

**ICIGCS 2012**

INTERNATIONAL CONFERENCE OF THE INDONESIAN CHEMICAL SOCIETY

**HKI**  
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This is to certify that

**Jaslin Ikhshan**

has been participated as

**Presenter**

in

**INTERNATIONAL CONFERENCE OF THE INDONESIAN CHEMICAL SOCIETY**

*"Strengthening Research and Innovation in Chemical Science for Better Quality of Life"*

University of Brawijaya, Malang

4--5 September 2012

President of HKI,

Head of HKI East Java,

Chairman of ICIGCS,

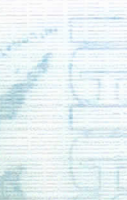
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KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN  
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Yogyakarta, 29 Agustus 2012  
Dekan FMIPA UNY



Dr. Hartono  
NIP. 19620329 198702 1 002

**ABSTRACT BOOK**

**ICIGS 2012**



**INTERNATIONAL CONFERENCE  
OF THE INDONESIAN CHEMICAL SOCIETY 2012**

**Organized by HKI - East Java**

**BRAWIJAYA UNIVERSITY  
MALANG, INDONESIA  
SEPTEMBER 4-5<sup>TH</sup> 2012**



Himpunan  
Kimia  
Indonesia



## TIME SCHEDULE

1<sup>st</sup> Day, Tuesday, 4 September 2012

Time	Program	Speaker	Venue
07.30-08.30	Registration	-	6 <sup>th</sup> Floor
08.30-09.00	Opening ceremony	Opening speech -Chairman of HKI East Java -Chairman of ICICS -Dean of Faculty of Science or Rector of Brawijaya University	Main Hall
09.00-10.00	Plenary I	Keynote Speech I	Hall
10.00-10.20	Coffee break	-	6 <sup>th</sup> Floor
10.20-11.20	Plenary II	Keynote Speech II	Hall
11.30-12.00	Parallel Session 1	Invited Speaker 1	Room 1-
12.00-12.30	Parallel Session 1	Invited Speaker 2 / sponsorship	Room 5
12.30-13.30	Lunch break	-	6 <sup>th</sup> Floor
13.30-14.00	Poster Session		6 <sup>th</sup> Floor
14.00-15.10	Parallel Session II		Room 1- Room 5
15.10-15.30	Coffee break	-	6 <sup>th</sup> Floor
15.30-16.05	Parallel Session III		Room 1- Room 5

2<sup>nd</sup> Day, Wednesday, 5 September 2012

Time	Program	Speaker	Venue
07.00-08.00	Registration	-	6 <sup>th</sup> Floor
08.00 - 08.30	Parallel Session IV	Invited Speaker 3	Room 1- Room 5
08.30-09.40	Parallel Session V		Room 1- Room 5
09.40-10.00	Coffee break	-	6 <sup>th</sup> Floor
10.00-11.10	Parallel Session VI		Room 1- Room 5
11.10-11.40	Poster Session		6 <sup>th</sup> Floor
11.45-13.00	Lunch break	-	6 <sup>th</sup> Floor
13.00-13.35	Parallel Session VII		Room 1- Room 5
13.40-14.00	Award		
14.00-14.15	Closing Ceremony		Main Hall

\* see pages 41 - 165 for oral presentation abstract  
 \*\* see pages 167 - 240 for poster presentation abstract

## The Detail of Oral Presentation

### Tuesday, 4 September 2012

#### Day 1 – Natural Products and Biochemistry

(Session 2)

14.00 - 15.10

- Identification of Compounds in Antioxidant Active Fraction from Water Extract of Kecombrang Flower (*Etilingera Elatior*) 41  
 Dede Sukandar\*, Sandra Hermanto dan Heru Cahyo Irawan
- Identification and Anticancer Activity Against Myeloma Cells 42  
 Wiwik Susannah Rita<sup>1,2)</sup>; I Made Dira Swantara<sup>1,2)</sup>, Ni Luh Sugiantini<sup>2)</sup>
- Isolation of Tannin Compound and Hypoglycemic Test Effect in Bungur (*Lagerstroemia speciosa* Pers.) Stem Bark Extract on Mice Blood Induced by Alloxan 43  
 Ida Ayu Raka Astiti Asih\*, Ni Made Puspawati\* dan Utari Sumadewi
- The Chemical Constituents of Tenggulun (*Protium Javanicum*, Ni Made Puspawati\* 44
- Isolation and Identification of Antibacterial Compound in Tamarind Pulp (*Tamarindus indica* L.) 45  
 Tagor Siregar

#### Day 1 – Natural Products and Biochemistry

(Session 3)

15.30 - 16.05

- Isolation of Peroxidase from *Brassica rapa comvar. Parachinensis* L. at Different pH Buffer 46  
 Sri Sugiwati\*, Hani Mulyani and Yulia Anita
- Characteristic and Kinetic Parameters in Partially Purified  $\beta$ -Galactosidase of *Enterobacter Cloacae* A4BI 47  
<sup>1</sup>Tatik Khusniati\*, <sup>1</sup>Risti Mynawaroh, <sup>1</sup>Abdul Choliq, <sup>1</sup>Sulistiani and <sup>2</sup>Djarot Sasongko

- Substitution at Asp121 of the  $\beta$ -D-Xylosidase from *Geobacillus thermoleovorans* IT-08 to Alter Its activity on Certain pH 48  
<sup>1</sup>Lanny Hartanti\*, <sup>1</sup>Ami Suwandi, <sup>2</sup>Zeilij Nurahman, <sup>3</sup>Ni Nyoman Tri Puspangsih

#### Day 1 – Physical and Analytical Chemistry

(Session 2)

14.00 - 15.10

- Computational Study of the Kinetics of Ammonium Perchlorate Decomposition at 298 K 50  
 Bayu Prianto<sup>1\*</sup>, Muhammad Abdulkadir Martoprawiro<sup>2</sup>
- Hydration Structure of Cerium(III) in Water based on ab Initio Quantum Mechanical Charge Field Molecular Dynamics Simulation 51  
<sup>1</sup>Ponco Iswanto\*, <sup>1</sup>Senny Widyaningsih, <sup>2</sup>Ria Arnunanto, <sup>2</sup>Harno Dwi Pranowo
- Adsorption of p-Menthan-3-ol Enantiomers on  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> Surface : A Computational Study 52  
<sup>1</sup>Elvina Dhiyal Iftitah\*, <sup>2</sup>Muhammad Muchalal, <sup>2</sup>Wega Trisunaryanti, <sup>2</sup>Ria Arnunanto
- Tuning The Hydrophobicity of Water Monolayer 53  
 Lukman Hakim
- Molecular and Energetic Properties of ClNO<sub>2</sub> and ClONO 54  
 Juli Andri, Lintang Hizbullah
- Toxic Elements As, Cr and Hg in Coal, Bottom Ash and Fly Ash by Instrumental Neutron Activation Analysis (INAA) 55  
 Diah Dwiana Lestiani

#### Day 1 – Physical and Analytical Chemistry

(Session 3)

15.30 - 16.05

- Beneficiation of Low-Grade Gold Ore by Hydrometallurgy Method 56  
 Ayis Kurnia, Suprpto, Hamzah Fansuri\*, M. Saud Gani

Nanomagnetite as Nitrogen Provider for Corn Crop.	57
Ilfa Nuraisyah Siregar	
Development of Diffusive Gradient in Thin Film ( <i>Diffusive Gradient in Thin Film</i> ) with Titanium Dioxide Adsorbent for Phosphate Measurement	
Asep Saefumillah*, Ima Husna, Iman Abdullah, Zainab Sihabudin	
<b>Day 1 – Applied and Material Chemistry (Session 2)</b>	<b>14.00 - 15.10</b>
Application CaO of Broiler Eggs Shell as Catalyst Synthesis Biodiesel from Bintanggur Oil ( <i>Callophyllum Inophyllum L.</i> )	60
I Wayan Sutapa*, Anida Husein, M.F.J.D.P.Tanasale	
Design and Analysis of Matrix Inhibitor of Metalloproteinase 2 Based on SB-3CT In Silico	61
Septi Angraini, Edy Junaedi, Sudaroko*	
Preparation, Characterization and Activity Test of Ni:Mo/ZAA Catalyst in Hydrocracking of Asphaltene from Butonian Asphalt	62
<sup>1</sup> Wega Trisunaryanti*, <sup>1</sup> Triyono, and <sup>2</sup> Gertreda Latumakulita	
Constrained Non Linear Programming for The Solution of Mass Balance Equation in the Steady State Cyclohexane Oxidation	63
Rudy Agustriyanto <sup>1</sup> , Akbaringrum Fatmawati <sup>1</sup>	
Catalytic Activity of Activated Natural Zeolite and Ni-Activated Natural Zeolite on Liquefied Organic Waste Hydrocracking Process	64
Arief Budiawan Majid*, Wega Trisunaryanti, Lailiy Amilia, Ananto Dwi Rahmadi, Ika Oktapriany	
3-Mercaptopropionic Acid as Corrosion Inhibitor on Carbon Steel in Environmental Appropriate for the Oil Well Condition	65
Yayan Sunarya	

<b>Day 1 – (Session 2)</b>	
Block Characterization of Zeolite Y and Zeolite X	82
Reversible Polymerization of Styrene	82
James Sit	
Characterization of Zeolite Y and Zeolite X	82
Compositional Analysis of Zeolite Y and Zeolite X	82
Muhammad	
Fabrication of Zeolite Y and Zeolite X	82
Imidazo	
Ahmad I	
<b>Day 1 (Session 2)</b>	
Preparation and Infrared Spectroscopic Studies of Chromium (III) – Glutamic Acid Complexes, Antidiabetic Supplement Candidates	70
<sup>1</sup> Kun Sri Budiasih*, <sup>2</sup> Chairil Anwar, <sup>2</sup> Sri Juari Santosa, <sup>2</sup> Hilda Ismail	
Copper(II) Complexes of Two New Polyamine Ligands: Synthetic, Structural and Magnetic Studies	71
<sup>1</sup> Hari Kristopo*, <sup>2</sup> Young Hoon Lee, <sup>2</sup> Arim Woo, <sup>2</sup> Mi Seon Won, <sup>3</sup> Shinya Hayami, <sup>4</sup> Pierre Thuéry, and <sup>2</sup> Yang Kim	
The Effect of Methanol on Microwave-Assisted Solvothermal Synthesis of Nb, N Co-Doped SrTiO <sub>3</sub>	72
Yui Sulaeman <sup>1</sup> , Shu Yin <sup>2</sup> and Tsugio Sato <sup>3</sup>	
Effect of Catalyst Concentration and pH of Phenol toward Degradation of Phenols Using Cu(II)-Zeolites Catalyst	73
Sri wardhani*, Darjito, Tutik Setianingsih, Dinar Purwonugroho, Fanus Fuaida, Ratna Juwita	

Organo-Bentonite and its Prospect as Save Adsorbents for Metal Ions and Pesticides Residues from Drinking Water	74
Anna Permanasari, Zackiyah	
Optimization of Ion Pb(II) Absorption Using Modified Natural Zeolite by Dithizone	75
Zurida Agustiningtyas	
First Principles Studies on Band Structures and Density of States of Graphite Surface Oxides	76
Nirwan Syarif*, Ivandini Tribidasari P., Widayanti Wibowo	
<b>Day 1 – Inorganic Chemistry and Environmental (Session 3)</b>	<b>15.30 - 16.05</b>
Activated Carbon from Oil Palm Shell for Removal of Procion Dyes and Regeneration by Hydrogen Peroxide	77
Poedji Loekitowati Hariani*, Muhammad Faizal, Ridwan, Marsi Dedi Setiabuddaya	
Fatty Acid Fish Oil Composition from Bleaching Process with Moringa Oleivera Pods NaCl Active Carbon	78
Yulianti, E.* and A.G. Fasya	
<b>Day 1 – Organic Chemistry and Education (Session 2)</b>	<b>14.00 - 15.10</b>
Reducing Misconceptions of Chemistry on Students as Prospective Teachers through Guided Simulation-Microteaching	80
Sukarnin Darmo Sarjju	
Student's Metacognitive Self-Regulation in the VSEPR Theory Problem Solving	81
Bambang Sugiarto*, Suyono, and Prabowo	

Comprehension Improvement of Character Value for Chemistry Integrated on Science Learning 2 Subject for the Student of Science Education Study Program FMIPA Unesa	82
Mitarlis	
Improvement of Student Result by Contextual Learning Based on Project of Inorganic Chemistry II	83
Kusumawati Dwiningasih	
Integrating Problem Solving Based Laboratory Activities into Chemical Literacy Teaching and Learning on the Topic Solubility Equilibria	84
Ahmad Mudzakhir*, Hendrawan, Hernani dan Yunita Dian Iswari	
Blending Tawas-Polipropilen-Potassium Permanganate as Filter	85
Retno Dwi Suyanti and Iqbal Maulana	
The Development of Chemistry Instructional Materials in "Group Investigation Cooperative" Oriented at The Topic Colloidal System for Empowering Thinking Skills in International Senior High School	86
Utuya Azizah, Harun Nasrudin	
<b>Day 1 – Organic Chemistry and Education (Session 3)</b>	<b>15.30 - 16.05</b>
Improvement of Student Performance using The Implementation Student Centered Learning (SCL) in Lesson Study Activities at The Reaction Rate Experiment in Senior High School Budi Utomo Prambon Sidoarjo	87
Harun Nasrudin	
The Effect of Element Card Media on Inside Outside Circle (IOC) Learning Model to the Student's Learning Outcomes, at MTsN Tungkop Aceh Besar Academic Year 2010/2011	88
Sri Adellila Sari*, Dewi Kasniar, and M. Nasir Mara	

**Wednesday, 5 September 2012****Day 2 – Natural Products and Biochemistry****(Session 2)****08.30 - 09.40**

Docking Studies of Ethanol Extract *Physalis peruviana* Linn using Molegro Virtual Docker on Insulin Tyrosine Kinase Receptor as Antidiabetic Agent 90  
Ayik Rosita Puspaningtyas

Distribution of Chlorophylls and Carotenoids in the Different Parts of Thallus Structure from Three *Sargassum* spp. as Revealed by Multi-Chromatograms HPLC Approach 91  
Renny Indrawati, Heryanto, Tatas H. P. Brotosudarmo, Leenawaty Limantara\*

*Tyrosine kinase* Inhibitory Activity of Secondary Metabolites from *Cryptocarya konishii* Hayata (Lauraceae) 92  
Fera Kurniadewi, Lia Dewi Juliatyaty, Yana Maolana Syah, Euis Holisotan Hakim, Kiyotaka Koyama

The Effect of Fermentation Treatment Using *Trichoderma viride* and The Distilling Collection Time toward the Characteristics of Patchouli Oil 93  
Rurimi Retnowati\*, Suratmo, M. Farid Rahman and Vindi Puspita Sari

Toxicity Levels of Sea Cucumber (*Holothuria scabra*) Crude Extracts Collected from Kenjeran Surabaya in Methanol, Ethanol and N-Hexane Againts *Arthemisia salina* 94  
Tri Kustono Adi\*, Rachmawati Ningsih

**Day 2 – Natural Products and Biochemistry****(Session 3)****10.00 - 11.10**

Acceleratory Activity of Melanin Biosynthesis by Quercetin Glucosides from *Helmintothosachys zeylanica* 95  
Kosei Yamauchi<sup>1</sup>, Tohru Mitsunaga<sup>1</sup>, Irmamida Batubara<sup>2\*</sup>

Differentiation of Bovine and Porcine Gelatin Based on Peptide Pattern Before and After Pepsin Hydrolysis 96  
10

Sandra Hermanto\*, La Ode Sumartini, Widya Fatimah  
A Newly Streptomycetes IM-0080 Producing Bioactive Substances from Soil Samples of Volcanic Mountain in West Java Indonesia 97  
Desak Gede Sri Andayani

The Biochemical Changes and the Amount of Contaminant Microbe of Chicken Meat through the Addition of Food Grade STPP 98  
I Gusti Made Sanjaya\*, Suzana Surodjo, Leny Yuanita, Siti Tjahjani

Enhancement of Biomass Production from *Spirulina* sp. Cultivated in POME Medium 99  
Hadiyanto\*, Muhamad Maulana, Azimatun Nur

Isolation and Characterization of fim-C S. Typhi Gene 0.8 Kilo Base as a Preliminary Study to Discover a Recombinant Vaccine Candidate for Typhoid 100  
Muktiningsih Nuriyayadi\*, Irma Ratna Kartika, Fera Kurnia Dewi, M.S.Dwi Destiana, Sinta Nurhidayati

**Day 2 – Natural Products and Biochemistry****(Session 4)****13.00 - 13.35**

Surimi of Beloso (*Saurida tumbil* Sp.) Fish and Nutritional Content Analysis 101  
Florentina Maria Titi Supriyanti<sup>1\*</sup>, Gebi Dwiyanti<sup>2</sup>, Puspa Dwipa Muliani<sup>3</sup>

Antioxidant Activity of Commercial Red and Black Rice and Its Processed Product Extract 102  
Gebi Dwiyanti, Wiwi Siswainingsih dan Wulan Nur Aprilianti

Preliminary Study of The Potential of *Phanerochaete chrysosporium* Immobilized in Agar to Degradation of Sugarcane Bagasse 103  
Evi Susanti



## Day 2 – Physical and Analytical Chemistry (Session 2)

08.30 - 09.40

- The Effect of N-(1-Naphthyl)-Ethylene Diamine Dihydrochloride (NED) Concentration as Absorber and Exposure Time for Determination NOx Gas in the Air 105
- Qoniah Fardiyah\*, Barlah Rumphayati, Ni Luh Putu Merawati
- Voltammetric Behavior of the Transfer of Methyl Ephedrine Ion Across the Water|Nitrobenzene Interface 106
- Idrhawati<sup>1</sup>, Hirotsuke Tatsumi<sup>2</sup>
- Investigation of Voltammetric Reduction Profile of N<sub>2</sub>O on Platinum Working Electrode: Variation on Potential Scan Rate, Supporting Electrolyte Concentration and Interferences 107
- Siswoyo\*, Harum S. Andini, Dwi Indarti
- Immobilization of Uricase Upon Gold Thick Film Electrodes Coated With Polypyrrrole-Polyaniline Film 108
- Robeth Viktoria Manurung\*,<sup>2</sup>Chandra Risdian and<sup>1</sup>Ery Dwi Kurniawan
- Simultaneous Determination of Cd and Cu in Seawater by Voltammetric Stripping Adsorptif (AdSV) Using Calcon as Complexing Agent 109
- Deswati Munir, Hilfi Pardi\*, Hamzar Suyani
- Automated Simultaneous Determination of Cyanide and Pb ions by Reverse Flow Injection Potentiometry 110
- Tri Mulyono\*, Asnawati, Nissa Nahdiyah

## Day 2 – Physical and Analytical Chemistry (Session 3)

10.00 - 11.10

- The Influences of Glutaraldehyde's Concentration that Added into Chitosan Gel Toward Performances of Conductometric Biosensor for Diazinon 111
- Indrajid Prayoga\*, Ani Mulyasuryani, and Anna Roosdiana

- Coated Wire Iodide Selective Electrodes Based on Chitosan Carriers for Potentiometric Iodide Sensor 112
- Atikah

Chromatographic Fingerprint Analysis of Pegagan and Temulawak for Development of Herbal Medicine Raw Material Quality Control Method 113

Latifah K. Darusman<sup>1,2)</sup> and Wulan Tri Wahyuni<sup>1,2)</sup>

Development of Methacrylate-Based Monolithic Microbore Columns for Separation and Quantification of Biomolecules 114

Akhamad Sabarudin<sup>1\*</sup>, Shin Shu<sup>2</sup>, Yuka Takasaki<sup>2</sup>, Shimosuke Sakagawa<sup>2</sup>, Junchao Huang<sup>2</sup>, Kato Kuniyuki<sup>2</sup>, Tomonari Umemura<sup>2</sup>

Optimization and Separation of Fatty Acid Ethyl Esters in The Mixture by Gas Chromatography-Mass Spectrometry 115

Ni Made Suanti<sup>1</sup>

Surface Modification on Silica Rice Husk for Enhancing Separation Power of Small Particles 116

Surjani Wonoraharjo\*, Matilinda Ayu Hana Margareta, Rini Sri Nova, Dian Agustini

## Day 2 – Physical and Analytical Chemistry (Session 4)

13.00 - 13.35

- 2D Infrared Spectra Pattern of Boiled Beef and Pork and Its Validation by Lagrange Interpolation 117
- <sup>1</sup>Himmatul Barroroh\*,<sup>2</sup>Ari Kusumastuti,<sup>1</sup>Lhappy Y.D.H.,<sup>1</sup>Diana C.D.
- Novel Spectrophotometric Method for Determination of Melamine in Milk Based on Diazotization Reaction Using  $\beta$ -Naphthol 118
- Ganden Supriyanto\*, Handoko Darmokoesoemo, Ida Bagus Rai Wiadnya
- Reconstruction of Banjar's Boat Artifacts Based on the Analysis of Species Fe, Mg and Ca 119
- Tanto Budi Susilo\*, Radna Nurmasari, Zaki Ajriani, Gina Adriana, Rifatul Mahmudah

**Day 2 – Applied and Material Chemistry  
(Session 2)****08.30 - 09.40**

- Preparation and Characterization of Carbon Composite from Coconut Shell with PVA at High Temperature 121  
 Meyti Jeanne Rampe\*, Bambang Setiaji, Wega Trisunaryanti, Triyono
- Improving Flame Retardancy of Recycled Polypropylene/Palm Oil Fiber Geo-Composites in The Presence of Kaolinite Clays 122  
<sup>1</sup>Neng Sri Suharty\*, <sup>2</sup>Kuncoro Diharjo and <sup>2</sup>Eliphedha Okidimis
- Tallor Made of Hyperbranched Nanoscopic Polybutadienen by Successive “graft from” and “graft onto” Copolymerization 123  
 Zainuddin Muchtar
- Synthesis of Highly Magnetic Properties of Fe<sub>3</sub>O<sub>4</sub> Nanoparticles through Simple Hydrothermal Process 124  
 Syukri Arief, Anggi Eka Putra dan Novesar Jamarnu
- Preparation of Colloidal Ag Nanoparticles Using the Biologically Compatible Polymers and Reducing Agents 125  
 Roto and Dita Floresyona
- The Effect of Dispersant in as-Synthesized TiO<sub>2</sub> Nanoparticle Towards the Suspension Stability and Hydrophilic Properties of its Thin Film 126  
 Bagus Sulasmono, J. Gunlazuardi dan Yuni. K. Krisnandi\*

**Day 2 – Applied and Material Chemistry  
(Session 3)****10.00 - 11.10**

- Simple Method to Grow TiO<sub>2</sub> Nanotube on Titanium Metal Sheet and Its Characterization 127  
 Jannuzi Gunlazuardi
- Study on the Preparation of Highly Ordered TiO<sub>2</sub> Nanotubes by Anodization of Titanium Metal Sheet and Its Application for Dye-Sensitized Solar Cells 128  
 Asef Purwanti

Modification of the Natural Zeolite's Pore of Malang Using Surfactant CTAB Template 129

Susi Nurul Khalifah<sup>1\*</sup>, Agie Botianovi<sup>1</sup>, Anton Prasetyo<sup>1</sup>, Rini Natsiati Astuti<sup>2</sup>  
 Preparation and Characterization of Intercalated ODTMABr Cationic Surfactants Organoclay and Its Application as Phenol Adsorbent 130  
 Evi Oktaviani, Rahman Arif Marz, Yuni Krisyunningsih Krisnandi\*, Ismunaryo Moenandar, Riwardi Sihombing

Synthesis and Characterization of Hierarchical Zeolite ZSM-5 through Alkaline Treatment 131

Savitri Octaviani, Riwardi Sihombing, Yuni Krisyunningsih Krisnandi\*  
 Impedance Analysis of Ytria Doped-Zirconia (YSZ) and Calcia-Ytria Doped Zirconia (CYYZ) 132

<sup>1</sup>Fritra Rahmawati\*, <sup>2</sup>Bambang Prijamboei, <sup>2</sup>Syoni Soepriyanto, <sup>2</sup>Ismunandar

**Day 2 – Applied and Material Chemistry  
(Session 4)****13.00 - 13.35**

- Isolation of Methyl Ricinoleate from Biodiesel of Castor Oil in Order to Produce The Additives of Cetane Improver 133  
 Abdullah<sup>1,2\*</sup>, Triyono<sup>3</sup>, Wega Trisunaryanti<sup>3</sup>, Winarto Haryadi<sup>3</sup>
- The Performance NOx Potentiometric Sensor Using NASICON as the Sensing Material 134  
 Agus Setiabudi\*, Rifan Hardian, Gusti Ayu D.A.
- Thermodynamic Parameters on the Sorption of Phosphate Ions by Montmorillonite 135  
 Jasmin Ikhsan\*, Endang Widjajanti LFX, and Sunarto

## Thermodynamic Parameters on the Sorption of Phosphate Ions by Montmorillonite

Jaslin Ikhsan\*, Endang Widjajanti LFX, and Sunarto

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### ABSTRACT

The sorption of phosphate by montmorillonite at 10, 30, and 50°C was investigated aiming to mainly determine thermodynamic parameters for the formation of surface complexes in the adsorption of phosphate ions by montmorillonite. Data were collected by adsorption edge experiments investigating the effect of pH, adsorption isotherms enabling the effect of sorbate concentration, and acid-base titration calculating protons released or taken up by adsorption process. Data analysis was carried out using surface complexation model to fit the data collected in this study using the parameters obtained from previous study, as well as to calculate the values of  $\Delta H$  and  $\Delta S$ . Previous study reported that phosphate ions formed two outer-sphere surface complexes with active sites of montmorillonite through hydrogen bonding. In the first complex,  $[(XH)^0-H_2L^-]$ , the phosphate was held to permanent-charge  $X^-$  sites on the tetrahedral siloxane faces, and the second complex,  $[(SO^-(SOH)]^- - [H_2L^-]^-2$  was formed through the interaction between the phosphate and variable charge surface hydroxyl groups at the edges of montmorillonite crystals and on the octahedral alumina faces. The values of  $\Delta H$  for the first and second reactions are 39.756 and  $3.765 \times 10^{-7}$  kJ mol<sup>-1</sup> respectively. Since both reactions have positive enthalpy values, it can be concluded that the reactions are endothermic. Large energy for the first reaction is needed by  $X^-$  sites (permanent negatively charge sites of montmorillonite) to be partially desolvated, on which  $K^+$  or other surface cations are replaced by  $H^+$  ions in the surface protonated process, and are then ready to interact phosphate ions in the solution. Small values of  $\Delta H$  for the second reactions indicates that hydrogen bonds formed by phosphate and SOH sites in the second reaction are easily broken out, and the phosphate can easily desorbed from the surface. The values of  $\Delta S$  for the first and second reactions are 122.523 dan  $2.393 \times 10^{-2}$  J K<sup>-1</sup> mol<sup>-1</sup>, which are greater than -10 kJ mol<sup>-1</sup> and indicates that the surface reactions occurs through dissociative mechanisms.

**Keywords:** temperature, adsorption, extended constant capacitance surface complexation model (ECCM), enthalpy, reaction mechanisms.