balance (METTLER COLLEGE 30). The total dissolved solid of each sample was calculated using the formula:

Total dissolved solids = (A - B)/V*100
Where A = Final weight of evaporating dish; B = Initial weight of evaporating dish;
V = Volume of water sample taken (ml).

The sulphate, nitrate and chloride content of the various water samples were determined using a programmable spectrophotometer (DR -2000 HACH). Total hardness was determined by titration method. 50ml of water sample was taken into a 250ml conical flask and 2-3 drops of erichrome black T indicator was added. The sample was then titrated against 0.1 EDTA solution (ethylene diamine tetra acetate) until a definite blue colour was obtained. The total hardness was calculated from the formula;

Total Hardness (mg/l) = $\frac{\text{vol. of titrate x 0.1 EDTA}}{\text{Vol. of sample}} \times 10^6$

IV. Results and Discussion

Physical characterization of well water samples in Tudun Wada, kaduna suggests the suitability of the water for domestic and other uses. The physical parameters analyzed in this research include pH, temperature, turbidity, conductivity and total dissolved solids (TDS). The pH of the well water samples was in the range of 6.8 to 7.5 as recommended by the world health organization (1971).

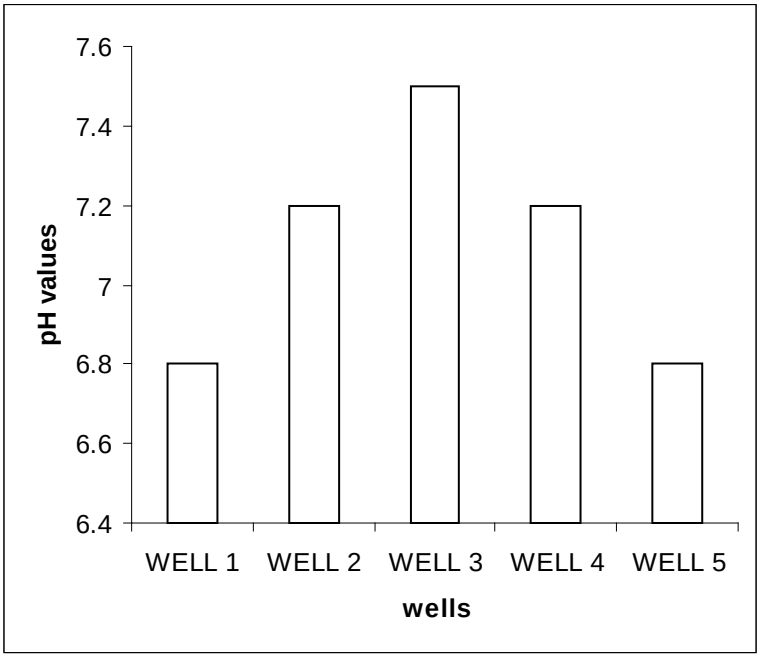


Figure 1 : pH values for the various hand dug well samples

The result obtained from the physical analysis shows that the temperatures of the well water are within the range of 24.8 °C to 26°C which is also within WHO acceptable limit of

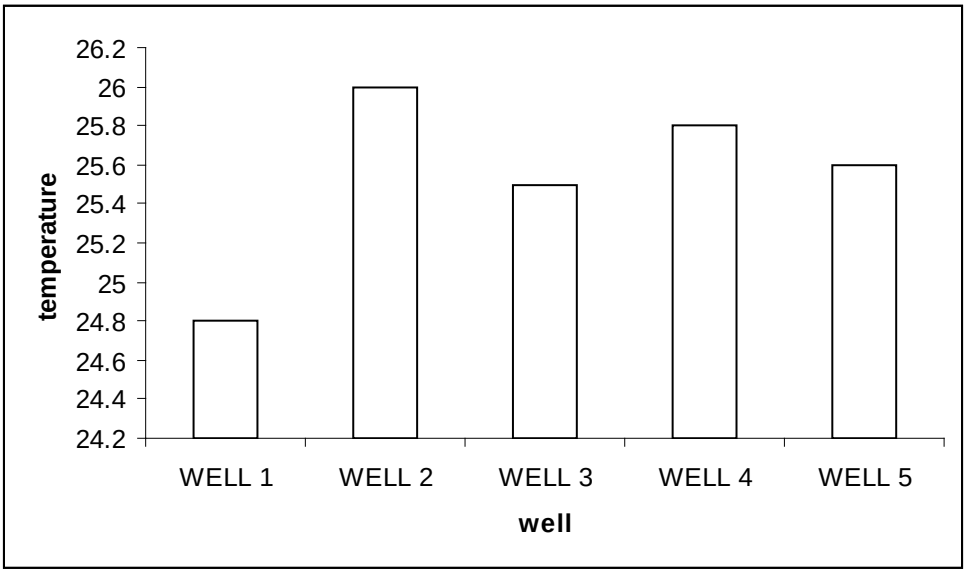


Figure 2 : Temperature values for the various hand dug well samples

From figure 3, the turbidity level of the samples ranges from 0.65 NTU in well 3 to 1.2 NTU in well 5 which are all less than the maximum allowable value of 5 NTU stipulated by the World Health Organisation. This shows absence colloidal particles.

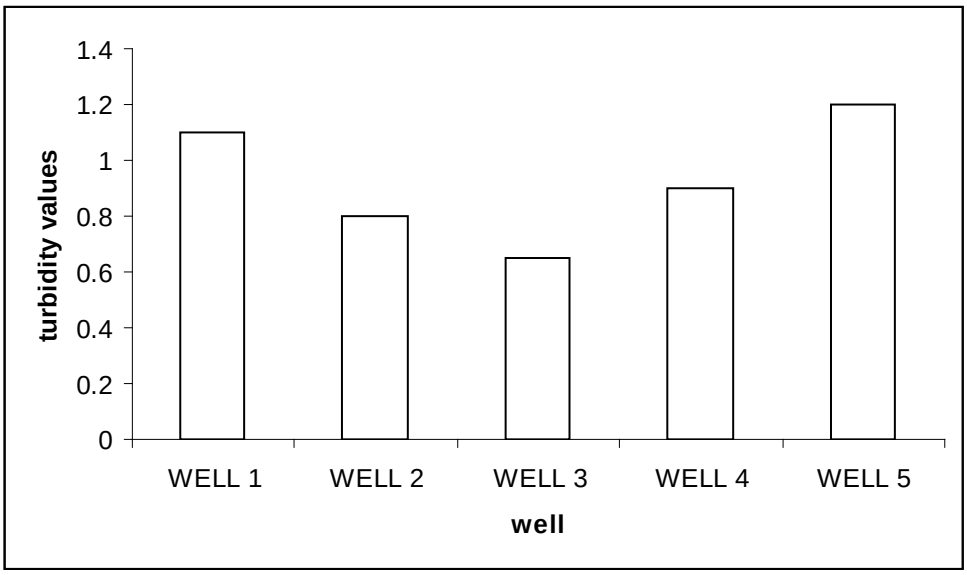


Figure 3 : Turbidity values for the various hand dug well samples

The conductivity values of the samples were generally low with the highest value of 0.22 us/cm in well 4 as indicated in figure 4.

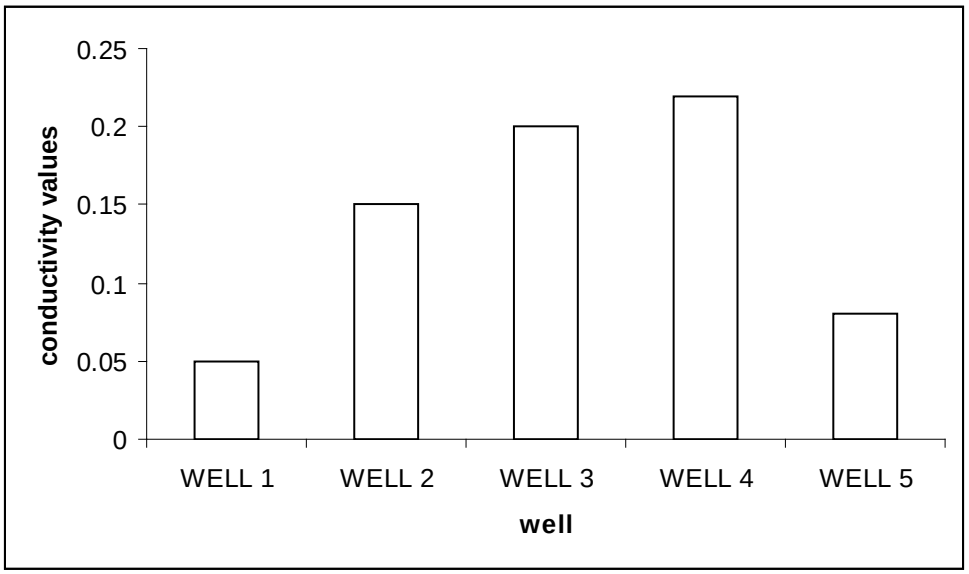


Figure 4 : Conductivity values for the various hand dug well samples

The total dissolved solid (TDS) is an indication of the degree of dissolved substances such as metal ions in the water. The TDS values for the samples are less than the maximum permissible level of 500mg/l.

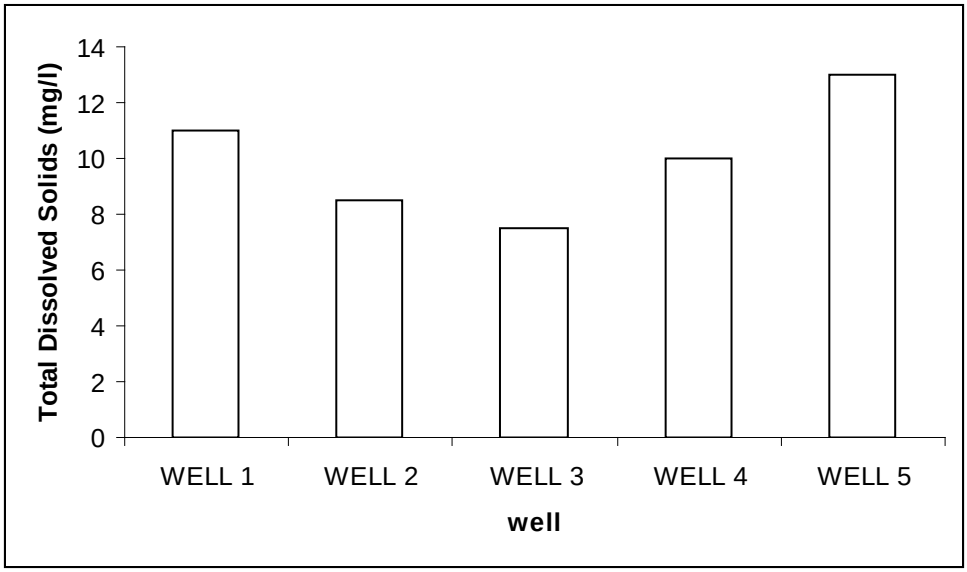


Figure 5 : Total Dissolved Solids values for the various hand dug well samples

The presence of some compounds such as bicarbonates of calcium and magnesium and sulphates, chlorides, nitrates of calcium and magnesium makes the water not to foam lather readily, such water is said to be hard. Well 1 has a high value of total hardness of 232 mg/l as compared to other samples

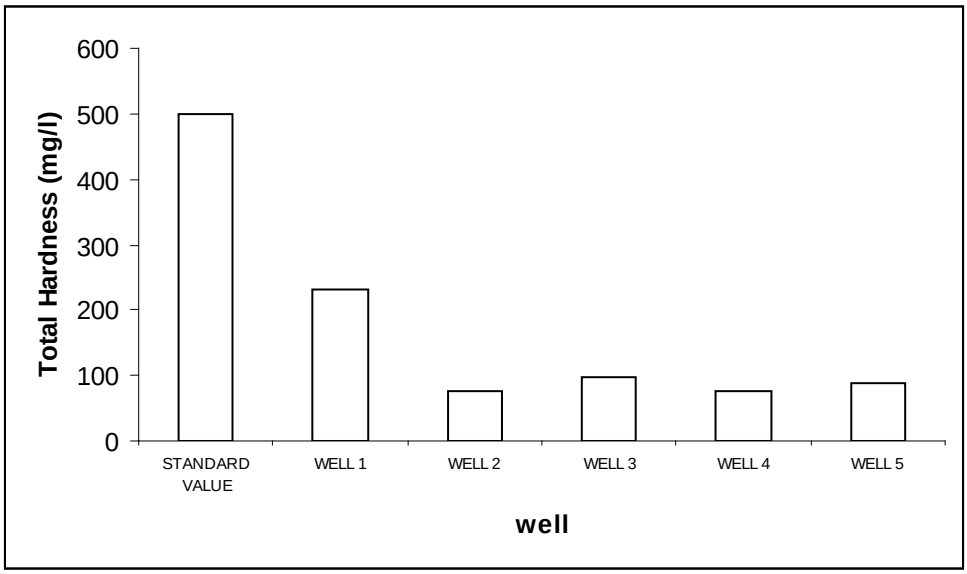


Figure 6 : Total hardness values for the various hand dug well samples

The Sulphate and nitrate concentrations in water from well 1 were also observed to be 23.2 mg/l and 53 mg/l respectively which are above the maximum permissible level for sulphate and nitrate. This is clearly indicated in figure7 and 9.

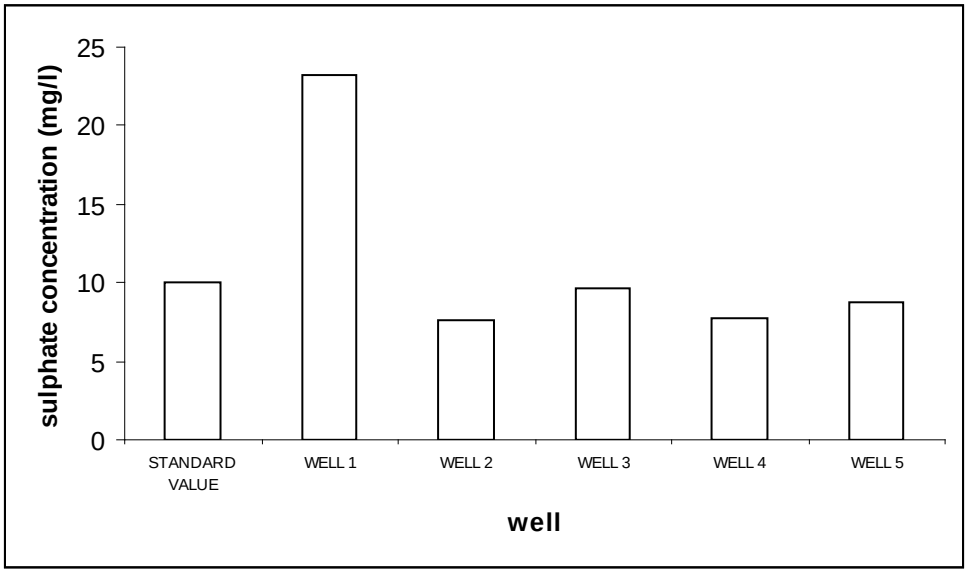


Figure 7 : Sulphate concentration for the various hand dug well samples

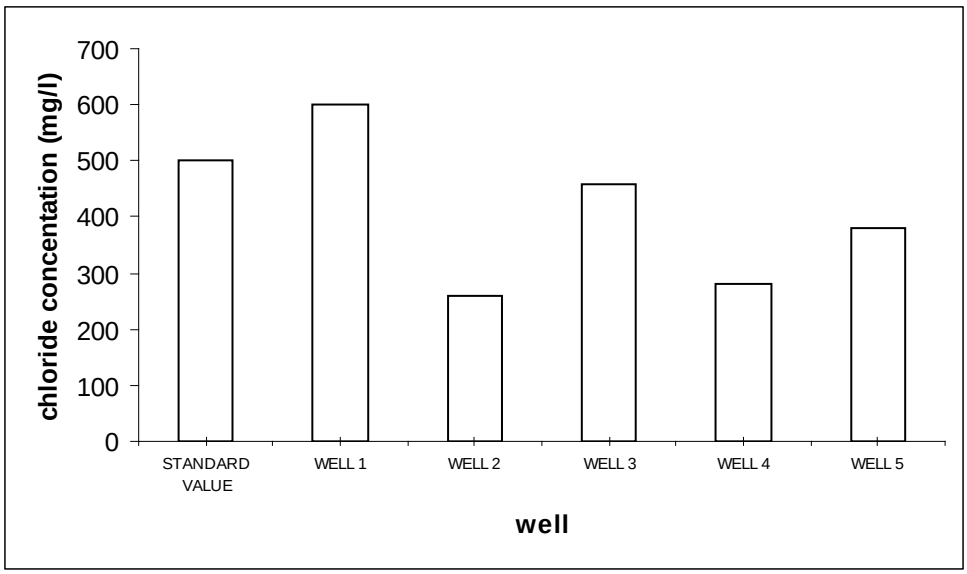


Figure 8 : Chloride concentration for the various hand dug well samples

This may due to the geological nature of the area. However, samples from the other wells have values below the permissible level.

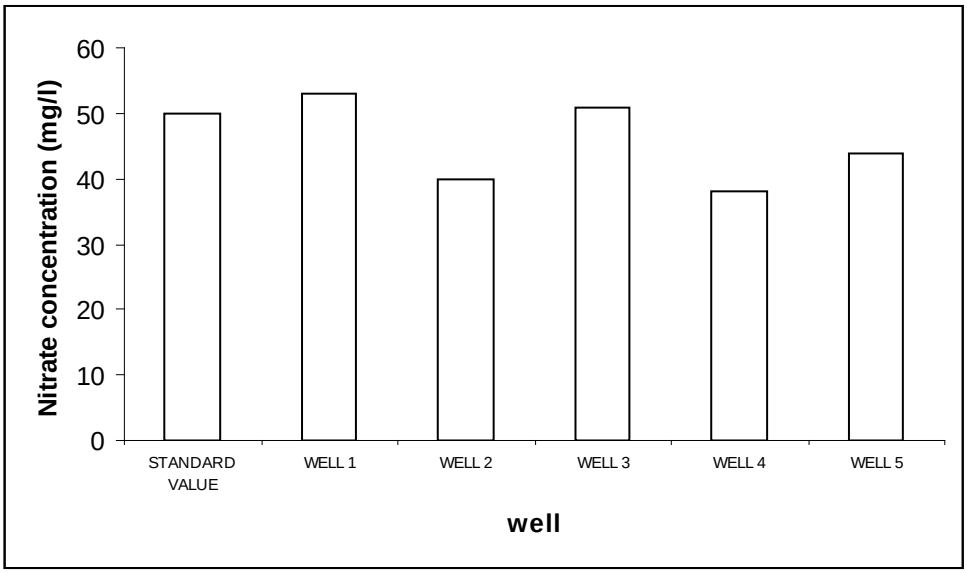


Figure 9 : Nitrate concentration for the various hand dug well samples

V. Conclusion

The results show high level of total hardness, nitrate and sulphate concentration in well water from Tudun Wada Kaduna. Therefore it can be concluded that there is need to subject well water in Kaduna to modern treatment process to improve its suitability for domestic and other uses.

References References Referencias

1. Chiroma, T.M; Ugheoke, B.I and Patrick, D.O (2007) Environmental Impact on the Quality of Water from Hand dug Wells in Yola Environs, Leonardo journal of Sciences. Issue 10 p.67-76.
2. Efe, S.I; Ogban, F.E; Horsfall, M. Jnr and Akporhonor, E.E. (2005) Seasonal Variations of Physico-Chemical Characteristics in Water Resources Quality In Western Niger Delta Region, Nigeria. Journal of applied Science and Environmental Management. Vol 9(1) p.191-195.
3. Fair, G. M and Geyer, C. (1957) Water Supply and Waste Water Disposal, John Wiley And Sons, NewYork.
4. Odigure, J.O and Adeniyi, O.D (2001) Analysis of water quality in Minna metropolis, Journal of Engineering Technology and Industrial Applications, Crosxing publishers, Kaduna.
5. Saba, A.M and Baba, A.H (2004) Physico- Chemical and Bacteriological Characterization of River Landzu, Bida, Nigeria. Proceedings of the 8th National Engineering Conference, Kaduna Polytechnic, Kaduna.
6. Wikipedia, (2010). Water Purification. http://www.wikipedia.com. Accesed on 28/02/2010 .

Global Journal of researches in engineering
Chemical engineering
Volume 11 Issue 7 Version 1.0 December 2011
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4596 Print ISSN:0975-5861

Potentiality of Carbon Sequestration in Six Year Ages Young Plant from University Campus of Aurangabad

By Chavan B. L., Rasal G. B.
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, India

Abstract - Carbon sequestration in urban sectors and forest areas is of great attention due to its concerns about global climate change. In the present investigation aboveground carbon sequestration potential of six year young age Emblica officinalis, Mangifera indica, Tamarindus indica, Achras sapota, Annona retiaculata and Annona squamosa species from the university campus of Aurangabad is measured. The aboveground biomass rate of carbon sequestered was estimated using ash method. The percentage of carbon content in the aboveground and below ground biomass i.e. leaves, stem, branches, bark and root of Emblica officinalis were 43.67%, 52.89%, 53.91%, 53.59% and 55.68% respectively, in Mangifera indica were 49.28%, 50.65%, 50.43%, 52.11 and 53.88% carbon respectively, in Tamarindus indica were 53.47%, 57.53%, 56.84%, 55.85% and 54.63% carbon respectively, in Achras sapota were 53.63%, 52.4%, 53.72%, 48.42% and 49.52% carbon respectively, Annona retiaculata were 53.67, 57.24%, 55.24 53.08% and 51.62% respectively, Annona squamosa there were 52.08%, 55.09%, 55.33%, 56.01% and 52.04 respectively. The total above ground biomass carbon stalk per hectare as estimated for Emblica officinalis was 33.07 Kg C ha-1, in Mangifera indica it was 30.6 Kg C ha-1 and in Tamarindus indica it was 36.96 Kg C ha-1 and in Achras sapota were 12.86 Kg C ha-1 in Annona retiaculata was 83.1 Kg Cha-1 and for Annona squamosa it was 73.5 Kg C ha-1 in University campus.

Keywords : Aboveground biomass, belowground biomass, carbon sequestration potential, climate change, carbon stock.

GJRE Classification : FOR Code: 050299

Strictly as per the compliance and regulations of :

Potentiality of Carbon Sequestration in Six Year Ages Young Plant from University Campus of Aurangabad

Chavan B. L.[α], Rasal G. B.[Ω]

Abstract - Carbon sequestration in urban sectors and forest areas is of great attention due to its concerns about global climate change. In the present investigation aboveground carbon sequestration potential of six year young age *Emblica officinalis, Mangifera indica*, *Tamarindus indica*, *Achras sapota, Annona retiaculata* and *Annona squamosa* species from the university campus of Aurangabad is measured. The aboveground biomass rate of carbon sequestered was estimated using ash method. The percentage of carbon content in the aboveground and below ground biomass i.e. leaves, stem, branches, bark and root of *Emblica officinalis* were 43.67%, 52.89%, 53.91%, 53.59% and 55.68% respectively, in *Mangifera indica* were 49.28%, 50.65%, 50.43%, 52.11 and 53.88% carbon respectively, in *Tamarindus indica* were 53.47%, 57.53%, 56.84%, 55.85% and 54.63% carbon respectively, in *Achras sapota* were 53.63%, 52.4%, 53.72%, 48.42% and 49.52% carbon respectively, *Annona retiaculata* were 53.67, 57.24%, 55.24 53.08% and 51.62% respectively, *Annona squamosa* there were 52.08%, 55.09%, 55.33%, 56.01% and 52.04 respectively. The total above ground biomass carbon stalk per hectare as estimated for *Emblica officinalis* was 33.07 Kg C ha^{-1}, in *Mangifera indica* it was 30.6 Kg C ha^{-1} and in *Tamarindus indica* it was 36.96 Kg C ha^{-1} and in *Achras sapota* were 12.86 Kg C ha^{-1} in *Annona retiaculata* was 83.1 Kg Cha^{-1} and for *Annona squamosa* it was 73.5 Kg C ha^{-1} in University campus.

Keywords : Aboveground biomass, belowground biomass, carbon sequestration potential, climate change, carbon stock.

I. Introduction

Carbon dioxide (CO_2) is a major contributing gas to the green house effect. It is one of the dominant greenhouse gases among them. The Kyoto Protocol prepared by the United Nations in the Framework of Convention on Climate Change stipulates Clean Development Mechanisms (CDM) and its Joint Implementation whereby storage of carbon in various terrestrial sinks may be acceptable for insertion in national greenhouse gas inventories of each nation. The increasing carbon emission is of major concerns all over the world and it has been well addressed in Kyoto protocol (Ravindranath et al., 1997; Chavan and Rasal, 2010). The rate of carbon storage increases in young tree species, while it declines after full growth as the stand ages (Jana, et al., 2009). Carbon sequestration is a natural method for the removal of carbon from the atmosphere by storing it in the biosphere (Dhruba, 2008; Chavan and Rasal, 2010). Biomass is defined as the total amount of aboveground living organic matter in trees expressed as oven-dry tons per unit area that reduces the concentration from atmospheric concentration of carbon dioxide (Brown, 1997; FORDA and JICA, 2005; Ravindranath and Ostwald, 2008). The atmospheric carbon dioxide is captured and stored in plants, soils, oceans, or atmosphere in the forms of biomass by photosynthesis process.

The amount of carbon sequestered continuously by a tree increases substantially over the time and age of tree till it matures. The process of carbon capture in photosynthesis is influenced by different factors including the tree age, leaf area and photosynthetic efficiency. The increasing carbon emission is of major concerns all over the world; it has been well addressed in Kyoto protocol (Ravindranath et al., 1997; Chavan and Rasal, 2010). The rate of carbon storage increases in young tree species, while it declines after full growth as the stand ages (Jana, et al., 2009). Above Ground Biomass (AGB) of tree includes all living biomass of all its parts above the soil, while Below Ground Biomass (BGB) includes all the plant biomass of live roots excluding the fine roots of sizes <2mm diameter (Ravindranath and Ostwald, 2008). Carbon sequestration in growing forests is known to be a cost-effective option for mitigation of global warming and global climatic change. The objective of this study is to measure carbon sequestered from selective tree species of *Emblica officinalis, Mangifera indica*, *Tamarindus indica*, *Achras sapota, Annona retiaculata* and *Annona squamosa* grown in the University campus in Aurangabad city, Maharashtra in India.

II. Methodology

a) Site and study area

The study area selected in present investigation for the estimation of above ground biomass and below ground biomass and carbon sequestration was the University campus of Aurangabad, which is located at

Author [αΩ]: Department of Environmental Science, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, India.
Email[α] : drblchavan@yahoo.co.in,
E-mail[Ω] : ganeshenviro@gmail.com

the latitude 19^{O}53'47"N and longitude 75^{O}23'54"E. The university campus is lousy green and covers about 140 hectares area under the plantation program for selected tree species. The tree species *Emblica officinalis, Mangifera indica*, *Tamarindus indica*, *Achras sapota, Annona retiaculata* and *Annona squamosa* selected for present investigation are from the plots grown on the university campus. The weather of Aurangabad is dry and moderately extreme. The average day temperature ranges from 27.7^{0} C to 38.0^{0} C. It falls from 26.9^{0}C to 20.0^{0}C during night. Relative humidity is extremely low for major part of the year and ranges between 30% and 50%, while it is highest 85% during monsoon. The average rainfall is about 90 cm. It is rather variable from year to year (ESRAM, 2009).

b) Estimation of carbon sequestered in different parts of six year tree species

The tree biomass includes the total of Above Ground Biomass (AGB) and Below Ground Biomass (BGB). The above ground biomass studied includes all above ground materials covering stem, braches, leaves, bark and below ground biomass consist coarse roots and stumps. The estimation of biomass in the plant was performed by measuring the tree height and diameter of plant species. Weight of the wood biomass has been calculated by multiplying the volume of biomass and specific gravity (SG) of the plant. The specific gravity (SG) considered is the ratio of oven dry weight and green volume of plant.

The organic carbon storage in selected tree species of *Emblica officinalis, Mangifera indica*, *Tamarindus indica*, *Achras sapota, Annona retiaculata* and *Annona squamosa* was estimated by Ash Method as described elsewhere (Allen, et al., 1986; Negi, et al., 2003; Jana, et al., 2009). The leaves, stem, sub branches, bark and root of each species were separated to estimate carbon by Ash method. The fresh weight of each part of all species washed with distilled water and dried with tissue paper immediately was taken then oven dried for moisture removal at 80^{0}C for 24 hrs. Oven dried sample were taken in pre-weighed crucible. The crucibles were placed in the Muffle furnace adjusted at 400^{0} C, ignition was carried out for 2.30 hrs. The crucible was cooled slowly inside the desiccators. After cooling the crucible with ash were weighed and percentage of organic carbon were calculated as formulae given by Allen et al, (1986).

$$\boldsymbol{C}\% = (100 - Ash\%) \times 0.58 \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, *C* is the organic carbon; W1is weight of crucibles, W2 is weight of oven-dried grind samples with Crucibles, and W3 the weight of ash with Crucibles.

In the present study we have estimated the aboveground biomass stocks, belowground biomass and carbon stocks taking volume of biomass and specific gravity (SG) of the tree, as described by many researchers (Rajput et al., 1996; Jana et al., 2009; Negi et al., 2003).

$$\boldsymbol{SG} = \frac{Oven\ dry\ weight}{Green\ volume} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

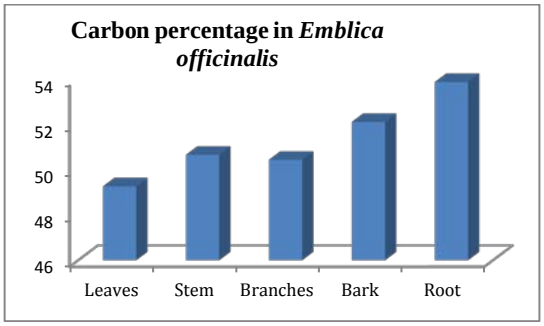
Biomass = Volume of Biomass X Specific Gravity... (3)

$$\boldsymbol{Carbon} = Biomass\ X\ Carbon\% \ldots\ldots\ldots\ldots (4)$$

III. Results and Discussion

The estimation of the above biomass in the selected tree species was performed by estimating carbon percentage and by knowing the tree height, diameter, and girth size.

Biomass carbon content: The Aboveground biomass (AGB) and Belowground biomass (BGB) of the tree such as leaves, stems, branches (including sub-branches), bark and root have been collected and dried at laboratory. The results of biomass analysis by ash method are presented in Figures. Total carbon stalk of a tree has been evaluated by the sum of all the carbon contents of leaves, stem, sub-branches and bark of the tree. The carbon concentration of different tree parts was rarely measured directly, but generally assumed to be 50% of the dry weight (Losi et al., 2003; Jana et al.,2009). The content of carbon in woody biomass any component of forest on average is around 50% of dry matter (Paladinic et al., 2009). The percentage of carbon in fresh biomass and in each component of the tree, as well as in the whole tree were calculated based on percentage of carbon in the dry biomass of the aboveground and belowground of all components of the leaves, stem, branches, bark, and root. Based on these results, the capacity to stored carbon in individual parts of the tree, in the whole tree and in fresh and dry biomass was compared.



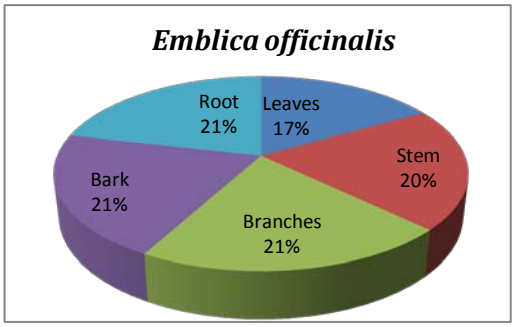
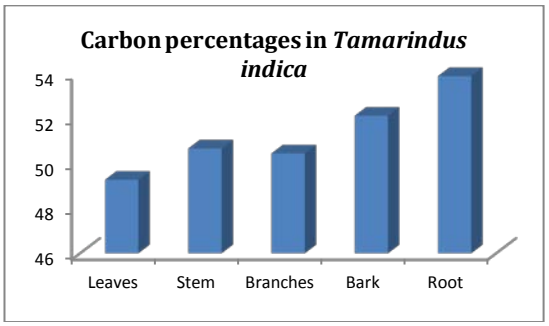


Fig.1: Carbon percentage in components of young *Emblica officinalis* tree parts (Bar chart) and proportion of whole tree components (Pie diagram).

It is observed for the percentage of carbon content in the aboveground and below ground biomass i.e. leaves, stem, branches, bark and root of *Emblica officinalis* were 43.67%, 52.89%, 53.91%, 53.59% and 55.68% respectively. The highest carbon percentage was shown in branches, bark and root it was 21% belowground biomass than the aboveground. The carbon percentages in the components of six year young *Emblica officinalis* tree parts (Bar chart) and proportion of whole tree components (Pie diagram) (Fig.1).



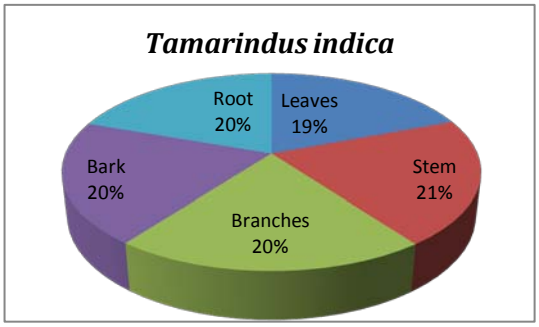
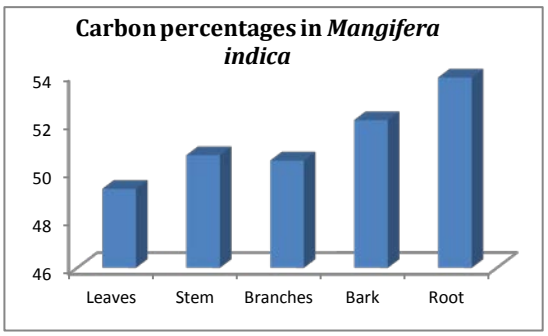


Fig.2 : Carbon percentage in components of young *Tamarindus indica* tree parts (Bar chart) and proportion of whole tree components (Pie diagram).

The percentage of carbon content in the ABG and BGB i.e. leaves, stem, branches, bark and root of *Tamarindus indica* carbon percentage were 53.47%, 57.53%, 56.84%, 55.85% and 54.63% respectively. The highest carbon percentage was noticed in the leaves in aboveground than the belowground plant parts. The carbon percentages in the components of six year young *Tamarindus indica* tree parts (Bar chart) and proportion of whole tree components (Pie diagram) (Fig.2).



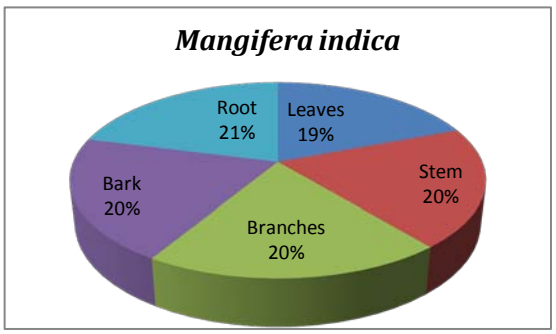


Fig.3 : Carbon percentage in components of young *Mangifera indica* tree parts (Bar chart) and proportion in whole tree components (Pie diagram).

The percentage of carbon content in the ABG and BGB i.e. leaves, stem, branches, bark and root of *Mangifera indica* in its different parts were 49.28%, 50.65%, 50.43%, 52.11 and 53.88% carbon respectively. The highest carbon percentage was observed in belowground plant part in root than the aboveground plant parts. The carbon percentages in the components of six year young *Mangifera indica* tree parts (Bar chart) and proportion of whole tree components (Pie diagram) (Fig.3).

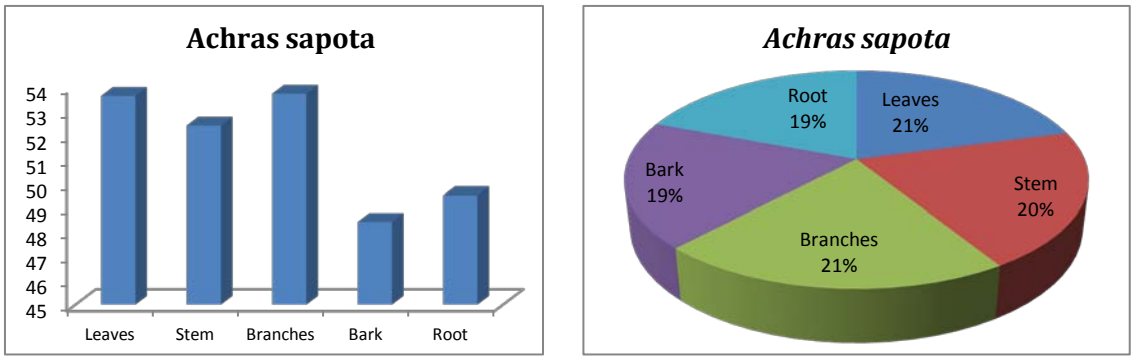


Fig.4 : Carbon percentage in components of young *Achras sapota* tree parts (Bar chart) and proportion of whole tree components (Pie diagram).

The percentage of carbon content in the ABG and BGB i.e. leaves, stem, branches, bark and root of *Achras sapota* were 53.63%, 52.4%, 53.72%, 48.42% and 49.52% carbon respectively. The highest carbon percentage was observed in stem in ABG than BGB plant parts. The carbon percentages in the components of six year young *Achras sapota* tree parts (Bar chart) and proportion of whole tree components (Pie diagram) (Fig.4).

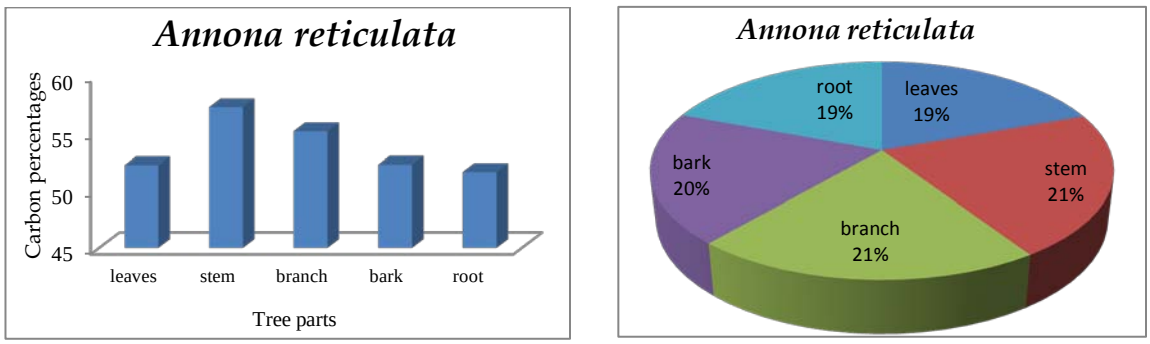


Fig.5 : Carbon percentage in components of young *Annona reticulata* tree parts (Bar chart) and proportion of whole tree components (Pie diagram).

It is observed for the percentage of carbon content in the aboveground and below ground biomass i.e. leaves, stem, branches, bark and root of *Annona retiaculata* were 53.67, 57.24%, 55.24 53.08% and 51.62% respectively. The highest carbon percentage was observed in stem in AGB than BGB plant parts (Fig.4). The carbon percentages in the components of six year young *Annona retiaculata* tree parts (Bar chart) and proportion of whole tree components (Pie diagram) (Fig.5).

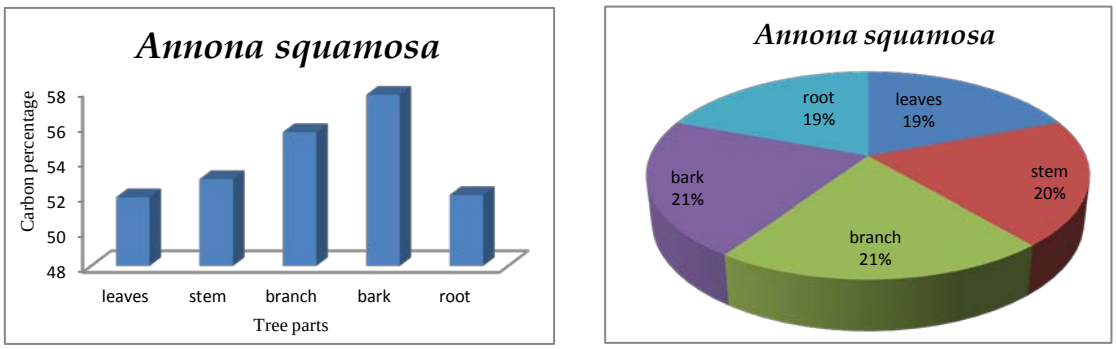


Fig.6: Carbon percentage in components of young *Emblica officinalis* tree parts (Bar chart) and proportion of whole tree components (Pie diagram).

The carbon percentage in components of ABG and BGB i.e. leaves, stem, branches, bark and root of *Annona squamosa* there were 52.08%, 55.09%, 55.33%, 56.01% and 52.04 respectively. The highest carbon percentage was observed in bark in AGB than BGB plant parts. The carbon percentages in the components of six year young *Annona retiaculata* tree parts (Bar chart) and proportion of whole tree components (Pie diagram) (Fig.6).

Table 1: Total biomass and carbon in trees of six year age

Tree species	Specific gravity	Biomass (Kg/tree)	Biomass (Kg ha^{-1})	Carbon (Kg C ha^{-1})
Emblica officinalis	0.63	0.067	63.31	33.07
Mangifera indica	0.56	0.038	58.14	30.6
Tamarindus indica	0.50	0.051	67.32	36.96
Achras sapota	0.54	0.057	23.65	12.86
Annona reticulata	0.43	0.102	153	83.1
Annona squamosa	0.50	0.090	135	73.5

The estimation of total amount of stored carbon in a tree should be based on biomass of components of whole tree. Using data collected from a typical tree, the fresh biomass of the tree components were determined, while the dry biomass of the component was estimated using sample analysis. The specific gravity, total biomass and total carbon content after six years of age in *Emblica officinalis, Mangifera indica*, *Tamarindus indica*, *Achras sapota*, *Annona reticulata* and *Annona squamosa* is shown in Table 1.

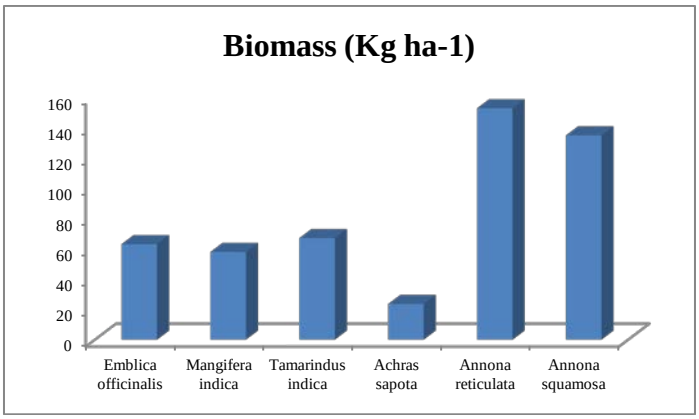


Fig.7: Total biomass in young tree species (Kg ha^{-1})

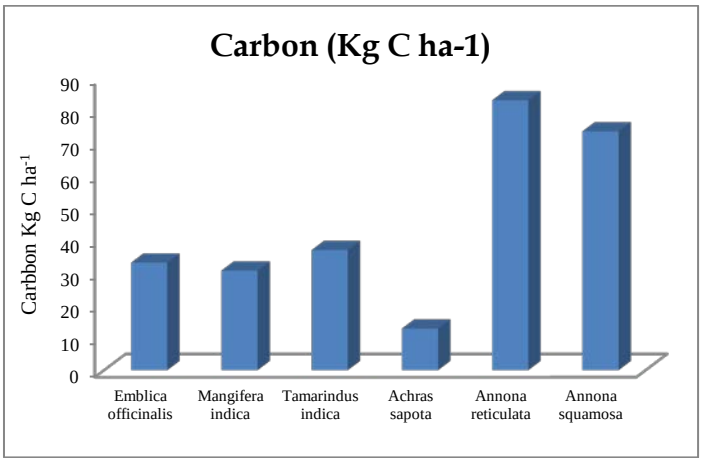


Fig.8 : Total carbon content in young tree species (Kg C ha^{-1})

It is evident that the total of aboveground biomass and Belowground biomass content together as in *Emblica officinalis, Mangifera indica*, *Tamarindus indica*, *Achras sapota*, *Annona reticulata* and *Annona squamosa* for per hectare observed were 63.31 Kg ha^{-1}, 58.14 Kg ha^{-1} , 67.32 Kg ha^{-1}, 23.65 Kg ha^{-1}, 153 Kg ha^{-1} and 135 Kg ha^{-1} respectively (Table 1 & Fig.7).

As per Table 1 & fig. 8 the total of aboveground biomass and belowground biomass together as sequestered carbon stalk per hectare as estimated for *Emblica officinalis* was 33.07 Kg C ha^{-1}, in *Mangifera indica* it was 30.6 Kg C ha^{-1}, in *Tamarindus indica* it was 36.96 Kg C ha^{-1}, in *Achras sapota* it was 12.86 Kg C ha^{-1}, in *Annona retiaculata* it was 83.1 Kg C ha^{-1} and in *Annona squamosa*, it was 73.5 Kg C ha^{-1}.

IV. Conclusion

The total carbon content of from Dr. B. A. M. University area were The total of AGB and BGB together as carbon stalk per hectare as estimated for *Emblica officinalis* was 33.07 Kg C ha^{-1}, in *Mangifera indica* it was 30.6 Kg C ha^{-1}, in *Tamarindus indica* it was 36.96 Kg C ha^{-1}, in *Achras sapota* it was 12.86 Kg C ha^{-1}, in *Annona retiaculata* it was 83.1 Kg C ha^{-1} and in *Annona squamosa*, it was 73.5 Kg C ha^{-1} respectively.

References References Referencias

1) Allen, S.E., Grimshaw, H.M., Rowland, A.P., 1986. Chemical Analysis. In: P.D. Moore and Chapman (eds.), *Method in Plant Ecology.* America: Blackwell Scientific Publications, 285-344.
2) Brown, S., 1997. Estimating Biomass and Biomass change of Tropical Forests: a Primer. Rome, Italy; FAO, *Forestry Paper-134,* 165.
3) Chavan B.L. and Rasal G.B., 2010. Sequestered standing carbon stock in selective tree species grown in University campus at Aurangabad, Maharashtra, India. *IJEST*, Vol.2 (7), 3003-3007.
4) Dhruba, B.G.C., 2008. Carbon Sequestration Potential and uses of *Dendrocalamus strictus*, A Thesis submitted to Tribhuwan University, Institute of Forestry, Nepal.
5) ESRAM, 2009. Environmental Status Report, Municipal Corporation, Aurangabad.
6) FORDA and JICA, 2005. Manual of Biomass survey and Analysis.
7) Jana, B. K., Biswas, S., Majumder, M., Roy, P. K., Mazumdar, A., 2009. Comparative Assessment of Carbon Sequestration Rate and Biomass Carbon Potential of Young *Shorea robusta and Albizzia lebbek, International Journal of Hydro-Climatic Engineering Assoc. Water and Enviro - Modeling,* 1-15.
8) Losi, C.J., Siccama, T.G., Condit, R., Morales, J.E., 2003. Analysis of alternative methods for estimating carbon stock in young tropical plantations, Elsevier for *For.Eco.Manag.*184:355-368.
9) Negi, J.D.S., Manhas, R.K. and Chauhan P.S., 2003. Carbon allocation in different components of some tree species of India: A new approach for carbon estimation. *Current Science*, 85 (11), 1528-1531.
10) Paladinic, E.,Vuletic, D., Martinic, I., Marjanovic, H., Indir, K., Benko, M., and Novotny,V., 2009. Forest biomass and sequestered carbon estimation according to main tree components on the forest stand scale. *Periodicum Biologorum,* Vol.111, No.4, 459-466.
11) Rajput, S. S., Shukla, N. K., Gupta V. K. and Jain J. D., 1996. Timber Mechanics: Strength Classification and Grading of Timber. ICFRE Publication-38, *New Forest*, Dehradun.
12) Ranabhat, S., Awasthi, K.D. and Malla, R., 2008. Carbon sequestration potential of *Alnus nepalensis* in the Mid-hill of Nepal: A case study from Kaski district, *Banko Janakari*,18(2), 3-9.
13) Ravindranath, N.H. and Ostwald M., 2008. Carbon Inventory Methods Handbook for Greenhouse Gas Inventory, Carbon Mitigation and Round wood Production Projects. Springer, Vol. 29.
14) Ravindranath, N.H., Somashekhar, B.S., Gadgil, M., 1997. Carbon flow in Indian forests, submitted to the Ministry of Environment and Forest.

Global Journal of researches in engineering
Chemical engineering
Volume 11 Issue 7 Version 1.0 December 2011
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4596 Print ISSN:0975-5861

A Study On Chemical Analysis Of Drinking Water From Some Communities In Nandyal Rural Areas Of Kurnool District Andhra Pradesh. INDIA

By Mohemmad Rafi.K , Rmachar.T , Umamahesh.M
R.G.M.Engg.College(Autonomous),Nandyal, India

Abstract - This study consisted of the determination of the trace metal ions and some physiochemical properties in drinking water samples from the neighboring villages of Nandyal region, Kurnool district, where drinking water samples are not treated before it is consumed. The purpose was to ascertain the quality of water from these sources. Samples were taken from ten sampling points and analyzed for the following parameters Fe, Cu, Mn, Zn, Al, pH,EC,NO3-, SO4 , and F- using the procedure outline in the plain test photometer method. The data showed the variation of the investigated parameters in samples as follows: pH 5.47-7.39, conductivity (EC) 49-1168 μs/cm, turbidity 4.68-73.34JTU, F - 0.54 to 1.29mg/L.NO3-11.19 to 39.76 mg/L , SO42- 41.2 to 73.0 mg/L Cu 1.25 to 2.96 mg/L. Fe 0.08-0.94mg/L, Zn 5-19 mg/L,Mn 0.004-0.016 mg/L and Al 0.07-0.18 mg/L , The concentrations of most of the investigated parameters in the drinking water samples from Nandyal region were within the permissible limits of the World Health Organization drinking water quality guidelines.

Keywords : *drinking water, Nandyal Rural region areas, World Health Organization,Trace metals, physiochemical Properties.*

GJRE Classification : *FOR Code: 050299*

Strictly as per the compliance and regulations of :

A Study On Chemical Analysis Of Drinking Water From Some Communities In Nandyal Rural Areas Of Kurnool District ,Andhra Pradesh. INDIA

Mohemmad Rafi.K [α], Rmachar.T [Ω], Umamahesh.M [β]

Abstract - This study consisted of the determination of the trace metal ions and some physiochemical properties in drinking water samples from the neighboring villages of Nandyal region, Kurnool district, where drinking water samples are not treated before it is consumed. The purpose was to ascertain the quality of water from these sources. Samples were taken from ten sampling points and analyzed for the following parameters Fe, Cu, Mn, Zn, Al, pH,EC,NO3-, SO_4 , and F- using the procedure outline in the plain test photometer method. The data showed the variation of the investigated parameters in samples as follows: pH 5.47-7.39, conductivity (EC) 49-1168 μs/cm, turbidity 4.68-73.34JTU, F - 0.54 to 1.29mg/L.NO_3-11.19 to 39.76 mg/L , $SO_4$2- 41.2 to 73.0 mg/L Cu 1.25 to 2.96 mg/L. Fe 0.08-0.94mg/L, Zn 5-19 mg/L,Mn 0.004-0.016 mg/L and Al 0.07-0.18 mg/L , The concentrations of most of the investigated parameters in the drinking water samples from Nandyal region were within the permissible limits of the World Health Organization drinking water quality guidelines.

Keywords : *drinking water, Nandyal Rural region areas, World Health Organization,Trace metals, physiochemical Properties.*

I. Introduction

Good drinking water quality is essential for the well being of all people. Unfortunately in many countries around the world, including India, some drinking water supplies have become contaminated, which has impacted on the health and economic status of the populations Contaminants such as bacteria, viruses, heavy metals, nitrates and salt have found their way into water supplies as a result of in adequate treatment and disposal of waste industrial discharges, and over-use of limited water resources Even other Chemicals to be harmful to human health. Unfortunately, this problem arose because the groundwater was extracted for drinking without a detailed chemical investigation. The natural water analyses for physical and chemical properties including trace element contents are very important for public health studies. These studies are also a main part of pollution studies in the environment (Kot., *et al*,. 2000; Soylak. *et al*., 2002 a). According to our literature review Some physical and chemical properties of the samples were determined by using standard analytical methods.

II. Materials and Methods

a) Sample collection

The drinking water samples were collected in prewashed (with detergent, diluted HNO3 and doubly de- ionized distilled water, respectively) polyethylene bottles. pH and conductivity of the samples were measured while collecting the samples. Each water sample was taken four times at four different sampling periods approximately three month apart. Samples were collected in January, April,July and October ;2009.The determinations of the physical and other chemical properties of the water samples were performed on the same day of sampling. For surface water sampling, the bottles and caps were rinsed three times with water to be sampled during sampling and for ground water, the samples were obtained directly from the water pump after allowing the water to run for at least five minutes and each sample bottle and its cap rinsed three times. These samples were subsequently stored at 4 °C for as short a time as possible before analysis to minimize physicochemical changes (Anonymous, 1996).Because very little particulate matter was present in the sample, filtration was not considered necessary.

b) Methodology

Analytical water test tablets (photometer grade) reagents for specific test were used for the preparation of all solutions. Each sample was analysis for , Fe, Cu,Mn, Zn, Al, NO3- , SO4 2-, and F- using procedures outline in the Palintest Photometer Method (Palintest Photometer 5000) for the examination of water and waste water.

Author α : *Asst.professor, Dept.of Chemistry* R.G.M Engg. College (Autonoumous), Nandyal,Kurnool. District : Andhra Pradesh.
E-mail : d.rafi9985687679@yahoo.com
Author Ω : Assoc.Professor, *Dept.of Basic Sciences* G.P.R. Engg. College (Autonomous), Kurnool.
Author β : *professor,HoD , Dept.of Chemistry* R.G.M Engg· College (Autonoumous), Nandyal,Kurnool. District :Andhra Pradesh

III. Results & Discussion

The average physical and chemical properties of the drinking water samples including pH, electrical conductivity, turbidity, fluoride, nitrate ,sulphate from these sample points(1,2,3,4,5,6,7,8,9,10) were given in Table 1. The pH values were in the range of 5.47 to 7.39. Minimum pH (5.47) was observed from an well in Panyam rural area(1) and a maximum of (7.39) was observed from the Panyam stream(2) at Nandyal Rural area. The pH levels were lower than permissible limit (6.5-8.5) in 10% villages, the rest were within optimum limit. The recommended permissible limit for electrical conductivity (EC) is 300 µs/cm. By analyzing the results 80% villages showed EC lower than permissible limit The value for EC ranged from 49 to 275 µs/cm, except that of the groundwater samples from Konidedu(4) and Alamur(7) which recorded 963 µs/cm and 1168 µs/ cm respectively. Turbidity is a measure of the cloudiness of water. It has no health effects. However,turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches . All the samples have turbidity values greater than the WHO permissible value of 10 JTU except that of the groundwater sample from Neravada(5) and Kowluru(6) villages which recorded values of 5.38 JTU and 4.68 JTU respectively. Fluoride (F-) varied from 0.54 to 1.29 mg/L.Minimum (0.54 mg/L) and maximum (1.29 mg/L) concentration of F- was observed from Odugandla(9) and Balapanuru(10) villages respectively (Table 1). Permissible limit for F concentration is 1-1.5 mg/L according to WHO (2003).The data revealed that 50 % villages are with in limit.. Nitrate in the investigated samples were found to be in a range of 11.19 to 39.76 mg/L .The range of sulphate (SO42-) in the samples was 41.2 to 73.0 mg/L but was negligible at Maddur (8)throughout the area.

Table 1 : The physical and chemical parameters of the drinking water samples

Sampling site	Sample site code	Water Type	pH	EC µs/cm
Panyam Rural area	1	Surface	6.78	67
Panyam Stream	2	Surface	7.37	129
Panyam Lake	3	Surface	7.17	184
Konidedu	4	Ground	5.47	963
Neravada	5	Ground	6.23	213
Kowlur	6	Ground	6.68	198
Alamur	7	Ground	7.12	1168
Maddur	8	Tap Water	7.43	95
Odiguntla	9	Tap Water	7.29	102
Balapanur	10	Tap Water	7.09	116

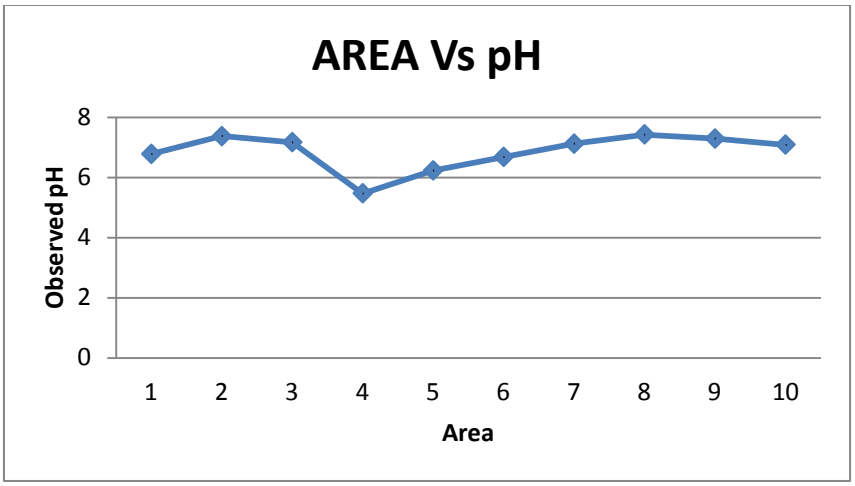


Figure: 1: Graphical representation between Area Vs Observed pH

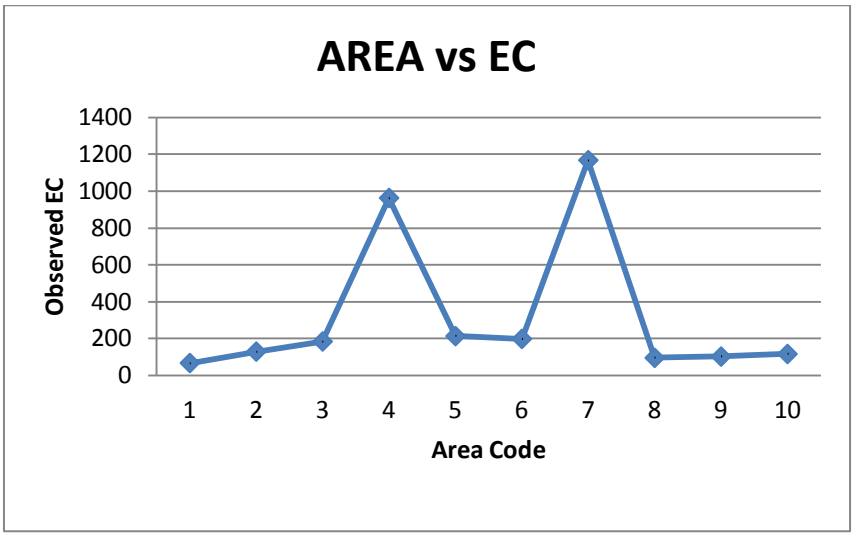


Figure: 2 : Graphical representation between Area Vs Observed EC

Table 2 : The physical and chemical parameters of the drinking water samples

Sampling site	Sample site code	Water Type	Turb. NTU	F (mg/l)
Panyam Rural area	1	Surface	36.0	1.03
Panyam Stream	2	Surface	43.67	1.18
Panyam Lake	3	Surface	51.53	0.99
Konidedu	4	Ground	62.98	0.68
Neravada	5	Ground	5.35	0.92
Kowlur	6	Ground	4.68	0.74
Alamur	7	Ground	73.34	1.05
Maddur	8	Tap Water	32.76	1.23
Odiguntla	9	Tap Water	26.88	0.54
Balapanur	10	Tap Water	29.0	1.29

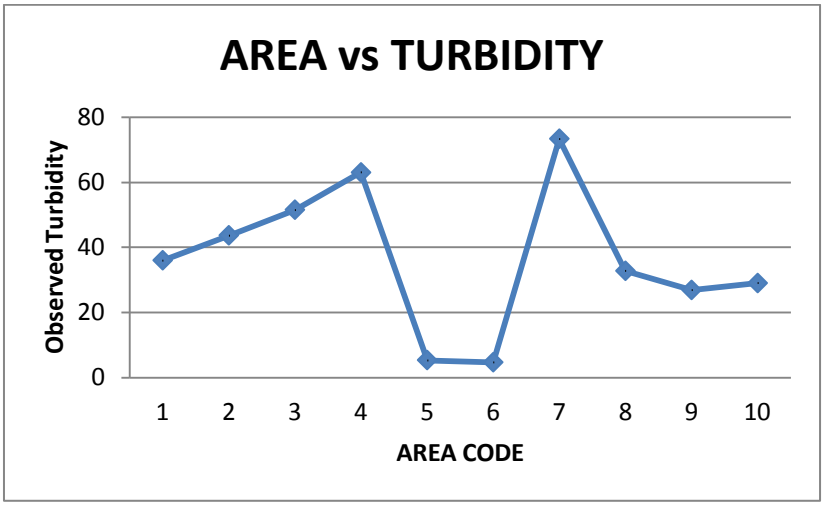


Figure: 3: Graphical representation between Area Vs Observed Turbidity

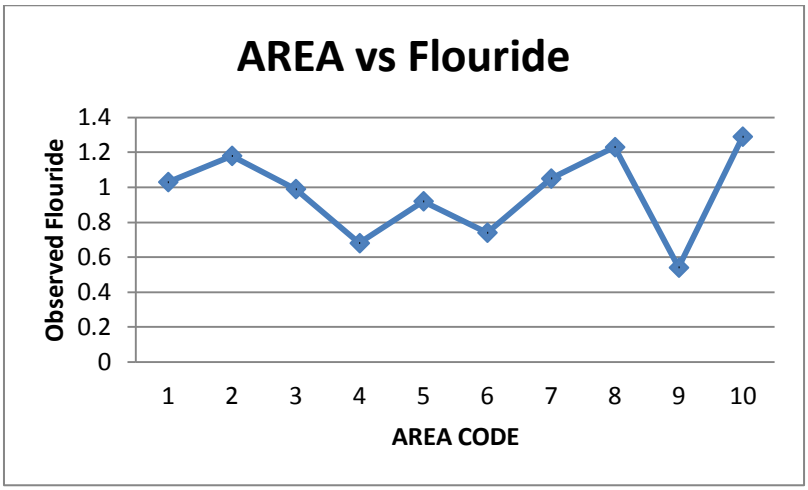


Figure: 4: Graphical representation between Area Vs Observed Flouride

Table 3: The physical and chemical parameters of the drinking water samples

Sampling site	Sample site code	Water Type	NO_3^- (mg/l)	SO_4^{2-} (mg/l)
Panyam Rural area	1	Surface	11.19	41.9
Panyam Stream	2	Surface	18.12	54.5
Panyam Lake	3	Surface	27.07	41.2
Konidedu	4	Ground	24.37	59.2
Neravada	5	Ground	32.49	68.7
Kowlur	6	Ground	19.45	53.4
Alamur	7	Ground	22.56	52.9
Maddur	8	Tap Water	39.76	--
Odiguntla	9	Tap Water	32.88	73.0
Balapanur	10	Tap Water	29.69	48.4

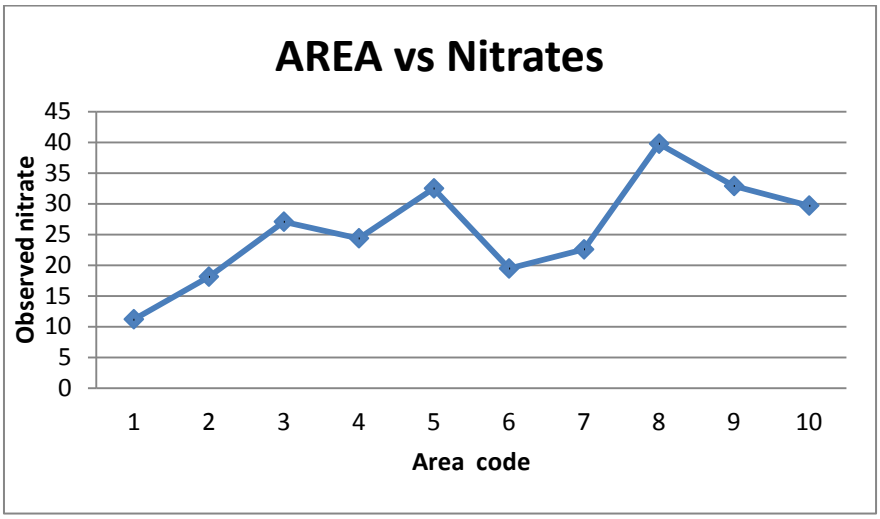


Figure: 5: Graphical representation between Area Vs Observed Nitrates

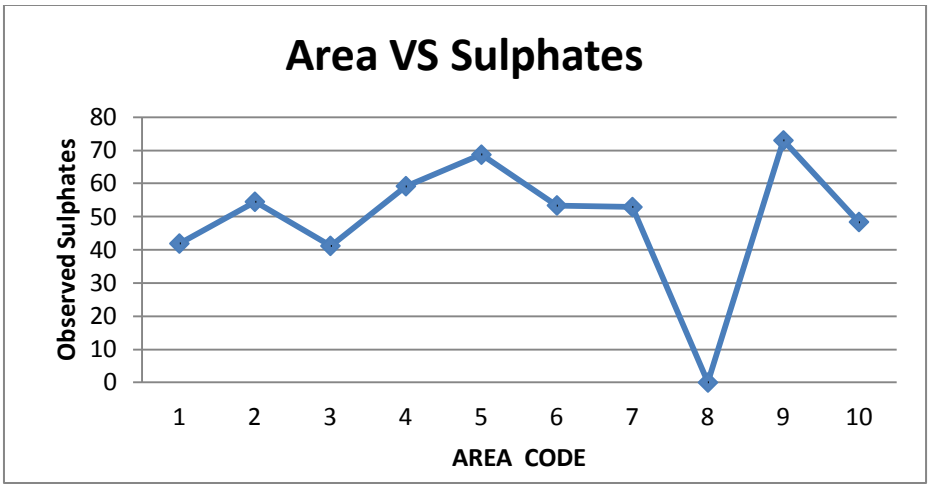


Figure: 6 : Graphical representation between Area Vs Observed Sulphates

The concentrations of the major ions were below the permissible limits given by the WHO. The concentrations of trace metals (Cu, Fe, Zn, Al and Mn) ions in the drinking water samples are presented in Table 2. The lowest and the highest levels of trace metals detected ranged between 0.004 mg/L - 0.016mg/l for manganese in the sample from Konidedu and 2.96 mg/L for copper from the K.c.canal at Maddur villages. The highest level of total trace metals ions were found in the water sample from K.C Canal at Maddur Average copper concentrations in the drinking water samples were in the range of 1.25 to 2.96 mg/L. The levels in all the stations were above the limit of 1.0 mg/L permitted by WHO in drinking water. This indicates that the local mineral deposit in the catchment area studied may have high levels of copper. Copper is an essential nutrient, but at high doses it has been shown to cause stomach and intestinal distress, liver and kidney damage, and anemia (US EPA, 2003). The highest iron level was found in the sample from Kowlur as 0.94 mg/L and the lowest in Panyam as 0.08 mg/L, almost all the samples contain higher amount of iron except in Panyam where it was below the acceptance limit of iron which is 0.1 mg/ L permitted by the WHO. The levels of zinc in the samples were in the range of 5 mg/L to 19 mg/L . 80% village are between limit according to WHO . Average manganese levels were found to be in the range of 0.042 mg/L to 0.63 mg/L. 70% villages water samples were with in the WHO permitted limit Aluminum concentration in the drinking water samples were in the range from a limit which is 0.05 mg/L. Aluminum concentration in the drinking water samples were in the range from a minimum of 0.07 mg/L from Panyam stream canal stream at Balapanur to a maximum of 0.18 mg/L from the river at Nandyal rural area. Aluminum was considerable below the limit of 0.5 mg/L permitted by WHO in drinking water. A linear regression correlation test was performed to investigate correlations between metal concentrations. The whole data were subjected to statistical analysis and correlation matrices were produced to examine the interrelationships between the investigated metal concentrations. Correlations between metal concentrations in water samples have been widely studied by a number of authors (Mohmood,*et al,* 1998 and Asubiojo, *et al,* 1997).

Table 4 : The concentration of trace metals ion in the drinking water samples

Sampling site	Sample site code	Water Type	Cu	Zn
Panyam Rural area	1	Surface	1.25	8
Panyam Stream	2	Surface	1.76	5
Panyam Lake	3	Surface	1.98	7
Konidedu	4	Ground	1.47	12
Neravada	5	Ground	2.38	16
Kowlur	6	Ground	2.67	11
Alamur	7	Ground	2.12	19
Maddur	8	Tap Water	2.96	9
Odiguntla	9	Tap Water	1.98	8
Balapanur	10	Tap Water	2.25	13

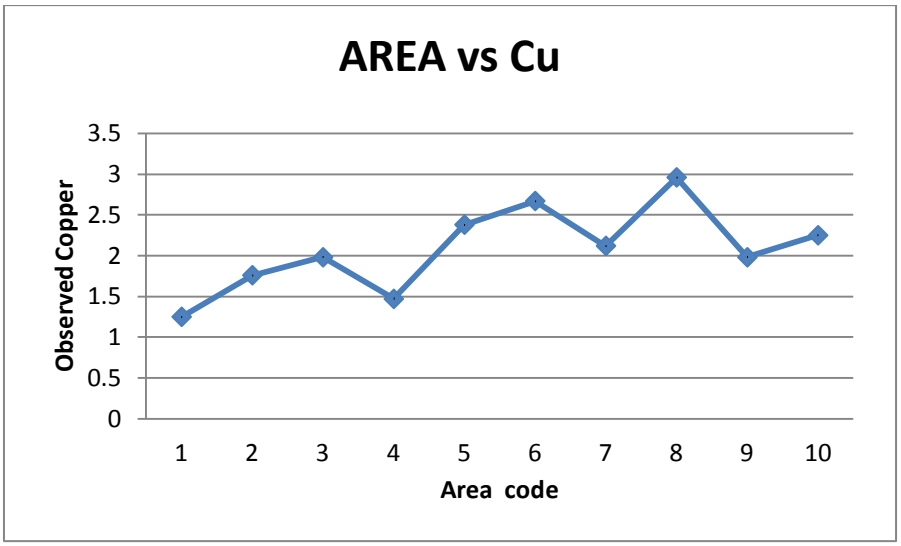


Figure: 7: Graphical representation between Area Vs Observed Copper

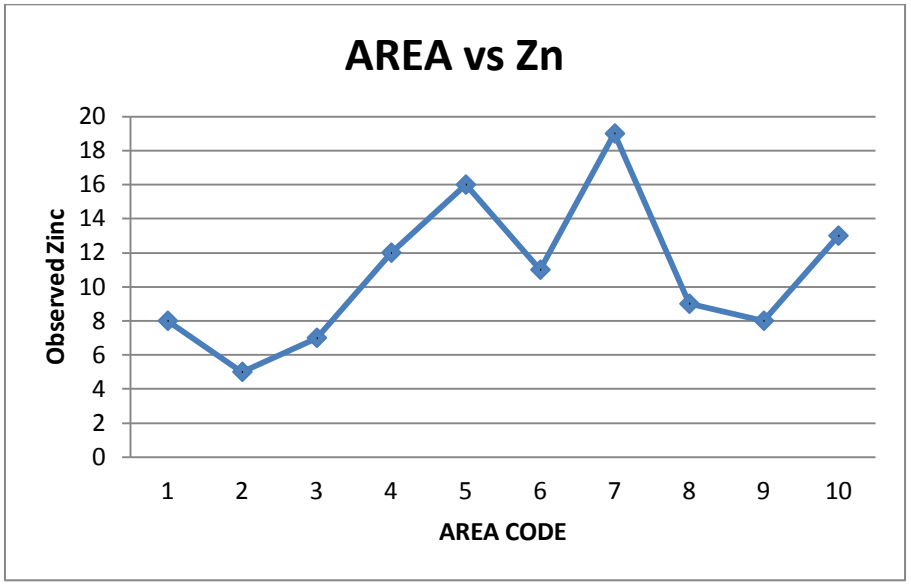


Figure: 8: Graphical representation between Area Vs Observed Zinc

Table 5 : The concentration of trace metals ion in the drinking water samples

Sampling site	Sample site code	Water Type	Mn	Fe
Panyam Rural area	1	Surface	0.042	0.08
Panyam Stream	2	Surface	0.054	0.12
Panyam Lake	3	Surface	0.23	0.25
Konidedu	4	Ground	0.058	0.76
Neravada	5	Ground	0.63	0.68
Kowlur	6	Ground	0.08	0.94
Alamur	7	Ground	0.39	0.89
Maddur	8	Tap Water	0.066	0.27
Odiguntla	9	Tap Water	0.414	0.34
Balapanur	10	Tap Water	0.313	0.48

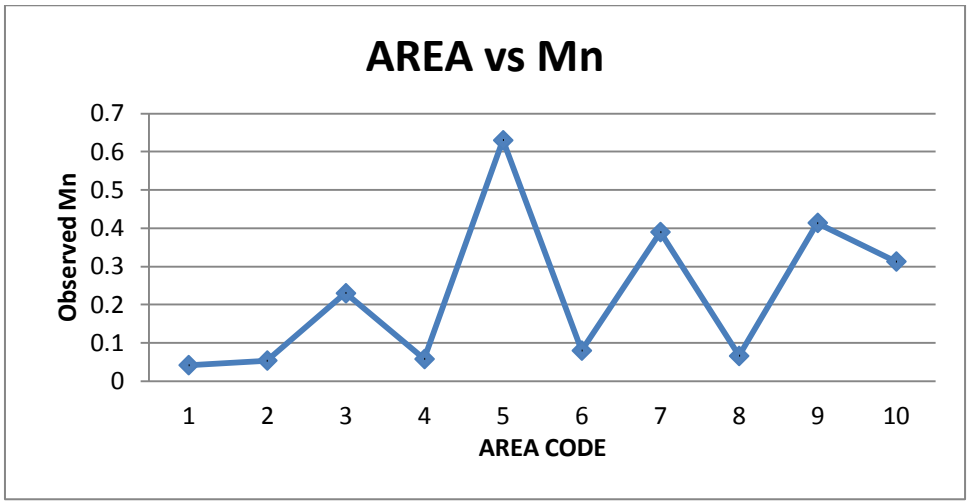


Figure: 9 : Graphical representation between Area Vs Observed Manganese

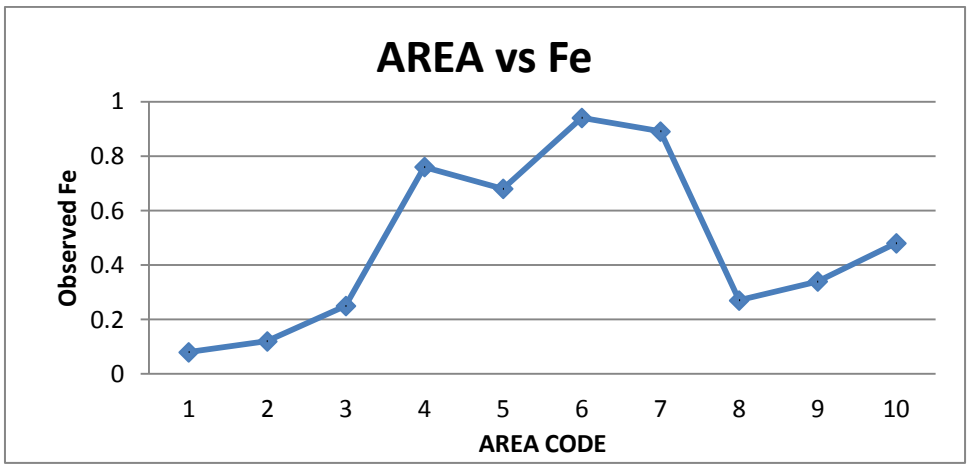


Figure: 10: Graphical representation between Area Vs Observed Fe

Table 6 : The concentration of trace metals ion in the drinking water samples

Sampling site	Sample site code	Water Type	Al
Panyam Rural area	1	Surface	0.10
Panyam Stream	2	Surface	0.07
Panyam Lake	3	Surface	0.09
Konidedu	4	Ground	0.08
Neravada	5	Ground	0.11
Kowlur	6	Ground	0.15
Alamur	7	Ground	0.14
Maddur	8	Tap Water	0.12
Odiguntla	9	Tap Water	0.16
Balapanur	10	Tap Water	0.18

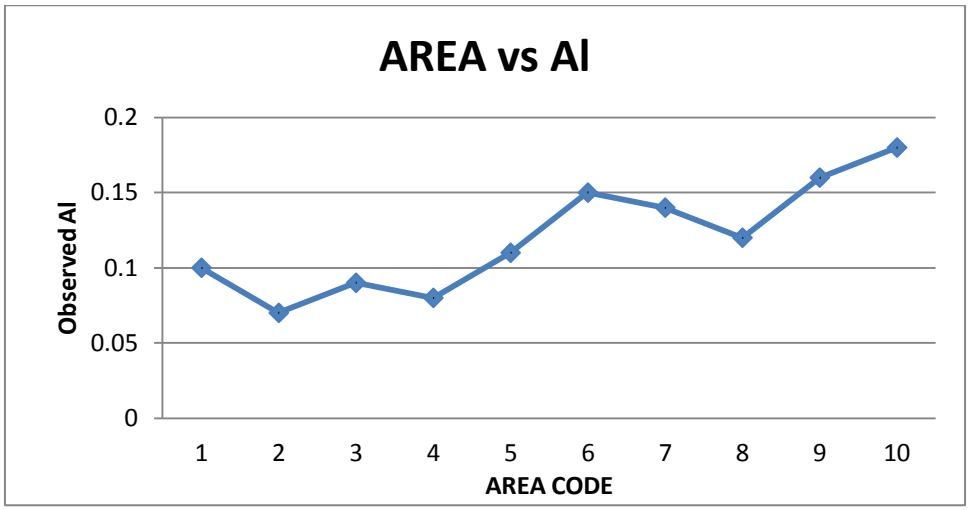


Figure: 11: Graphical representation between Area Vs Observed Aluminium

IV. Discussion and Colclusion

In conclusion, the concentrations of the investigated major ions and trace metal ions in the drinking water samples from these communities in the Nandyal region, Iddia were found below the guidelines for drinking waters given by the World Health Organization (WHO). Further research on other communities in this region for drinking water analyses is required as levels of contaminants may vary due to different soil types, water chemistry and different human activities. No correlations were found between metal concentrations in the drinking water samples.

V. Acknowledgement

The authors are grateful for the financial support of the Environmental Research Area, Head Administrative Staff college of India (ASCI). Hyderabad,A.P, and The Pincipal, RGM College of Engineering & Technology ,Nandyal for providing the necessary facilities.

References References Referencias

1. International Reference Centre for Community Water Supply and Sanitation. 1986.
2. Interwater Directory of Sources of Information and Documentation on Community Water Supply and Sanitation (ref TD 327 I58)
3. Langenegger . O (1987). Groundwater quality in rural areas of western Africa. Abidjan, Ivory Coast, World Bank Regional Water and Sanitation Group.
4. Lewis, W.J., Farr, J.L., and Foster, S.S.D. (1980b). 'The pollution hazard to village water supplies in eastern Botswana'. In : Proceedings of the Institute of Civel Engineers. Part2, vol.69.
5. Anawara, H.M., Akaib, J., Mostofac, K.M.G., Safiullahd, S.,Tareqd, S.M., (2002). Arsenic poisoning in groundwaterhealthrisk and geochemical sources in Bangladesh. Environ.Int., **27**, 597-604.
6. Anonymous, (1992). Report on UN Conf. on Environ. &Development, A/CONF. 151/26., **1**, 277
7. Anonymous, (1996), Guidelines for drinking water quality (2),231, World Health Organization (WHO Asubiojo, O.I., Nkono, N.A., Ogunsua, O.A, Oluwole, A.F.,Ward, N.I, Akanle, O.A., Spyrou, N.M., (1997). Traceelements in drinking and groundwater samples in Southern Nigeria, Sci.otal Environ,**208,** 1. Kot, B., Baranowski, R., Rybak, A., (2000). Analysis of mine waters using X-ray fluorescence spectrometry, Polish Journal of Environmental Studies, **9**, 429.
8. Mahmood, S.N., Naeem, S., Siddiqui, I., Khan, F.A., (1998).Metal contamination in ground water of Korangi Industrial Area, Karachi. Journal of Chemical Society. Pakistan, **20,** 125.
9. Miller, J.C, Miller, J.N., (1988). Statistics for analytical chemistry, Ellis Horwood Limited, Chichester. Singh1, S., Mosley, L.M., (2003). Trace metal levels in drinking water on Viti Levu, Fiji Islands. S. Pac. J. Nat. Sci., **21**, 31-34.
10. Soylak. M., Armagan Aydin, F., Saracoglu, S., Elci, L., Dogan, M., (2002a). Chemical analysis of drinking water samples from Yozgat, Turkey. Polish Journal of Environmental Studies., **11** (2), 151-156.
11. Soylak, M., Divrikli, U., Saracoglu, S., Elci, L., (2002 b).Monitoring trace metal levels in Yozgat- Turkey: Copper,iron, nickel, cobalt, lead, cadmium, manganese and chromiumlevels in stream sediments, Polish Journal of Environmental Studies., **11,** 47.
12. Stumm, W., Morgan, J.J., (1996). Aquatic

Chemistry, 3rd Ed. Wiley-Interscience Publication. Envieonmental Protection Agency (USEPA), (2003). Chemical contaminants in drinking water. Technical fast sheet on microbes. EPA 816-03-016.

13. World Health Organization, (WHO), (2003). Guidelines for drinking water quality. Geneva., (WHO/SDE/WSH 03. 04).
14. Miller, J.C, Miller, J.N., (1988). Statistics for analytical chemistry, Ellis Horwood Limited, Chichester. Singh1, S., Mosley, L.M., (2003). Trace metal levels in drinking water on Viti Levu, Fiji Islands.South Pacific Journal of Natural Science(S. Pac. J. Nat. Sci)., **21**, 31-34.

Global Journals Inc. (US) Guidelines Handbook 2011

www.GlobalJournals.org

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN ENGINEERING (FARSE)

- 'FARSE' title will be awarded to the person after approval of Editor-in-Chief and Editorial Board. The title 'FARSE" can be added to name in the following manner. eg. Dr. John E. Hall, Ph.D., FARSE or William Walldroff Ph. D., M.S., FARSE
- Being FARSE is a respectful honor. It authenticates your research activities. After becoming FARSE, you can use 'FARSE' title as you use your degree in suffix of your name. This will definitely will enhance and add up your name. You can use it on your Career Counseling Materials/CV/Resume/Visiting Card/Name Plate etc.
- 60% Discount will be provided to FARSE members for publishing research papers in Global Journals Inc., if our Editorial Board and Peer Reviewers accept the paper. For the life time, if you are author/co-author of any paper bill sent to you will automatically be discounted one by 60%
- FARSE will be given a renowned, secure, free professional email address with 100 GB of space eg.johnhall@globaljournals.org. You will be facilitated with Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.
- FARSE member is eligible to become paid peer reviewer at Global Journals Inc. to earn up to 15% of realized author charges taken from author of respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account or to your PayPal account.
- Eg. If we had taken 420 USD from author, we can send 63 USD to your account.
- FARSE member can apply for free approval, grading and certification of some of their Educational and Institutional Degrees from Global Journals Inc. (US) and Open Association of Research, Society U.S.A.
- After you are FARSE. You can send us scanned copy of all of your documents. We will verify, grade and certify them within a month. It will be based on your academic records, quality of research papers published by you, and 50 more criteria. This is beneficial for your job interviews as recruiting organization need not just rely on you for authenticity and your unknown qualities, you would have authentic ranks of all of your documents. Our scale is unique worldwide.
- FARSE member can proceed to get benefits of free research podcasting in Global Research Radio with their research documents, slides and online movies.
- After your publication anywhere in the world, you can upload you research paper with your recorded voice or you can use our professional RJs to record your paper their voice. We can also stream your conference videos and display your slides online.
- FARSE will be eligible for free application of Standardization of their Researches by Open Scientific Standards. Standardization is next step and level after publishing in a journal. A team of research and professional will work with you to take your research to its next level, which is worldwide open standardization.

- FARSE is eligible to earn from their researches: While publishing his paper with Global Journals Inc. (US), FARSE can decide whether he/she would like to publish his/her research in closed manner. When readers will buy that individual research paper for reading, 80% of its earning by Global Journals Inc. (US) will be transferred to FARSE member's bank account after certain threshold balance. There is no time limit for collection. FARSE member can decide its price and we can help in decision.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN ENGINEERING (MARSE)

- 'MARSE' title will be awarded to the person after approval of Editor-in-Chief and Editorial Board. The title 'MARSE" can be added to name in the following manner. eg. Dr. John E. Hall, Ph.D., MARSE or William Walldroff Ph. D., M.S., MARSE
- Being MARSE is a respectful honor. It authenticates your research activities. After becoming MARSE, you can use 'MARSE' title as you use your degree in suffix of your name. This will definitely will enhance and add up your name. You can use it on your Career Counseling Materials/CV/Resume/Visiting Card/Name Plate etc.
- 40% Discount will be provided to MARSE members for publishing research papers in Global Journals Inc., if our Editorial Board and Peer Reviewers accept the paper. For the life time, if you are author/co-author of any paper bill sent to you will automatically be discounted one by 60%
- MARSE will be given a renowned, secure, free professional email address with 30 GB of space eg.johnhall@globaljournals.org. You will be facilitated with Webmail, SpamAssassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.
- MARSE member is eligible to become paid peer reviewer at Global Journals Inc. to earn up to 10% of realized author charges taken from author of respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account or to your PayPal account.
- MARSE member can apply for free approval, grading and certification of some of their Educational and Institutional Degrees from Global Journals Inc. (US) and Open Association of Research,Society U.S.A.
- MARSE is eligible to earn from their researches: While publishing his paper with Global Journals Inc. (US), MARSE can decide whether he/she would like to publish his/her research in closed manner. When readers will buy that individual research paper for reading, 40% of its earning by Global Journals Inc. (US) will be transferred to MARSE member's bank account after certain threshold balance. There is no time limit for collection. MARSE member can decide its price and we can help in decision.

AUXILIARY MEMBERSHIPS

ANNUAL MEMBER

- Annual Member will be authorized to receive e-Journal GJHSS for one year (subscription for one year).
- The member will be allotted free 1 GB Web-space along with subDomain to contribute and participate in our activities.
- A professional email address will be allotted free 500 MB email space.

PAPER PUBLICATION

- The members can publish paper once. The paper will be sent to two-peer reviewer. The paper will be published after the acceptance of peer reviewers and Editorial Board.

Process of submission of Research Paper

The Area or field of specialization may or may not be of any category as mentioned in 'Scope of Journal' menu of the GlobalJournals.org website. There are 37 Research Journal categorized with Six parental Journals GJCST, GJMR, GJRE, GJMBR, GJSFR, GJHSS. For Authors should prefer the mentioned categories. There are three widely used systems UDC, DDC and LCC. The details are available as 'Knowledge Abstract' at Home page. The major advantage of this coding is that, the research work will be exposed to and shared with all over the world as we are being abstracted and indexed worldwide.

The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

(A) (I) First, register yourself using top right corner of Home page then Login. If you are already registered, then login using your username and password.

(II) Choose corresponding Journal.

(III) Click 'Submit Manuscript'. Fill required information and Upload the paper.

(B) If you are using Internet Explorer, then Direct Submission through Homepage is also available.

(C) If these two are not convenient, and then email the paper directly to dean@globaljournals.org.

Offline Submission: Author can send the typed form of paper by Post. However, online submission should be preferred.

Preferred Author Guidelines

MANUSCRIPT STYLE INSTRUCTION (Must be strictly followed)

Page Size: 8.27" X 11'"

- Left Margin: 0.65
- Right Margin: 0.65
- Top Margin: 0.75
- Bottom Margin: 0.75
- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
- Author Name in Font Size of 11 with one column as of Title.
- Abstract Font size of 9 Bold, "Abstract" word in Italic Bold.
- Main Text: Font size 10 with justified two columns section
- Two Column with Equal Column with of 3.38 and Gaping of .2
- First Character must be three lines Drop capped.
- Paragraph before Spacing of 1 pt and After of 0 pt.
- Line Spacing of 1 pt
- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
- Numbering of Second Main Headings (Heading 2) must be in Alphabets, Italic, and Font Size of 10.

You can use your own standard format also.
Author Guidelines:

1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

1. GENERAL

Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

Scope

The Global Journals Inc. (US) welcome the submission of original paper, review paper, survey article relevant to the all the streams of Philosophy and knowledge. The Global Journals Inc. (US) is parental platform for Global Journal of Computer Science and Technology, Researches in Engineering, Medical Research, Science Frontier Research, Human Social Science, Management, and Business organization. The choice of specific field can be done otherwise as following in Abstracting and Indexing Page on this Website. As the all Global

Journals Inc. (US) are being abstracted and indexed (in process) by most of the reputed organizations. Topics of only narrow interest will not be accepted unless they have wider potential or consequences.

2. ETHICAL GUIDELINES

Authors should follow the ethical guidelines as mentioned below for publication of research paper and research activities.

Papers are accepted on strict understanding that the material in whole or in part has not been, nor is being, considered for publication elsewhere. If the paper once accepted by Global Journals Inc. (US) and Editorial Board, will become the copyright of the Global Journals Inc. (US).

Authorship: The authors and coauthors should have active contribution to conception design, analysis and interpretation of findings. They should critically review the contents and drafting of the paper. All should approve the final version of the paper before submission

The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

1) Substantial contributions to conception and acquisition of data, analysis and interpretation of the findings.

2) Drafting the paper and revising it critically regarding important academic content.

3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgement. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

Appeal of Decision: The Editorial Board's decision on publication of the paper is final and cannot be appealed elsewhere.

Permissions: It is the author's responsibility to have prior permission if all or parts of earlier published illustrations are used in this paper.

Please mention proper reference and appropriate acknowledgements wherever expected.

If all or parts of previously published illustrations are used, permission must be taken from the copyright holder concerned. It is the author's responsibility to take these in writing.

Approval for reproduction/modification of any information (including figures and tables) published elsewhere must be obtained by the authors/copyright holders before submission of the manuscript. Contributors (Authors) are responsible for any copyright fee involved.

3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.

To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5.STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)

The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

6.3 Author Services

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

6.4 Author Material Archive Policy

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

6.5 Offprint and Extra Copies

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher's terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org .

the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. **Pick a good study spot:** To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. **Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be

sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page

- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to

shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.
- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic

principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.

- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

Global Journal of Researches in Engineering

Visit us on the Web at www.GlobalJournals.org | www.EngineeringResearch.org
or email us at helpdesk@globaljournals.org

ISSN 9755861