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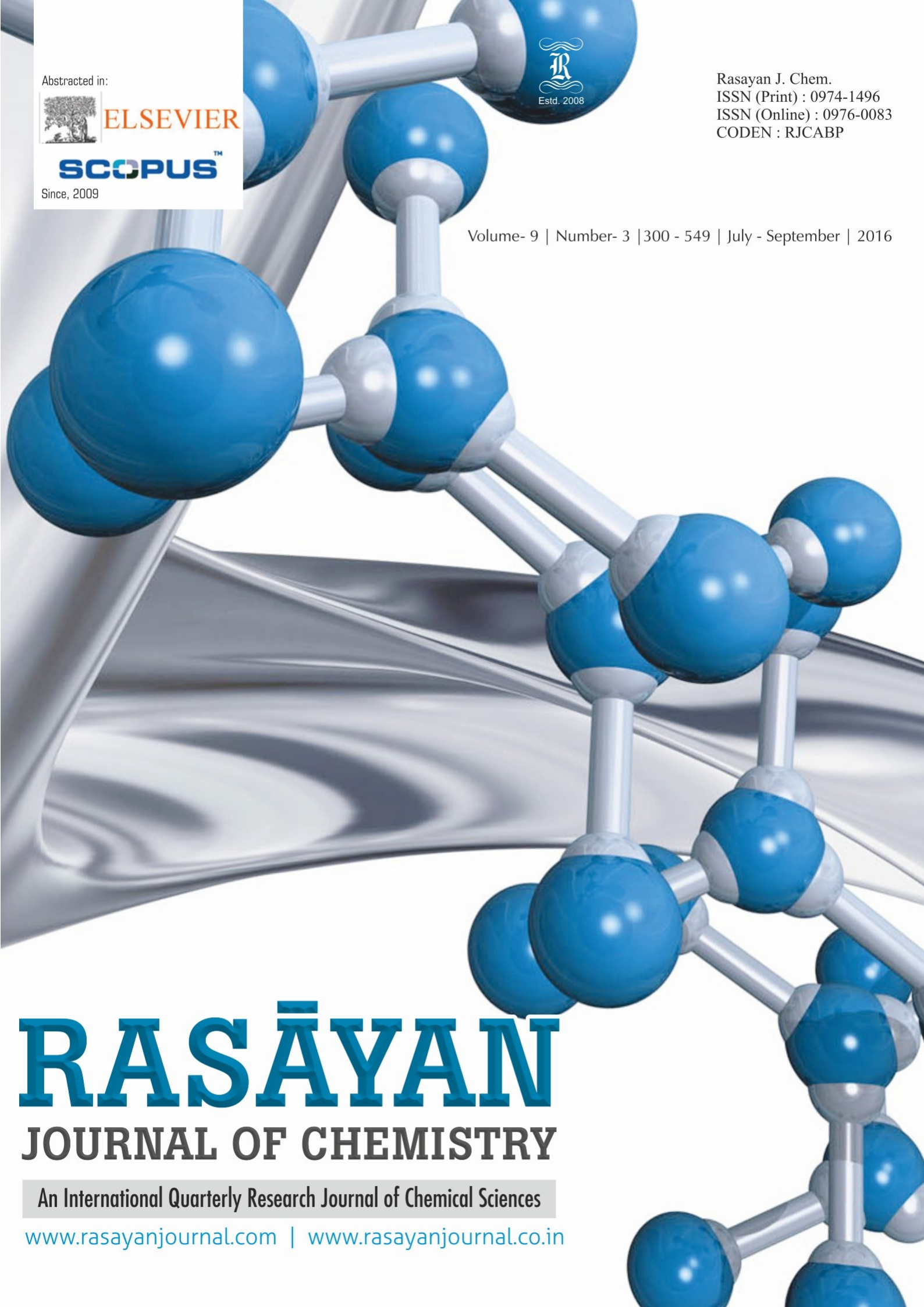

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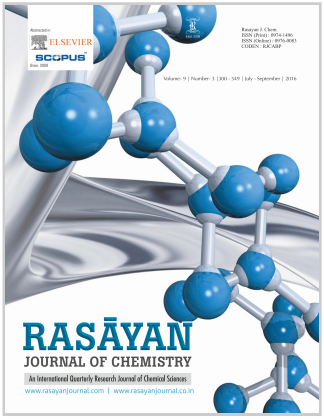

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Volume 10, Number 2, 305-688, April - June (2017)

ASSESSMENT OF HEPATOPROTECTIVE ROLE OF PHENOLIC EXTRACT OF *URTICADIOICA* AND SILVER NANOPARTICLES IN MALE RAT INDUCED BY CARBON TETRA-CHLORIDE

M. M. Kadhim, A.N. Aldujaili and M.H. Homady

Rasayan J. Chem., 10(2), 305-312 (2017)

KeywordsSS: tetrachloride, Hepatotoxicity, Urticadioica, Silver nano-particles, Regucalcin

DOI: http://dx.doi.org/10.7324/RJC.2017.1021631

THE STUDY OF EFFECT OF METAL ION Fe(III) ON THE CHLOROPHYLL AS POTENTIAL PHOTOSENSITIZER ON DYE SENSITIZED SOLAR CELL

H. Darmokoesoemo, H. Setyawati, A.T.A. Ningtyas and H.S. Kusuma

Rasayan J. Chem., 10(2), 313-318 (2017)

KeywordsSS: Fe(III)-chlorophyll, photosensitizers,dye sensitized solar cell, metal ligand chargetransfer.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021561

A FACILE SYNTHESIS OF 2-(4-(BENZO[D]THIAZOL-2-YL) PHENYLIMINO) THIAZOLIDIN-4-ONE AND 2-(4-(BENZO[D]THIAZOL-2-YL) PHENYLIMINO)-5- ARYLIDENETHIAZOLIDIN-4-ONES

P. Uma, K. C. Rajanna, Y. Hemanth Sriram and P. K. Saiprakash

Rasayan J. Chem., 10(2), 319-332 (2017)

KeywordsSS: Facile synthesis; 2-(4-(benzo[d]thiazol-2-yl) phenylimino) thiazolidin-4-one; 2-(4-(benzo[d]thiazol-2-yl) phenylimino)-5-arylidenethiazolidin-4-ones; antimicrobial (biological) activity.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021604

ORGANOCATALYTIC SYNTHESIS OF AMIDES FROM ALDEHYDES THROUGH p -NITRO PHENOL ESTER ACTIVATION

Medikonda Manorajani and Tatavarti Bhagya Kumar

Rasayan J. Chem., 10(2), 333-338 (2017)

KeywordsSS: Organo catalysis, Amidation, Activated ester, Tetrabutyl ammonium bromide

DOI: http://dx.doi.org/10.7324/RJC.2017.1021625

ACCUMULATION DETECTION OF SOME HEAVY METALS IN SOME TYPES OF FRUITS IN THE LOCAL MARKET OF AL-DIWANIYAH CITY, IRAQ

Lujain Hussein Ibraheen and Salwan Ali Abed

Rasayan J. Chem., 10(2), 339-343 (2017)

KeywordsSS: Heavy Metals, Fruit, Local Market, Accumulation, Al-Diwaniyah, Iraq.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021641

PROCESSING OF THE BOTTOMHOLE ZONES OF OIL WELLS WITH USE OF THE CARBON NANOMATERIALS

D. A. Baiseitov, M. I. Tulepov, S. Tursynbek, L. R. Sassykova, M. Nazhipkyzy, Sh. E. Gabdrashova, Y. V. Kazakov, I. O. Pustovalov, F.Y. Abdrakova, Z. A. Mansurov and A. B. Dalton

Rasayan J. Chem., 10(2), 344-348 (2017)

KeywordsSS: oil well, combustion rate, bottomhole zone of oil wells, nanostructured soot

DOI: http://dx.doi.org/10.7324/RJC.2017.1021644

METHYL RED DYE REMOVAL USING NEW BIO-SORBENTS DERIVED FROM *HYACINTH AND TINOSPORA CORDIFOLIA* PLANTS FROM WASTE WATERS

K. Venkata Ramana, K. Swarna Latha, K. Ravindranath and B. Hari Babu

Rasayan J. Chem., 10(2), 349-362 (2017)

KeywordsSS: Methyl Red (MR), pollution control, Bio-adsorbents, adsorption isotherm, Kinetics, equilibrium models.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021537

STABILITY CONSTANTS OF MIXED LIGAND COMPLEXES OF TRANSITION METAL(II) IONS WITH 1-[(1*E*)-*N*-(2,4 DICHLOROPHENYL) ETHANIMIDOYL] NAPHTHALEN-2-OL AND 2-{(*E*)-[(4-BROMO-3-METHOXYPHENYL)IMINO]METHYL}PHENOL

A. K. Mapari

Rasayan J. Chem., 10(2), 363-367 (2017)

KeywordsSS: Binary complexes, Ternary complexes, mixed ligand, Stability constant.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021652

NEW METHOD FOR MICROGRAM DETERMINATION OF *p*-PHENETIDINE

R. D. Kaushik, Jaspal Singh, Richa Saini, Priyanka Tyagi andEkata Kumari

Rasayan J. Chem., 10(2), 368-374 (2017)

KeywordsSS: Periodate ion, p-phenetidine, MnII catalysed, 4-ethoxy-1, 2-benzoquinone, Microgram

DOI: http://dx.doi.org/10.7324/RJC.2017.1021656

INFLUENCE OF ACTIVATED CARBON PARTICLES ON MICROSTRUCTURE AND THERMAL ANALYSIS OF AA7075 METAL MATRIX COMPOSITES

G. Ramanan, J. Edwin Raja Dhas, M. Ramachandran andG. Diju Samuel

Rasayan J. Chem., 10(2), 375-384 (2017)

KeywordsSS: AA7075, Powdered activated carbon, EDAX, FTIR, TGA

DOI: http://dx.doi.org/10.7324/RJC.2017.1021663

KINETIC AND THERMODYNAMIC STUDIES OF THE OXIDATION OF ACYCLIC PRIMARY PERFUMERY ALCOHOLS USING $K_2S_2O_8$ AND KIO_4 IN ACIDIC MEDIUM

D.V.Prabhu and Chetana Rana

Rasayan J. Chem., 10(2), 385-390 (2017)

KeywordsSS: Acyclic primary perfumery alcohols, inorganic oxidants,first order kinetics, ionic strength, thermodynamic activation parameters,entropy of activation.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021649

SYNTHESES, CHARACTERIZATION AND ANTIMICROBIAL STUDIES OF COORDINATION COMPOUNDS OF SCHIFF BASE POSSESSING SEMICARBAZONE MOIETY

D. Kumar, N. Sharma and S. Chadda

Rasayan J. Chem., 10(2), 391-398 (2017)

KeywordsSS: Coordination compounds, distorted octahedral structure, molecular modelling, semicarbazide and spectral studies.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021643

MODELING OF THE PRECIPITATION INDUCED FLASH FLOOD IN SARPANG, BHUTAN USING HEC-RAS

Jigme Tenzin and Aparna S. Bhaskar

Rasayan J. Chem., 10(2), 399-406 (2017)

KeywordsSS: Flash flood, Modelling, Roughness Coefficient, HEC-RAS, LULC, SRTM DEM

DOI: http://dx.doi.org/10.7324/RJC.2017.1021648

OPTIMIZATION OF LIGNIN EXTRACTION FROM RICE HUSK BY ALKALINE HYDROGEN PEROXIDE USING RESPONSE SURFACE METHODOLOGY

Anwar Maruf, Bambang Pramudono, and Nita Aryanti

Rasayan J. Chem., 10(2), 407-414 (2017)

KeywordsSS: Rice husk, rice husk lignin, alkaline hydrogen peroxide, response surface methodology

DOI: http://dx.doi.org/10.7324/RJC.2017.1021667

AN EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF FINE AGGREGATE BY USED TYRE RUBBER PARTICLES IN CONCRETE

S. Karthik and T. Saranya

Rasayan J. Chem., 10(2), 415-422 (2017)

KeywordsSS: Environment, Concrete, Compression, Flexural, Mechanical Properties, Rubberized Concrete, Tyre Rubber Particles, Crumb rubber.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021642

EFFECT OF ENERGETICALLY MODIFIED FLY ASH ON THE DURABILITY PROPERTIES OF CEMENT MORTAR

L. Krishnaraj, Yeddula Bharath Simha Reddy,N.Madhusudhan and P.T. Ravichandran

Rasayan J. Chem., 10(2), 423-428 (2017)

KeywordsSS: Durability, Chloride ion penetration, Water absorption, Sorptivity, Ball milling, Fly Ash, SEM Analysis.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021682

ASSESSMENT OF SOIL NUTRIENTS AND PHYSICO-CHEMICAL PARAMETERS IN THE REGION OF HIWARKHED VILLAGE OF AMRAVATI DISTRICT (MAHARASHTRA STATE), INDIA

Rajesh P. Ganorkar, Harshali A. Hole1and Dinesh A. Pund

Rasayan J. Chem., 10(2), 429-433 (2017)

KeywordsSS: Soil testing, Parameters, Hiwarkhed Village, Nutrients.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021665

EXPERIMENTAL ANALYSIS OF EXHAUST NOISE USING A MUFFLER AND A PARTICULATE TRAP IN A DIESEL ENGINE

R. Sundara Raman, G. Sankara Narayanan, N. Manoharan and S. Sendilvelan

Rasayan J. Chem., 10(2), 434-441 (2017)

KeywordsSS: Engine Noise, Noise Level, Particulate Trap, Muffler.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021629

EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF CEMENT WITHEGG SHELL POWDER AND SILICA FUME

N. Parthasarathi, M.Prakash, K.S.Satyanarayanan

Rasayan J. Chem., 10(2), 442-449 (2017)

KeywordsSS: Egg shell, Silica fume, Cement, Compressive strength, Split tensile test, Flexural strength test.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021689

ANALYSIS OF CREATININE BY POTENTIOMETRIC USING ELECTRODE CARBON PASTE MODIFIED BY MOLECULARLY IMPRINTED POLYMER AS SENSOR

H. Darmokoesoemo, M. Khasanah, N.M. Sari and H.S. Kusuma

Rasayan J. Chem., 10(2), 450-453 (2017)

KeywordsSS: Creatinine, Molecularly imprinted polymer, Carbon paste, Potentiometric

DOI: http://dx.doi.org/10.7324/RJC.2017.1021560

EXPERIMENTAL INVESTIGATION ON CERIUM OXIDE NANOPARTICLES WITH ALUMINA CATALYTIC CONVERTER TO INCREASE EMISSION CONVERSION EFFICIENCY IN AUTOMOBILES

S. Sendilvelan,K.Bhaskar and S. Nallusamy

Rasayan J. Chem., 10(2), 454-460 (2017)

KeywordsSS: Automobile, Alumina, Cerium Oxide, Catalytic Converter, Nanoparticles

DOI: http://dx.doi.org/10.7324/RJC.2017.1021685

EVALUATION OF STABILITY CONSTANT OF TERNARY INTERMEDIATE COMPLEX FORMATION IN MN^{II} CATALYSED PERIODATE OXIDATION OF 2, 5-XYLIDINE BY STOPPED FLOW METHOD

R. D. Kaushik, Jaspal Singh, Richa Agarwal, Payal Rathi and Ekata Kumari

Rasayan J. Chem., 10(2), 461-470 (2017)

KeywordsSS: 2, 5-xylidine, Stopped flow trace, Ternary complex, MnII catalyzed, Stability constant, Periodate oxidation

DOI: http://dx.doi.org/10.7324/RJC.2017.1021690

A RAPID AND FACILE DOMINO SYNTHESIS OF STRUCTURALLY DIVERSE 3, 4-DIHYDROPYRIMIDIN-2(1*H*)-THIONES DERIVATIVES

Suresh Rai1, Anand Kumar Arya, Dilip Kumar Khatri and Rekha Israni

Rasayan J. Chem., 10(2), 471-480 (2017)

KeywordsSS: Multicomponent Domino reactions (MDRs), DHPMs, Thiourea, Thiones.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021728

INVESTIGATION ON MECHANICAL VIBRATION OF DOUBLE-WALLED CARBON NANOTUBES ON WINKLER FOUNDATION WITH LENGTH EFFECTS VIA DTM

B. Ravi Kumar and K. Palaksha Reddy

Rasayan J. Chem., 10(2), 481-487 (2017)

KeywordsSS: Aerospace, Winkler, DTM, DWCNT, MATLAB, MEMS

DOI: http://dx.doi.org/10.7324/RJC.2017.1021711

ULTRASONIC STUDIES IN BINARY LIQUID MIXTURES OFTRICHLOROETHYLENE WITH THREE ALCOHOLS AT 303.15 K

J. Panduranga Rao, K. Jyothi, K. Nanda Gopal and G. Srinivas

Rasayan J. Chem., 10(2), 488-498 (2017)

KeywordsSS: Ultrasonic velocity, Molecular viscosity, Molecular Interactions, Binary liquids, trichloroethylene

DOI: http://dx.doi.org/10.7324/RJC.2017.1021610

TECHNIQUES FOR ENVIRONMENTAL RISK ASSESSMENT: A REVIEW

Tejaswi D and Christopher Samuel

Rasayan J. Chem., 10(2), 499-506 (2017)

KeywordsSS: Environmental Risk Assessment, Leopold matrix, HAZOP, Knowledge-based HAZOP, Fault Tree Analysis, Event Tree Analysis, Process mapping, Failure Mode and Effect Analysis, What-if analysis, Checklists

DOI: http://dx.doi.org/10.7324/RJC.2017.1021657

STRUCTURAL AND OPTICAL ANALYSIS OF PLASMA EXPOSED AND ANNEALED SB_2S_3 THIN FILM

S. Inbakumar and P. M. Andavan

Rasayan J. Chem., 10(2), 507-512 (2017)

KeywordsSS: Plasma treatment, Antimony trisulfide, thin films, Structural and Optical analysis.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021725

FINITE ELEMENT MODAL ANALYSIS OF COMPOSITE HEAVY VEHICLE CHASSIS USING ANSYS

A. Vinod, P. Senthil Kumar B. Rajadurai, V. Arun Kumar, S. Leoni Ranjith Kumar, P. Jayavel and G.R. Anandha Gomathy

Rasayan J. Chem., 10(2), 513-521 (2017)

KeywordsSS: Structural modal analysis, ANSYS Workbench, Chassis, AISI, AMS

DOI: http://dx.doi.org/10.7324/RJC.2017.1021739

SYNTHESIS AND CRYSTALLOGRAPHY OF A DIMERIZED CHALCONE DERIVATIVE

Sanjay Kumar, Vinutha V Salian, B. Narayana, B. K. Sarojini, Sumati Anthal and Rajni Kant

Rasayan J. Chem., 10(2), 522-527 (2017)

KeywordsSS: Chalcone, Chlorobenzoyl, Direct methods, Crystallography,Intramolecular interactions.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021607

AN EXPERIMENTAL INVESTIGATION ON STRENGTH PROPERTIES OF STEEL FIBRES ALONG WITH RECYCLED AGGREGATE IN CEMENT CONCRETE

S. PrakashChandar, K.Gunasekaran,N.SaiSandeep and S.Manikandaprabhu

Rasayan J. Chem., 10(2), 528-533 (2017)

KeywordsSS: Recycled aggregate, steelfibres, compressive strength, demolished material, reborn concrete

DOI: http://dx.doi.org/10.7324/RJC.2017.1021636

EVALUATION OF *MERREMIATRIDENTATA* MUCILAGE AS BINDING AGENT INTABLET DOSAGE FORMS

M.Vidyavathi, K.Radha, A.Rajyalakshmiand R.Ramya

Rasayan J. Chem., 10(2), 534-541 (2017)

KeywordsSS: Compaction, Mucilage, Merremiatridentata, Binder, Starch, Tablets.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021614

OPTIMIZATION OF POMEGRANATE PEEL FIBERS REINFORCED WITH POLYVINYL ALCOHOL BIOCOMPOSITE FILM USING RESPONSE SURFACE METHODOLOGY

G. Nandhavathy, S. Periyar Selvam, M. Mahesh Kumar and E. Rotimi Sadiku

Rasayan J. Chem., 10(2), 542-548 (2017)

KeywordsSS: Biocomposite film, pectin, pomegranate peel, polyvinyl alcohol, response surface methodology.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021724

ADSORPTIVE STRIPPING VOLTAMMETRIC METHODFOR THE INDIVIDUAL DETERMINATION OFCd(II), Cu(II), Pb(II), AND Zn(II) IN VEGETABLESAMPLES USING CALCEIN

Deswati, Hamzar Suyani, Rahmiana Zein, Admin Alif and Hilfi Pardi

Rasayan J. Chem., 10(2), 549-557 (2017)

KeywordsSS: Adsorptive stripping voltammetric method, vegetable samples, calcein, complexing agent

DOI: http://dx.doi.org/10.7324/RJC.2017.1021591

IMPULSE- RESPONSE ENDORSEMENT OF STRENGTH SUSTAINABILITY IN PAVER BLOCKS INFUSED WITH BIOSORPTED TEXTILE EFFLUENTS

S. Manivel, G. Premkumar and V. Satya Ramesh Potti

Rasayan J. Chem., 10(2), 558-563 (2017)

KeywordsSS: Paver block, Potable water, Textile/Dyeing industry effluents, water hyacinth, biosorption process, Compressive Strength, Flexural Strength

DOI: http://dx.doi.org/10.7324/RJC.2017.1021733

CHEMICAL CONSTITUENTS AND ANTIMICROBIAL ACTIVITIES OF ESSENTIAL OILS OF SYZYGIUMPOLYANTHUM AND SYZYGIUMAROMATICUM

A. Hamad, M.G.P. Mahardika, I. Yuliani, and D. Hartanti

Rasayan J. Chem., 10(2), 564-569 (2017)

KeywordsSS: Essential oils, S.polyanthum, S. aromaticum, chemical constituents, MIC

DOI: http://dx.doi.org/10.7324/RJC.2017.1021693

SYNTHESIS OF HAP-CHITOSAN-PVA COMPOSITE AS INJECTABLE BONE SUBSTITUTE MATERIAL

Firnanelty, S. Sugiarti and Charlena

Rasayan J. Chem., 10(2), 570-576 (2017)

KeywordsSS: Hydroxyapatite, Injectable bone substitute, Osteoporosis, Tutut shell

DOI: http://dx.doi.org/10.7324/RJC.2017.1021465

AN EXPERIMENTAL STUDY OF SELF HEALING OF CRACKS IN CONCRETE USING SODIUM SILICATE CAPSULE

A. Manoj Prabahar, R. Dhanya, N. Ganapathy Ramasamy, S. Dhanasekar

Rasayan J. Chem., 10(2), 577-583 (2017)

KeywordsSS: Self-healing, Sodium silicate capsules, Micro cracks, Cracks, Crack depth, Ultra sonic concrete tester, Durability

DOI: http://dx.doi.org/10.7324/RJC.2017.1021671

CORROSION PROTECTION OF CARBON STEEL IN RO WATER BY SODIUM GLUCONATE-Zn2+ SYSTEM

T. Deepa and C. Thangavelu

Rasayan J. Chem., 10(2), 584-591 (2017)

KeywordsSS: Carbon Steel, Corrosion protection, sodium gluconate, RO Water

DOI: http://dx.doi.org/10.7324/RJC.2017.1021550

UTILISATION OF RMC WASTE WITH CHEMICAL ADMIXTURES TO MANUFACTURING OF SUSTAINABLE BUILDING COMPONENTS

L. Krishnaraj1, R. Suba Lakshmi and P.T. Ravichandran

Rasayan J. Chem., 10(2), 592-599 (2017)

KeywordsSS: Recycled Cement Dust, Structural Building Components, Sustainable Materials, Paver Blocks, Solid Blocks, Compressive Strength

DOI: http://dx.doi.org/10.7324/RJC.2017.1021670

EXPERIMENTAL STUDY ON PROPERTIES OF CONCRETE USING GROUND GRANULATED BLAST FURNACE SLAG AND COPPER SLAG AS A PARTIAL REPLACEMENT FOR CEMENT AND FINE AGGREGATE

Divya Krishnan K, P.T.Ravichandran and V. K. Gandhimathi

Rasayan J. Chem., 10(2), 600-605 (2017)

KeywordsSS: Copper Slag, GGBS, Compressive strength, Tensile strength

DOI: http://dx.doi.org/10.7324/RJC.2017.1021677

ADSORPTION OF HEXAVALENT CHROMIUM FROM AQUEOUS SOLUTIONS USING ACID ACTIVATED OF NATURAL ZEOLITE COLLECTED FROM ENDE-FLORES, INDONESIA

Yantus A.B Neolaka, Eka B.S Kalla, GandenSupriyanto, Suyanto4 and Ni Nyoman Tri Puspaningsih

Rasayan J. Chem., 10(2), 606-612 (2017)

KeywordsSS: Natural zeolite, acid activated, Cr(VI) adsorption, kinetic, isotherm.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021710

QUANTUM CHEMICAL STUDY OF ORGANIC DYE SENSITIZED SOLAR CELLS:4,4-BIPYRIDINE DERIVATIVES

S. Mohan Kumar, T.Kannaian and V.Sathyanarayanamoorthi

Rasayan J. Chem., 10(2), 613-620 (2017)

KeywordsSS: DSSC, Dipyridyl, Organic dyes

DOI: http://dx.doi.org/10.7324/RJC.2017.1021598

INVESTIGATION OF UREA DECOMPOSITION AND UNIFORM CONCENTRATION OF UREA WATER SOLUTION IN SCR SYSTEM FOR DIESEL ENGINE EXHAUST USING CFD

P.Kumaran, S.Mohanamurugan, P.Shankar and R. Narayanan

Rasayan J. Chem., 10(2), 621-629 (2017)

KeywordsSS: Selective catalytic reduction (SCR); urea-water solution (UWS); ammonia; CFD

DOI: http://dx.doi.org/10.7324/RJC.2017.1021706

MICROWAVE ASSISTED IMPROVED METHOD FOR THE SYNTHESIS, CHARACTERIZATION OF 1-(2-HYDROXY PHENYL)-METHANONE-3,5-DISUBSTITUTED PYRAZOLINES

Shrikant A. Wadhal and Imran Khan

Rasayan J. Chem., 10(2), 630-633 (2017)

KeywordsSS: Pyrazolines, 1,3-Disubstituted-prop-2-ene-1-one,Methyl Salicylate,MWI

DOI: http://dx.doi.org/10.7324/RJC.2017.1021666

INFLUENCE OF HEAT TREATMENT ON EGGSHELL PARTICLES AS LOW COST ADSORBENT FOR METHYLENE BLUE REMOVAL FROM AQUEOUS SOLUTION

Rahmi and Lelifajri

Rasayan J. Chem., 10(2), 634-642 (2017)

KeywordsSS: Eggshell particles, methylene blue, adsorption, heat treatment, temperature

DOI: http://dx.doi.org/10.7324/RJC.2017.1021736

NONLOCAL VIBRATION ANALYSIS OF FLUID CONVEYING SINGLE-WALLED CARBON NANOTUBE WITH MAGNETIC EFFECTS

B. Ravi Kumar

Rasayan J. Chem., 10(2), 643-651 (2017)

KeywordsSS: Vibration, DTM, nonlocal, SWCNT, critical flow velocity.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021669

INFLUENCE OF CARBON NANOTUBE REINFORCED TiO_2-Al_2O_3 COATING MIXTURE ON AISI 1020 SURFACE PERFORMANCE

P.Vijayanand, Amitesh Kumar, K. R. Vijaya Kumar, Nazir Hussain, P.Kumaran and S.Arungalai Vendan

Rasayan J. Chem., 10(2), 652-664 (2017)

KeywordsSS: Al2O3, TiO2,Nano composites, Metallographic, Thermal Spray, Coatings

DOI: http://dx.doi.org/10.7324/RJC.2017.1021707

AC CONDUCTIVITY AND THERMAL STUDIES OF PAN-NAFDOPED GEL POLYMER ELECTROLYTES FOR SOLID STATE BATTERY APPLICATIONS

Narasimharao Maragani, K. VijayaKumar and N. KrishnaJyothi

Rasayan J. Chem., 10(2), 665-672 (2017)

KeywordsSS: Polymer Gel electrolyte Composite, AC Conductivity Studies, Impedance data, Thermal conductivity

DOI: http://dx.doi.org/10.7324/RJC.2017.1021697

SPECTRAL, DFT AND ANTIBACTERIAL STUDIES OF TIN(II) COMPLEXES OF SCHIFF BASES DERIVED FROM AROMATIC ALDEHYDE AND AMINO ACIDS

Sunita Bhanukaand Har Lal Singh

Rasayan J. Chem., 10(2), 673-681 (2017)

KeywordsSS: tin(II) compounds, 4-methoxybenzaldhyde, amino acids, Schiff base, spectral studies, theoretical calculations, antibacterial activities.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021668

OPTICAL AND PHOTOLUMINESCENT STUDIES ON VO^{2+} DOPED SnO_2 THIN FILMS

K. Lakshmi, SK. Shahenoor Basha and M.C. Rao

Rasayan J. Chem., 10(2), 682-688 (2017)

KeywordsSS: SnO2, Chemical spray pyrolysis, Optical, dc conductivity and PL studies.

DOI: http://dx.doi.org/10.7324/RJC.2017.1021744

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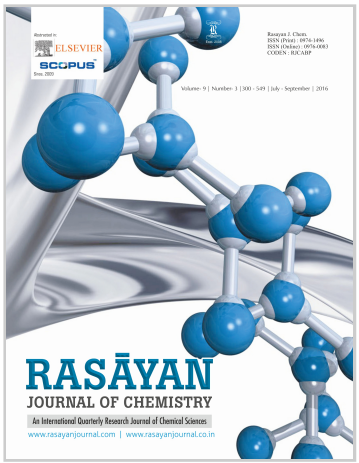

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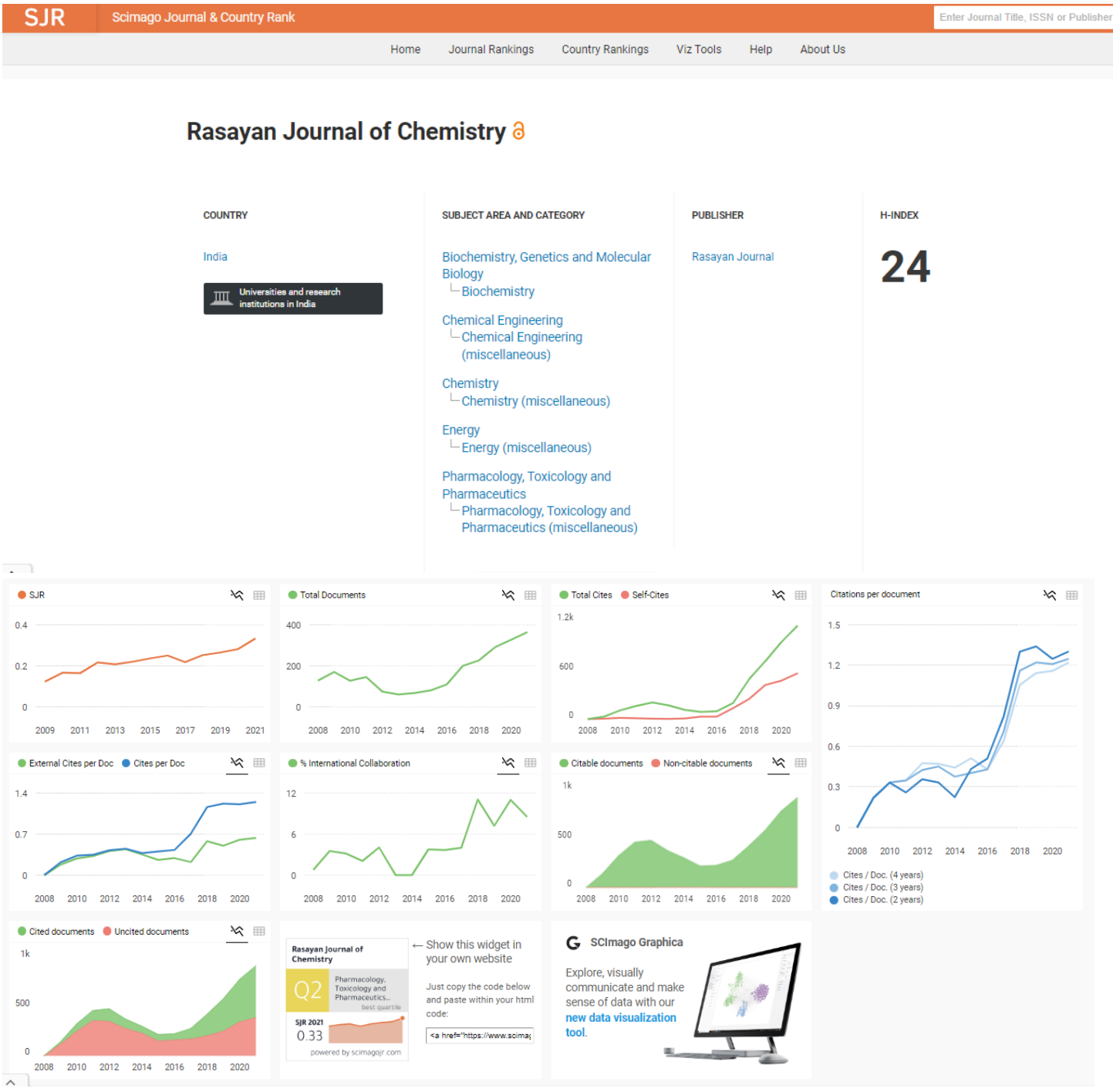

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THE STUDY OF EFFECT OF METAL ION Fe(III) ON THE CHLOROPHYLL AS POTENTIAL PHOTOSENSITIZER ON DYE SENSITIZED SOLAR CELL

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ABSTRACT
The energy crisis is major problem facing the world today, so it takes renewable energy source that are environmentally friendly and can be renewed, one of which is Dye Sensitized Solar Cell (DSSC). DSSC is one of the photochemical electric cells that can convert solar energy into electrical energy. This research aims to study the characteristics of chlorophyll compounds with the addition of metal ions Fe(III) as well as determine the effect of metal ions Fe(III) on the performance of chlorophyll as photosensitizer in the DSSC. The formation of complex compounds of Fe(III)-chlorophyll shown by the phenomenon of Metal Ligand Charge Transfer (MLCT) at wavelength of 263.00 nm and absorption transition d-d at 745.00 nm. FTIR characterization of the binding of the Fe-O complex compounds appeared at 486.06 cm^{-1}. The complex compounds of Fe(III)-chlorophyll has higher conductivity value than the solvent (DMSO) indicating that the complex compounds are ionic. So the presence of metal ions Fe(III) on chlorophyll can increases the potential of chlorophyll as photosensitizer on DSSC.
Keywords: Fe(III)-chlorophyll, photosensitizers, dye sensitized solar cell, metal ligand charge transfer.

INTRODUCTION

Energy is essential requirement for human survival. Reliance on fossil fuels cause the supply of energy sources dwindling, while demand for energy is increasing.[1] The problems of the energy crisis prompted many researchers to develop technologies that generate renewable energy. Solar energy is one of renewable energy is being actively developed at this time. Applications of Dye Sensitized Solar Cell (DSSC) using dye as catcher sunlight is potential to be developed because DSSC produces electricity and its applications easily be applied to life.[2]

Dye or pigment of plants which is often used as photosensitizer in previous research is chlorophyll powder of Classic Mulberry Powder (CMP). Researchers have proven that chlorophyll and xanthophyll can be excited by the exposure of the dye. As the result of its development, researchers have gained the energy conversion efficiency is better on derivative of chlorophyll dye because it has carboxylic group.[3] Chlorophyll as major pigment is effective as photosensitizers in the photosynthesis process of green plants which have maximum absorption at 670 nm, so that chlorophyll is compound which is suitable for photosensitizer.[4] However, the stability of chlorophyll is weak and easily decompose when exposed to heat, light, acidic and alkaline conditions.[5] The performance of photosensitizer is influenced by the level of absorption peaks, if absorption peak of dye is high it indicate that the more photons energy can be absorbed and converted into electrical energy in solar cell applications. The produced current and voltage also affect the performance of the photosensitizer.

In previous studies, the formation of curcumin complex with Fe(III) to improve photostability and the antioxidant of curcumin. Curcumin interacts with Fe(III) via the carbonyl group and provide better antioxidant photostability.[6,7] Interactions that occur in complex molecules characterized by the shift in wavelength bathochromic derived from electronic transition $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$. The chlorophyll also has carbonyl group and is expected to have similar interaction with curcumin when it binds to Fe(III).

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Therefore in this research studied the effect of ion Fe(III) on the performance of chlorophyll as potential dye sensitizer on DSSC. Fe metal selected because it is transition metal in which the electron configuration d^6 same as ruthenium and osmium metals (used as dye solar cell), ferrous metals more easily obtained because of its abundance in nature is much more compared to other metals, has quantum that relatively high for produce sensitization on the nanocrystalline TiO_2, cheaper and can be obtained in Indonesia easily than other metals which has been studied previously as complex for solar cells, soluble in polar solvents, and its wavelength in the UV-Vis i.e. 551 nm.[8]

EXPERIMENITAL

Materials and chemicals

The chemicals used in this study have purity degree of pro analysis, among others: sodium hydroxide (NaOH), ethanol (C_2H_5OH), hydrochloric acid (HCl), iron (III) chloride ($FeCl_3$), TiO_2 Degussa P25, acetonitrile, hydrochloric acid (HCl), aquabidest, electrolyte solution of I_2 in KI and chlorophyll powder CMP (PT. Health Wealth International).

Preparation of chlorophyll

A total of 1 g of chlorophyll powder dissolved with aquabidest in glass beaker, then transferred into 10 ml volumetric flask up to the mark.

Saponification reaction of chlorophyll

A total of 2 g of NaOH dissolved in 50 mL aquabidest, then NaOH solution are taken 5 mL and diluted in 50 mL of aquabidest to obtain concentration of 0.1 M. NaOH solution with concentration of 0.1 M was taken 2 mL and added 8 mL ethanol to form ethanol-NaOH with total volume of 10 mL. Chlorophyll solution as much as 5 mL added to the solution and homogenized for 2 hours in water bath at temperature of 50°C. The addition of NaOH to form reaction with alkaline conditions. A total of 1 mL of chlorophyll taken and dissolved in 50 ml aquabidest then checked using UV-Vis spectrophotometer1800 Shimadzu at wavelength 639.00 nm.[5]

Preparation of complex compound Fe(III)-chlorophyll

The chlorophyll solution is added with concentrated HCl of 2 drops to achieve pH of 2-3. Furthermore, added $FeCl_3$ solution with concentration of 10%. Furthermore, the solution with each concentration homogenized at temperature of 60-70°C for 1 hour, then the solution was evaporated to one-third parts and reheated until the filtrate became exhausted. Next, the precipitate is heated in the oven at temperature of 80°C for 24 hours to form the product Fe(III)-chlorophyll.[5]

The characterization of complex compounds of Fe(III)-chlorophyll using UV-Vis spectrophotometer

The chlorophyll solution of 1 mL dissolved by aquabidest in 50 mL volumetric flask. Furthermore, the absorbance is measured at wavelengths between 200-800 nm using UV-Vis spectrophotometer.[9] The solution from saponification of chlorophyll of 1 mL dissolved in 50 mL volumetric flask with aquabidest. Then measured the absorbance at region 200-800 nm.

The characterization of complex compounds of Fe(III)-chlorophyll using FTIR

The characterization using FTIR aims to observe the formation of bond between the metal with ligands and identify the functional groups on the formed compound.[4] The complex compounds of Fe(III)-chlorophyll mixed with KBr then the mixture was made pellets and measured IR absorption at wave number 4000-300 cm^{-1}.[10]

The characterization of electrical conductivity of complex compound of Fe(III)-chlorophyll

This characterization is aimed to determining the properties of complex compounds of Fe(III)-chlorophyll that dissolved in dimethyl sulfoxide (DMSO) at concentration of 10^{-4} M. The electrical conductivity of complex compounds will be compared with the electrical conductivity of DMSO using conductometer.

RESULTS AND DISCUSSION

The complex compounds that have been made were characterized to determine the properties and characteristics. The characterization is conducted using UV-Vis spectrophotometer, FTIR, and conductometer.

The characterization of complex compounds of Fe(III)-chlorophyll using UV-Vis

The characterization using UV-Vis spectrophotometer is conducted to determine the absorption maximum wavelength in the wavelength range 200-800 nm. The characterization results with UV-Vis spectrophotometer is shown in Table 1.

Table-1: The characterization result of complex compounds of Fe(III)-chlorophyll and chlorophyll

Compounds	Maximum wavelength (nm)			
Fe(III)-chlorophyll	263.00	-	-	745.00
chlorophyll	-	404.00	-	628.50

Table-1 shows that there is difference between the maximum wavelength of the complex compound of Fe(III)-chlorophyll and chlorophyll. The maximum wavelength of the complex compound of Fe(III)-chlorophyll is 263.00 nm and 745.00 nm, while the maximum wavelength of the chlorophyll is 404.00 nm and 628.50 nm. The difference of maximum wavelength that emerged showed that the complex compounds of Fe(III)-chlorophyll has been formed. In the complex compounds of Fe(III)-chlorophyll the maximum wavelength in the UV and Visibel region is at 263.00 nm and 745.00 nm. The maximum wavelength which appears at region 200-300 nm due to the phenomenon of charge transfer in the form Metal to Ligand Charge Transfer (MLCT). In the complex compounds of Fe(III)-chlorophyll occurred these phenomena because metal ion Fe(III) has lower oxidation states.[11] The wavelength of MLCT on complex compounds of Fe(III)-chlorophyll can be used as dye sensitizer in DSSC due to the phenomenon of charge transfer. The maximum wavelength of compound is also influenced by the transition d-d that appearing on visible areas.[12] This transition is changing the distribution of metal-ligand charge because the electron density shifts from orbital with high metal character to high ligand orbitals. This phenomenon is included in the phenomenon of MLCT.[13] MLCT phenomenon occurs due to ligand has orbital π^* with low energy and the presence of MLCT phenomenon on the complex compound cause the complex compound is very well be used as dye sensitizer because it can absorb light with optimal so that it can be converted into electrical energy. When a compound has a lot of electrons in d orbitals and amount of ligand is abundant it cause the compounds are able to suffer the MLCT phenomenon.[13]

In this study, Fe(III)-chlorophyll dissolved in dimethyl sulfoxide (DMSO) as solvent because this solvent has high degree of polarity. In addition DMSO also not liberate hydrogen when met with very electropositive metal.[14]

The characterization of complex compounds of Fe(III)-chlorophyll using Fourier Transform Infrared (FTIR)

The characterization of complex compounds of Fe(III)-chlorophyll by Fourier Transform Infrared (FTIR) is to determine the functional groups and the formed bond between metal and ligands. The differences in the FTIR spectra between chlorophyll as ligand with the complex compound of Fe(III)-chlorophyll indicates that the compound has been successfully synthesized. The characterization results of chlorophyll as ligand and complex compound Fe(III)-chlorophyll can be seen in Figure-1 with the FTIR data can be seen in Table-2.

Based on the FTIR spectra from Figure-1 and FTIR data from Table-2 there is bond between the metal Fe(III) with chlorophyll as ligand. It can be known from the formation of Fe-O bond, so it can be concluded that the complex compounds of Fe(III)-chlorophyll has been formed. The prediction bonding between the metal Fe(III) with chlorophyll as ligand is shown in Figure-2.

The electrical conductivity characterization of complex compound of Fe(III)-chlorophyll using conductometer

The characterization of electrical conductivity of complex compounds using conductometer aims to determine the type of complex compound whether molecular or ionic. The complex compounds that have measured the electrical conductivity is then compared with the electrical conductivity of used solvent is DMSO. If the conductivity value of complex compounds of Fe(III)-chlorophyll is higher than the solvent (DMSO), this indicates that the complex compound is an ionic compound. But if conductivity value of the solvent (DMSO) is higher than the complex compound, this indicates that the complex compound is molecular compound. The conductivity value are shown in Table-3.

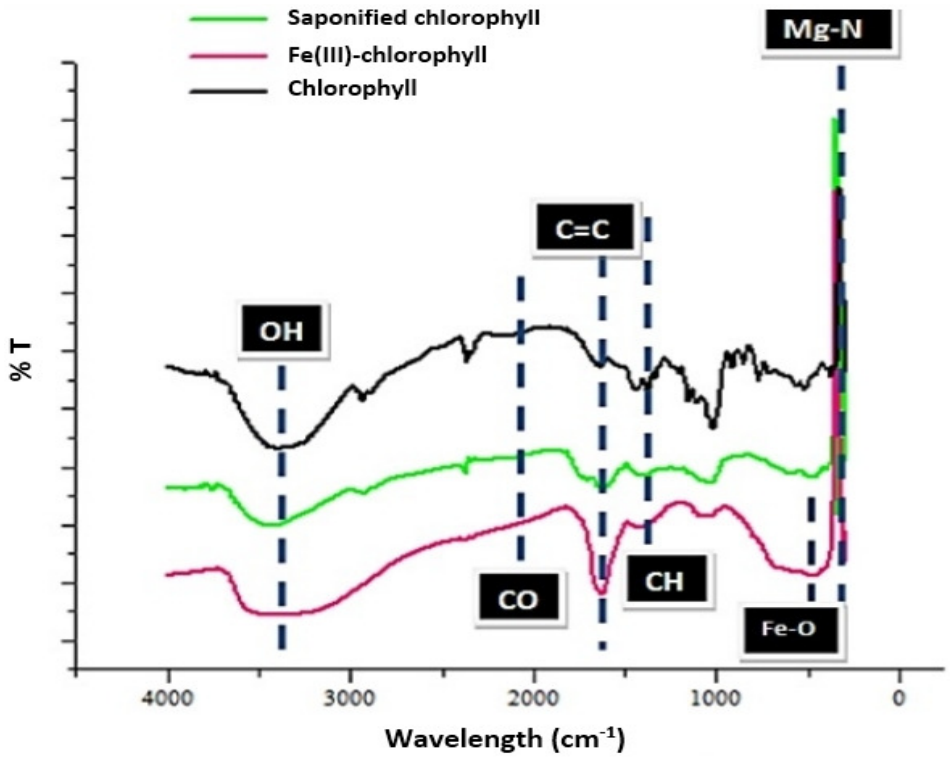

Fig.-1: FTIR spectra of chlorophyll, saponified chlorophyll and complex compounds of Fe(III)-chlorophyll

Table-2: The FTIR data of ligand and complex compound

Bond	Wavelength of ligand (cm^{-1})	Wavelength of complex compound (cm^{-1})	Wavelength Theoretically (cm^{-1})	Reference
Fe-O	-	486.06	430-480	Darmokoesoemo *et al.*, 2017a
Mg-N	300.9	308.61	242-310	Darmokoesoemo *et al.*, 2016a
OH	3394.72	3402	3362-3421	Darmokoesoemo *et al.*, 2016b
CO	2167.99	2167.99	2150-2200	Darmokoesoemo *et al.*, 2016a
CH	1381	1381	1350-1400	Darmokoesoemo *et al.*, 2017b
C=C aromatic	1635	1620	1619-1640	Darmokoesoemo *et al.*, 2017c

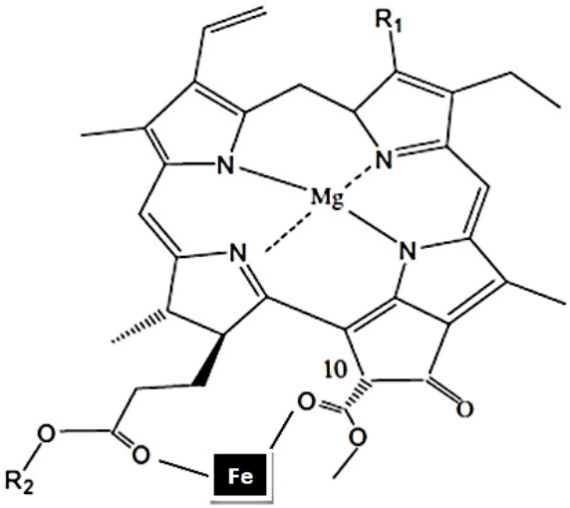

Fig.-2: The prediction bonding between the metal Fe(III) with chlorophyll as ligand

Table-3: The conductivity value of complex compounds and DMSO

Compounds	Conductivity (μs)
Solvent (DMSO)	0.08
Fe(III)-chlorophyll in the solvent (DMSO)	2.05

Based on Table-3 it can be seen that the conductivity of the complex compound of Fe(III)-chlorophyll is higher than the solvent (DMSO) indicating that the complex compounds are ionic. Ionic compounds easily conduct electricity because it has high boiling point and melting point. Moreover the ionic compound is also easy to break down into ions due to the electron transfer process can take place continuously so it is good to be applied in DSSC.[15]

CONCLUSION

The characterization of chlorophyll compounds with the addition of metal ions Fe(III) using UV-Vis spectrophotometer showed the presence of Metal Ligand Charge Transfer (MLCT) phenomenon at maximum wavelength of 263.00 nm. In the FTIR spectrum, the complex compounds showed the presence of Fe-O vibration of chlorophyll as ligand at wavenumber of 436.06 cm^{-1}. Based on the electrical conductivity test can be seen that the formed complex compounds is ionic compound. Moreover the presence of metal ions Fe(III) on chlorophyll can increases the potential of chlorophyll as photosensitizer on Dye Sensitized Solar Cell (DSSC).

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