Document details

‹ Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More... ›

View at Publisher

Malaysian Journal of Analytical Sciences
Volume 23, Issue 5, October 2019, Pages 880-891

Glycerol degradation in the absence of external hydrogen gas by using waste eggshell as heterogeneous catalyst (Article)

[Degradasi gliserol tanpa kehadiran hidrogen luaran dengan menggunakan sisa kulit telur sebagai mangkin heterogen]

Mhd Sawal, M.I.F.[a], Oslan, A.I.[a], Hatta, M.H.M.[a], Hamzah, N.[b], Nordin, N.[c], Jumali, N.[a], Samad, W.Z.[a]

[a]Department of Chemistry, Kulliyyah of Science, International Islamic University Malaysia, Bandar Indera Mahkota, Kuantan, Pahang 25200, Malaysia
[b]Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Selangor 40450, Malaysia
[c]School of Chemical Sciences, Universiti Sains Malaysia, Minden, Pulau Pinang 11800, Malaysia

Abstract

View references (25)

The demand of biodiesel production nowadays is increasing every day. However, the booming of biodiesel demand resulted in the increase of glycerol production as a major by-product. Although glycerol could serve in various industries, the demand and usage are still limited. Therefore, an alternative method was proposed in this research in order to convert glycerol into more value-added chemicals such as methanol (MeOH), propanol (1-PrOH), and 1,2-propanediol (1,2-PDO) through a new low cost and simple approach which is the reflux technique in the absence of external hydrogen gas. Due to the concern of global food waste issues, calcium oxide (CaO) catalyst derived from waste eggshells is utilized as a possible heterogeneous catalyst. This preliminary research studied the influence of reaction temperature and reaction time whereas catalyst weight and glycerol concentration were fixed as independent variables. Overall, the three chemicals were successfully synthesized with different optimum conditions. The formation of 1,2-PDO is more preferred at lower temperature (130 °C and 5 hours) with glycerol conversion and selectivity of 53.70% and 64.76%, respectively. However, the formation of MeOH and 1-PrOH are preferred at higher temperature. The formation of 1-PrOH (170 °C and 5 hours) resulted in glycerol conversion and selectivity of 81.64% and 70.85%, respectively. Meanwhile, the best condition in the formation of MeOH is at 190 °C and 7 hours reaction time with glycerol conversion and selectivity of 65.8 % and 46.44%, respectively.

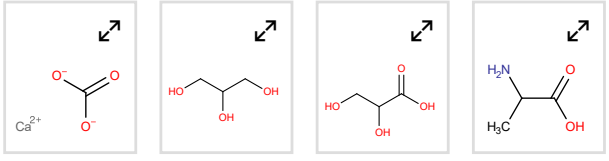
SciVal Topic Prominence

Topic: Glycerol | Hydrogenolysis | Glycerol dehydration

Prominence percentile: 99.348

Chemistry database information

Substances



Author keywords

Degradation | External hydrogen | Glycerol | Heterogeneous catalyst | Waste eggshell

Funding details

Funding sponsor	Funding number	Acronym
Ministry of Higher Education, Malaysia	FRGS17-016	MOHE

Funding text

This research was supported by the grant of RIGS16-304-0468. The authors would also like to acknowledge the Ministry of Education Malaysia (Higher Education) and Dr Norsaliyana Jumali for the financial support under the grant of FRGS17-016.

ISSN: 13942506
Source Type: Journal
Original language: English
DOI: 10.17576/mjas-2019-2305-13
Document Type: Article
Publisher: Malaysian Society of Analytical Sciences

References (25)

View in search results format >

All | Export | Print | E-mail | Save to PDF | Create bibliography

1 Qadariyah, L., Mahfud, Sumarno, Machmudah, S., Wahyudiono, Sasaki, M., Goto, M.

Degradation of glycerol using hydrothermal process

(2011) *Bioresource Technology*, 102 (19), pp. 9267-9271. Cited 45 times.
doi: 10.1016/j.biortech.2011.06.066

View at Publisher

2 Johnson, D.T., Taconi, K.A.

The glycerin glut: Options for the value-added conversion of crude glycerol resulting from biodiesel production

(2007) *Environmental Progress*, 26 (4), pp. 338-348. Cited 655 times.
doi: 10.1002/ep.10225

View at Publisher

3 Nanda, M.R., Yuan, Z., Shui, H., Charles Xu, C.

Selective hydrogenolysis of glycerol and crude glycerol (A by-product orwaste stream from the biodiesel industry) to 1,2-propanediol over B_2O_3promoted Cu/Al_2O_3catalysts (Open Access)

(2017) *Catalysts*, 7 (7), art. no. 196. Cited 6 times.
http://www.mdpi.com/2073-4344/7/7/196/pdf
doi: 10.3390/catal7070196

View at Publisher