Toxicity of benzyl benzoate from *Kaempferia rotunda* L. rhizome

Cite as: AIP Conference Proceedings **2237**, 020079 (2020); https://doi.org/10.1063/5.0005554
Published Online: 02 June 2020

Hartiwi Diastuti, Ari Asnani, Undri Rastuti, and Mela Anggraeni

Toxicity of Benzyl Benzoate from *Kaempferia rotunda* L. Rhizome

Hartiwi Diastuti[1, a)], Ari Asnani[1, b)], Undri Rastuti[1, c)], Mela Anggraeni[1, d)]

[1]*Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Jenderal Soedirman Jl. Dr. Soeparno 61 Karangwangkal Purwokerto Indonesia 53123*

[a)]Corresponding author: hartiwidiastuti@yahoo.com
[b)]asnani@gmail.com
[c)]undrirastuti@yahoo.co.id
[d)]melaangraenis@yahoo.com

Abstract. Benzyl benzoate is the major component of the essential oil of *K. rotunda* L. rhizome. They are potential to be developed as the medicinal compound. However, the toxicity study of benzyl benzoate as the bioactive compound was still limited. Therefore, the toxicity of benzyl benzoate was investigated. The isolation steps include the extraction of *K. rotunda* L. rhizome using acetone by maceration, then acetone extract was partitioned with *n*-hexane and chloroform respectively. The benzyl benzoate from *n*-hexane fraction was isolated using vacuum liquid chromatography and radial chromatography. The molecular structure of benzyl benzoate was determined based on NMR (1D and 2D) spectroscopic data. The toxicity assay of acetone extract and isolated compounds carried out using the brine shrimp lethality test (BSLT). BSLT results were presented through the lethal concentration 50 (LC_{50}). The toxicity evaluation confirms that acetone extract, n-hexane fraction of *K. rotunda* L rhizome and the benzyl benzoate have biological activity with LC_{50} 35.86, 49.80, and 173.49 µg/mL respectively.

INTRODUCTION

Kaempferia rotunda (Zingiberaceae) is a medicinal plant in Indonesia. It was known locally name as "*kunci pepet*" or "*kunir putih*". The rhizome of *K. rotunda* was used for traditional medicine such as treating stomach pain, fever, accelerate wound healing, carminative and inflammation due to bruises or sprains [1]. The extracts, essential oils and isolated compounds from *K. rotunda* L rhizome exhibited the essential biological activities. The extract of *K. rotunda* rhizome showed antioxidant activity [2, 3], insecticides [4], anti-inflammatory [5], anthelmintic [6] and antimicrobial activities [7,8]. Some compounds of the *K. rotunda* rhizome also some biological activities. A 2-hydroxy-4,4',6-trimethoxy calkon indicated antioxidant activity with IC_{50} value of 142 µg/mL [2]. Pinostrobin and 5,7-dihydro flavanone were showed anticancer activity against breast cancer cell T47D with IC_{50} of 59.8 µg/mL and 122.71 µg/mL respectively [9]. Meanwhile, benzyl benzoate revealed insecticidal activity with an LC_{50} of 5.6 µg/mLon *Spodoptera littoralis* [4].

The essential oil has an important role in the biological activity of the *K. rotunda,* because of it as a significant component. The essential oil of *K. rotunda* rhizome was contained about 75 compounds with two main compounds namely benzyl benzoate (69.7%) and *n*-pentadecane (22.9%) [10]. In different locations, It was also mentioned that

The 14th Joint Conference on Chemistry 2019
AIP Conf. Proc. 2237, 020079-1–020079-5; https://doi.org/10.1063/5.0005554
Published by AIP Publishing. 978-0-7354-1996-4/$30.00

of 20 compounds in the volatile oil of *K. rotunda* was contain benzyl benzoate 30.61% and cyclopropazulen 28.85% [11]. Furthermore, it was reported that essential oils in the *n*-hexane extract of *K. rotunda* rhizome could inhibit the growth of some bacteria [8]. The other plant study reported that *Cinnamomum aureofulvum* essential oil that contained 43.4% benzyl benzoate showed antibacterial activity against *Staphylococcus aureus*, *S. epidermis*, *Pseudomonas aeruginosa* and *P. cepacia* with minimum inhibitory of 1.87 µg/µL [12]. Then *Salvia urmiensis* essential oil contained 60.3% benzyl benzoate showed high activity against *S. epidermis* and *S. cerevisiae* with minimum inhibitory of 9.3 µg/mL [13]. It showed that benzyl benzoate has potential as a bioactive agent because it is the main component of *K. rotunda* essential oil. In this article, we wish to report the isolation of benzyl benzoate as well as toxicity properties.

Nowadays brine shrimp (*Artemia salina*, fairy shrimp or sea monkeys) lethality assay is commonly used to check the cytotoxic effect of bioactive compounds. The brine shrimp lethality test (BSLT) has been developed for toxicity assay of various concentrations of pure compounds and crude plant extracts. Several advantages of this method are rapidness, simplicity and low requirements [14]. This method has been successfully employed as a bioassay guide for cytotoxic activity and antitumor agents [15].

EXPERIMENTAL

Materials and Instruments

The rhizomes of *K. rotunda* L were collected from Yogyakarta, Indonesia. All chemicals used for extractions and chromatography were of technical grade and analytical grade from Merck.

Structure elucidation of the isolated compound was determined based on ^{1}H- and ^{13}C-NMR (nuclear magnetic resonance) spectra were performed on the Agilent DD2 system operating at 500 (^{1}H) MHz and 125 (^{13}C) MHz.and GCMS (Gas Chromatography-Mass Spectrometer): GC17A MSQP 5000 Shimazu.

Isolation of Benzyl Benzoate

Powder of *K. rotunda L* rhizomes (500 g) was extracted with acetone (5 L, 2 times) for 2 days at room temperature, then filtrated and evaporated to give acetone extract. The acetone extracts were partitioned with *n*-hexane and methanol, respectively. *n*-Hexane soluble fractions (15 g) was fractionated by using a silica gel column (vacuum liquid chromatography) and eluted step-wise with 150 mL *n*-hexane, 150 mL *n*-hexane: chloroform (8:2, 7:3, 5.5, 3:7, 2:8), 150 mL chloroform, and 150 mL methanol respectively. All fractions were concentrated on a rotary evaporator, then loaded on the TLC plate with eluent n-hexane: chloroform (1:1). The fractions having similar R_f values were pooled sub-fractions, afforded fractions A: 5.9 g, B: 0.9 g, C: 0.5 g, D: 0.8 g, and E: 1.1 g. Fractions A was purified by radial chromatography and eluted with *n*-hexane: chloroform (19:1) yield benzyl benzoate (230 mg). The molecule structures of benzyl benzoate were identified by NMR (1D and 2D) spectrometer.

Toxicity Assays

The toxicity assay was carried out using BSLT method [14] on acetone extract, *n*-hexane soluble fraction and isolated compound (benzyl benzoate). These method was begin with hatching the brine shrimp (*A. salina*) eggs for 48 hours incubations in artificial sea water that prepared by diluting 38 g of sea salt in 1.0 L of distilled-water in a glass chamber. During incubation, the hatching chamber was given constant light source and aerator for oxygen supply. After 24 hours the larvae were fed with added yeast solution 0.06% was into the hatching chamber. The nauplii that 48 hours old were used for toxicity assays.

The test solution was prepared by dissolving 10 mg of sample (acetone extract, *n*-hexane soluble fraction and benzyl benzoate) in 1 mL of 10% v/v dimethylsulfoxide (10000 µg/mL). The stock solution was diluted, so that the sample concentrations of 1000 µg/mL, 500 µg/mL, 250 µg/mL, 100 µg/mL and 10 µg/mL. Six test tubes were labeled as 1, 2, 3, 4, 5 and 6. Then 1 mL of samples solution was taken into the test tubes 1-5 that containing 10 nauplii and 1 mL of seawater. Whereas into the test tube 6 the sample solution was replaced with control (dimethylsulfoxide 10% v/v). After 24 hours of incubation, the number of live nauplii in each concentration and control was counted, then the percentage of dead nauplii (%death) was determined. The experiments were performed in triplicate.

$$\% \, Death = \frac{Number\ of\ death\ nauplii}{number\ of\ death\ nauplii + number\ of\ live\ nauplii} x\ 100 \quad (1)$$

The median lethal concentration (LC_{50}) of the test samples is obtained by a plot of percentage of the dead shrimps against the logarithm of the sample concentration. LC_{50} values are estimated using a probit regression analysis, were analyzed with the SPSS 16.0 program for probit analysis to determine LC_{50} values and 95% confidence intervals.

RESULTS AND DISCUSSION

Identification of Benzyl Benzoate from *K. rotunda* Rhizome

The identification of isolated compounds by GCMS and NMR spectrometers (1D and 1D) proves that it is benzyl benzoate (Fig. 1).

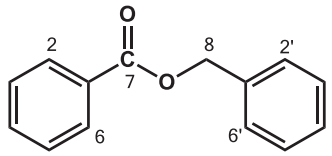

FIGURE 1. Benzyl benzoate

Based on the GCMS analysis, the GC chromatogram shows one main peak with a retention time of 28.146 minutes and an area of 100%. These show that the isolated compound is quite pure. The MS spectra show that the molecular ion peak at m/z 212 [M+] is attributed to the molecular mass of benzyl benzoate ($C_{14}H_{12}O_2$). The GC-MS spectra of the isolated compound are presented in Fig. 2 and Fig. 3.

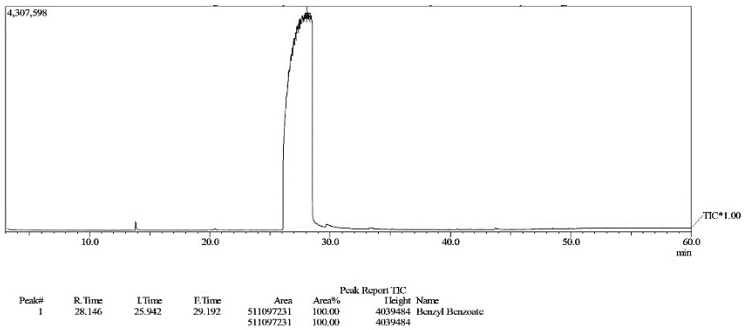

FIGURE 2. Chromatogram of benzyl benzoate

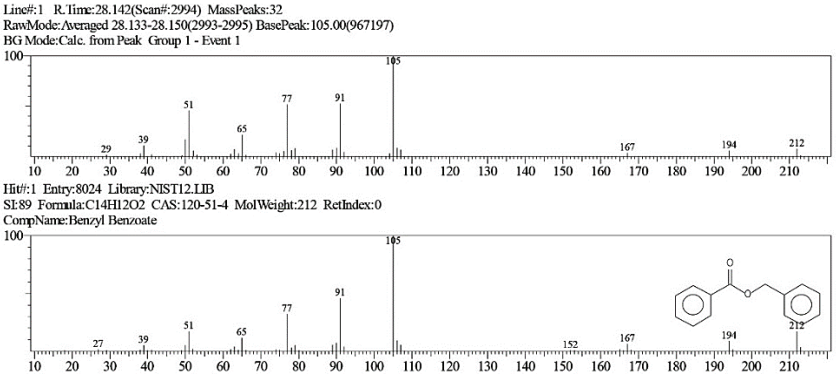

FIGURE 3. Mass spectrum of benzyl benzoate

The ^{1}H-NMR spectra (500 MHz, $CDCl_3$) of the isolated compound indicates eleven proton signals. They reveal an oxygenated methylene signal (δ 5.39, *s*), and ten signals of two aromatic rings. at δ 7.36 (1H, *t*, J = 7.2 Hz, H-3, H-5), δ 7.40 (2H, *t*, J = 7.2 Hz, H-3 'and H-5'), δ 7.45 (1H, *t*, J = 7.5 Hz, H-4 '), δ 7.47 (2H, *d*, J = 7.2 Hz, H-2', H-6 ') , δ 7,58 (1H, *t*, J = 7.2 Hz, H-4), and δ 8.10 (2H, *d*, J = 7.5 Hz, H-2, H-6) ppm. Three proton triplet and two proton doublet could be assigned to a phenyls group which indicates a substituent on an aromatic ring. The ^{13}C-NMR spectra confirms that there are 14 carbon signals, which indicated the presence of two sp3-carbon of oxygenated methylene (CH_2-O-) at δ 66.70 (C-8) ppm, a sp^2- carbon of carbonyl group at δ 166.43 (C-7) ppm, two substituted sp^2-carbons at δ 130.15 (C-1) and 136.07 (C-1') ppm, and ten sp^2-carbons bearing a hydrogen at δ 129.66 (C-2, C-6), δ 128.16 (C-3, C-5), δ 133.02 (C-4), δ 128.37 (C-2', C-6'), δ 128.40 (C-3', C-5') and δ 128.32 (C-4') ppm. The ^{1}H and ^{13}C NMR spectra data of benzyl benzoate was the newest data from previous data [16].

The carbon and proton correlation in one bond is determined by the 2D NMR spectra of HSQC (Heteronuclear Single Quantum Coherence), whereas the correlation of two or three bonds between carbon and proton is determined by the HMBC (Heteronuclear Multiple Bond Coherence) spectra. Table 1 showed the 1D (^{1}H and ^{13}C) and 2D (HSQC and HMBC) benzyl benzoate spectra data. Figure 4 describes the correlation proton and carbon (HMBC) of benzyl benzoate.

TABLE 1. The NMR spectra data of benzyl benzoate

C atom	HSQC		HMBC (^{1}H ←→ ^{13}C)
	δ_C ppm	δ_H (*mult*, *J* Hz) ppm	
1	130.15	-	-
2, 6	129.66	8,10 (2H, *d*, 7,3)	C-1, C-3, C-4, C-5, C-7
3, 5	128.16	7,36 (2H, *t*, 7,2)	C-2, C-4, C-7
4	133.02	7,58 (1H, *m*, 7,5)	C-2, C-3, C-5, C-6
7	166.43	-	-
8	66.70	5,38 (2H, *s*)	C-7, C-1', C-2'
1'	136.07	-	-
2', 6'	128.37	7,47 (2H, *d*, 7,2)	C-8, C-1', C-3', C-4'
3', 5'	128.40	7,40 (2H, *t*, 7,3)	C-1', C-2', C-4'
4'	128.32	7,45 (1H, *m*, 7,5)	C-2', C-3', C-5', C-6'

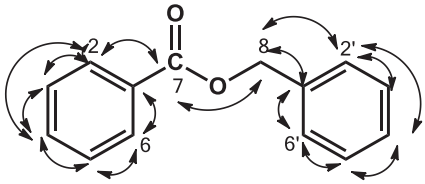

FIGURE 4. HMBC of benzyl benzoate

Toxicity Assays

Brine shrimp lethality test is a convenient method for monitoring bioactivities of various plant species. Although this method has not provided any adequate information about the mechanism of toxic action, it is a very useful method for the evaluation of the toxic potential of various plant extracts or isolated compounds [14].

Toxicity assay with the BSLT method was performed on acetone extract, n-hexane fraction and benzyl benzoate. The toxicity of samples that stated with LC_{50} values was compared with Meyer's or to Clarkson's toxicity index. According to Meyer's toxicity index, sample with LC_{50} < 1000 µg/mL are considered as toxic, while extracts with LC_{50} > 1000 µg/mL are considered as non-toxic [15]. Clarkson's toxicity criterion for the toxicity assessment of samples classifies them in the following order: samples with LC_{50} above 1000 µg/mL are non-toxic, LC_{50} of 500 - 1000 µg/mL is low toxic, samples with LC_{50} of 100 - 500 µg/mL are medium toxic, and samples with LC_{50} of 0 - 100 µg/mL are highly toxic [17].

TABLE 2. Toxicity of extract, fraction, and benzyl benzoate from *K. rotunda* L. rhizome

Sample	LC_{50} (µg/mL)
Acetone extract	35.86
n-Hexane fraction	49.80
Benzyl benzoate	173.49

Based on the Table 2 data, the LC_{50} of benzyl benzoate most highest than acetone extract and *n*-hexane fraction this means the benzyl benzoate has lowest toxicity. The acetone extract and *n*-hexane fraction contain many compounds so that the synergistic effect of their compounds lead to higher activity of the pure compound. Synergistic effect is the interaction or combination of two or more compounds that produce the greater effects [18].

CONCLUSION

Toxicity assay of benzyl benzoate which isolated from the rhizome of *K. rotunda* L, using brine shrimp lethality test exhibited medium toxic with LC_{50} value of 173.49 µg/mL. It was suggested that benzyl benzoate had a potential application to be developed as active cytotoxic and antitumor agents.

ACKNOWLEDGMENTS

The grateful for the financial support from 'Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Jenderal Soedirman' through the Researcht Grant in 2019, scheme of competency improvement research.

REFERENCES

1. S. Dalimartha, *Atlas Tumbuhan Obat Indonesia 3*, 4th ed.(Puspa Swara, Jakarta, 2007).
2. P. Lotulung, Minarti, L.B., Kardono, and K. Kawarrishi, K., Pakistan J. Biol. Sci. **11**(20), 2447–2450 (2008).
3. J.P. Mohanty, L. Nath, and B.Nihar, Indian J. Pharm. Sci. **70**(3), 362–364 (2008).
4. B.W. Nugroho, B.Schwarz, V. Wray, and P.Proksch, Phytochemistry **41**(1), 129–132 (1996).
5. S.A. Imam, S. K. Rout, N. and Sutar, Int. J. Curr. Microbiol. Appl. Sci. **2**(12), 74–78 (2013).
6. S. Agrawal, A. Bhawsar, P. Choudhary, S Singh, N.Keskar, and M.Chaturvedi, Int. J. Pharm. Life Sci. **2**(9), 1062–1064 (2011).
7. C. Astutiningsih, R. Octaviani, S. and Suratiningsih, J. Farm. Sains dan Komunitas **11**(1), 18–22 (2014).
8. A. Kumar, S. Kumar, and Navneet, Der Pharm. Lett. **7**(9), 389–395 (2015).
9. S. Atun, and R. Arianingrum, R. Int. J. Pharmacogn. Phytochem. Res. **7**(2), 262–269 (2015).
10. H. J. Woerdenbag, T. Windono, R. Bos, S. Riswan, and W. J. Quax, Flavour Fragr. J. **19**, 145–149 (2004).
11. S.B. Sulianti, S.M. and Chairul, Biofarmasi **3**(2), 39–42 (2005).
12. M.N.A. Ali, M. Mohtar, K. Shaari, M, Rahmani, A.M. Ali, and I. Bin Jantan, I., J. Essent. Oil Research **14**(2), 135–138 (2002).
13. M.H. Farjam, Asian Pac. J. Trop. Biomed. **2**(3), 2–4 (2012).
14. M. R. Hamidi, B. Jovanova, T. K. Panovska, Macedonian Pharmaceutical Bulletin, **60** (1), 9-18 (2014).
15. B.N. Meyer, N.R. Ferrigni, J. E. Putnam, L.B Jacobsen, D.E. Nichols, and J.L. McLaughlin, Planta Medica. **45**, 31-34 (1982).
16. H.C. Sindra and M.C. de Mattos, J. Braz. Chem. Soc. **27**(6), 129–1136 (2016).
17. C. Clarkson, V.J. Maharaj, N.R. Crouch, O.M. Grace, P. Pillay, M.G. Matsabisa, N. Bhagwandin, P.J. Smith, P.I Folb, J. Ethnopharm. **92**, 177-191 (2004).
18. A.C. Abreu, A.J. M. Simoes, Nat. Pro. Rep. **29**, 1007-1021. (2012).

AIP Conference Proceedings

scitation.org/journal/apc

Volume 2237

The 14th Joint Conference on Chemistry 2019

Surakarta, Indonesia • 10–11 September 2019

Editors • Fitria Rahmawati, Teguh Endah Saraswati, Khoirina Dwi Nugrahaningtyas, Soerya Dewi Marliyana and Triana Kusumaningsih

AIP Publishing

Table of Contents

THE 14TH JOINT CONFERENCE ON CHEMISTRY 2019

PREV NEXT

Conference date: 10–11 September 2019
Location: Surakarta, Indonesia
ISBN: 978-0-7354-1996-4
Editors: Fitria Rahmawati, Teguh Endah Saraswati, Khoirina Dwi Nugrahaningtyas, Soerya Dewi Marliyana and Triana Kusumaningsih
Volume number: 2237
Published: Jun 2, 2020

DISPLAY : 20 50 100 all

PRELIMINARY

No Access . June 2020

Preface: The 14th joint conference on chemistry 2019

AIP Conference Proceedings **2237**, 010001 (2020); https://doi.org/10.1063/12.0000415

No Access . June 2020

Committees: The 14th Joint Conference on Chemistry 2019

AIP Conference Proceedings **2237**, 010002 (2020); https://doi.org/10.1063/12.0000669

No Access . June 2020

Photos: The 14th Joint Conference on Chemistry 2019

AIP Conference Proceedings **2237**, 010003 (2020); https://doi.org/10.1063/12.0000584

ARTICLES

No Access . June 2020

Kinetic study of methylene blue photocatalytic decolorization using zinc oxide under UV-LED irradiation

Riki Subagyo, Yuly Kusumawati and Wahyu Bambang Widayatno

AIP Conference Proceedings **2237**, 020001 (2020); https://doi.org/10.1063/5.0005263

SHOW ABSTRACT

No Access . June 2020

Fenton reaction involvement on methyl orange biodegradation by brown-rot fungus *Gloeophyllum trabeum*

Adi Setyo Purnomo, Nur Elis Agustina Andyani, Refdinal Nawfa and Surya Rosa Putra

AIP Conference Proceedings **2237**, 020002 (2020); https://doi.org/10.1063/5.0005230

SHOW ABSTRACT

No Access . June 2020

Metal phase and electron density of transition metal/HZSM-5

Khoirina Dwi Nugrahaningtyas, Marita Maharani Putri and Teguh Endah Saraswati

AIP Conference Proceedings **2237**, 020003 (2020); https://doi.org/10.1063/5.0005561

SHOW ABSTRACT

No Access . June 2020

Renewable energy from sediment microbial fuel cell technology from Kendari Bay swamp sediments

Ahmad Zaeni, Prima Endang Susilowati, Alwahab and La Ode Ahmad

BROWSE VOLUMES

SHOW ABSTRACT

No Access . June 2020

Synthesis and characterization of unsymmetrically branched alkyl chains carbazole-based polymer

Mohd Sani Sarjadi, Shu Er Tan, Xin Lin Wong, Farah Hannan Anuar, Md. Shaheen Sarkar and Md. Lutfor Rahman

AIP Conference Proceedings **2237**, 020005 (2020); https://doi.org/10.1063/5.0005389

SHOW ABSTRACT

No Access . June 2020

Synthesis of magnetite@SILICA-CTA in a *cetyl trimethyl ammonium bromide* (CTAB) concentration variations for fenol adsorption

Choiril Azmiyawati, F. A. Yamin, A. Darmawan and L. Suyati

AIP Conference Proceedings **2237**, 020006 (2020); https://doi.org/10.1063/5.0005717

SHOW ABSTRACT

No Access . June 2020

Study of Rhodamine B adsorption onto activated carbon from spent coffee grounds

BROWSE VOLUMES

Teguh Wirawan, Soerja Koesnarpadi and Nanang Tri Widodo

AIP Conference Proceedings **2237**, 020007 (2020); https://doi.org/10.1063/5.0005610

SHOW ABSTRACT

No Access . June 2020

Photodegradation of phenol in batik wastewater with copper (II) oxide under visible light illumination

Tien Setyaningtyas, Kapti Riyani and Cherly Firdharini

AIP Conference Proceedings **2237**, 020008 (2020); https://doi.org/10.1063/5.0005354

SHOW ABSTRACT

No Access . June 2020

Curing characteristics and mechanical properties of wasted crumb rubber-styrene butadiene rubber binary blends using bio based softener

Rahmaniar, Aprillena Tornadez Bondan and Tri Susanto

AIP Conference Proceedings **2237**, 020009 (2020); https://doi.org/10.1063/5.0005226

SHOW ABSTRACT

No Access . June 2020

BROWSE VOLUMES

Activation of carbon from rice husk using chemical activating agents and physical treatments as sodium lauryl sulfate adsorbent

Arnelli, Laila N. Mastuti, Aulia D. Arini and Yayuk Astuti

AIP Conference Proceedings **2237**, 020010 (2020); https://doi.org/10.1063/5.0008302

SHOW ABSTRACT

No Access . June 2020

Imprinted zeolite modified carbon paste electrode as a selective potentiometric sensor for blood glucose

Miratul Khasanah, Alfa Akustia Widati, Usreg Sri Handajani, Masfah Raudlotus Shofiyyah, Sabrina Aulia Rakhma and Herwin Predianto

AIP Conference Proceedings **2237**, 020011 (2020); https://doi.org/10.1063/5.0005231

SHOW ABSTRACT

No Access . June 2020

Optimization of supersaturated solution from *stevia rebaudiana* water extract lead to crystal nucleation

Yohanes Martono, Yohanes Difto Adiwibowo and November Rianto Aminu

AIP Conference Proceedings **2237**, 020012 (2020); https://doi.org/10.1063/5.0005667

SHOW ABSTRACT

BROWSE VOLUMES

No Access . June 2020

Determination of glucose content with a concentration within the physiological range by FT-NIR spectroscopy in a trans-reflectance mode

Ferdy S. Rondonuwu and Andreas Setiawan

AIP Conference Proceedings **2237**, 020013 (2020); https://doi.org/10.1063/5.0008552

SHOW ABSTRACT

No Access . June 2020

Effect of acidic level (pH) of red dragon fruit (*Hylocereus costaricencis*) peels extract on DSSC efficiency

P. Faqih, F. Nurosyid and T. Kusumaningsih

AIP Conference Proceedings **2237**, 020014 (2020); https://doi.org/10.1063/5.0005686

SHOW ABSTRACT

No Access . June 2020

Larvicidal potential of *Lantana camara* as bio larvicidal for *Aedes aegypti* 3rd instar larvae

November Rianto Aminu, Ribka Dewi Kristiana, Sri Hartini and Hartati Soetjipto

AIP Conference Proceedings **2237**, 020015 (2020); https://doi.org/10.1063/5.0005207

SHOW ABSTRACT

No Access . June 2020

Adsorption of cibacet yellow and cibacet red from aqueous solution onto activated carbon from annatto peels (*Bixa orellana* L.)

C. A. Riyanto, Y. S. Widodo, M. S. Ampri, E. Prabalaras, A. Sudibya, Y. A. Putra, I. G. K. A. Kameswara and F. T. W. Hananto

AIP Conference Proceedings **2237**, 020016 (2020); https://doi.org/10.1063/5.0005372

SHOW ABSTRACT

No Access . June 2020

Effect of working electrode thickness using binahong leaves (*Anredera cordifolia*) dye to the efficiency of dye-sensitized solar cell (DSSC)

B. Y. Muryani, F. Nurosyid and Kusumandari

AIP Conference Proceedings **2237**, 020017 (2020); https://doi.org/10.1063/5.0005688

SHOW ABSTRACT

No Access . June 2020

A novel synthesis of 1,1'-(2,4,6-trihydroxy-1,3-phenylene)bis(ethan-1-one) (DAPG) using $CuSO_4.5H_2O$ as a green catalyst

Carissa Hertiningtyas, Triana Kusumaningsih and Maulidan Firdaus

AIP Conference Proceedings **2237**, 020018 (2020); https://doi.org/10.1063/5.0005344

BROWSE VOLUMES

SHOW ABSTRACT

No Access . June 2020

RGO-$NiCo_2S_4$ composite as a counter electrode for solid-state DSSC system with CuI as an electrolyte

Qonita Awliya Hanif, Sayekti Wahyuningsih and Ari Handono Ramelan

AIP Conference Proceedings **2237**, 020019 (2020); https://doi.org/10.1063/5.0009131

SHOW ABSTRACT

No Access . June 2020

Biodiesel production using palm fatty acid distillate and rice husk silica supported $NiSO_4$ as catalyst

Noor Hindryawati, Nanang Tri Widodo, Moh. Syaiful Arief, Irfan Ashari Hiyahara and Gaanty Pragas Maniam

AIP Conference Proceedings **2237**, 020020 (2020); https://doi.org/10.1063/5.0005557

SHOW ABSTRACT

No Access . June 2020

Esterification of oxidized ricinoleic acid with various alcohols to produce emulsifier and antimicrobial compounds

Atika Nabilah, Sri Handayani, Siswati Setiasih, Dyah Utami Cahyaning Rahayu and Sumi Hudiyono

AIP Conference Proceedings **2237**, 020021 (2020); https://doi.org/10.1063/5.0005809

BROWSE VOLUMES

SHOW ABSTRACT

No Access . June 2020

Nanoparticles Fe_3O_4 modified chitosan and its antibacterial applications

Soerja Koesnarpadi, Winni Astuti and Ika Yekti Lianasari

AIP Conference Proceedings **2237**, 020022 (2020); https://doi.org/10.1063/5.0005693

SHOW ABSTRACT

No Access . June 2020

Synthesis of hydroxylated azomethine compounds and the antioxidant activity

Nova Rifqi Rahmawati, Ngadiwiyana, Nor Basid Adiwibawa Prasetya, Purbowatingrum Ria Sarjono, Yosie Andriani, Desy Fitrya Syamsumir and Ismiyarto

AIP Conference Proceedings **2237**, 020023 (2020); https://doi.org/10.1063/5.0005806

SHOW ABSTRACT

No Access . June 2020

Synthesis of salicylic acid modified magnetite nanoparticles and its application in wastewater treatment

Thutug Rahardiant Primadi, Fauziatul Fajaroh, Syaiful Bahri, Nazriati, Aman Santoso, Endang Gintayati and Adrian Nur

BROWSE VOLUMES

AIP Conference Proceedings **2237**, 020024 (2020); https://doi.org/10.1063/5.0005360

SHOW ABSTRACT

No Access . June 2020

Modification of synthetic carpet using chitosan-titania nanocomposite for anti-bacterial and anti-odor purposes

Mohamad Iman Sulaeman, M. Ibadurrohman and Slamet

AIP Conference Proceedings **2237**, 020025 (2020); https://doi.org/10.1063/5.0005257

SHOW ABSTRACT

No Access . June 2020

Development of nanofluid biodegradable detergent from palm kernel oil and TiO_2

Reysa Anggraini Vestiana Putri, Muhammad Ibadurrohman and Slamet

AIP Conference Proceedings **2237**, 020026 (2020); https://doi.org/10.1063/5.0005258

SHOW ABSTRACT

No Access . June 2020

Preparation of activated carbon from *Calophyllum inophyllum* seed using different activating agents: Comparison study

Nur Izzati Machrita, Kartika A. Madurani, Suprapto, M. Luki Kurniawan, Yulianto Adi Nugroho and Fredy Kurniawan

AIP Conference Proceedings **2237**, 020027 (2020); https://doi.org/10.1063/5.0005659

SHOW ABSTRACT

No Access . June 2020

Synthesis and characterization of tetrasulfapyridine-copper(II) sulfate trihydrate

Sentot Budi Rahardjo, Husna Syaima, Yuniar Dwi Andrieza, Witri Wahyu Lestari and Abu Masykur

AIP Conference Proceedings **2237**, 020028 (2020); https://doi.org/10.1063/5.0005340

SHOW ABSTRACT

No Access . June 2020

Preparation of starch-graft-acrylic acid/bentonite composite gel

Kaeksi Sekar Arum, Enggar Candra Prastiti, Prida Novarita Trisanti and Sumarno

AIP Conference Proceedings **2237**, 020029 (2020); https://doi.org/10.1063/5.0006169

SHOW ABSTRACT

No Access . June 2020

BROWSE VOLUMES

Identification of natural product compounds as NS5 RDRP inhibitor for dengue virus serotype 1-4 through in silico analysis

Hersal Hermana Putra, Mutiara Saragih, Yulianti and Usman Sumo Friend Tambunan

AIP Conference Proceedings **2237**, 020030 (2020); https://doi.org/10.1063/5.0005236

SHOW ABSTRACT

No Access . June 2020

Flexible molecular docking simulation of peptide compounds as inhibitor of GluI host protein for dengue fever therapy

Filia Stephanie, Ahmad Husein Alkaff and Usman Sumo Friend Tambunan

AIP Conference Proceedings **2237**, 020031 (2020); https://doi.org/10.1063/5.0005237

SHOW ABSTRACT

No Access . June 2020

The synthesis of surfactant by alcoholysis between glyceryl trilaurate and n-amyl alcohol

Daniel

AIP Conference Proceedings **2237**, 020032 (2020); https://doi.org/10.1063/5.0005692

SHOW ABSTRACT

No Access . June 2020

Study on the ion-exchange properties of the activated carbon black nanoparticles of ACBNPs20_17 code using sodium hydroxide solution

Pratama Jujur Wibawa, Muhammad Nur, Muhammad Asy'ari, Hadi Nur, Mohd. Arif Agam and Hashim Saim

AIP Conference Proceedings **2237**, 020033 (2020); https://doi.org/10.1063/5.0005234

SHOW ABSTRACT

No Access . June 2020

The effect of zeolite addition and freeze-drying method on alginat beads for controlled release fertilizer

Adhitasari Suratman, Nurul Pramita, Pradiya Nadya Agasta, Dwi Ratih Purwaningsih, Agus Kuncaka, Eko Sri Kunarti and Atmanto Heru Wibowo

AIP Conference Proceedings **2237**, 020034 (2020); https://doi.org/10.1063/5.0005798

SHOW ABSTRACT

No Access . June 2020

Chemical composition and antioxidant activities of citronella essential oil *Cymbopogon nardus* (L.) rendle fractions

Undri Rastuti, Hartiwi Diastuti, Moch. Chasani, Purwati and Rafly Hidayatullah

AIP Conference Proceedings **2237**, 020035 (2020); https://doi.org/10.1063/5.0005685

SHOW ABSTRACT

No Access . June 2020

Initial study on the synthesis of 1-(4'-isopropilbenzil)-1,10-phenanthrolinium bromide from cuminyl alcohol, a potent antimalarial

Maulidan Firdaus, Soerya Dewi Marliyana and Muhammad Fajar Razak

AIP Conference Proceedings **2237**, 020036 (2020); https://doi.org/10.1063/5.0005341

SHOW ABSTRACT

No Access . June 2020

Freundlich adsorption isotherm in the perspective of chemical kinetics (II); rate law approach

Patiha, Maulidan Firdaus, Fitria Rahmawati, Sayekti Wahyuningsih and Triana Kusumaningsih

AIP Conference Proceedings **2237**, 020037 (2020); https://doi.org/10.1063/5.0005342

SHOW ABSTRACT

No Access . June 2020

Synthesis and spectra study of Cu (II), Fe (II), Zn (II)-5,15-diphenyl porphyrin

Atmanto Heru Wibowo, Metin Yuliati, Abu Masykur, Suyitno, Desi Suci Handayani, Dian Maruto Widjonarko, Maulidan Firdaus, Ari Yustisia and Takuji Ogawa

AIP Conference Proceedings **2237**, 020038 (2020); https://doi.org/10.1063/5.0005553

BROWSE VOLUMES

SHOW ABSTRACT

No Access . June 2020

Forward osmosis membrane to produce water energy drink from seawater

Saiful, Aida Afriyanti, Marlina, Muliadi Ramli and Abu Masykur

AIP Conference Proceedings **2237**, 020039 (2020); https://doi.org/10.1063/5.0005201

SHOW ABSTRACT

No Access . June 2020

Reusability study of fenton catalyst@bacterial celluloses for removal of methylene blue as synthetic dyes model

Husaini Ardy, Fakhri Arsyi Hawari, Ade Wahyu Y. P. Parmita, Untung Triadi, Azhar Isti Hanifah and Arie Wibowo

AIP Conference Proceedings **2237**, 020040 (2020); https://doi.org/10.1063/5.0005229

SHOW ABSTRACT

No Access . June 2020

Effect of phosphate ion on sorption of Nd(III) ion from aqueous solution using ion imprinted polymers

Muhammad Ali Zulfikar, Sri Wahyuni, Muhammad Yudhistira Azis, Muhammad Bachri Amran, Handajaya Rusli and Henry Setiyanto

AIP Conference Proceedings **2237**, 020041 (2020); https://doi.org/10.1063/5.0005598

BROWSE VOLUMES

SHOW ABSTRACT

No Access . June 2020

Aging resistance and functional group analysis of natural rubber/oil palm empty fruit bunch charcoal composites

Hari Adi Prasetya, Popy Marlina and Rochmi Widjajanti

AIP Conference Proceedings **2237**, 020042 (2020); https://doi.org/10.1063/5.0005338

SHOW ABSTRACT

No Access . June 2020

Determination of the optimum composition to produce minimum particle size of β-carotene microencapsulated in acid hydrolyzed starch-chitosan/TPP (tripolyphosphate) matrices using Taguchi method

Agnes Dyah Novitasari Lestari, Mudasir, Dwi Siswanta and Ronny Martien

AIP Conference Proceedings **2237**, 020043 (2020); https://doi.org/10.1063/5.0005249

SHOW ABSTRACT

No Access . June 2020

The effect of coconut shell activated charcoal on vulcanizaton and morphology behaviour in natural rubber starch modified

AIP Conference Proceedings **2237**, 020044 (2020); https://doi.org/10.1063/5.0005337

SHOW ABSTRACT

No Access . June 2020

Synthesis and characterization of chitosan based super absorbent polymer modified with acrylic acid and acrylonitrile for Pb (II) metal ions removal from water

F. Widhi Mahatmanti, Harjono and Izzatun Niswah Assa'idah

AIP Conference Proceedings **2237**, 020045 (2020); https://doi.org/10.1063/5.0005748

SHOW ABSTRACT

No Access . June 2020

Hybrid PVA/alginate for extended delivery of antibiotic

Michael, Julietta Lady and Eko Adi Prasetyanto

AIP Conference Proceedings **2237**, 020046 (2020); https://doi.org/10.1063/5.0005241

SHOW ABSTRACT

No Access . June 2020

Synthesis of N'-(3-trimethoxysilylpropyl)diethylentriamine modified silica ($SiO_{2(RHA)}$-TMPDT) for adsorption of gold(III)

BROWSE VOLUMES

AIP Conference Proceedings **2237**, 020047 (2020); https://doi.org/10.1063/5.0008267

SHOW ABSTRACT

No Access . June 2020

Methyl red dye-sensitized zinc oxide as photocatalyst for phenol degradation under visible light

Wynona A. Nimpoeno, Hendrik O. Lintang and Leny Yuliati

AIP Conference Proceedings **2237**, 020048 (2020); https://doi.org/10.1063/5.0005797

SHOW ABSTRACT

No Access . June 2020

Crystalline carbon nitride for photocatalytic phenol degradation: Effect of precursor and salt melt amounts

Leny Yuliati, Mohd Hayrie Mohd Hatta, Siew Ling Lee and Hendrik O. Lintang

AIP Conference Proceedings **2237**, 020049 (2020); https://doi.org/10.1063/5.0005795

SHOW ABSTRACT

No Access . June 2020

Synthesis of CuO-TiO_2 nano-composite for *Escherichia coli* disinfection and toluene degradation

BROWSE VOLUMES

AIP Conference Proceedings **2237**, 020050 (2020); https://doi.org/10.1063/5.0005260

SHOW ABSTRACT

No Access . June 2020

Adsorption of Au(III) on diethylenetriamine-functionalized silica coated on iron sand magnetic material

Fahmiati, Alrum Armid, Suyanta and Nuryono

AIP Conference Proceedings **2237**, 020051 (2020); https://doi.org/10.1063/5.0005579

SHOW ABSTRACT

No Access . June 2020

Decolourization of methylene blue by NiO/ZSM-5 photocatalyst under UV-LED irradiation

Garcelina Rizky Anindika, Yuly Kusumawati, Didik Prasetyoko, Wahyu Bambang Widayatno and Abdul Hamid

AIP Conference Proceedings **2237**, 020052 (2020); https://doi.org/10.1063/5.0005268

SHOW ABSTRACT

No Access . June 2020

Isolation, characterization, and identification of endophytic

leaves of *carica papaya* and its potential as an antioxidant

Purbowatiningrum Ria Sarjono, Qisthy Hanifati Hazrina, Anggit Saputra, Nies Suci Mulyani, Agustina Lulustyaningati Nurul Aminin, Ngadiwiyana, Ismiyarto, Dewi Kusrini and Nor Basid Adiwibawa Prasetya

AIP Conference Proceedings **2237**, 020053 (2020); https://doi.org/10.1063/5.0005715

SHOW ABSTRACT

No Access . June 2020

Properties of starch biofoam reinforced with microcrystalline cellulose from banana stem fiber

Syahrul Fatrozi, Linda Purwanti, Sandra Kartika Sari, Muhammad Naufal Ariesta and Soerya Dewi Marliyana

AIP Conference Proceedings **2237**, 020054 (2020); https://doi.org/10.1063/5.0005254

SHOW ABSTRACT

No Access . June 2020

Thermal stability study of commercial lube oil at moderate temperature and long working period

Husaini Ardy, Azhar Isti Hanifah and Arie Wibowo

AIP Conference Proceedings **2237**, 020055 (2020); https://doi.org/10.1063/5.0005275

SHOW ABSTRACT

No Access . June 2020

Analysis of chemical profile and antibacterial activity of secondary metabolites of endophytic fungi from *Annona squamosa L.* from Timor Island-Eastern Indonesia

Antonius R. B. Ola

AIP Conference Proceedings **2237**, 020056 (2020); https://doi.org/10.1063/5.0005214

SHOW ABSTRACT

No Access . June 2020

Gold (Au) selective adsorption using polyeugenol based ionic imprinted polymer with ethylene glycol dimethacrylate crosslink

M. Cholid Djunaidi, Nor Basid Adiwibawa Prasetya, Didik Setiyo Widodo, Retno Ariadi Lusiana and Pardoyo

AIP Conference Proceedings **2237**, 020057 (2020); https://doi.org/10.1063/5.0005546

SHOW ABSTRACT

No Access . June 2020

Synthesis of molecularly imprinted polymer urea based on polyeugenol with ethylene glycol dimethacrylate as crosslinking agent

M. Cholid Djunaidi, Arifatul Azizah and Gunawan

AIP Conference Proceedings **2237**, 020058 (2020); https://doi.org/10.1063/5.0005544

SHOW ABSTRACT

No Access . June 2020

The comparison of nitroxide radical derivative compound interaction with brookite and anatase surface: A guide to choose the best photoanode for DSSC application

Yuly Kusumawati, Leli D. Astuti, Eko Santoso and Syafsir Akhlus

AIP Conference Proceedings **2237**, 020059 (2020); https://doi.org/10.1063/5.0005271

SHOW ABSTRACT

No Access . June 2020

In-vivo acute toxicological studies of *Vasconcellea pubescens* A. DC. fruit extract against hepatic injury

Heru Sasongko, Arifin Wicaksono and Sugiyarto

AIP Conference Proceedings **2237**, 020060 (2020); https://doi.org/10.1063/5.0005224

SHOW ABSTRACT

No Access . June 2020

Optimization of Suweg starch (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) and lactose as *co-processed excipient* of Ibuprofen-PEG 6000 solid dispersion of effervescent tablet

Dian Eka Ermawati, Bimar Putri Andini, Fea Prihapsara, Yeni Farida, Sholichah Rohmani,

BROWSE VOLUMES

AIP Conference Proceedings **2237**, 020061 (2020); https://doi.org/10.1063/5.0005632

SHOW ABSTRACT

No Access . June 2020

Developing formula of SNEDDS (*self nano emulsifying drug delivery system*) antihypertensive herbals "Hortus Medicus"

Dian Eka Ermawati, Roro Karina Pambudi, Vinda Aviwiandari, Yeni Farida, Sholichah Rohmani, Wisnu Kundarto and Estu Retnaningtyas Nugraheni

AIP Conference Proceedings **2237**, 020062 (2020); https://doi.org/10.1063/5.0005630

SHOW ABSTRACT

No Access . June 2020

Optimization of hydroxymethylcellulose and sodium CMC of transdermal patch of antihypertension "Hortus Medicus" and transport through membrane using franz diffusion cell method

Dian Eka Ermawati, Dyah Ayu Ambarwati, Niken Rosyana Dewi, Anif Nur Artanti, Sholichah Rohmani and Wisnu Kundarto

AIP Conference Proceedings **2237**, 020063 (2020); https://doi.org/10.1063/5.0005628

SHOW ABSTRACT

Liposomes from jack beans phospholipid extract for delivering vitamin C

Dwi Hudiyanti, Ratna Indria Sari, Aditya Putri Arya and Parsaoran Siahaan

AIP Conference Proceedings **2237**, 020064 (2020); https://doi.org/10.1063/5.0005213

SHOW ABSTRACT

No Access . June 2020

The effect of methyltriethoxysilane (MTES) concentration on hydrophobic properties of silica thin layer

Lucky Diana Mustika, Choiril Azmiyawati and Adi Darmawan

AIP Conference Proceedings **2237**, 020065 (2020); https://doi.org/10.1063/5.0005240

SHOW ABSTRACT

No Access . June 2020

Synthesis zeolite y from kaolin: Activation of metakaolin with various concentration of sulfuric acid and its application for esterification

Leli Endah Safitri, Ulul Khairi Zuryati, Hannis Nur Rohma, Yatim Lailun Ni'mah and Didik Prasetyoko

AIP Conference Proceedings **2237**, 020066 (2020); https://doi.org/10.1063/5.0005581

SHOW ABSTRACT

No Access . June 2020

Synthesis of phenylcalix[4]resorcinarena sulfonate and it's aplication as an antioxidant

Santi Nur Handayani, Heny Ekowati, Irmanto, Della Nadya Ayu Aprilia and Silva Utami

AIP Conference Proceedings **2237**, 020067 (2020); https://doi.org/10.1063/5.0006139

SHOW ABSTRACT

No Access . June 2020

The electronic properties study of betanin and their derivatives compound: An explanation to betanin limitation in DSSC application

Zulfa H. Damayanti, Garcelina R. Anindika, Eko Santoso, Syafsir Akhlus and Yuly Kusumawati

AIP Conference Proceedings **2237**, 020068 (2020); https://doi.org/10.1063/5.0005274

SHOW ABSTRACT

No Access . June 2020

Anthocyanin from butterfly pea flowers *(Clitoria ternatea)* by ultrasonic-assisted extraction

Achmad Qodim Syafa'atullah, Arie Amira, Sonya Hidayati and Mahfud Mahfud

AIP Conference Proceedings **2237**, 020069 (2020); https://doi.org/10.1063/5.0005289

SHOW ABSTRACT

No Access . June 2020

Synthesis and characterization of carbonaceous-based nanomaterials produced in chemical vapor deposition (CVD) using copper catalyst

Teguh Endah Saraswati, Ayu Dwi Priyanti, and Oktaviana Dewi Indah Prasiwi

AIP Conference Proceedings **2237**, 020070 (2020); https://doi.org/10.1063/5.0005445

SHOW ABSTRACT

No Access . June 2020

Preparation of $NaFeO_2$ from iron sand as a raw material for cathode of sodium-ion battery

Fitria Rahmawati, Arum A. Kusumaningtyas, Teguh E. Saraswati, Iwan Yahya and Younki Lee

AIP Conference Proceedings **2237**, 020071 (2020); https://doi.org/10.1063/5.0005348

SHOW ABSTRACT

No Access . June 2020

Chemical interaction analysis of L-Theanine compounds from *Camellia sinensis* L. with kainate glutamate receptors and their toxicity effect as anti autism candidates based on in silico

Mohamad Amin, Nanda Hilda Khikmawati, Suryadi, Ihya Fakhrurizal Amin, Kodama Yayoi, Atmanto Heru Wibowo, Dina Maulina and Indriyani Rachman

AIP Conference Proceedings **2237**, 020072 (2020); https://doi.org/10.1063/5.0008500

SHOW ABSTRACT

No Access . June 2020

Synthesis, anticancer activity, and apoptosis mechanism of some chalcone derivatives

Hery Suwito, Helda Dwi Hardiyanti, Kautsar ul Haq, Alfinda Novi Kristanti, Umrotul Furghoniyyah, Aprillia Noni Rahmawati and Diwyareta Ristya Ayuningtyas

AIP Conference Proceedings **2237**, 020073 (2020); https://doi.org/10.1063/5.0005376

SHOW ABSTRACT

No Access . June 2020

Synthesis of 5-benzylidene-hydantoin and 5-benzylidene-creatinine derivatives under mixed catalyst systems of urea-*p*-toluenesulfonic acid (Urea-PTSA) and guanidine hydrochloride-triethylamine (GnHCl-TEA)

Kautsar Ul Haq, Septi Rosiana Dewi, Sherly Dwi Cicilianingrum, Amalia Muti Anggraini, Zella Dwipuspita Dahana, Indrianti Yunita Sari, Rina Dewi Renjanawati, Januardi Wardana, Fandi Gunawan, Nuzilatul Muschafi, Nisa'ur Rosyidah and Hery Suwito

AIP Conference Proceedings **2237**, 020074 (2020); https://doi.org/10.1063/5.0005378

SHOW ABSTRACT

No Access . June 2020

The compounds of styrene-butadiene rubber in the incorporation of palmitamide: Abrasion resistance, cure rate index and torque properties

Indra Surya and Edwin

AIP Conference Proceedings **2237**, 020075 (2020); https://doi.org/10.1063/5.0005219

SHOW ABSTRACT

No Access . June 2020

The compounds of montmorillonite-filled natural rubber: Cure rate index, swelling and hardness properties

I. Surya and H. Khosman

AIP Conference Proceedings **2237**, 020076 (2020); https://doi.org/10.1063/5.0005218

SHOW ABSTRACT

No Access . June 2020

Effect of low molecular weight organic acid (LMWOA) on the Zn^{2+} desorption from the soil of illegal land fill in Yogyakarta-Indonesia

Suherman, Ayu Maulidya Rachmanda, Roto and Kinichi Morita

AIP Conference Proceedings **2237**, 020077 (2020); https://doi.org/10.1063/5.0005244

SHOW ABSTRACT

No Access . June 2020

Microbial life on the surface of the soft coral for solve the self-healing concrete

Prima Endang Susilowati, Ahmad Zaeni, Sapril Kartini and I. Nyoman Sudiana

AIP Conference Proceedings **2237**, 020078 (2020); https://doi.org/10.1063/5.0005712

SHOW ABSTRACT

No Access . June 2020

Toxicity of benzyl benzoate from *Kaempferia rotunda* L. rhizome

Hartiwi Diastuti, Ari Asnani, Undri Rastuti and Mela Anggraeni

AIP Conference Proceedings **2237**, 020079 (2020); https://doi.org/10.1063/5.0005554

SHOW ABSTRACT

No Access . June 2020

Physico-chemical characteristics of gelatin as green template for nanomaterial production

Maria Ulfa and Windi Apriliani

AIP Conference Proceedings **2237**, 020080 (2020); https://doi.org/10.1063/5.0006142

SHOW ABSTRACT

No Access . June 2020

Intermolecular hydrogen bond interactions in *N*-carboxymethyl chitosan and $n$$H_2O$: DFT and NBO studies

Beti Safitri, Dwi Hudiyanti, Marlyn Dian Laksitorini, Nurwarrohman Andre Sasongko and Parsaoran Siahaan

AIP Conference Proceedings **2237**, 020081 (2020); https://doi.org/10.1063/5.0005287

SHOW ABSTRACT

No Access . June 2020

Synthesis and anticancer study of complex nickel (II) 5,7-dibromoisatin-derived hydrazine carbothiamide

Fahimah Martak, Nofri Eka Safitri, Endah Mutiara Marhaeni Putri, Agung Bagus Pambudi and Arif Fadlan

AIP Conference Proceedings **2237**, 020082 (2020); https://doi.org/10.1063/5.0005731

SHOW ABSTRACT

Poster Presentation Schedule

Day 1: Tuesday, September 10th, 2019

ID	Tittle	Presenter
20	Antibiotics produced by actinobacteria from Taklimakan desert in China	chenghang sun | Ting Wang | Qin-Pei Lu
32	Syntesis and characterization of water hyacinth (Eichhornia crassipes) cellulose-based bioplastic reinforced with chitosan	Jeesica Hermayanti Pratama | Amalia | Rizka Lailatul Rohmah
46	Anthocyanin from Telang by Ultrasound Assisted Extraction	Achmad Qodim Syafaatullah
66	In vivo acute toxicological studies of mountain papaya fruit (Vasconcellea pubescens A.DC) against hepatic injury	Heru Sasongko
69	Acute oral toxicity test of eel (Anguilla bicolor bicolor) oil in mice liver and kidney cells	Heru Sasongko
80	The Application of Face-Centered Central Composite Design for the Optimization of Clove Oil Extraction from Syzygium aromaticum Stem using Solvent-Free Microwave Extraction Method	Ayu Mardinah Suyadi
83	Optimization of the Formulation in the Production of Anti-Acne Cream made from Basil (Ocimum basilicum L.) Oil with Central Composite Design	Verycha Finish Wiya Tania
89	Optimization of Furfural Rice Straw (*Oryza sativa L.*) as Revealed by Rice Varieties, H_2SO_4 Concentration, and Substrate Mass Ratio and H_2SO_4	Sri Hartini
120	Toxicity Of Benzyl Benzoate From Kaempferia Rotunda L. Rhizome	Hartiwi Diastuti
126	Antioxidant activity from of endhophytic Bacteria Isolated from Carica Papaya Leaves	Purbowatiningrum R Sarjono
154	Formulation of Topical gel loaded with Methanolic Root Extract of Annona 20eticulate for treatment of Skin Cancer	Subhash Medhi
194	Antioxidant Activity and Identification of Bioactive Compounds from Teak (*Tectona grandis*) Leaves	Venty Suryanti

14	An Enhancement Conformational Sampling of P53 Using REMD Method	Heri Purnomo
23	Transmutation of 129I Containing Nuclear Waste by Proton Bombardment	Imam Kambali
31	The Electronic Properties Study of Betanine and Their Derivatives Compound: An Explanation to Betanine Limitation in DSSC Application	Garcelina R. Anindika
35	The Comparison of Nitroxide Radical Derivative Compound Interaction with Brookite and Anatase Surface	Lely Dwi Astuti
49	Process Design and Steady State Simulation of Natural Gas Dehydration using Triethylene Glycol (TEG) to Get Minimum Total Annual Costs (TAC)	Nurul Kharisma
144	Imprinted Zeolite Modified Carbon Paste Electrode as a Selective Potentiometric Sensor for Blood Glucose	Miratul Khasanah
36	PROCESS DESIGN OF HEAVY FRACTION SEPARATION FROM USED LUBE OIL USING VACUUM DISTILLATION AND THIN FILM EVAPORATOR TO OBTAIN OPTIMUM TOTAL ANNUAL COST	Dimas Kusuma Eryzal | Khurotul A'yunin
48	INITIAL STUDY ON THE SYNTHESIS OF 1-(4'-ISOPROPILBENZIL)-1,10-PHENANTHROLINIUM BROMIDE FROM CUMINYL ALCOHOL, A POTENT ANTIMALARIAL	Maulidan Firdaus
102	Microbial life on the surface of the soft coral for solve the self-healing concrete	Prima Endang Susilowati
104	RENEWABLE ELECTRICAL ENERGY THROUGH MICROBIAL FUEL CELL TECHNOLOGY FROM SEDIMENT BAY KENDARI	Ahmad Zaeni
161	Study The Effect Of UV-B Mutation On Biodiesel Microalgae Botryococcus brauni Using Esterification, Transesterification And Combination Esterification-Transesterification	Muhammad Hafizh Prashantyo
26	Synthesis of Zeolite Na-Y without Organic Template From Geothermal Sludge	Lailatul Ilmiyah
41	Synthesis of N1- (3-trimethoxysilylpropyl)diethylentriamine modified silica (SiO_2(RHA)-TMPDT) for adsorption of gold(III)	Sri Hastuti
67	Synthesis of 5-benzylidene-hydantoin and 5-benzylidene-creatinine	Kautsar Ul Haq

	derivatives under mixed catalyst systems of Urea–p-Toluene sulfonic acid (Urea-PTSA) and Guanidine hydrochloride–Triethylamine (GnHCl-TEA)	
84	Characteristics Changing and Antibacterial Activities of Liquid Soap From Nyamplung Seed Oil (Calophyllum inophyllum L) Due to Storage	Senny Widyaningsih
115	Synthesis of Indolin-2-one Derivatives and Their in vitro Anticancer Activity Against WiDr Cell Line	Arif Fadlan
238	Catalytic Hydrocracking of Palm Oil to Biofuel on Ni-Cu/Zirconia-Pillared Bentonite	Ahmad Suseno
77	The effect of pH of red dragon fruit (Hylocereus costaricencis) peels extract as a dye of Dye-Sensitized Solar Cell (DSSC) on DSSC efficiency	Parahita Faqih
74	The Use of Snail Shells (Pilla ampullacea) and Sugar Cane Bagasse as A Smart-Partisi Through TiO¬2 and Al2O3 Coating Technology	Jeesica Hermayanti
124	Biodiesel Production Using Palm Fatty Acid Distillate and Rice Husk Silica Supported NiSO4 as Catalyst	Noor Hindryawati
166	ANTIOXIDANT ACTIVITIES OF ETHANOL EXTRACTION PRODUCTFROM CITRONELLA GRASS (Cymbopogonnardus)DISTILLATION RESIDUE	Enny Fachriyah
56	The role of temperature on carbonization of water hyacinth for solid biofuel	Nona Merry Merpati Mitan

Certificate

No. 5.1/1-200/09/2019

This is to certify that

Hartiwi Diastuti

as

Presenter

in The 14th Joint Conference on Chemistry 2019

"Strengthening the Foundation of Sustainable Development: Research, Practice and Education"

held between 10th-11th September 2019

at Solo Paragon Hotel & Residences, Surakarta Indonesia

Dean of Mathematics and Natural Sciences
Sebelas Maret University

Drs. Harjana, M.Si., M.Sc., Ph.D
NIP. 195907251986011001

Chairman of The 14th Joint Conference on Chemistry

14th JCC
Joint Conference on Chemistry

Dr. rer. nat. Atmanto Heru Wibowo, S.Si., M.Si
NIP. 197408132000031001