



PREFACE

Bulletin of Chemical Reaction Engineering & Catalysis (ISSN 1978-2993) is an international journal published by Department of Chemical Engineering, Diponegoro University, jointly with *Masyarakat Katalis Indonesia* - Indonesian Catalyst Society (MKICS). This journal is dedicated as a media for communicating all research activities in chemical reaction engineering and catalysis fields, and disseminating the novel technology and news related to chemical reaction engineering, catalyst engineering and science, bioreactor engineering, membrane reactor, and catalytic reactor engineering.

This issue (BCREC, Volume 10, Issue 1, Year 2015) has published 12 articles with various topics in catalysis materials, kinetics and enzymatic catalysis. This issue was authored and co-authored by 53 authors from 4 countries (China, Indonesia, India, and Egypt).

A research article about synthesis of 4-tert-butyltoluene by vapor phase tert-butylation of toluene with tert-butylalcohol over USY Zeolite was published by Shen *et al.* The results showed that the USY zeolite catalyst offered better toluene conversion of about 30% and 4-tert-butyltoluene selectivity of about 89% at the suitable reaction condition as follows: reaction temperature of 120 °C, toluene/TBA ratio of 2:1 and liquid space velocity of 2 ml/g·h. The clogging of micropores by the formed carbon or oligomers was the main reason for the deactivation of the catalyst.

In second article, Sangian *et al.* suggested preparation of reducing sugar hydrolyzed from high-lignin coconut coir dust pretreated by the recycled ionic liquid [mmim][dmp] and combination with alkaline. They reported that the recycled IL pretreatment of the high-lignin lignocellulose, coconut coir dust, is a new prospect for the economical manufacture of fermentable sugars and biofuel in the coming years.

In third article, Suryawanshi *et al.* highlighted selective hydrogenation of dibenzo-18-crown-6 ether over highly active monodisperse Ru/ γ -Al₂O₃ nanocatalyst. The Ru/ γ -Al₂O₃ nanocatalyst with different metal loading was synthesized by microwave irradiated sol-vothermal technique. Synthesized nanocatalyst (4-14 nm of metal particle size) was then successfully implemented for the hydrogenation of Dibenzo-18-crown-6 ether (DB18C6) at 9 MPa, 393 K temperature and 3.5 h. It was observed that the metallic small nanoclusters produced at 4 wt% metal concentration exhibited higher catalytic activity and resulted 96.7% conversion with 100% selectivity towards cis-syn-cis-dicyclohexano-18-crown-6 ether (CSC DCH18C6).

Another article about mass transfer and chemical reaction approach of the kinetics of the acetylation of *gadung* flour using glacial acetic acid was reported by Kumoro & Amalia. Acetylation is one of the common methods of modifying starch properties by introducing acetyl (CH₃CO) groups to starch molecules at low temperatures. They reported that increasing pH lead to increase the degree of substitution, while increasing GAA/GF mass ratio caused such decreases in the degree of substitution, due to the hydrolysis of the acetylated starch. The desired starch acetylation reaction is accompanied by undesirable hydrolysis reaction of the acetylated starch after 40-50 minutes reaction time. Investigation of kinetics of the reaction observed that the value of mass transfer rate constant (K_{cs}) is smaller than the surface reaction rate constant (k). Thus, it can be concluded that rate controlling step is mass transfer.

Selective synthesis of benzaldehydes by hypochlorite oxidation of benzyl alcohols under phase transfer catalysis was highlighted by Bijudas *et al.* in fifth article in this issue. The reaction is highly selective since no traces of benzoic acid or substituted benzoic acids have been detected and the yield is found to be more than 90%. The products obtained were precipitated as 2,4-dinitrophenylhydrazone and the recrystallised products were characterized by melting point and by spectrophotometric techniques like infra red and UV-Visible analysis.

Another article in this issue focused on preparation of TiO₂-SiO₂ using rice husk ash as silica source



and the kinetics study as photocatalyst in methyl violet decolorization. The formation of crystalline titania in anatase and rutile phase was identified with increasing surface porosity data and the value of band gap energy which sufficiently contribute to a photocatalytic mechanism. The character data are in line with the kinetic data of methyl violet decolorization. From the compared photooxidation, photolysis, photocatalysis and adsorption process, it can be concluded that $\text{TiO}_2\text{-SiO}_2$ acts efficiently as a photocatalyst.

Next article in this issue is about kinetic study on catalytic cracking of rubber seed (*Hevea brasiliensis*) oil to liquid fuels written by Rengga *et al.* Kinetics was studied using the model of 6-lump parameters. The parameters were rubber seed oil, gasoline, kerosene, diesel, gas, and coke. The simulation result illustrated that the six-lump kinetic model can well predict the product yields of rubber seed oil catalytic cracking. The product has high selectivity for gasoline fraction as liquid fuel and the smallest amount of coke. The constant indicates that secondary reactions occurred in diesel products compared to gasoline and kerosene. The predicted results indicate that catalytic cracking of rubber seed oil had better be conducted at 450 °C for 90 minutes using 0.5 wt.% catalyst.

Article focused on hydrocracking of *Calophyllum inophyllum* oil with non-sulfide CoMo catalysts was published by Rasyid *et al.* in this issue. It is figured out from the experiment that non-sulfide CoMo based catalysts have functioned well in the hydrocracking conversion of *Calophyllum inophyllum* kernel oil into fuels, such as gasoline, kerosene, and gasoil. The CoMo/ $\gamma\text{-Al}_2\text{O}_3$ catalyst resulted higher conversion than CoMo/SiO₂ and CoMo/ $\gamma\text{-Al}_2\text{O}_3\text{-SiO}_2$.

Next article in this issue is about application of ionic liquid [DMIM]DMP pretreatment in the hydrolysis of sugarcane bagasse for biofuel production written by Widjaja *et al.* This work was aimed to develop new pretreatment combination methods to process sugarcane bagasse lignocellulose into biofuel (bio-hydrogen). Pretreatment of sugarcane bagasse using NaOH solution in combination with ionic liquid [DMIM]DMP enhanced the enzymatic hydrolysis significantly. After the pretreatment, the content of cellulose and hemicellulose increased by 29.31% compared to the untreated one. Cellulose and hemicelluloses were used as raw materials to produce reducing sugars, that can be converted to bio-hydrogen via fermentation.

Next article in this issue was written by Kaushik *et al.* focusing on stopped-flow kinetic study and evaluation of stability constant of ternary complex forming in the MnII - catalysed periodate oxidation of 2, 3-dimethylaniline (D) in acetone-water medium. Stop-flow spectrophotometric method was used to study the ternary complex formation and to determine its stability constant.

Struvite precipitation and phosphorous removal from urine synthetic solution: reaction kinetic study was studied and reported by Shalaby & El-Rafie. First-order kinetics was found to be sufficient to describe the rate data. The rates increased with increasing pH and so SSR and the apparent rate constants for the reaction were determined.

The last article about preparation, characterization and NO-CO redox reaction studies over palladium and rhodium oxides supported on manganese dioxide was written by Fal Desai *et al.* The catalytic activity of PdO/MnO₂ and Rh₂O₃/MnO₂ is investigated for NO-CO redox reaction. Supported catalysts were prepared by wet impregnation method. Among the tested catalysts, PdO/MnO₂ shows higher activity for this reaction. Active metal dispersion on MnO₂ enhances the selectivity for N₂ over N₂O in this reaction.

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