LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH: JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Performance of Ultrafiltration–Ozone Combined System for Produced Water Treatment		
Jumlah Penulis	:	4 orang		
Status Pengusul	:	Penulis pertama/ ~~penulis ke - 3~~/ ~~penulis korespondensi~~		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Periodica Polytechnica Chemical Engineering
		b. Nomor ISSN	:	1587-3765
		c. Volume, nomor, bulan, tahun	:	Vol. 63, No. 3, Juli 2019
		d. Penerbit	:	Budapest University of Technology and Economics
		e. DOI Artikel	:	10.3311/PPch.13491
		f. Alamat web Jurnal	:	https://pp.bme.hu/ch
		Alamat artikel	:	https://pp.bme.hu/ch/article/view/13491/8319
		g. Terindeks	:	SCOPUS (Q3), Scimagojr SJR = 0.287 (2018) JIF Web of Science = 1.382 (2018)

Kategori Publikasi Jurnal Ilmiah (Beri ✓pada katergori yang tepat)

- [✓] Jurnal Ilmiah Internasional
- [ ] Jurnal Ilmiah Nasional Terakreditasi
- [ ] Jurnal Ilmiah Nasional Tidak Terakreditasi

Hasil Penilaian *Peer Review*

Komponen yang Dinilai	Nilai Reviewer		Nilai Rata-rata
	Reviewer 1	Reviewer 2	
a. Kelengkapan unsur isi Artikel (10%)	4	4	
b. Ruang lingkup dan kedalaman pembahasan (30%)	11.2	11	
c. Kecukupan dan kemutakhiran data/ informasi dan metodologi (30%)	12	10	
d. Kelengkapan unsur dan kualitas terbitan/ jurnal (30%)	11.2	12	
Total = (100 %)	38.40	37	37.7
Nilai pengusul = (60% x 37.7 = 22.62			

Semarang, Mei 2020

Reviewer 2

Prof. Dr. M. Djaeni, ST., M.Eng.
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Reviewer 1

Prof. Dr. Ir. Bambang Pramudono, MS.
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		e. DOI Artikel	:	10.3311/PPch.13491
		f. Alamat web JURNAL	:	https://pp.bme.hu/ch
		Alamat web ARTIKEL	:	https://pp.bme.hu/ch/article/view/13491/8319
		g. Terindeks	:	SCOPUS(Q3)/SCIMAGO, SJR=0.287 (2018)

Kategori Publikasi Jurnal Ilmiah (Beri ✓pada katergori yang tepat)

- [✓] Jurnal Ilmiah Internasional
- [ ] Jurnal Ilmiah Nasional Terakreditasi
- [ ] Jurnal Ilmiah Nasional Tidak Terakreditasi

Hasil Penilaian *Peer Review*

Komponen yang dinilai	Nilai Maksimal Jurnal Ilmiah			Nilai Akhir yang diperoleh
	Internasional [40]	Nasional Terakreditasi [ ]	Nasional Tidak Terakreditasi [ ]	
a. Kelengkapan unsur isi artikel (10%)	4			4
b. Ruang lingkup dan kedalaman pembahasan (30%)	12			11.2
c. Kecukupan dan kemutakhiran data/ informasi dan metodologi (30%)	12			12
d. Kelengkapan unsur dan kualitas terbitan/ jurnal (30%)	12			11.2
Total = (100%)	**40**			**38.40**
Nilai pengusul = 60% x 38.40				**23.04**

Catatan penilaian artikel oleh Reviewer:

1. Kesesuaian dan kelengkapan unsur isi artikel:
Kelengkapan unsur artikel baik dan lengkap **(Nilai → 10%)**

2. Ruang lingkup dan kedalaman pembahasan:
Ruang lingkup artikel cukup menarik yaitu pengolahan air produced water hasil kegiatan eksplorasi minyak bumi dengan sistem kombinasi Ultrafiltrasi-Ozon. Artikel ini mengkaji performa dari sistem tersebut, dari sisi flux maupun selektivitas membran yang dipakai. Masing-masing dibahas secara komprehensif, dengan merujuk atau membandingkannya dengan peneliti2 terdahulu yang sejenis. Ini dapat dilihat sitasi dalam teks pada sub bab pembahasan sangat banyak yaitu 17 buah dari peneliti pembanding. **(Nilai → 28%)**

3. Kecukupan dan kemutakhiran data/informasi dan metodologi:
Daftar referensi cukup banyak (ada 42 acuan, sebagian besar adalah jurnal). Kemutakhiran data/informasi yang berasal dari referensi 10 tahun terakhir dari jurnal, sebanyak 22 atau 52,3 %. Metodologi diuraikan secara lengkap dan jelas. **(Nilai → 30%)**

4. Kelengkapan unsur dan kualitas terbitan:
Periodica Polytechnica Chemical Engineering, Publisher: Budapest University of Technology and Economics, ISSN 03245853. Indexed by: SCOPUS; Impact Factor/SJR = 0.29, h-index Scopus =14; Kategori jurnal: Q3; Subject area : Chemical Engineering; Editorial board terdiri dari berbagai negara; Penulis artikel dari berbagai negara **(Nilai → 28%)**

Semarang, 12 Maret 2020
Reviewer I

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NIP. 19520312 197501 1 004
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		Alamat artikel	:	https://pp.bme.hu/ch/article/view/13491/8319
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Hasil Penilaian *Peer Review*

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	Internasional [40]	Nasional Terakreditasi [ ]	Nasional Tidak Terakreditasi [ ]	
a. Kelengkapan unsur isi Jurnal (10%)	4			4
b. Ruang lingkup dan kedalaman pembahasan (30%)	12			11
c. Kecukupan dan kemutakhiran data/ informasi dan metodologi (30%)	12			10
d. Kelengkapan unsur dan kualitas terbitan/ jurnal (30%)	12			12
Total = (100%)	**40**			**37**
Nilai pengusul = 60% x 37				**22.2**

Catatan penilaian artikel oleh Reviewer:

1. Kesesuaian dan kelengkapan unsur isi jurnal:
Artikel ini terdiri dari: Title, Abstract, Introduction, Materials and Method, Results and Discussion, Conclusion, Abbreviation, Acknowledgment, References dan ditulis sesuai dengan Guide for Author. Substansi artikel sesuai dengan bidang ilmu (Teknik Kimia).

2. Ruang lingkup dan kedalaman pembahasan:
Artikel ini berisi tentang pengolahan air terproduksi menggunakan membrane ultrafiltrasi (UF) dengan pretreatment atau posttreatment dengan Ozon. Kajian dofokuskan pada uji kinerja (fluks dan rejeksi) serta karakteristik effluent yang dihasilkan dari berbagai mode operasi UF, UF-Pretreatment dan UF-Post Treatment. Hasil dibahas dengan cukup detail serta komprehensif. Dalam pembahasan disertai oleh referensi yang memadai sebanyak 17 dari 42 referensi yang digunakan (40.5%). Secara umum hasil cukup signifikan dalam pengembangan ilmu terkait, hanya Fig. 1 saja yang menunjukkan kurang begitu signifikan antara PES1 dan PES 2.

3. Kecukupan dan kemutakhiran data/informasi dan metodologi:
Kemutakhiran artikel ini cukup baik. Hal ini ditunjukkan dengan jumlah referensi 10 tahun terakhir menunjukkan 16 dari 42 artikel (38%) adalah 10 tahun terakhir. Metode cukup lengkap, dituliskan dalam beberapa sub bagian, sehingga para penliti/pembaca dapat mencoba metode tersebut. Data-data juga disajikan cukup detail..

4. Kelengkapan unsur dan kualitas terbitan:
Jurnal diterbitkan oleh Budapest University of Technology and Economics, termasuk dalam jurnal terindeks SCOPUS Q3 dengan SJR = 0.28 (Tahun 2018), H index=14.Editorial board terdiri dari 10 negara.Pada vol. 63(3), 2019, penulis berasal dari berbagai negara dari 19 dengan distribusi Hungaria (7), Iran (2), Cekoslovakia (2), Indonesia (2), India (1), Cina (1), Serbia (1), Turki (1), Pakistan (1) dan Finlandia (1). Proses review juga dilakukan dengan cukup baik dimana dari mulai submission sampai terbit diperlukan waktu 4 bulan. Nilai similaritas artikel berdasarkan Turnitin sebesar 12 %.

Semarang, Mei 2020
Reviewer I

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Periodica Polytechnica Chemical Engineering Open Access
Volume 63, Issue 3, 15 May 2019, Pages 438-447

Performance of ultrafiltration-ozone combined system for produced water treatment (Article) (Open Access)

Aryanti, N.[a,b], Kusworo, T.D.[a,b], Oktiawan, W.[c], Wardhani, D.H.[a]

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Abstract

Oil exploration waste, also called produced water, contains hazardous pollutants, such as benzene; benzene, toluene, and xylene (BTX); naphthalene, phenanthrene, and dibenzothiophene (NDP); polyaromatic hydrocarbons (PAHs); and phenol. Produced water is characterized by high chemical oxygen demand (COD) and oil content, which exceed the standard limits of regulation. In this study, the combination of ultrafiltration (UF) and ozone pre-treatment and post-treatment were applied for treatment of produced water to minimize its environmental impact. Produced water and membrane were characterized, and their ultrafiltration performance for removal of oil content, benzene, toluene, xylene, and COD. Two commercial Polyethersulfone membranes, with molecular-weight cut-off values of 10 and 20 kDa, were used. The membrane flux profile illustrated that ozone pre-treatment had higher normalized flux than UF only. Separation performance was evaluated based on flux profile and removal of COD, oil and grease content, toluene, and xylene. Significant finding was found where the combination of UF with ozone pre-treatment and post-treatment could significantly eliminate COD, oil content, toluene, and xylene. The rejection of these components was found higher than conventional process, which was in the range of 80% to 99 %. In addition, almost oil and grease can be removed by using this combined system. Permeate quality of this system confirmed the acceptable level as water discharge.

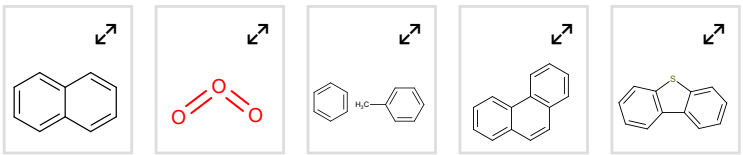
SciVal Topic Prominence

Topic: Produced Water | Ceramic Membranes | Microfiltration

Prominence percentile: 95.801

Chemistry database information

Substances



Author keywords

Benzene Ozone Produced water Toluene Ultrafiltration Xylene

Indexed keywords

Engineering controlled terms: Benzene | Chemical oxygen demand | Naphthalene | Ozone | Ozone water treatment | Petroleum prospecting | Polycyclic aromatic hydrocarbons | Produced Water | Toluene | Ultrafiltration | Xylene

Engineering uncontrolled terms: Benzene , toluene , and xylenes | Dibenzothiophenes | Hazardous pollutants | Molecular weight cutoff | Polyaromatic hydrocarbons | Polyethersulfone membrane | Separation performance | Water discharges

Engineering main heading: Water pollution

Funding details

Funding sponsor	Funding number	Acronym
Kementerian Riset Teknologi Dan Pendidikan Tinggi Republik Indonesia		

Funding text

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Subject area: Chemical Engineering: General Chemical Engineering

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PERIODICA POLYTECHNICA-CHEMICAL ENGINEERING

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DOAJ Subjects / Keywords	Bioengineering, Chemical engineering, Environmental engineering, Technology: Chemical technology: Chemical engineering, Technology: Engineering (General).... [show more]

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Rank	Full Journal Title	Journal Impact Factor	Impact Factor without Journal Self Cites	5-Year Impact Factor	Cited Half-Life	Citing Half-life	% Articles in Citable Items	Average Journal Impact Factor Percentile
1	CA-A CANCER JOURNAL FOR CLINICIANS	292.278	291.481	225.870	3.4	4.6	77.27	99.795
2	NEW ENGLAND JOURNAL OF MEDICINE	74.699	73.983	72.098	8.7	4.9	84.45	99.697
3	Nature Reviews Materials	71.189	70.968	84.972	2.8	5.5	2.27	99.678
4	NATURE REVIEWS DRUG DISCOVERY	64.797	63.905	60.796	8.2	5.5	11.11	99.747
5	LANCET	60.392	59.208	59.345	8.6	4.2	69.82	99.091
6	WHO Technical Report Series	59.000	59.000	2.366	19.3	Not Available	Not Available	99.741
7	NATURE REVIEWS MOLECULAR CELL BIOLOGY	55.470	54.940	53.949	8.9	6.2	0.00	99.744
8	Nature Reviews Clinical Oncology	53.276	52.667	34.517	3.8	4.4	17.07	99.385
9	NATURE REVIEWS CANCER	53.030	52.604	52.659	9.1	4.9	4.65	98.975
10	CHEMICAL REVIEWS	52.758	52.234	60.399	7.8	7.2	0.00	99.718
11	Nature Energy	46.495	45.803	56.397	2.7	4.4	89.25	99.538
12	JAMA-JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION	45.540	44.379	47.677	10.0	4.9	78.00	98.485
13	REVIEWS OF MODERN PHYSICS	45.037	44.840	46.149	11.7	7.8	5.26	99.412
14	CHEMICAL SOCIETY REVIEWS	42.846	42.493	45.907	6.0	5.3	0.00	99.153
15	NATURE	42.778	42.243	46.486	10.9	6.2	97.67	99.296
16	SCIENCE	41.845	41.329	44.372	11.2	6.6	91.73	97.887
17	Nature Reviews Disease Primers	40.689	40.622	42.523	3.0	6.4	100.00	97.879
18	World Psychiatry	40.595	36.881	38.279	4.8	5.8	76.19	99.661
18	World Psychiatry	40.595	36.881	38.279	4.8	5.8	76.19	99.661
20	NATURE REVIEWS IMMUNOLOGY	40.358	40.066	49.054	8.4	6.3	9.62	99.684
21	NATURE MATERIALS	38.663	38.337	43.608	7.7	5.9	94.44	99.460
22	CELL	38.637	38.045	38.620	9.0	6.4	91.20	99.531
23	NATURE BIOTECHNOLOGY	36.558	35.688	42.297	7.5	4.8	92.68	99.038
24	NATURE MEDICINE	36.130	35.752	36.230	7.9	5.0	93.53	99.284
25	Living Reviews in Relativity	35.429	35.286	38.185	7.8	7.6	0.00	98.276
26	Nature Reviews Chemistry	34.953	34.709	34.953	2.1	6.6	0.00	98.588
27	NATURE REVIEWS MICROBIOLOGY	34.209	33.936	36.883	8.0	6.1	0.00	99.630
28	LANCET ONCOLOGY	33.752	33.223	35.843	5.2	4.1	76.65	98.566
29	NATURE REVIEWS NEUROSCIENCE	33.654	33.442	36.673	10.1	7.6	0.00	99.815
30	NATURE REVIEWS GENETICS	33.133	32.816	44.337	8.4	5.2	0.00	99.718
31	Annual Review of Astronomy and Astrophysics	32.963	32.741	40.347	10.8	7.0	0.00	99.265
32	JOURNAL OF CLINICAL ONCOLOGY	32.956	32.193	25.597	8.0	5.4	95.09	98.156
33	PROGRESS IN MATERIALS SCIENCE	31.560	31.210	37.352	6.9	7.3	0.00	98.885
34	Nature Nanotechnology	31.538	31.176	40.301	6.2	5.4	94.33	98.555
35	Nature Photonics	31.241	30.684	36.870	6.0	6.1	92.17	99.255
36	NATURE METHODS	30.822	30.161	36.147	7.1	4.9	97.42	99.351

8745	ACTA PETROLOGICA SINICA	1.265	0.818	1.730	8.9	11.4	100.00	50.000
8745	JOURNAL OF ORGANIZATIONAL BEHAVIOR MANAGEMENT	1.265	0.824	1.233	12.8	10.1	100.00	21.537
8745	NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT	1.265	0.946	1.309	10.7	8.5	74.28	26.672
8745	PHOTOGRAMMETRIC ENGINEERING AND REMOTE SENSING	1.265	1.186	2.985	15.5	7.6	100.00	14.405
8745	QUARTERLY JOURNAL OF MECHANICS AND APPLIED MATHEMATICS	1.265	1.163	1.152	39.5	17.2	100.00	39.177
8745	SOFT MATERIALS	1.265	1.147	1.177	5.6	9.8	95.83	18.312
8745	Wood Material Science & Engineering	1.265	1.191	Not Available	5.6	8.9	90.00	64.286
8752	Evaluation	1.264	0.943	1.949	8.2	9.6	100.00	49.537
8752	JOURNAL OF ENVIRONMENTAL ENGINEERING	1.264	1.203	1.547	12.1	8.6	100.00	19.511
8752	JOURNAL OF POLITICAL PHILOSOPHY	1.264	1.245	2.197	11.8	11.6	100.00	53.295
8752	POETICS	1.264	0.917	2.137	12.3	11.6	100.00	46.333
8756	ACTA CHIMICA SLOVENICA	1.263	0.868	1.123	7.3	8.8	98.26	25.706
8756	JOURNAL OF FINANCIAL RESEARCH	1.263	1.211	2.106	13.6	13.7	100.00	31.944
8756	Journal of Exercise Science & Fitness	1.263	1.184	1.663	7.0	6.6	76.47	15.882
8756	Polish Maritime Research	1.263	1.084	1.261	3.3	7.5	98.73	46.429
8760	JOURNAL OF GEOGRAPHY	1.262	0.976	1.441	11.8	10.1	100.00	27.976
8760	Paddy and Water Environment	1.262	1.215	1.394	6.3	9.8	100.00	45.604
8762	JOURNAL OF RADIOLOGICAL PROTECTION	1.261	0.994	1.366	6.2	8.9	96.05	24.317
8762	Journal of European Integration	1.261	1.134	1.773	5.6	7.2	94.44	48.472
8762	Journal of Pension Economics & Finance	1.261	1.196	1.452	8.2	10.4	100.00	37.814
8765	Journal of Oral & Facial Pain and Headache	1.260	1.130	2.421	4.7	11.1	94.00	19.231
8765	Oxford Journal of Legal Studies	1.260	1.178	1.343	13.0	14.3	94.44	60.714
8767	JOURNAL OF ORTHOPAEDIC SCIENCE	1.259	1.147	1.477	7.8	10.0	97.93	27.439
8767	WEED TECHNOLOGY	1.259	0.906	1.349	12.7	11.5	98.90	44.093
8769	ALCHERINGA	1.258	1.135	1.158	11.3	25.5	100.00	31.818
8769	Geografia Fisica e Dinamica Quaternaria	1.258	1.258	1.610	9.2	13.1	100.00	11.000
8769	IET Software	1.258	1.226	1.253	5.6	7.1	89.83	32.870
8769	WILDLIFE BIOLOGY	1.258	1.202	1.596	10.9	11.2	97.50	39.881
8773	KNOWLEDGE ENGINEERING REVIEW	1.257	1.114	1.832	13.1	8.8	0.00	19.485
8773	Maderas-Ciencia y Tecnologia	1.257	0.927	1.344	4.9	10.9	100.00	59.524
8773	NEW GENETICS AND SOCIETY	1.257	1.029	1.391	7.3	7.9	94.74	35.057
8773	NEW GENETICS AND SOCIETY	1.257	1.029	1.391	7.3	7.9	94.74	35.057
8773	PERIODICA POLYTECHNICA-CHEMICAL ENGINEERING	1.257	1.149	1.368	3.5	10.1	97.14	31.119
8773	Research in Social Stratification and Mobility	1.257	1.176	2.393	7.1	11.4	100.00	45.667
8773	ZOOLOGICAL STUDIES	1.257	0.871	1.219	9.4	12.6	97.73	53.869
8773	ZYGOTE	1.257	1.184	1.192	6.8	11.4	90.16	6.706

8781	Citizenship Studies	1.256	1.034	1.757	8.2	8.6	97.87	46.389
8781	IEEE TECHNOLOGY AND SOCIETY MAGAZINE	1.256	0.907	1.438	5.9	5.0	97.06	23.872
8781	JOURNAL OF PSYCHOEDUCATIONAL ASSESSMENT	1.256	1.176	1.626	8.4	11.0	95.06	29.167
8781	JOURNAL OF RESEARCH IN READING	1.256	1.256	1.647	10.0	12.1	96.67	30.648
8781	Latin American Journal of Solids and Structures	1.256	1.063	1.377	4.1	9.8	98.99	24.873
8781	Physicochemical Problems of Mineral Processing	1.256	1.093	1.199	4.5	9.0	100.00	25.741
8781	VETERINARY CLINICS OF NORTH AMERICA-SMALL ANIMAL PRACTICE	1.256	1.232	1.583	11.0	9.0	100.00	58.099
8781	ZDM-Mathematics Education	1.256	1.024	Not Available	6.2	10.2	98.91	32.129
8789	Asia-Pacific Journal of Public Health	1.255	1.070	1.514	4.8	6.4	95.00	23.910
8789	Asia-Pacific Journal of Public Health	1.255	1.070	1.514	4.8	6.4	95.00	23.910
8789	INTERNATIONAL JOURNAL OF PSYCHOLOGY	1.255	1.221	2.194	8.9	11.3	97.94	42.391
8789	INTERNATIONAL JOURNAL OF TOXICOLOGY	1.255	1.182	1.468	9.8	11.2	83.33	7.909
8789	VETERINARY SURGERY	1.255	0.880	1.457	10.4	10.8	98.82	57.394
8794	ANNALES DE L INSTITUT HENRI POINCARE-PROBABILITES ET STATISTIQUES	1.254	1.172	1.366	8.9	12.2	100.00	56.048
8794	Critical Discourse Studies	1.254	1.143	1.421	7.1	10.0	94.29	29.891
8794	JOURNAL OF CRUSTACEAN BIOLOGY	1.254	1.138	1.166	15.4	17.5	96.51	46.684
8794	Journal of Water and Climate Change	1.254	1.140	1.271	4.1	8.9	98.55	23.936
8794	Journal of the Institute of Mathematics of Jussieu	1.254	1.237	1.180	7.7	14.1	100.00	77.315
8794	X-RAY SPECTROMETRY	1.254	1.071	1.177	11.3	11.6	97.44	36.905
8800	Dynamic Games and Applications	1.253	1.120	1.448	4.8	13.1	98.04	36.321
8800	Journal of Empirical Research on Human Research Ethics	1.253	1.103	1.622	6.2	8.0	80.00	45.824
8800	Journal of Empirical Research on Human Research Ethics	1.253	1.103	1.622	6.2	8.0	80.00	45.824
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8804	European Journal of Cultural Studies	1.250	1.182	1.682	7.4	9.4	98.21	81.111
8804	HELGOLAND MARINE RESEARCH	1.250	1.250	1.404	15.4	13.5	100.00	33.591
8804	INDIAN JOURNAL OF OPHTHALMOLOGY	1.250	1.018	1.280	6.2	9.5	92.71	14.167
8804	International Relations	1.250	1.000	1.446	8.1	10.8	100.00	48.947
8804	JOGNN-JOURNAL OF OBSTETRIC GYNECOLOGIC AND NEONATAL NURSING	1.250	1.168	1.741	9.7	4.5	73.33	31.319
8804	JOGNN-JOURNAL OF OBSTETRIC GYNECOLOGIC AND NEONATAL NURSING	1.250	1.168	1.741	9.7	4.5	73.33	31.319
8804	JOURNAL OF VISUAL LANGUAGES AND COMPUTING	1.250	1.250	1.305	6.6	Not Available	Not Available	31.944
8804	LEARNING DISABILITY QUARTERLY	1.250	1.150	1.781	11.6	10.4	100.00	50.377

12821	ZEITSCHRIFT FUR ETHNOLOGIE	0.040	0.040	0.308	41.5	Not Available	Not Available	0.556
12822	AEROSPACE AMERICA	0.029	0.029	0.025	Not Available	Not Available	100.00	1.613
12823	MANUFACTURING ENGINEERING	0.022	0.022	0.053	13.0	Not Available	100.00	1.000
12824	Amme Idaresi Dergisi	0.020	0.020	0.142	Not Available	14.9	100.00	1.042
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12826	Correspondances en Metabolismes Hormones Diabetes et Nutrition	0.018	0.018	0.030	Not Available	5.5	100.00	0.456
12827	NATURAL HISTORY	0.017	0.017	0.047	43.9	Not Available	100.00	0.573
12828	ACTA PHYSICA SLOVACA	0.000	0.000	1.222	12.5	36.2	100.00	0.588
12828	BELL LABS TECHNICAL JOURNAL	0.000	0.000	4.200	9.1	Not Available	100.00	0.355
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12828	Current Perspectives in Social Theory	0.000	0.000	0.359	Not Available	Not Available	Not Available	0.333
12828	Journal of Neurological Sciences-Turkish	0.000	0.000	0.110	7.1	Not Available	Not Available	0.185
12828	PULP & PAPER-CANADA	0.000	0.000	0.072	20.1	Not Available	100.00	2.381
12828	SEN-I GAKKAISHI	0.000	0.000	0.068	16.5	9.8	76.12	1.884
12828	SURFACE COATINGS INTERNATIONAL	0.000	0.000	0.054	17.0	Not Available	87.50	1.145
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12838	BMC Chemistry	Not Available	0.000	Not Available	Not Available	7.7	93.38	Not Available
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12838	Brazilian Journal of Psychiatry	Not Available	0.000	Not Available	Not Available	8.5	88.89	Not Available
12838	Brazilian Journal of Psychiatry	Not Available	0.000	Not Available	Not Available	8.5	88.89	Not Available
12838	Electronic Research Archive	Not Available	0.000	Not Available	Not Available	12.2	100.00	Not Available
12838	Environmental Microbiome	Not Available	0.000	Not Available	Not Available	7.5	100.00	Not Available
12838	Environmental Pollutants and Bioavailability	Not Available	0.000	Not Available	Not Available	7.9	94.74	Not Available
12838	Food Science of Animal Resources	Not Available	0.000	Not Available	Not Available	9.8	97.65	Not Available
12838	Geochemistry	Not Available	0.000	Not Available	Not Available	13.8	93.75	Not Available
12838	Journal of Computer Languages	Not Available	0.000	Not Available	Not Available	9.5	97.92	Not Available
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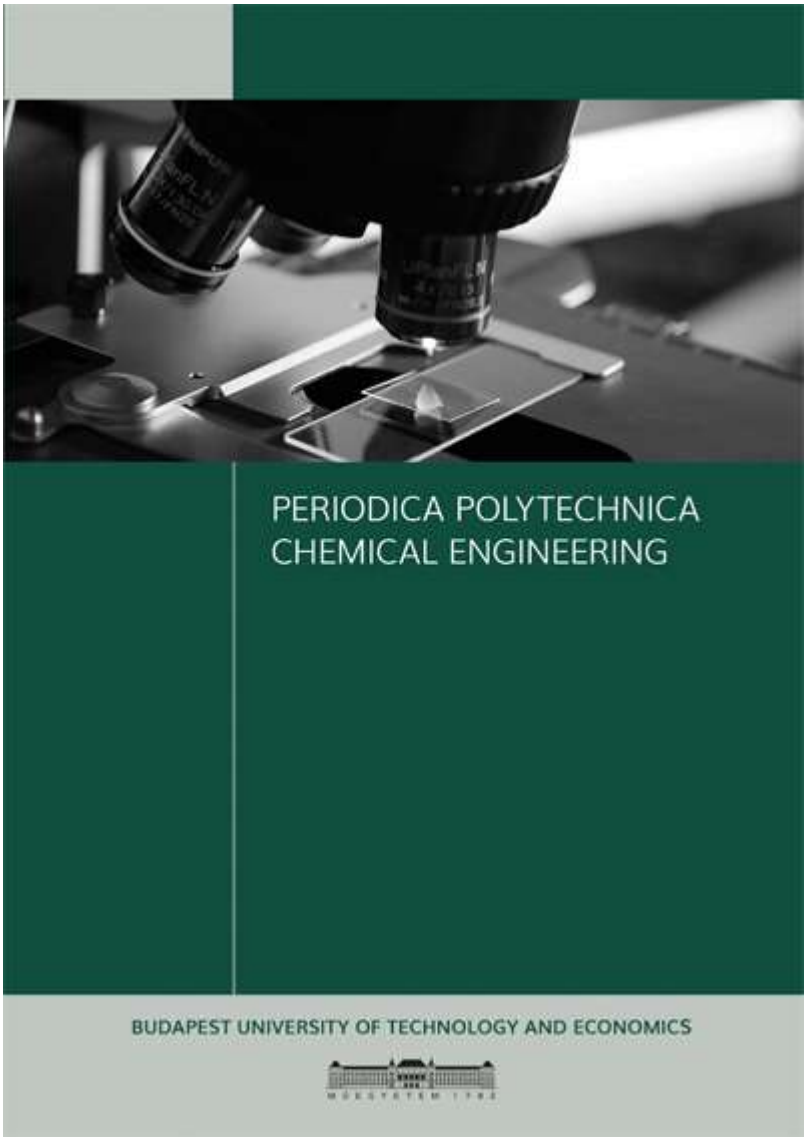
12838	Wound Management & Prevention	Not Available	0.000	Not Available	Not Available	7.3	93.02	Not Available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Periodica Polytechnica Chemical Engineering, 63(3), pp. 397–405, 2019

Quantitative Risk Assessment of Biogas Plant – Determination of Assumptions and Estimation of Selected Top Event

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Abstract

Biogas plants are a specific facility from the QRA (Quantitative Risk Assessment) methodologies' point of view, especially in the case of the determination of the event frequency of accident scenarios for biogas leakage from a gas holder and subsequent initiation. QRA methodologies determine event frequencies for different types of accident events related to vessels made of steel. Gas holders installed at biogas plants are predominantly made of other materials and are often integrated with the fermenter. It is therefore a specific type of gas holder, differing from that which is commonly used in the chemical industry. In addition, long-term experience is not available for the operation of biogas plants, unlike in the chemical industry. The event frequencies listed in the QRA methodologies are not relevant for the risk assessment of biogas plants. This work is focused on setting the prerequisites for QRA of biogas storage, including for example: information on hazardous chemical substances occurring at biogas plants, their classification, and information on the construction of integrated gas holders. For the purpose of the work, a scenario was applied where the greatest damage (to life or property) is expected. This scenario is the leakage of the total volume of hazardous gas substance from the gas holder and subsequent initiation. Based on this information, a "tree" was processed for "Fault Tree Analysis" (FTA), and frequencies were estimated for each event. Thereafter, an "Event Tree Analysis" was carried out. This work follows up on a discussion by experts on the determination of scenario frequencies for biogas plants that was conducted in the past.

Keywords

biogas, leakage, scenarios, Fault Tree Analysis, QRA

1 Introduction

Biogas plants are technologies where potentially hazardous substances are produced or stored. The major hazardous substance is biogas with the main hazardous property being its flammability. Under EU Directive No. 2012/18/EU, in Europe most facilities have a below-limit quantity of hazardous substances. Facilities with an over-limit quantity of hazardous substances are the exception. An example is the NAWARO BioEnergie Park in Güstrow, where cogeneration units with a total output of 20 MWel [1] are located. There an excessive amount of hazardous substance (biogas) can be expected. In this case, the biogas consumption with a methane content of 50-55 %vol is approximately 9 600 – 10 000 m^3 per hour.

For the purpose of quantitative risk analysis (QRA), it is necessary to have a knowledge of the frequencies of events of accident scenarios. These frequencies of events are possible to determine based on recognized methodologies for QRA in the chemical industry, such as Dutch CPR 18 or methodology by HSE (UK Health and Safety Executive). Unfortunately, these methodologies do not consider construction materials other than steel. However, some important elements of biogas plants are often made from different materials. For example, the gas holder is made from EPDM material.

The research of professional works has shown that discussion on this topic is very limited in professional circles. The work by Heezen et al. [2] is an exception. This work states that the National Institute for Public Health and the Environment (RIVM) has proposed that companies that process safety documentation for a biogas plant falling

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Periodica Polytechnica Chemical Engineering, 63(3), pp. 388–396, 2019

Investigating the Effect of CuO/NiO and CuO/CoO Relative Composition on the Reduction Time of $(CuO)_x$-$(NiO)_{(1-x)}$ and $(CuO)_x$-$(Co_3O_4)_{(1-x)}$ with Methane Gas as the Reducing Agent in the Synthesis of Nano-bimetallic Ni_x-$Cu_{(1-x)}$ and Cu_x-$Co_{(1-x)}$

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Abstract

In this paper, the reduction duration of $(CuO)_x$-$(NiO)_{(1-x)}$ and $(CuO)_x$-$(Co_3O_4)_{(1-x)}$ binary mixtures was studied using thermogravimetric method. The reduction reaction was performed using copper, nickel and cobalt oxides as metal precursors and methane gas as the reducing agent, under atmospheric pressure. The products as well as the raw materials were characterized and analyzed using X-Ray diffraction (XRD) and Energy Dispersive Spectroscopy (EDS). Initially, CoO, NiO and CuO were transformed to Co, Ni and Cu through reduction reactions with 23 Vol.% of methane at 830 °C. Results demonstrated that the reduction times of NiO, CoO and CuO NPs with CH_4 at 830 °C were 14, 39 and 47 min, respectively. EDS and XRD analysis indicated that more than 97 % of copper, nickel and cobalt oxides were transformed to copper, nickel and cobalt NPs. The reaction time of $(CuO)_x$-$(NiO)_{(1-x)}$ and $(CuO)_x$-$(Co_3O_4)_{(1-x)}$ binary mixtures with methane was investigated to evaluate the effect of CuO (x=0, 0.4, 0.6, 1) relative composition. In addition, the reaction time of ternary mixture of $(NiO)_{0.6}$-$(CuO)_{0.2}$-$(Co_3O_4)_{0.2}$ with methane gas was also studied.

Keywords

binary metal, Cu-Ni, Cu-Co, methane, the reduction time, thermogravimetric method

1 Introduction

In recent years, the synthesis of metallic Nanoparticles (NPs) and their mixtures in comparison to micro-structured materials have attracted many researchers due to their unique features including fine particle sizes and high surface to volume ratio [1, 2]. Among metallic nanoparticles, copper, nickel, cobalt and their binary and ternary mixtures possess great significance in various industrial applications which stem from their outstanding physical and chemical properties. In this regard, unique electrical, catalytic and thermal characteristics along with high surface to volume ratio, resistance to corrosion, great flexibility and strength are considered as their main features [3-6].

Copper-nickel and copper-cobalt binary nanoparticles (BNPs) are consisted of copper and nickel and cobalt and copper metals, respectively, which provide many applications in different fields, compared to single-metal copper, nickel and cobalt nanoparticles, due to the composition of different percentages, varied particle sizes and the coexistent properties of both metals (copper and nickel or copper and cobalt) [7-11]. Nickel is completely mixed with copper and the resulting alloy only contains one phase in any ratio. The most important property of nickel-copper alloy is the variation in the thermal expansion of the alloy with the amount of nickel, making it possible to make alloys with defined and precise thermal expansion. The presence of nickel in copper-nickel alloy increases the hardness which maintains even at high temperatures [12-14].

Cu-Ni and Cu-Co BNPs not only possess the combined properties associated with the presence of both copper and nickel and copper and cobalt in the mixture, but also it is expected that this composition can induce new chemical, biological, mechanical, and thermal properties, due to the correlation between the metals in the binary mixture. Binary nanoparticles (BNPs) are generally nano-sized multi-purpose materials which are used in various applications. In fact, application of these materials can

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A Metal-organic Framework with Paddle-wheel $Zn_2(CO_2)_4$ Secondary Building Units and Cubane-1,4-dicarboxylic Acid Linkers

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Abstract

A new crystal structure of catena-(bis((μ$_4$-cubane-1,4-dicarboxylato)-(N-methyl-2-pyrrolidone)-zinc(II)) N-methyl-2-pyrrolidone solvate) (**1**) was prepared by solvothermal method. The crystal structure of the compound was analyzed by single-crystal X-ray diffraction. It has a $P\bar{1}$ space group, with lattice parameters a = 10.7190(4) Å, b = 10.8245(5) Å, c = 10.8403(8) Å, α = 80.291(5)°, β = 70.0015(5)°, y = 77.531(4)°, V = 1147.97(12) Å^3. The secondary building units of **1** consist of 2 central Zn ions, coordinated by 4 carboxylate groups in a bis-monodentate way, forming a square planar configuration of $Zn_2(CO_2)_4$, known as paddle-wheel units. The paddle-wheels are connected by cubane-1,4-dicarboxylic acid linkers at the edges, resulting in a two-dimensional coordination polymer with a square lattice (**sql**) underlying network topology. The axial sites of the zinc atoms are occupied by N-methyl-2-pyrrolidone molecules. In this new crystal structure the two-dimensional polymer planes are interstacked by weak dispersion bonds. The axial N-methyl-2-pyrrolidone solvent molecules determine the distances of planar polymer planes. The thermal properties of this new structure were studied by thermogravimetry/mass spectrometry in inert atmosphere. It was found, that the organic linkers in the framework structure do not decompose below 200 °C. The stochiometry of the activated compound is $Zn_2[C_8H_6(COO)_2]_2(C_5H_9NO)_2$, as determined by thermogravimetry in oxidative atmosphere.

Keywords

metal-organic frameworks, cubane, reticular chemistry, single-crystal X-ray diffraction, thermogravimetry/mass spectrometry

1 Introduction

Metal-organic frameworks are porous coordination polymers with crosslinks [1]. Multifunctional linkers, for example carboxylates can form strong covalent-like multidentate bonding with the metal centers, resulting in robust coordination polymer structures with high thermal stability [2, 3]. In the crystalline MOF structures, the rigid, metal-containing clusters, the so-called secondary building units (SBUs) at the vertices are interconnected by organic linkers. The most important metal-organic framework is MOF-5 [2], which builds up from $Zn_4O(CO_2)_6$ SBUs at the nodes and terephthalate linkers at the edges. Since the discovery of MOF-5 more than 20000 MOF structures were reported [3]. The combination of hundreds of SBUs and thousands of organic linkers led to discover of thousands of new MOF structures each year. Metal-organic-frameworks are typically microporous compounds with exceptional high porosity and surface area enabling many potential industrial applications, for example gas-storage, heterogeneous catalysis, molecular separation, molecular sensing or drug delivery. For a common description of the family of MOFs, Yaghi and coworkers introduced the principle of reticular chemistry based on the design of topology of framework structures [4]. For example, MOF-5 has $Zn_4O(CO_2)_6$ SBUs with six points of extension (carboxylate groups) and ditopic terephtalate linkers, so MOF-5 has a 6-c primitive cubic (**pcu**) underlying topology with

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