Online ISSN: 2249-4626
Print ISSN: 0975-5896

Global Journal

of Science Frontier Research: B

Chemistry

Highlights

- Asphalt Chemistry
- Photocatalytic Activity of Phenol
- The Mechanism of Oxidation
- Periodate Ion in Acidic Medium

Discovering Thoughts, Inventing Future

VOLUME 15 ISSUE 2 VERSION 1.0

© 2001-2015 by Global Journal of Science Frontier Research , USA

Volume 15 Issue 10 was originally issued as B2

Global Journal of Science Frontier Research: B
Chemistry

Volume 15 Issue 10
Originally issued as B2

Global Journal of Science Frontier Research: B
Chemistry

Volume 15 Issue 2 (Ver. 1.0)

Open Association of Research Society

© Global Journal of Science Frontier Research. 2015.

All rights reserved.

This is a special issue published in version 1.0 of "Global Journal of Science Frontier Research." By Global Journals Inc.

All articles are open access articles distributed under "Global Journal of Science Frontier Research"

Reading License, which permits restricted use. Entire contents are copyright by of "Global Journal of Science Frontier Research" unless otherwise noted on specific articles.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without written permission.

The opinions and statements made in this book are those of the authors concerned. Ultraculture has not verified and neither confirms nor denies any of the foregoing and no warranty or fitness is implied.

Engage with the contents herein at your own risk.

The use of this journal, and the terms and conditions for our providing information, is governed by our Disclaimer, Terms and Conditions and Privacy Policy given on our website http://globaljournals.us/terms-and-condition/menu-id-1463/

By referring / using / reading / any type of association / referencing this journal, this signifies and you acknowledge that you have read them and that you accept and will be bound by the terms thereof.

All information, journals, this journal, activities undertaken, materials, services and our website, terms and conditions, privacy policy, and this journal is subject to change anytime without any prior notice.

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 Headquarters
301st Edgewater Place Suite, 100 Edgewater Dr.-Pl,
Wakefield MASSACHUSETTS, Pin: 01880,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, 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: *investors@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)

Integrated Editorial Board
(Computer Science, Engineering, Medical, Management, Natural Science, Social Science)

John A. Hamilton,"Drew" Jr.,
Ph.D., Professor, Management
Computer Science and Software Engineering
Director, Information Assurance Laboratory
Auburn University

Dr. Henry Hexmoor
IEEE senior member since 2004
Ph.D. Computer Science, University at Buffalo
Department of Computer Science
Southern Illinois University at Carbondale

Dr. Osman Balci, Professor
Department of Computer Science
Virginia Tech, Virginia University
Ph.D.and M.S.Syracuse University, Syracuse, New York
M.S. and B.S. Bogazici University, Istanbul, Turkey

Yogita Bajpai
M.Sc. (Computer Science), FICCT
U.S.A.Email:
yogita@computerresearch.org

Dr. T. David A. Forbes
Associate Professor and Range Nutritionist
Ph.D. Edinburgh University - Animal Nutrition
M.S. Aberdeen University - Animal Nutrition
B.A. University of Dublin- Zoology

Dr. Wenying Feng
Professor, Department of Computing & Information Systems
Department of Mathematics
Trent University, Peterborough,
ON Canada K9J 7B8

Dr. Thomas Wischgoll
Computer Science and Engineering,
Wright State University, Dayton, Ohio
B.S., M.S., Ph.D.
(University of Kaiserslautern)

Dr. Abdurrahman Arslanyilmaz
Computer Science & Information Systems Department
Youngstown State University
Ph.D., Texas A&M University
University of Missouri, Columbia
Gazi University, Turkey

Dr. Xiaohong He
Professor of International Business
University of Quinnipiac
BS, Jilin Institute of Technology; MA, MS, PhD,. (University of Texas-Dallas)

Burcin Becerik-Gerber
University of Southern California
Ph.D. in Civil Engineering
DDes from Harvard University
M.S. from University of California, Berkeley & Istanbul University

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

President Editor (HON.)

Dr. George Perry, (Neuroscientist)
Dean and Professor, College of Sciences
Denham Harman Research Award (American Aging Association)
ISI Highly Cited Researcher, Iberoamerican Molecular Biology Organization
AAAS Fellow, Correspondent Member of Spanish Royal Academy of Sciences
University of Texas at San Antonio
Postdoctoral Fellow (Department of Cell Biology)
Baylor College of Medicine
Houston, Texas, United States

Chief Author (HON.)

Dr. R.K. Dixit
M.Sc., Ph.D., FICCT
Chief Author, India
Email: authorind@computerresearch.org

Dean & Editor-in-Chief (HON.)

Vivek Dubey(HON.)
MS (Industrial Engineering),
MS (Mechanical Engineering)
University of Wisconsin, FICCT
Editor-in-Chief, USA
editorusa@computerresearch.org

Sangita Dixit
M.Sc., FICCT
Dean & Chancellor (Asia Pacific)
deanind@computerresearch.org

Suyash Dixit
(B.E., Computer Science Engineering), FICCTT
President, Web Administration and
Development , CEO at IOSRD
COO at GAOR & OSS

Er. Suyog Dixit
(M. Tech), BE (HONS. in CSE), FICCT
SAP Certified Consultant
CEO at IOSRD, GAOR & OSS
Technical Dean, Global Journals Inc. (US)
Website: www.suyogdixit.com
Email:suyog@suyogdixit.com

Pritesh Rajvaidya
(MS) Computer Science Department
California State University
BE (Computer Science), FICCT
Technical Dean, USA
Email: pritesh@computerresearch.org

Luis Galárraga
J!Research Project Leader
Saarbrücken, Germany

Contents of the Issue

i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Contents of the Issue

1. Asphalt Chemistry. *1-6*
2. Evaluation of Pure and Ag-Doped Tio_2 Films in the Photocatalytic Activity of Phenol. *7-13*

v. Fellows and Auxiliary Memberships
vi. Process of Submission of Research Paper
vii. Preferred Author Guidelines
viii. Index

Global Journal of Science Frontier Research: B
Chemistry
Volume 15 Issue 2 Version 1.0 Year 2015
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Asphalt Chemistry

By Sharon A. Lewis, Terry Phillips, Kayla Love, Martell McKinney, Quintessa Jackson, Denzel Pugh, Evann Comeaux, Lindsay Davis, Megan Bowlin, Rajah Singh, Phoebe Carter, Nichole Newman[€], LeMarcus Lott, Ryan Johnson, Brittany Vann & Mehari Future

Langston University, United States

Abstract- The students were taught to generate oil (binder) from recycled asphalt pavement (aggregate) using a Buchi Rotavapor R-15 for submission for elemental analysis (C, N, H, O) and engineering rheology testing and microbial growth. We obtained 18 samples from Oklahoma Department of Transportation divisions and two construction companies to compare the physical and chemical properties of these samples.

GJSFR-B Classification : FOR Code: 039999

ASPHALTCHEMISTRY

Strictly as per the compliance and regulations of :

© 2015. Sharon A. Lewis, Terry Phillips, Kayla Love, Martell McKinney, Quintessa Jackson, Denzel Pugh, Evann Comeaux, Lindsay Davis, Megan Bowlin, Rajah Singh, Phoebe Carter, Nichole Newman, LeMarcus Lott, Ryan Johnson, Brittany Vann & Mehari Future. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Asphalt Chemistry

Sharon A. Lewis [α], Terry Phillips [σ], Kayla Love [ρ], Martell McKinney [ω], Quintessa Jackson [¥], Denzel Pugh [§], Evann Comeaux [χ], Lindsay Davis [ν], Megan Bowlin [Θ], Rajah Singh [ζ], Phoebe Carter [£], Nichole Newman [€], LeMarcus Lott [ƒ], Ryan Johnson [₳], Brittany Vann [₵] & Mehari Future [₡]

Abstract- The students were taught to generate oil (binder) from recycled asphalt pavement (aggregate) using a BuchiRotavapor R-15 for submission for elemental analysis (C, N, H,O) and engineering rheology testing and microbial growth. We obtained 18 samples from Oklahoma Department of Transportation divisions and two construction companies to compare the physical and chemical properties of these samples.

Subject: comparison of various samples of recycled asphalt pavement.

I. Introduction

We collected eighteen samples from 5 Oklahoma Department of Transportation divisions and 2 construction companies. The objective of this research was to generate the oil (binder) from recycled asphalt pavements (aggregate) samples using the BuchiRotavapor R15. We were able to determine the age of the sample by observing the physical properties of the sample. We sent the samples to Galbraith Laboratory for carbon, nitrogen, hydrogen, and oxygen elemental analysis. They learned to independently use the Rotavapor and the Humboldt to process samples from the beginning to final product of generating binder. I learned the protocol from mixing samples to recovering binder.

II. Problem Statement

Recycled Asphalt Pavement (RAP) contains valuable binder and therefore, RAP should be used with new millings on surface roads and not just to patch up holes. Today the oil being produced from refineries is not as rich and of as good of quality as the oil produced twenty years ago or the roads being laid down these days would not have potholes and cracks so soon.

Roads in the United States disintegrate over a shorter period due to increasing traffic. So a focus in today's society is repairing and replacing these roads which cost a significant amount of money. The government is taking available funds and stretching them to meet our restoration needs. Recycled asphalt pavement can save money for the government, create additional business opportunities from research, save energy, and conserve diminishing resources of aggregate. Over the past decades RAP usage has increased. It is the most recycled material in the US. It has been proven that mixtures with RAP can perform as well as mixtures made with virgin binder. Increasing the usage of RAP in new mixtures can reduce the amount of new material being added.

III. Background

Once all of the binder is removed from RAP, engineers are then able to perform rheology testing. Rotational Viscosity test, Performance Grading test to include the following: Dynamic Shear Rheometer, Rotational Thin Film Oven, Pressure Aging Vessel, and Bending Beam Rheometer. You can analyze binder properties from Mechanical Empirical Pavement Design Procedures (MEPDP).

Once all the binder is removed from the RAP, the original aggregate remains for sieve analysis of extracted aggregate, specific gravity of fine and coarse aggregates, Los Angeles Abrasion test, Micro Deval Abrasion test and sand equivalent.

IV. Protocol

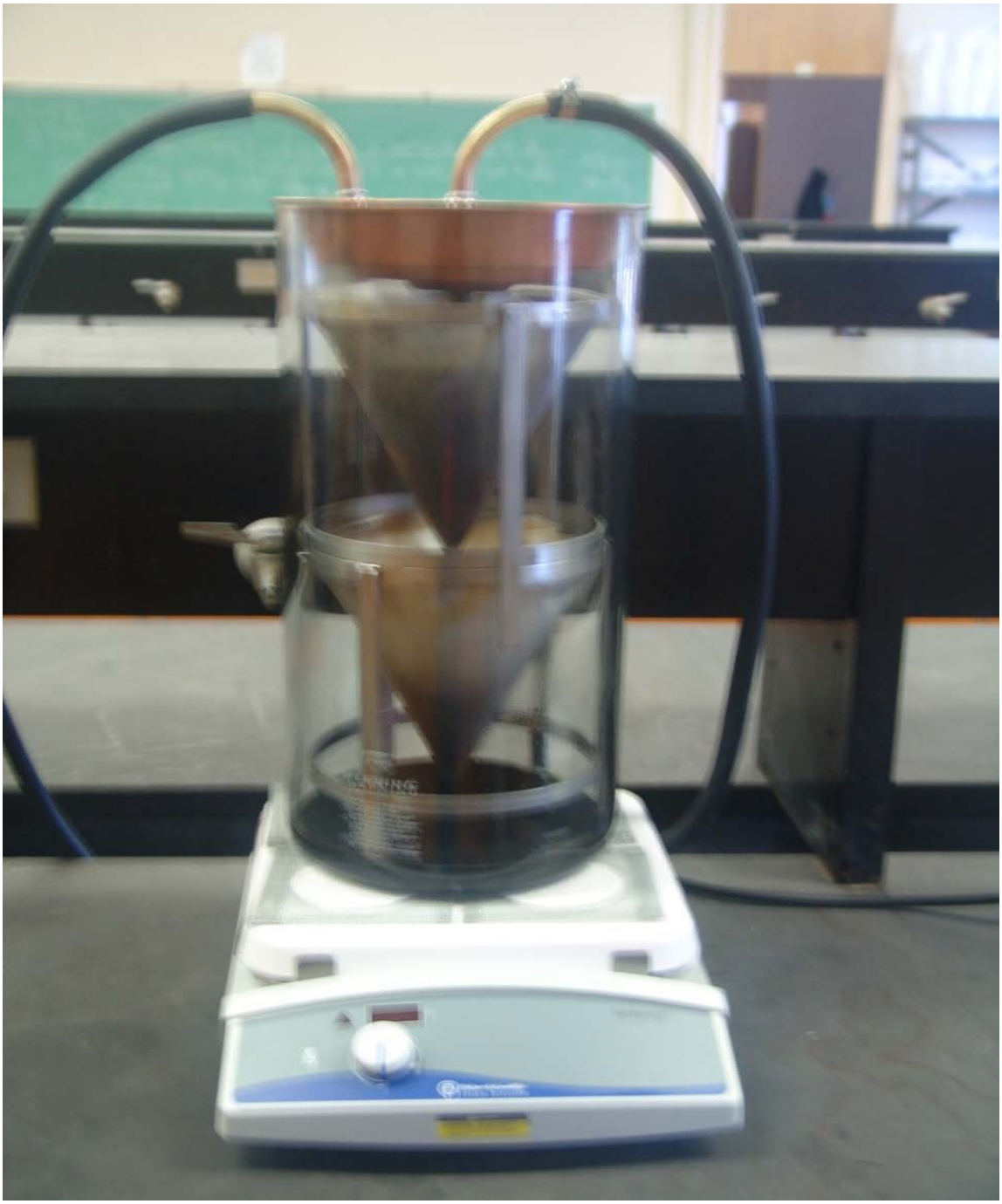
It is the American Association of State Highway and Transportation Officials (AASHTO) designation: T 164-08, test method B. Crush RAP to generate a weight of 300 grams and put in a 1000 ml beaker. Add Trichloroethylene (TCE) to reach the 900 ml beaker level, actually 750 ml TCE. Saturate RAP with TCE by stirring with a spatula. Allow RAP to soak in the TCE for an hour while stirring randomly. To filter the fines such as small aggregate, use the Humboldt Reflux Extractor H-149S. We used 2 sieves with appropriately wetted filter paper and set inside of the Humboldt. Connect two radiator hoses to the lid on Humboldt. One end of the lid had a hose connected to a water source. The other end of the lid had a hose connected to allow flow of water into the trough. Heat the hot plate to 120°C. Pour RAP/TCE into the top funnel. Turn on water. Continue filtration until all the binder collects into the bottom of the Humboldt. All the aggregate and fines collected into the top two sieve.

Author α σ ρ ω ¥ § χ ν Θ ζ £ € ƒ ₳ ₵ ₡: Chemistry Department, Langston University, Langston, Oklahoma 73050. e-mail: salewis@langston.edu

Global Journal of Science Frontier Research (B) Volume XV Issue II Version I Year 2015

© 2015 Global Journals Inc. (US)

Figure#1-Humboldt



After the Humboldt activities are complete, we are no longer handling RAP/TCE. At this point, we are handling binder/TCE. Decant the binder/TCE mixture into a 2 L evaporating flask. Connect the evaporating flask to the Rotavapor. Put fresh ice into ice trap. Replace distilled water in the water bath. Turn on the pressure unit where the pressure decreases from 970 mbar to 63-67 mbar. Lower the flask into water bath and start rotating the flask at 135 rpm or higher. Every hour, depressurize the system to remove the thawed ice from the cold trap. The TCE is condensed from the binder/TCE mixture into the solvent collecting flask. When solvent stopped collecting in the collecting flask, the system is depressurized, and the flask is removed. The binder is recovered by placing the flask in an oven for ten minutes and setting it upside down over a tin can.

© 2015 Global Journals Inc. (US)

Figure #2-Rotavapor R15

V. Results

There are two result tables. Table #1 reflects the sources of the samples and the conditions. Where you see gaps between starting the sample and processing the sample, the Rotavapor was incapacitated. The menu on the Rotavapor recommends 33mbar pressure for TCE. However, the binder/TCE would boil and reflux into the collecting flask. After troubling shooting the protocol, we noticed that 63-37mbarr worked. Also we had a problem with the water in the water bath boiling the sample even when the temperature of the water was room temperature. Increasing the pressure solved this problem also. The instructions for the Rotavapor states that optimal conditions included having a 40 point difference between the water setting and the pressure. We came very close to that requirement after much troubleshooting.

Table#1 : Sources and Conditions in the order of work performed

	Source	Date	Pressure	Bath Temp	Results
Sample #1	Sq#1	9/26/14	67mbarr	20°C	8 grams 11/20/14
Sample #2	Hwy75 Okmulgee County	10/7/14	67mbarr	20°C	19 grams 11/19/14
Sample #3	Muskogee County	9/26/14	67mbarr	20°C	10 grams 11/19/14
Sample #4	Haskell County	9/24/14	67mbarr	20°C	11 grams 11/18/14
Sample #5	HL Norman Medium RAP	9/12/14	63mbarr	20°C	10 grams 11/14/14
Sample #6	Seq. County	10/1/14	63mbarr	20°C	8 grams

© 2015 Global Journals Inc. (US)

					11/14/14
Sample #7	HL East Plant Medium RAP	9/10/14	63mbarr	20°C	8 grams 11/13/14
Sample #8	Haskell Lemon 5% shingles, no RAP	9/3/14	66mbarr	23°C	5 grams 9/3/14
Sample #9	Haskell Lemon 5% shingles, no RAP	9/3/14	66mbarr	23°C	82 grams 9/3/14
Sample #10 Crust	Haskell Lemon 5% shingles, no RAP	9/3/14	66mbarr	23°C	37 grams 9/3/14
Sample #11	Division 7 (Chickashe, OK)	2/17/14	68mbarr	19°C	10 grams 4/1/14
Sample #12	No sample				
Sample #13 Binder	Haskell Lemon 25% Rap with 5% shingles	8/28/14	100mbarr	23°C	12 grams 8/28/14
Sample #14 Crust	Haskell Lemon 25% Rap with 5% shingles	8/28/14	100mbarr	23°C	47 grams 8/28/14
Sample #15	Haskell Lemon East Plant Medium RAP with Aggregate	3/31/14	68mbarr	27°C	4 grams
Sample #16	Division 5 (Hydro, OK)	8/21/14	68mbarr	19°C	16 grams 8/27/14
Sample #17	Haskell Lemon West Plant	2/18/14	67mbarr	27°C	6 grams
Sample #18	Division 4 (Quapaw)	2/17/14	60mbarr	40°C	8 grams

Table #2 reflects the elemental analysis. The procedure used for elemental analysis was GLI ME-14 for carbon, hydrogen, and nitrogen. The procedure used for oxygen was GLI E8-4. Some of the samples were special. Samples #8 & #9 are together. This was an interesting looking sample. It looked grainy, thick, and viscous before running through the Humboldt. Four hundred grams of shingles collected on the first filter paper of the Humboldt. Once removing the shingles, crust not binder was removed from the filter paper. Sample # 7 was very fluid. Sample #13 had a lot of sand but very little aggregate. All of the liquid part of the sample was put in the Humboldt. The student patiently poured the RAP/TCE trying not to pour any of the sand into the first seive of the Humboldt. All of the sample flowed through the first filter immediately. It took forever for the sample to flow through the second filter paper.

Table #2 : Elemental Analysis

	Source	%Carbon	%Hydrogen	%Nitrogen	%Oxygen
Sample#1 Binder	Sq#1	81.93	10.05	.51	3.52
Sample#2 Binder	Hwy75 Okmulgee County	83.36	10.48	.52	2.75
Sample #3 Binder	Muskogee County	9.44	.51	<.5	18.53
Sample#4 Binder	Haskell County	83.90	10.52	.50	2.51
Sample #5 Binder	HL Norman Medium RAP	79.94	10.04	.65	4.29
Sample #6 Binder	Seq. County	1	2	3	4
Sample #7 Binder	HL East Plant Medium RAP	10.74	,.5	<.5	24.87
Sample #8 Binder	Haskell Lemon 5% shingles, no RAP (5grams)	75.98	9.42	<.5	2.32
Sample #9 Binder	Haskell Lemon 5% shingles, no RAP (82 grams)	81.56	10.11	2.06	
Sample #10 Crust	Haskell Lemon 5% shingles, no RAP The weight of the crust remaining on filter paper was 37 grams of from Samples #8 & #9)				
Sample #11	Division 7	82.75	10.20	.52	2.31

© 2015 Global Journals Inc. (US)

Binder	(Chickashe, OK)				
Sample #12	Miss count				
Sample #13 Binder	Haskell Lemon 25% Rap with 5% shingles	84.33	10.50	<.50	2.48
Sample #14 Crust	Haskell Lemon 25% Rap with 5% shingles The weight of the crust left on the filter paper was 47 grams.				
Sample #15 Binder	Haskell Lemon East Plant Medium Rap with Aggregate				
Sample #16 Binder	Division 5 (Hydro, OK)	82.67	10.60	.53	2.23
Sample #17 Binder	Haskell Lemon West Plant				
Sample #18 Binder	Division 4 (Quapaw)	74.41	8.95	<0.5	2.23

VI. Conclusion

This research is beneficial to the work of engineers because they would be able to perform rheology testing: Rotational Viscosity test, Performance Grading test, Dynamic Shear Rheometer, using Rotational Thin Film Oven, Pressure Aging Vessel, and Bending Beam Rheometer. In conclusion, we used the Rotavapor to extract binder from different sources to perform carbon, hydrogen, nitrogen, and oxygen elemental analysis data.

VII. Anticipated Benefits

The anticipated benefit is to present this analysis to the eight ODOT divisions in Oklahoma so that they will realize that RAP is more valuable to them than usage as a black rock. We recommend that the ODOT divisions start using RAP at various percentages with virgin aggregate on surface roads. They must first start separating RAP sources from various projects.

VIII. Acknowledgements

The authors would like to thank Langston University, Department of Chemistry; Haskell Lemon Construction Company, specifically Jay Lemon; and several divisions of the Oklahoma Department of Transportation.

© 2015 Global Journals Inc. (US)

This page is intentionally left blank

© 2015 Global Journals Inc. (US)

Global Journal of Science Frontier Research: B
Chemistry
Volume 15 Issue 2 Version 1.0 Year 2015
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Evaluation of Pure and Ag-Doped Tio_2 Films in the Photocatalytic Activity of Phenol

By Adriana B. Araújo, Sônia M. A. Jorge, Pedro M. Padilha, Dorotéia F. Bozano, Gustavo R. Castro & Ariovaldo O. Florentino

Universidade Estadual Paulista, Brazil

Abstract- Pure TiO_2 films, modified by the addition of Degussa P25 powder and Ag-doped were synthesized using sol-gel route and immobilized in borosilicate support at different withdrawing rates and dipping time. They were characterized by X-ray diffractometry, scanning electronic microscopy and high-resolution field-emission gun scanning electronic microscopy. Their photocatalytic activities under UV irradiation were examined using phenol. The higher activities were achieved through the Ag-doped films deposited with 0.4 mm s^{-1} and two dipping. Approximately 90% of the organic contaminant was photodegradated after 24 h of irradiation.

Keywords: TiO_2 films, photocatalysis, doping, phenol, photodegradation.

GJSFR-B Classification : FOR Code: 259999

EVALUATIONOFPUREANDAGDOPEDTIOFILMSINTHEPHOTOCATALYTICACTIVITYOFPHENOL

Strictly as per the compliance and regulations of :

© 2015. Adriana B. Araújo, Sônia M. A. Jorge, Pedro M. Padilha, Dorotéia F. Bozano, Gustavo R. Castro & Ariovaldo O. Florentino. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Evaluation of Pure and Ag-Doped Tio_2 Films in the Photocatalytic Activity of Phenol

Adriana B. Araújo [α], Sônia M. A. Jorge [σ], Pedro M. Padilha [ρ], Dorotéia F. Bozano [ω], Gustavo R. Castro[¥] & Ariovaldo O. Florentino[§]

Abstract- Pure TiO_2 films, modified by the addition of Degussa P25 powder and Ag-doped were synthesized using sol-gel route and immobilized in borosilicate support at different withdrawing rates and dipping time. They were characterized by X-ray diffractometry, scanning electronic microscopy and high-resolution field-emission gun scanning electronic microscopy. Their photocatalytic activities under UV irradiation were examined using phenol. The higher activities were achieved through the Ag-doped films deposited with 0.4 mm s^{-1} and two dipping. Approximately 90% of the organic contaminant was photodegradated after 24 h of irradiation.

Keywords: TiO_2 films, photocatalysis, doping, phenol, photodegradation.

I. Introduction

Heterogeneous photocatalysis has received a great deal of attention as an advanced oxidation process (AOP) for degrading persistent organic compounds, reducing chemical oxygen demand (COD) and eliminating microorganisms in water bodies to allow for its reuse [1-5]. The advantage of this process is that it leads to the total mineralization of the organic contaminants, whether they are simple or complex molecules. The photocatalysis mechanism is based on the activation of a semiconductor, by sunlight or artificial light (Ultraviolet visible radiation). The interaction of light with the semiconductor excites electrons in the valence band toward the conduction band. This excitation produces holes (h^+) in the valence band that will act as oxidizing sites, while the photogenerated electrons (e^-) combine with the dissolved oxygen, preventing the recombination of the electron-hole pair. In addition, the oxygen reacts with reduction sites, the electrons of the conduction band, initially forming superoxide ion-radical ($O_2^{\cdot-}$) and later, peroxides. The latter can react with the photogenerated electron (or superoxide ion-radical) forming $^{\cdot}OH$ radicals. By this mechanism, both molecular and dissociated water (OH^- groups bound at the TiO_2 surface) react with the photogenerated h^+ holes to form highly oxidizing hydroxyl radicals [6]. The organic pollutant can thus be degraded directly at the surface of the semiconductor through the photogenerated hole, or through the hydroxyl radical, resulting in complete mineralization or in the formation of persistent intermediaries for subsequent oxidation.

Different semiconductors have been tested for photodegradation of several organic pollutants. Of all, titania has proved to be the best material because of its many desirable properties. It possesses photostability, is biologically inert, inexpensive, and displays chemical stability within a wide range of pH [7]. Although this method is quite efficient, its disadvantage is that the catalyst is suspended in the solution in the form of powder, which of course makes the separation process difficult and expensive, rendering the method unfeasible on a large scale. In order to resolve this problem, more recent studies propose the use of TiO_2 in the form of films obtained via sol-gel immobilized in inert substrate [8,9].

Although the use of films is an advance for enabling of large-scale photocatalysis, the physically adhered film can be leached during the photocatalytic process. To overcome this difficulty it is necessary to prepare films with suitable physical and chemical properties for photocatalysis and firmly adhered to the substrate.

Another important factor is the greater efficiency of the photocatalytic process. It makes the recombination of the electron-hole pair difficult, extending the occurrence time for reactions that lead to the formation of oxidizing species. This can be achieved through modifications on the semiconductor's surface and/or structure or by the addition of sensitizers that improve the system's quantic yield [10-12].

The addition of noble metals on the surface of the semiconductor can improve its photocatalytic activity [13-17]. This deposition can produce traps to withdraw photoinduced electrons or holes leading to a decrease of the electron-hole recombination in photocatalytic process and an increase in the ability of visible light absorption by TiO_2 [13]. Some noble metals such as Pt, Pd, Rh and Au are very expensive to be used in industrial scale, leading to the search for less valuable metals but which have similar performance as sensitizers. According to the literature, among the metal dopants such as Fe, Cr, Zn, Ag, etc, Ag is the most

Author α σ ρ ¥ §: Departamento de Química e Bioquímica - IB - UNESP, C.P. 510, CEP 18618-970, Botucatu, SP, Brasil. Departamento de Química Analítica – IQ – UNESP, C.P. 355, CEP 14800-900, Araraquara, SP, Brasil. e-mail: smajorge@ibb.unesp.br

Author ω: Departamento de Química e Bioquímica - IB - UNESP, C.P. 510, CEP 18618-970, Botucatu, SP, Brasil. INFI-UFMS, C.P. 549, CEP 79070-900, Campo Grande, MS, Brasil.

© 2015 Global Journals Inc. (US)

promising as a modifier of TiO_2 for organic pollutants photodegradation [17].

Thus, this study describes the synthesis and characterization of thin titania films prepared by the sol-gel route and modified with silver ions. These films were immobilized in borosilicate support and their photocatalytic activities under UV irradiation were analyzed using phenol as a model organic contaminant.

II. Experimental

a) Chemicals

All chemicals used in this study were of analytical grade without further purification. Titania, supplied by Degussa (P25), was predried at 150°C under vacuum for 10 h and then used immediately.

b) Preparation of the TiO_2 films

Titanium dioxide suspensions were prepared by the sol-gel method, according to the following procedure: titanium(IV) isopropoxide ($Ti(i\text{-}OPr)_4$, Aldrich Chemical, 97%) was mixed quickly with glacial acetic acid under constant stirring (molar ratio $H^+/Ti = 4$). Next, this solution was diluted with isopropyl alcohol in 1:1 Ti/alcohol ratio and the resulting solution (solution A) kept under agitation for ~1 h. Alcohol and a nitric acid solution (solution B) were then added to the mixture, still under continual stirring, keeping the molar ratios at alcohol/Ti = 7.6 and $H^+/Ti = 0.5$ [18]. Solution A and Solution B were mixed and the resulting solution (Solution C) was kept under stirring for ~2 h. The immobilized films prepared immediately after the obtainment of this sol were called pure 0 h TiO_2. When these films were kept under refrigeration for 24 h before to be immobilized they were denominated pure 24 h. It was also prepared a sol following the same procedure above described, being the Solution A the same. However, to the solution B was added TiO_2 P25 in a proportion of 1.0 g of titania per liter of ethanol and this solution was sonicated for ~20 min before to be mixed with Solution A. These films immobilized immediately after sol formation were named mixed 0 h TiO_2 and those immobilized after to be kept under refrigeration for 24 h were called mixed 24 h TiO_2. Titania films modified by silver were also prepared. For this, beyond TiO_2 P25 in a proportion above mentioned, it was added $AgNO_3$ to the Solution B to get Ag/TiO_2 films at different Ag loadings from 0.15 to 5 weight%.

The TiO_2 solution prepared (Solution C) were immobilized, by the dip-coating deposition method, in a tubular borosilicate support, whose area available for the formation of the thin film was ~ 132 cm^2. The withdrawing rate was varied as well as the dipping time. The films were dried at room temperature and then calcined at 250°C for 15 min and at 450°C for 4 h.

c) Characterization

The thin films were characterized by several techniques. X-ray diffractometry (XRD) was performed with a Rigaku diffractometer model D/Max-2100/PC automatic, equipped with a nickel monochromator using Cu K_α (λ = 1.5405 Å) radiation at 40 kV and 20 mA. The method employed was the small angle, using a scanning velocity of 2^0 min^{-1} and scans between 15^0 and 80^0. Scanning electronic microscopy (SEM) and high-resolution field-emission gun scanning electronic microscopy (FEG-SEM) were done on a Zeiss, model DSM 94A and on a Leo, model Supra 35 microscopes, respectively.

d) Photocatalytic experiments

The photocatalytic activity, using a solution containing 15.0 mg L^{-1} of phenol, was investigated. The photodegradation experiments were conducted in a cylindrical reactor in which the sample was kept at a temperature of 25°C, under stirring, saturated with oxygen, and irradiated with light at predominant wavelength of 365 nm, produced by four 15 W light bulbs. The incident irradiation, measured with a model PMA2100 version 1.16 Solar Light Company Inc. photometer/radiometer, was 5.11 mW cm^{-2}. Aliquots of 7 mL of the solution were removed at various times during the photocatalytic process and the photodegraded phenol content was evaluated by UV-VIS spectro photometry by using a spectrophotometer Thermo Spectronic model Genesys 6.

III. Results and Discussion

a) The pure 0 h TiO_2 and pure 24 h TiO_2 films

The photocatalytic activity of the pure 0 h TiO_2 and pure 24 h TiO_2 films immobilized in a support of borosilicate utilizing 0.4 mm s^{-1} withdrawing rate and two dipping was evaluated towards phenol. Under these circumstances, approximately 55% and 65% of phenol degradation after 24 h of illumination was achieved using the pure 0 h TiO_2 and pure 24 h TiO_2 films, respectively. These results may be considered satisfactory since the covered surface area of the substrate was equal to 0.0132 m^2. Without the catalyst, only 5% of the standard phenol solution was found to have become photo degraded after 24 h of illumination.

Micrographs were obtained by SEM and FEG-SEM for pure 24 h TiO_2 film with different withdrawing rates and dipping time. It was observed a decrease of particles` size, roughness and porosity of film as well as an increase of micro cracks on the surface film when the withdrawing rate increased. The photo catalytic activity of this film towards phenol also decreases with the increase of withdrawing rate in agreement with the results of film`s characterization. The increase of this parameter promotes the increase of micro cracks leading to the decrease of the amount of available catalyst for degradation of the organic contaminant [19-

© 2015 Global Journals Inc. (US)

21]. A decrease in the photo catalytic activity was also observed when the dipping time increased. This is probable due to higher recovering of actives sites by successive layers of titania hindering the contact of UV radiation. Another fact to be considered under this condition is the increase of rutile phase. Several studies have shown that pure anatase TiO_2 has a higher activity than pure rutile under oxidizing conditions and a discussion about this was taken by Balasubramanian *et al*. [19]. The higher photo catalytic activity was confirmed for the pure 24 h TiO_2 film deposited with 0.4 mm s^{-1} and two dipping, and its thickness, using SEM micrograph, was estimated at 140 nm.

b) The mixed 0 h TiO_2 and mixed 24 h TiO_2 films

The photo catalytic activity of the mixed 0 h TiO_2 and mixed 24 h TiO_2 films was also evaluated for the degradation of phenol and the results are presented in Figure 1. In the same Figure are shown the activities for the pure 0 h TiO_2 and pure 24 h TiO_2 films. As may be observed it was similar for pure 0 h TiO_2 and mixed 0 h TiO_2 films. On the other hand, the higher activity was found for the mixed 24 h TiO_2 film. This behavior may be attributed to the higher viscosity of the sol after aging process for 24 h. According Balasubramanian *et al*. [21], the addition of TiO_2 P25 to the sol also increase the viscosity since it leads to the particle growth during the drying step and serve as nucleation sites. Thus the particle growth occurs on the surface of the P25 particles.

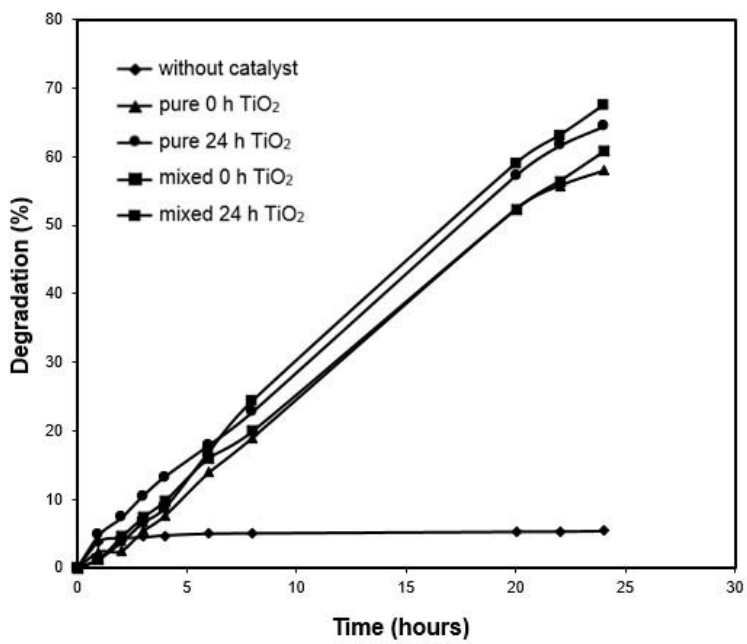


Figure 1 : Photo degradation of phenol as a function of irradiation time in the absence and presence of catalysts: pure 0 h TiO_2, pure 24 h TiO_2, mixed 0 h TiO_2 and mixed 24 h TiO_2 films under UV illumination, oxygen atmosphere and stirring (pH 5).

The thickness of the mixed 24 h TiO_2 film, estimated using SEM micrograph was 188 nm, being higher than that obtained for the pure 24 h titania film (140 nm). This result corroborates the increase in viscosity of mixed film and is consistent with published studies which show that the film thickness increases with increasing viscosity within a certain range [21,22]. Furthermore, Figure 1 shows that the phenol degradation percentage in the first 8 h of irradiation is around 25%, which increases to 68% after 24 h of irradiation. This difference is probable due to the presence of intermediates hindering the process of photo degradation at the beginning of irradiation.

Photo degradation of phenol using the mixed 24 h TiO_2 film was also evaluated at different pH values as shown in Figure 2. As may be seen, the photo catalytic activity increased with decreasing pH. This result may be attributed to the characteristic of the TiO_2 whose surface becomes positively charged with increasing acidity promoting electrostatic attraction with the phenolate anion. As a result, the adsorption of the substrate increases. Pecchi *et al*. have also observed that the percentage of pentachlorophenol adsorbed on TiO_2 P25 increases with decreasing pH [23].

c) The Ag doped TiO_2 films

The same sol utilized to prepare the mixed 24 h TiO_2 film was used to get Ag doped TiO_2 films. So, $AgNO_3$ was added to Solution B for obtaining films with the following silver content: 0.15, 0.5, 2 and 5 weight %, named as 0.15%Ag/TiO_2, 0.5%Ag/TiO_2, 2%Ag/TiO_2 and

© 2015 Global Journals Inc. (US)

5%Ag/TiO_2, respectively. By using all these films, the photo degradation of phenol was about 90% after 24 h of irradiation as may be observed in Figure 3. Accordingly, these results were better than those obtained with the mixed 24 h TiO_2 film.

As the photo catalytic activity was similar for all doped films, studies of characterization were carried out for the 0.15%Ag/TiO_2 film. FEG-SEM micrographs showed little particles, porous structure and increased thickness when compared to those

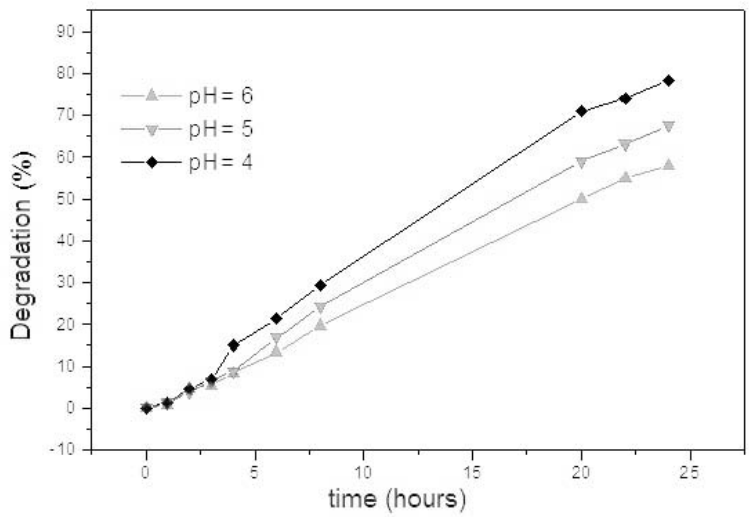


Figure 2 : Photo degradation of phenol as a function of irradiation time for mixed 24 h TiO_2 films at different pH values. (a) pH 4, (b) pH 5 and (c) pH 6.

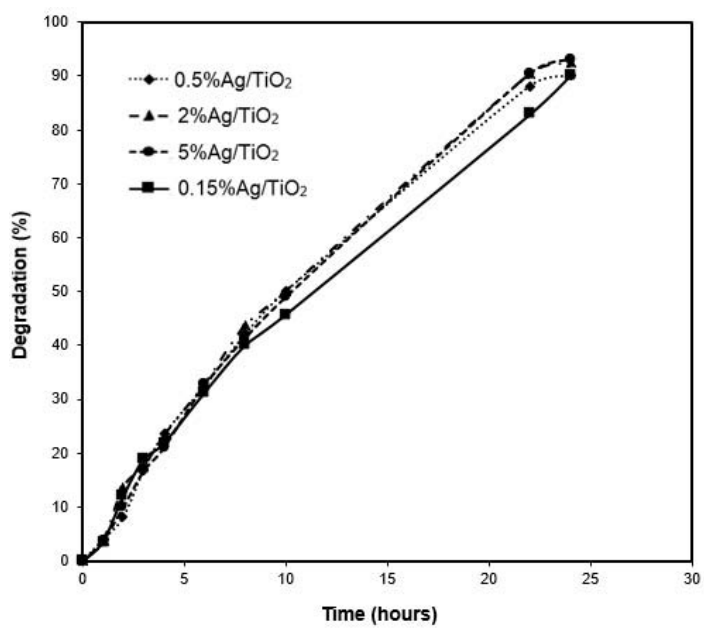


Figure 3 : Photo degradation of phenol as a function of irradiation time for Ag doped TiO_2 films at different Ag loadings

obtained for the mixed 24 h TiO_2 film (188 nm). The thickness of the 0.15%Ag/TiO_2 film was estimated at 210 nm.

The influence of Ag doping on the microstructure of the film was analyzed through X-ray diffraction and the results are presented in Figure 4. The patterns for the mixed 24 h TiO_2 and the 0.15%Ag/TiO_2 films showed the predominance of the anatase phase with a pronounced (1 0 1) peak at $2\theta = 25.3^o$. Other peaks of smaller intensity, at 37.7^o, 38.5^o, 48.1^o, 55.1^o, 59.3^o, 62.4^o were attributed to the same phase [9,20,24].

© 2015 Global Journals Inc. (US)

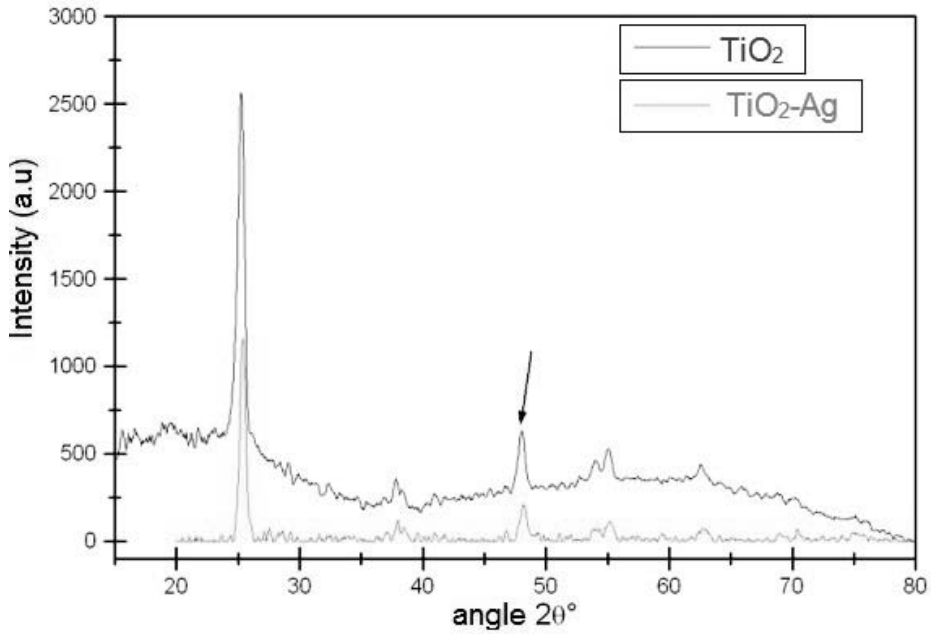


Figure 4 : XRD patterns for the mixed 24 h TiO_2 and 0.15%Ag/TiO_2 films

Crystallite size was calculated by using Scherrer´s formula [25]:

$$D = \frac{0.9\lambda}{\beta \cos\theta}$$

where D is the crystallite size, λ the X-ray wavelength used, β the broadening of diffraction line measured as half its maximum intensity and θ the corresponding angle. Values of 14 nm and 12 nm were found for the mixed 24 h TiO_2 and 0.15% Ag/TiO_2 films, respectively. So, the grain size decreases with the Ag doping. Researchers [15,17] have explained this behavior as follows: the radius of Ag^+ (ca. 126 pm) is bigger than that of Ti^{4+}(ca. 68 pm), then Ag^+ ions introduced by the sol-gel process would not enter the lattice of the anatase phase to form a stable solid solution. During the calcination step these dispersed Ag^+ ions would gradually migrate from the volume of TiO_2 grains to their surfaces and further to the surface of TiO_2 film. Those Ag^+ ions then would compete with Ti^{4+} and O^{2-} ions for the diffuse and reorganization, and the anatase crystallization and grain growth is hindered. Furthermore, because the Ag^+ ions gradually moves along with the anatase grain boundaries to the surface of TiO_2 film, the energy necessary for the movement of anatase grain boundary would increase and the driving force for the anatase grain boundary migration consequently decreases.

The effect of Ag doping on the TiO_2 photo catalytic activity was also analyzed. The results, depicted in Figure 5, showed that the photo degradation of phenol using the 0.15%Ag/TiO_2 film was around 25% higher when compared to the mixed 24 h TiO_2 film. Similar behavior has been observed by other investigators [17] and according to them the increase in the photo catalytic activity using the modified silver TiO_2 film can be related to the fact that the Fermi level of TiO_2 is higher than that of silver. By this reason, electrons would transfer from film to metallic silver particles resulting in a space charge layer at the boundaries between Ag and TiO_2. The electric field drives electrons to the interior and abstracts holes to the interfacial region of TiO_2 film, which enhances the photo generated electron-hole pair separation and inhibits their recombination. The charge separation efficiency and lifetime of photo generated charge carriers then increases. Relatively larger amount of generated hole can reach the interfacial region of TiO_2 film producing higher densities of reactive radicals such as HO_2, $^{\cdot}OH$ and H_2O_2,

© 2015 Global Journals Inc. (US)

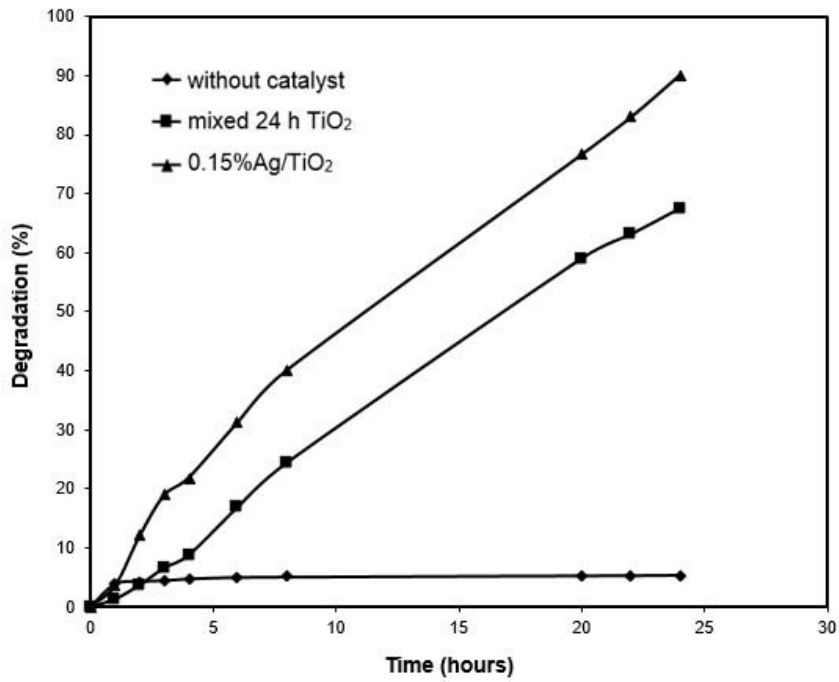


Figure 5 : Photodegradation of phenol as a function of irradiation time in the absence and presence of catalyst: mixed 24 h TiO_2 and 0.15%Ag/TiO_2 films under UV illumination, oxygen atmosphere and stirring (pH 5)

etc. For the TiO_2 photocatalytic oxidation proceeding mainly through the oxidization of photogenerated holes and its carriers, i.e. the reactive radicals, the photocatalysis is then facilitated. Besides, owing to the electrostatic interaction between the relatively positively charged TiO_2 film and negative ^{-}OH and H_2O, absorption of hydroxyl groups and water on doped TiO_2 film would be improved. This also leads to the increase in the contents of surface hydroxyl groups on doped TiO_2 films, which facilitates the charge transfer and the TiO_2 photocatalysis.

IV. Conclusions

The photocatalytic activities of the following films: pure titania, modified by addition of TiO_2 P25 and doped with Ag at different loadings and immobilized in borosilicate substrate were investigated. The results, tested for phenol degradation, showed that the most promising were the Ag-doped films deposited at 0.4 mm s^{-1} withdrawing rate and two dipping. Under these conditions, around 90% of the organic pollutant was photodegraded after 24 h of irradiation.

V. Acknowledgments

The authors gratefully acknowledge the financial support of FAPESP, CAPES and FUNDIBIO (Brazil).

References Références Referencias

1. J.A. Byrne, P.A. Fernández-Ibáñez, P.S.M. Dunlop, D.M.A. Alrousan, J.W.J. Hamilton, Photocatalytic enhancement for solar disinfection of water: a review, Int. J. Photoenergy 2011 (2011) 1-12.
2. A.O. Ibhadon, P. Fitzpatrick, Heterogeneous photocatalysis: Recent advances and applications, Catalysts 3 (2013) 189-218.
3. S. Ahmed, M.G. Rasul, R. Brown, M.A. Hashib, Influence of parameters on the heterogeneous photocatalytic degradation of pesticides and phenolic contaminants in wastewater: a short review, J. Environ. Manage. 92 (2011) 311-330.
4. G. Giovanni, J.P.S. Valente, P.M. Padilha, S.M.A Jorge, M. J. Saeki, A. O. Florentino, Polishing of water treated by a biological process with heterogeneous photocatalysis, J. Applied Sci. 10 (2010) 731-737.
5. A.L. Linsebigler, G.Q. Lu, J.T. Yates, Photocatalysis on TiO_2 surfaces: Principles, mechanisms, and selected results, Chem. Rev. 95 (1995) 735-758.
6. U.I. Gaya, A.H. Abdullah, Heterogeneous photocatalytic degradation of organic contaminants over titanium dioxide: A review of fundamentals, progress and problems, J. Photochem. Photobiol., C 9 (2008) 1-12.
7. D. Chatterjee, S. Dasgupta, Visible light induced photocatalytic degradation of organic pollutants, J. Photochem. Photobiol., C 6 (2005) 186-205.
8. L. Zhang, T. Kanki, N. Sano, A. Toyoda, Development of TiO_2 photocatalyst reaction for water purification, Sep. Purif. Technol. 31 (2003) 105-110.
9. S. Gelover, P. Mondragón, A. Jiménez, Titanium dioxide sol-gel deposited over glass and its

© 2015 Global Journals Inc. (US)

application as a photocatalyst for water decontamination, J. Photochem. Photobiol., A 165 (2004) 241-246.
10. P. Lu, F. Wu, N. S. Deng, Enhancement of TiO_2 photocataytic redox ability by β-cyclodextrin in suspened solutions, Appl. Catal., B 53 (2004) 87-93.
11. P.D. Cozzoli, E. Fanizza, R. Camparelli, M.L. Curri, A. Agostiano, Role of metal nanoparticles in TiO_2/Ag nanocomposite-based microheterogeneous photocatalysis, J. Phys. Chem. B 108 (2004) 9623-9630.
12. C.M.Teh, A.R. Mohamed, Roles of titanium dioxide and ion-doped titanium dioxide on photocatalytic degradation of organic pollutants (phenolic compounds and dyes) in aqueous solutions. A review, J. Alloys Compd. 509 (2011) 1648-1660.
13. B. Xin, L. Jing, Z. Ren, B. Wang, H. Fu, Effects of simultaneously doped and deposited Ag on the photocatalytic activity and surface states of TiO_2, J. Phys. Chem. B 109 (2005) 2805-2809.
14. M. Moonsiri, P. Rangsunvigit, S. Chavadej, E. Gulari, Effects of Pt and Ag on the photocatalytic degradation of 4-chlorophenol and its by-products, Chem. Eng. J. 97 (2004) 241-248.
15. H.E. Chao, Y.U. Yun, H.U. Xingfang, A. Larbot, Effect of silver doping on the phase transformation and grain growth of sol-gel titania powder, J. Eur. Ceram. Soc. 23 (2003) 1457-1464.
16. D. Shchukin, E. Ustinovich, D. Sviridov, P. Pichat, Effect of silver deposits on the photocatalytic activity of titanium dioxide for the removal of 2-chorophenol in water, Photochem. Photobiol. Sci. 3 (2004) 142-144.
17. C. He, Y. Yun, X. Hu, A. Larbot, Influence of silver doping on the photocatalytic activity of titania films, Appl. Surf. Sci. 200 (2002) 239-247.
18. D.F. Bozano, Preparação e caracterização de catalisadores de V_2O_5 sobre suportes mistos de TiO_2-SiO_2 obtidos pelo método sol-gel: oxidação de metano e diclorometano. Tese de Doutorado, FCA, UNESP, Botucatu, 2003.
19. G. Balasubramanian, D.D. Dionysiou, M.T. Suidan, I. Baudin, J.–M. Laîné, Evaluating the activities of immobilized TiO_2 powder films for the photocatalytic degradation of organic contaminants in water, Appl. Catal., B 47 (2004) 73-84.
20. J. Liqiang, S. Xiaojun, C. Weimin, X. Zili, D. Yaoguo, F. Honggang, The preparation and characterization of nanoparticle TiO_2/Ti films and their photocatalytic activity, J. Phys. Chem. Solids 64 (2003) 615-623.
21. G. Balasubramanian, D. D. Dionysiou, M. T. Suidan, V. Subramanian, I. Baudin, J. –M. Laîné, Titania powder modified sol-gel process for photocatalytic applications, J. Mater. Sci. 38 (2003) 823-831.
22. R.S. Sonawane, S.G. Hegde, M.K. Dongare, Preparation of titanium(IV) oxide thin film photocatalyst by sol-gel dip coating, Mater. Chem. Phys. 77 (2002) 744-750.
23. G. Pecchi, P. Reyes, P. Sanhueza, J. Villaseñor, Photocatalytic degradation of pentachlorophenol on TiO_2 sol-gel catalysts, Chemosphere 43 (2001) 141-143.
24. B.R. Sankapal, M.Ch. Lux-Steiner, A. Ennaoui, Synthesis and characterization of anatase-TiO_2 thin film, Appl. Surf. Sci. 239 (2005) 165-170.
25. B.D. Cullity, Elements of X-ray Diffraction, Second ed., Addison-Wesley, California, 1978.

© 2015 Global Journals Inc. (US)

Global Journals Inc. (US) Guidelines Handbook 2015

www.GlobalJournals.org

FELLOWS

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN SCIENCE (FARSS)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards "FARSS" title to individuals. The 'FARSS' title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.

- The "FARSS" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSS or William Walldroff, M.S., FARSS.

FARSS accrediting is an honor. It authenticates your research activities. After recognition as FARSB, you can add 'FARSS' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:

FARSS designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

Once FARSB title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA). The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The FARSS can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSS, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

The FARSS will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSS member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSS, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website https://associationofresearch.org which will be helpful to upgrade the dignity.

The FARSS members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSS member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.

© Copyright by Global Journals Inc.(US)| Guidelines Handbook

The FARSS is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSS can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSS member can decide its price and we can help in making the right decision.

The FARSS member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN SCIENCE (MARSS)

The ' MARSS ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The “MARSS” is a dignified ornament which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., MARSS or William Walldroff, M.S., MARSS.

MARSS accrediting is an honor. It authenticates your research activities. After becoming MARSS, you can add 'MARSS' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefitscan be availed by you only for next three years from the date of certification.

MARSS designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSS, you will be given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSS member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSS, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

Auxiliary Memberships

Institutional Fellow of Global Journals Incorporation (USA)-OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

"

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone. "

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 conveninet , 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 .

Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish 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.

The Administration Rules

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).

Topics	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

A

Acrylamide · 9

B

Binder · 1, 3, 4, 5, 6

C

Corroborates · 22

G

Gelatinous · 11

P

Pavements · 1
Pentachlorophenol · 22, 28
Persistent · 19, 20

S

Sieve · 1, 5

T

Trichloroethylene · 1

save our planet

Global Journal of Science Frontier Research

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

ISSN 9755896

© Global Journals