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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : PROSIDING

Judul Karya Ilmiah : Regenerated silica gel as stationary phase on vacuum column chromatography to purify temulawak's extracts

Jumlah Penulis : 4 Orang (**Bambang Cahyono**, Ratna Dewi Maduwu, Widayat, and Meiny Suzery)

Status Pengusul : Penulis ke-1

Identitas Prosiding :

- a. Judul Prosiding : INTERNATIONAL CONFERENCE OF CHEMICAL AND MATERIAL ENGINEERING (ICCME) 2015: Green Technology for Sustainable Chemical Products and Processes
- b. ISBN/ISSN : 978-0-7354-1346-7
- c. Thn Terbit, Tempat Pelaks. : 2015, Semarang - Indonesia
- d. Penerbit/Organiser : AIP Publishing LLC
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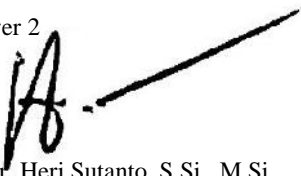
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Semarang, 23 Maret 2020

Reviewer 2



Prof. Dr. Heri Sutanto, S.Si., M.Si.
 NIP. 197502151998021001
 Unit : Dep. Fisika, FSM UNDIP

Reviewer 1



Prof. Dr. Hadiyanto, S.T., M.Sc.
 NIP. 197510281999031004
 Unit Kerja : Teknik Kimia FT UNDIP

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b. Ruang lingkup dan kedalaman pembahasan (30%)	9,00		6,00
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Nilai Pengusul = (60% x 20,00) = 12,00			

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Kualitas penerbit cukup baik, terindeks scopus

Semarang, 23 Maret 2020

Reviewer 1



Prof. Dr. Hadiyanto, S.T., M.Sc.
 NIP. 197510281999031004
 Unit Kerja : Teknik Kimia FT UNDIP

LEMBAR
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b. Ruang lingkup dan kedalaman pembahasan (30%)	9,00		6,00
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Semarang, 23 Maret 2020

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 Prof. Dr. Heri Sutanto, S.Si., M.Si.
 NIP. 197502151998021001
 Unit : Dep. Fisika, FSM UNDIP



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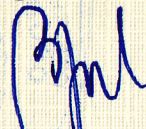
who has successfully accomplished his/her role
as
Presenter

In the 2nd INTERNATIONAL CONFERENCE ON CHEMICAL AND MATERIAL ENGINEERING 2015 (2nd ICCME 2015)
Grand Candi Hotel, Semarang, Indonesia, September 29-30th, 2015


In conjunction with

The Golden Jubilee (50th) of Department of Chemical Engineering, Faculty of Engineering, Diponegoro University

On behalf of Dean of Faculty of Engineering,
Vice Dean for Academic Affairs
Diponegoro University


Dr. Budiyo

The 2nd ICCME 2015
Organizing Committee Chairwoman


Dr. -Ing. Silviana



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AIP Conference Proceedings

Volume 1699, 29 December 2015, Article number 060022

2nd International Conference of Chemical and Material Engineering: Green Technology for Sustainable Chemical Products and Processes, ICCME 2015; Semarang; Indonesia; 29 September 2015 through 30 September 2015; Code 117825

Regenerated silica gel as stationary phase on vacuum column chromatography to purify temulawak's extracts (Conference Paper)

Cahyono, B. ✉, Maduwu, R.D., Widayat, Suzery, M. 👤

Organic Chemistry Laboratory, Departement of Chemistry, Diponegoro University, Jln Prof. Soedharto SH, Tembalang, Semarang, 50275, Indonesia

Abstract

✓ View references (16)

Commercial silica gel only used once by many researchers and affected high cost for purification process, also less support the green chemistry program. This research focused in regeneration silica gel that used purification of temulawak's extracts (*Curcuma xanthorrhiza* Roxb) by vacuum column chromatography. Sample extracts (contains $10.1195 \pm 0.5971\%$ of curcuminoids) was purified by vacuum column chromatography (pressure: 45?kPa, column: 100mm on length and 16mm on diameter). Ethanol 96% and acetone were compared as eluent. The amount of solvent and yield of curcuminoids used as indicator purification. The silica gel was regenerated with heating in 600°C for 8 hours The silica gels were analyzed by IR spectroscopy and X-ray diffraction. Furthermore, regenerated silica gel was used as the stationary phase in vacuum column chromatography under the same conditions with the previous purification. All the purification experiments were performed in three repetitions. Based on regression equation, $y=0.132x+0.0011$ ($r^2=0.9997$) the yield of curcuminoids on purified products using ethanol as the eluent was improved 4.26% (to $14.3724 \pm 0.5749\%$) and by acetone was improved 3,03% (to $13.1450 \pm 0.6318\%$). The IR spectrum of both silica gel showed the same vibration profile and also there were three crystallinity peaks missing on its X-ray diffraction. Regenerated silica gel has the same performance with new silica gel in purification of temulawak's extract: by ethanol has increased 4.08% ($14.1947 \pm 0.7415\%$) and 2.93% (13.0447 ± 0.4822) by acetone. In addition, all purification products showed similar TLC profiles. Purification using regenerated silica gel as the adsorbent on vacuum column chromatography has exactly same potential with the new silica gel. © 2015 AIP Publishing LLC.

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Isolation, characterization and formulation of curcuminoids and in vitro release study of the encapsulated particles

Perko, T. , Ravber, M. , Knez, Ž. (2015) *Journal of Supercritical Fluids*

Purification of curcumin from ternary extract-similar mixtures of curcuminoids in a single crystallization step

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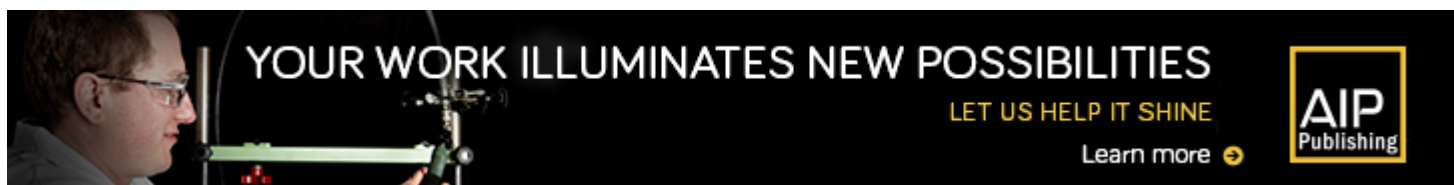
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Published Online: 29 December 2015

Preface: International Conference on Chemical and Material Engineering (ICCME) 2015

AIP Conference Proceedings 1699, 010001 (2015); <https://doi.org/10.1063/1.4938284>



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KEYNOTE SPEAKERS

1. **Prof. Choi Kwang-Hwan (NTU Korea)**
2. **Prof. Dr. Shinichiro Kawasaki** (National Institute of Advanced Industrial Science and Technology(AIST), Japan): <http://www.scopus.com/authid/detail.url?origin=resultslist&authorId=16480363400>
3. **Dr. Eng Ferry Iskandar** (Institute Technology Bandung): <http://www.scopus.com/authid/detail.url?origin=resultslist&authorId=6602257221>
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The 2nd International Conference on Chemical and Material Engineering 2015

Department of Chemical Engineering, Diponegoro University

Jl. Prof. H. Soedarto, SH, Kampus Undip Tembalang, Semarang 50275-Indonesia Phone: (62-24)

7460058, Fax: (62-24) 76480675

Email: iccme2015@che.undip.ac.id

Website: <http://iccme2015.undip.ac.id>

Conference Publications

Selected papers from this conference will be published in several Scopus-indexed journals after peer-reviewed process depending on field of the journals after the conference. The selected papers will be distributed to publish in:

- ***Bulletin of Chemical Reaction Engineering and Catalysis*** (ISSN 1978-2993, indexed by Scopus)
- ***American Institute of Physics (AIP) Conference Proceedings*** (ISSN: 0094-243X/E-ISSN: 1551-7616, indexed by Scopus)

Other accepted papers will be published in an ISBN-registered proceeding (978-602-097-281-7).

Preface: International Conference on Chemical and Material Engineering (ICCME) 2015 September 29-30, 2015

We are very pleased to introduce the proceedings of The 2nd International Conference on Chemical and Material Engineering (ICCME) 2015. The conference has been conducted by Chemical Engineering Department, Diponegoro University in Semarang on 29-30 September 2015, in conjunction with The Golden Jubilee (50th) of the Department of Chemical Engineering, Diponegoro University. The 200 scientific participants have participated in the conference, and had many fruitful discussions and exchanges that contributed to the success of the conference. Participants from six countries made the conference truly international in scope.

In this conference, it had been presented 125 abstracts which were selected from 175 registered abstracts and these presentations formed the heart of the conference and provided ample opportunity for discussion in the scope of green technology for sustainable chemical products and processes. The abstracts were split almost equally between the four main conference areas, i.e., Food and Bioprocess Engineering (FBE), Material and Science Development (MSD), Process and System Engineering (PSE) and Separation and Purification Engineering (SPE). Prior to the abstract presentations, there were four plenary speakers had been presented: Prof. Choi Kwang-Hwan from Pukyong National University (PKNU) Korea, Prof. Dr. Shin-Ichiro Kawasaki from National Institute of Advanced Industrial Science and Technology (AIST) Japan, Prof. Sugeng Triwahyono from University Technology Malaysia, Prof. Heru Susanto from Diponegoro University. These speakers gave high valuable impact to the conference and brought new research idea to the participants.

This proceeding consists of 96 full-text papers which have been selected from the presented abstract. The selection was conducted and reviewed by scientific committee. We kindly express our acknowledge to Prof. Hadi Nur (Ibnu Sina Institute Malaysia), Prof. Arief Budiman (UGM Indonesia) Dr Ferry Iskandar (ITB Bandung), Dr Hadiyanto (Diponegoro University), Dr Suryadi Ismadji (Widya Mandala Universty, Surabaya) who gave valuable review and comments on the papers.

Finally, it is appropriate that we record our thanks to Advisory Board of conference, our fellow members of the Organizing Committee and supporting funds from Institute of Research and Community Services, Diponegoro University. We are also indebted to those who served as chairmen/women during the parallel sessions. Without their support, the conference could not have been the success that it was. We also acknowledge the authors themselves, without whose expert input there would have been no successful conference. The continuing success of this conference series means that planning can now proceed with confidence for the next event.

Hadiyanto, Hadi Nur, Arief Budiman, Ferry Iskandar, Suryadi Ismadji
Editor

International Conference of Chemical and Material Engineering(ICCME) 2015
AIP Conf. Proc. 1699, 010001-1-010001-3; doi: 10.1063/1.4938284
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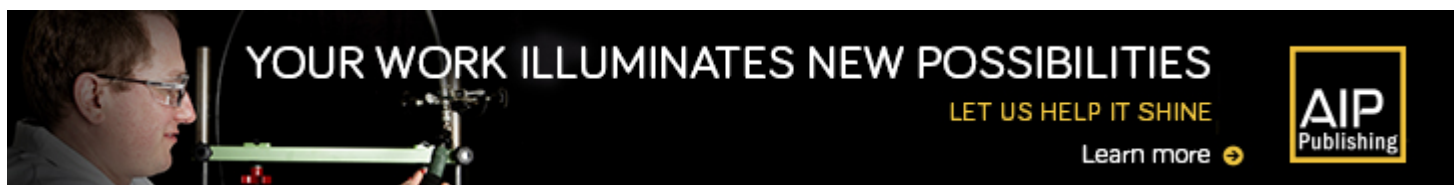
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Location: Semarang, Indonesia

ISBN: 978-0-7354-1346-7

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Isolation and identification of thermophilic and mesophylic proteolytic bacteria from shrimp paste “*Terasi*”

R. Murwani, Supriyadi, Subagio, A. Trianto and Ambariyanto

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Effects of water blanching on polyphenol reaction kinetics and quality of cocoa beans

A. S. Menon, C. L. Hii, C. L. Law, S. Suzannah and M. Djaeni

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Isolation of ethyl acetic based AGF bio-nutrient and its application on the growth of *Capsicum annum L.* plants

Hendrawan, Yaya Sonjaya, Fitri Khoerunnisa, Iqbal Musthapa and Astri Rizki Nurmala

AIP Conference Proceedings **1699**, 030007 (2015); <https://doi.org/10.1063/1.4938292>

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Swelling properties of cassava starch grafted with poly (potassium acrylate-co-acrylamide) superabsorbent hydrogel prepared by ionizing radiation

Dhena Ria Barleany, Fida Ulfiyani, Shafina Istiqomah, Heri Heriyanto, Rahmayetty and Erizal

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Synthesis and characterization of composites filtration membranes based on chitosan-poly(ethylene glycol)

Fitri Khoerunnisa, Hendrawan, Yaya Sonjaya and Agnes Putri

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Hydrophilic polymer composites synthesized by electrospinning under dense carbon dioxide

Wahyudiono, Koichi Okamoto, Siti Machmudah, Hideki Kanda and Motonobu Goto

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The effect of pH on the corrosion behavior of intermetallic compounds $\text{Ni}_3(\text{Si,Ti})$ and $\text{Ni}_3(\text{Si,Ti}) + 2\text{Mo}$ in sodium chloride solutions

Gadang Priyotomo, Lutviasari Nuraini and Yasuyuki Kaneno

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Silviana and M. Petermann

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Regenerated Silica Gel as Stationary Phase on Vacuum Column Chromatography to Purify Temulawak's Extracts

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Abstract. Commercial silica gel only used once by many researchers and affected high cost for purification process, also less support the green chemistry program. This research focused in regeneration silica gel that used purification of temulawak's extracts (*Curcuma xanthorrhiza* Roxb) by vacuum column chromatography. Sample extracts (contains $10.1195 \pm 0.5971\%$ of curcuminoids) was purified by vacuum column chromatography (pressure: 45 kPa, column: 100mm on length and 16mm on diameter). Ethanol 96% and acetone were compared as eluent. The amount of solvent and yield of curcuminoids used as indicator purification. The silica gel was regenerated with heating in 600°C for 8 hours. The silica gels were analyzed by IR spectroscopy and X-ray diffraction. Furthermore, regenerated silica gel was used as the stationary phase in vacuum column chromatography under the same conditions with the previous purification. All the purification experiments were performed in three repetitions. Based on regression equation, $y = 0.132x + 0.0011$ ($r^2 = 0.9997$) the yield of curcuminoids on purified products using ethanol as the eluent was improved 4.26% (to $14.3724 \pm 0.5749\%$) and by acetone was improved 3.03% (to $13.1450 \pm 0.6318\%$). The IR spectrum of both silica gel showed the same vibration profile and also there were three crystallinity peaks missing on its X-ray diffraction. Regenerated silica gel has the same performance with new silica gel in purification of temulawak's extract: by ethanol has increased 4.08% ($14.1947 \pm 0.7415\%$) and 2.93% (13.0447 ± 0.4822) by acetone. In addition, all purification products showed similar TLC profiles. Purification using regenerated silica gel as the adsorbent on vacuum column chromatography has exactly same potential with the new silica gel.

INTRODUCTION

Column is one apparatus important in chromatography equipment that used separation compounds. Commonly, the price of column is expensive but the column has operation time very long. If active compound in column un active, column can not used for separation in analysis use chromatography. The column can be modified or developed in accordance with the desired goals. Some equipments, such as preparative HPLC, is one example of development in Industry. The additional of a vacuum on column chromatography has advantages as higher elution rate also shortening the solute and adsorbent contact time[1]. This type of chromatography is still often used in education and research laboratory for the separation of extracts from natural products. Theoretically, this method can be developed in a larger scale.

One of the adsorbent that often used on vacuum column chromatography was silica gel. This material is widely used because it has very inert property, hydrophilic, has a thermal and high mechanical stability, and also relatively not swell in organic solvents[2]. Although this material is widely reported can be synthesized[3,4], but commercial silica gel still remain unreliable, although the price is quite high. Some researchers are still often use this adsorbent once. When it is done, it will certainly requires a high cost when it should be applied to upper scale.

The objective of this research was to develop column regeneration for purification temulawak's extracts (*Curcuma xanthorrhiza* Roxb) and analysis with chromatography by using ethanol and acetone as eluent/mobile phase.

Effects of Water Blanching On Polyphenol Reaction Kinetics and Quality of Cocoa Beans

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Abstract. Several studies have been reported on the potential health benefits of cocoa polyphenols. However, drying has an inhibitory effect on the substantial recovery of cocoa polyphenols. This is majorly because of the high degradation of polyphenol compounds as well as the enhanced activity of polyphenol oxidases; a pre-cursor for browning of polyphenols during drying. Pre-treatment technique such as water blanching (80° and 90°C for 5 min, 10 min and 15 min exposure times respectively) can inactivate the polyphenol oxidases enzyme and promote high percent of the polyphenol recovery in dried cocoa bean. The degradation kinetics of cocoa polyphenols during hot water blanching are analyzed; The rate constant for the polyphenol degradation after blanching was found to be ranging from 0.0208 to 0.0340 /min. The results for dried fresh cocoa beans showed an optimal level of polyphenol recovery (118 mg GAE/g) when blanched at 90°C for 5 minutes duration. The antioxidant activity is also analyzed using DPPH scavenging assay.

Keywords: COCOA, POLYPHENOL, DRYING, WATER BLANCHING, QUALITY

INTRODUCTION

Cocoa is an important commodity which finds in application in food, pharmaceutical and cosmetic industries. There has been varied research going on the medical benefits of cocoa polyphenols. The polyphenol content in cocoa is found to be more than red wine and green tea [1]. The health benefits of cocoa polyphenols ranges from anti-atherosclerotic, anticariogenic, anticarcinogenic, antidepressant, antihypertensive, antiinflammatory, antimutagenic, antiproliferative and antiradical properties to cardioprotective effects [2]. Three distinguished groups of polyphenols present in cocoa beans namely proanthocyanidins (58%), catechins (37%) and anthocyanins (4%) [3]. Typically, the cocoa polyphenols contents are about 6 to 8% by weight of a dried fermented cocoa bean. The

Hydrophilic Polymer Composites Synthesized by Electrospinning under Dense Carbon Dioxide

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Abstract. Electrospinning technique is feasible in some applications, it has attracted more attention in recent years. Various polymers have been successfully electrospun into ultrafine fibers in solvent solution and some in melt form. In this work, polyvinylpyrrolidone (PVP) as a hydrophilic polymer would be synthesized by electrospinning under dense carbon dioxide (CO₂). The experiments were performed at 40 °C and 5 MPa. During the electrospinning process, the applied voltage was 10–17 kV and the distance of nozzle and collector was 8 cm. The concentration of PVP solution as a major component was 4 wt%. The results showed that the fibers surface morphology from PVP which blended with poly L-lactide acid (PLLA) were smooth with hollow core fibers at 5 MPa. At the same conditions, PVP-carbon nanotube was also successfully generated into electrospun fiber products with diameter 2 µm.

eywords: Electrospinning, Polyvinylpyrrolidone (PVP), Hollow fibers; Dense CO₂, Polymer blends

INTRODUCTION

Polyvinylpyrrolidone (PVP) is a water-soluble polymer made from the monomer N-vinylpyrrolidone. Due to PVP has hydrophilic as well as hydrophobic functional groups, this polymer could soluble in various organic solvents. PVP was a nonionic water-soluble polymer and its viscosity in aqueous solution is not affected by electrolytes. Therefore, it allows to use this polymer in a variety of fields-of-use owing to following its advantageous characteristics. PVP is an environmental friendly synthetic polymer, biocompatibility, and widely used in biomedical, biochemical, food, textile, and other fields [1]. Similar to PVP, poly L-lactide acid (PLLA), polymer derived from lactic acid, is also biocompatible and environmental degradable and has wide applications [2]. This polymer was composed and derived from renewable resources mainly starch and sugar, so that PLLA seemed to be a promising material to reduce the environmental solid waste disposal problem. The most interesting aspect of PLLA is its biocompatibility with respect to biomedical applications that results non-toxic or non-carcinogenic effects in local tissues. However, PLLA is a hydrophobic polymer causing to the certain limitation of its applications. Generally, PLLA was modified with PVP in organic solvents to hinder its hydrophobicity property.

Chemicals Loading in Acetylated Bamboo Assisted by Supercritical CO₂ Based on Phase Equilibrium Data

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Abstract. Indonesia has a large tropical forest. However, the deforestation still appears annually and vastly. This reason drives a use of bamboo as wood alternative. Recently, there are many modifications of bamboo in order to prolong the shelf life. Unfortunately, the processes need more chemicals and time. Based on wood modification, esterifying of bamboo was undertaken in presence of a dense gas, i.e. supercritical CO₂. Calculation of chemicals loading referred to ASTM D1413-99 by using the phase equilibrium data at optimum condition by a statistical design. The results showed that the acetylation of bamboo assisted by supercritical CO₂ required 14.73 kg acetic anhydride/m³ of bamboo for a treatment of one hour.

Keywords: acetylation, bamboo, chemicals loading, supercritical CO₂

INTRODUCTION

Bamboo with the ecological benefits regards as well as auspicious material due to increasing natural resources demand with circumscribed supply. It is a sustainable material due to the high-carbon capture in the biomass, the fast growing of the plants, and it is abundantly available in Asia. Indonesia has around 135 species of bamboo [1-3]. Therefore, it would be nice to reduce the devastation of tropical forest where about 0.5 million ha are annually deforested, by the use of bamboo [4]. As consequences many research activities are trying to substitute wood with other ligno-cellulous materials, such as bamboo. Hitherto, the modification of bamboo has been conducted based on wood modification in order to extend the shelf life concerning to the durability aspect [5].

The acetylation using acetic anhydride is an accustomed chemical treatment of wood for over 50 years. The acetylation of the bamboo species *Dendrocalamus asper* is already reported [6]. In this work, the acetylation is supported with a surface modification using microwaves leading to increase liquid uptake. In this research bamboo modification through acetylation assisted by scCO₂ without a catalyst is based upon the acetylation of wood using supercritical carbon dioxide [7].

The use of carbon dioxide in chemicals processing gained from waste gas of industries is considered as sustainable. Thus, in the context of the principles of green chemistry [8], scCO₂ acts as an environmentally benign reaction medium for chemical synthesis. The density and solvent power of CO₂ correspond to those of liquid, while its compressibility and transport properties are similar to a gas [9]. Therefore, scCO₂ is used as auxiliary media for

Effect of Silica Particle size in Cellulose Membrane for Desalination Process

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Abstract. Development of desalination technologies is very important for fulfilling future water demand. The objective of this research is to synthesis membrane for desalination process from cellulose acetate (CA) by blending with polyethylene glycol (PEG) and silica resulting CA/PEG/Silica composite membrane. In this study, the synthesis and characterization of composite membrane is attempt where membrane performance is investigated for reverse osmosis desalination of saline water. CA/PEG membrane with ratio 80/20 (wt%) was modified with three different particle sizes of silica: 0.007, 0.02, and 60 μm . Composite membranes were characterized for their hydrophilicity, functional groups and permeation properties. The experiment results show that hydrophilicity of CA/PEG membrane increases after the addition of silica as shown by the decreasing of contact angle and the increasing of silanol group. Hydrophilicity of composite membrane increases with the decreasing of particle size of silica. The best performance membrane is obtained by using silica with particle size of 0.02 μm .

Keywords: cellulose, PEG, silica, membrane, reverse osmosis.

INTRODUCTION

The need for fresh clean water is growing rapidly due to the world population growth that imposes larger demands of water supply for domestic use, agriculture, and industry. Another reason is deterioration of fresh water supplies: aquifers, the largest fresh water resource, are being contaminated constantly by industrial and agricultural activities, as well as by intrusions of seawater or saline water due to overuse. Rivers and lakes (surface water resources) are also in threat. Hence, there is a strong need to increase fresh water availability either by recycling waste water or by production of fresh water from seawater [1]. The need to increase fresh water supply and more extensive water treatment drove the advancement of new water technologies and the maturity of existing ones, in all fields of water: desalination and ion removal by reverse osmosis (RO), disinfection techniques by catalysts and by biological treatment, decontamination, new filtration techniques, and monitoring of water quality. Desalination is a general term for methods to remove salt from salty water to produce fresh water.

For membrane technologies, the development of the first high-flux anisotropic acetate cellulose (CA) RO membranes via immersion precipitation by Loeb and Sourirajan [2] was one of the most critical breakthroughs in desalination. Today, extensive knowledge exists on how to 'tailor' the membrane's pore structure including its cross-section morphology by the selection of polymer, solvents and non-solvents, additives, precipitation time, bath temperature and other parameters during immersion precipitation [3–9]. For example, different casting conditions and post-treatments were proposed to improve the water flux and salt rejection of the CA membranes [10–15].