

DAFTAR PUSTAKA

- Andianto. (2011). *Di dalam digester biogas tipe aliran kontinyu skripsi*.
Universitas Indonesia.
- Bhattacharya, S. C., Bhatia, R., Islam, M. N., & Shah, N. (1985). Densified biomass in Thailand: Potential, status and problems. *Biomass*, 8(4), 255–266.
[https://doi.org/10.1016/0144-4565\(85\)90058-7](https://doi.org/10.1016/0144-4565(85)90058-7)
- bps.go.id. (2015). *Badan Pusat Statistik* (p. 1). bps.go.id
- Budi, L., & Marzuki, A. (2015). *Kajian Termodinamika Biogas Berbahan Dasar Kotoran Sapi*. 2–5.
- Deublein, D., Editors, A. S., Gmbh, W. V., & Kгаа, C. (2008). *Book Review BIOGAS FROM WASTE AND RENEWABLE RESOURCES An introduction*. 7(4), 483–485.
- Dinas Pekerjaan Umum, K. S., Widodo, T. W., Asari, A., Elita, A. N., Sudradjat, R., Febriyanita, W., Syair, S. N., Fyadlon, A., Sofya, A., Yulistiani, F., Denitasari, N. A., Luditama, C., Wirandika, W., Nurdiana, W., Yayah Yuliah, Sri Suryaningsih, K. U., Liberto Pratama Arizandy, R., Murfihenni, W., Hermawan, D., Agustri, W., ... Armia, Y. (2015). Pengembangan Biogas Dalam Rangka Pemanfaatan Energi Terbarukan Di Desa Jetak Kecamatan Getasan Kabupaten Semarang. *Skripsi*, 2(2), 1–13.
- Edition, S., & Four, V. (2010). *Bergey's Manual of Systematic Bacteriology* second edition. In *Springer-Verlag New York Inc*.
<https://doi.org/10.1007/978-0-387-68572-4>
- Ghazali, A. M., Ubaid, A., Wardhana, A. R., Masud, I., Mohammad, J., Ma'afi,

- M., Wahid, M., & Budiarto, R. (2017). *FIKIH ENERGI TERBARUKAN Pandangan dan Respons Islam atas Pembangkit Listrik Tenaga Surya (PLTS)*.
- Gunawan, D. (2013). *Produksi Biogas sebagai Sumber Energi Alternatif dari Kotoran Sapi*. 1(2), 1–3.
- Harihastuti, N., & Diponegoro, U. (2014). *Study of Activated Carbon and Zeolite Integrated Application*. 65–72.
- Hendrison, dkk. (2003). *Untung Rugi Indonesia Meratifikasi Protokol Kyoto Ditinjau Dari Sektor Energi*. 14–15.
- Kavuma, C. (2013). Variation of Methane and Carbon dioxide Yield in a biogas plant. *Department of Energy Technology, MSc*, 46. <http://www.diva-portal.org/smash/get/diva2:604559/FULLTEXT02>
- Khalid, A., & Naz, S. (2013). Isolation and Characterization of Microbial Community in Biogas Production from Different Commercially Active Fermentors in Different Regions of Gujranwala. *International Journal of Water Resources and Environmental Sciences*, 2(2), 28–33.
<https://doi.org/10.5829/idosi.ijwres.2013.2.2.11124>
- Kimia, J. T., Teknik, F., Diponegoro, U., Soedarto, J. P., & Fax, T. (2006). *MELALUI PROSES HIDROLISA ASAM DAN ENZIMATIS Nopita Hikmiyati dan Noviea Sandrie Yanie*. 024, 2–6.
- Kurniawan, B. (2017). *PRODUKSI BIOGAS DAN PUPUK ORGANIK CAIR DARI CAMPURAN AIR LIMBAH PABRIK KELAPA SAWIT DAN KOTORAN SAPI*.

- Kurniawan, B. (2018). *PRODUKSI BIOGAS DAN PUPUK ORGANIK CAIR DARI CAMPURAN AIR LIMBAH PABRIK KELAPA SAWIT DAN KOTORAN SAPI*. 14–15.
- Maryani, S. (2016). Potensi Campuran Sampah Sayur Dan Kotoran Sapi Sebagai Penghasil Biogas. *Jurusan Biologi. Fakultas Sains Dan Teknologi .Universitas Islam Negeri Maulana Malik Ibrahim Malang*, 2–126.
- Moch, Krisno, A. (2014). *Instalasi Biogas Kotoran Sapi* (I. Azizah, Nurul (Ed.)). UPT PENERBITAN UNIVERSITAS MUHAMMADIYAH MALANG.
- Muhiddin, N. H., Juli, N., & Aryantha, I. N. P. (2001). Peningkatan Kandungan Protein Kulit Ubi Kayu Melalui Proses Fermentasi. *Jms*, 6(1), 1–12.
- Ode, W. A., & Verlina, V. (2014). *Potensi arang aktif tempurung kelapa sebagai adsorben emisi gas co, no, dan no. x*.
- Rahmawati, A. (2010). PEMANFAATAN LIMBAH KULIT UBI KAYU (Manihot utilissima Pohl.) DAN KULIT NANAS (Ananas comosus L.) PADA PRODUKSI BIOETANOL MENGGUNAKAN *Aspergillus niger*. *JURUSAN BIOLOGI FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM UNIVERSITAS SEBELAS MARET SURAKARTA*, 9(1), 76–99.
- Regulatory Toxicology and Pharmacology (2001) 33: 173-186. (2001). *Regulatory Toxicology and Pharmacology*, 16, 1–10.
- Said, I., & Abram, P. H. (2016). *Erna, Said, I., & Abram, P. H. 2016. 5(August)*, 121–126.
- Sanjaya, D., & Haryanto, A. (2015). Produksi Biogas Dari Campuran Kotoran

- Sapi Dengan Kotoran Ayam. *Jurnal Teknik Pertanian Lampung*, 4, 127–136.
- Sumarno, & Saraswati, R. (2008). Pemanfaatan Mikroba Penyubur Tanah srbagai Komponen Teknologi Pertanian. *Iptek Tanaman Pangan*, 3(1), 41–58.
- Sumianto; A. S., Danar; Lukiawan, R. (2013). Kebutuhan Standar dalam Mendukung Pengembangan Sumber Energi Baru (Biogas). *Standardisasi*, 15(1), 9–19.
- Suyitno, Nizam, M., & Darmanto. (2010). Teknologi Biogas. *Teknologi Biogas*, 24. info@grahailmu.co.id
- UNIDO. (2007). *Biomass Conversion Technology On-line Information Platform - Phase I Opportunity study*.
- Wahyuni Sri. (2011). *Menghasilkan Biogas dari Aneka Limbah (Revisi) - Sri Wahyuni, SE. MP - Google Books*. PT AgroMedia Pustaka.
https://books.google.co.id/books?hl=en&lr=&id=g2Q8pF1qD1AC&oi=fnd&pg=PR6&dq=info:VMNgYyiH55UJ:scholar.google.com&ots=ro9uA0z-XK&sig=nyGafMzM0kg8hDLSno5k7BUX-Ow&redir_esc=y#v=onepage&q&f=false
- Widyastuti, F. R., Purwanto, & Hadiyanto. (2013). *Potensi Biogas melalui Pemanfaatan Limbah Padat pada Peternakan Sapi Perah Bangka Botanical Garden Pangkalpinang*. 9(2), 19–26. <http://www.psil.undip.ac.id>

LAMPIRAN

Lampiran 1. Hasil Data Pencacatan Penelitian selama 20 hari

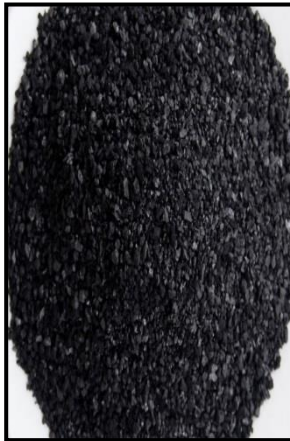
No.	Hari	Waktu	Perlakuan					
			Kotoran Sapi + Air		Kotoran sapi + Air + Kulit singkong		Kotoran sapi + Air + Kulit singkong + filter	
			Temperatur (°C)	Tekanan (psi)	Temperatur (°C)	Tekanan (psi)	Temperatur (°C)	Tekanan (psi)
1	1	06,00	25	0	26	0	26	0
2		12,00	29	0	30	0	30	0
3		18,00	29	0	29	0	29	0
4	2	06,00	25	0	25	1	25	1
5		12,00	30	0	30	5	30	5
6		18,00	29	0	30	11	30	11
7	3	06,00	26	0	27	9	27	9
8		12,00	30	0	31	12	31	11.5
9		18,00	29	0	31	15	31	15
10	4	06,00	25	0	27	4	26	4.5
11		12,00	29	0	30	7.5	30	8
12		18,00	30	0	31	12	31	12
13	5	06,00	26	0	26	16	26	16
14		12,00	30	0	31	12	31	12
15		18,00	31.5	0	31	15	31	15

16	6	06,00	25	0	26	7	26	7
17		12,00	30	0	30	0	30	8
18		18,00	31	0	31	2	31	8.5
19	7	06,00	25	0	27	4	26	10.5
20		12,00	28	0	31	6.5	30	12
21		18,00	29	0	32	8	31	14
22	8	06,00	26	1	27	11	27	4
23		12,00	30	1	32	12	31.5	7
24		18,00	31	1.5	31	13.5	31	8.5
25	9	06,00	27	2.5	26	15	26	10
26		12,00	31.5	3	32	16	32	11
27		18,00	30	3	30.5	17.5	30	12.5
28	10	06,00	25	4	26	9	26	13
29		12,00	28	4.6	29	9	29	13
30		18,00	29	5	29	10	29	14
31	11	06,00	26	0	26	4	26	5
32		12,00	29	0	30	6	30	6.5
33		18,00	29	0.7	29	6	30	7
34	12	06,00	25	1	25	7.5	25	7.5
35		12,00	28	1.5	29	8	29	7.5
36		18,00	29	1.8	29	8	29	8
37	13	06,00	25	2	26	7.5	26	9
38		12,00	30	2.2	30	8	29	9

39		18,00	29	2.7	30	8	30	9
40	14	06,00	25	3.4	26	8	26	8
41		12,00	29	2	30	8	30	8
42		18,00	29	2.4	29	8	29	8
43	15	06,00	26	3.5	27	7.5	27	8
44		12,00	30	3.5	31	8	31	8
45		18,00	30	3.8	31	8	31	8
46	16	06,00	25	0	26	2	26	2
47		12,00	30	0	30	3	30	3
48		18,00	30	0.6	29	4	29	4
49	17	06,00	25	1.4	26	4	26	4
50		12,00	29	2.1	29	4	29	4
51		18,00	29	2.8	29	4	29	4
52	18	06,00	26	3.7	26	4	26	4
53		12,00	29	4.2	30	4	30	4
54		18,00	30	4.4	30	4	30	4
55	19	06,00	25	3.8	26	4	26	4
56		12,00	29	3.8	30	4	30	4
57		18,00	29	3.6	31	4	31	4
58	20	06,00	26	3.5	26	4	26	4
59		12,00	30	3.5	31	4	31	4
60		18,00	29	3.5	30	4	30	4

Lampiran 2. Menyiapkan Alat dan Bahan





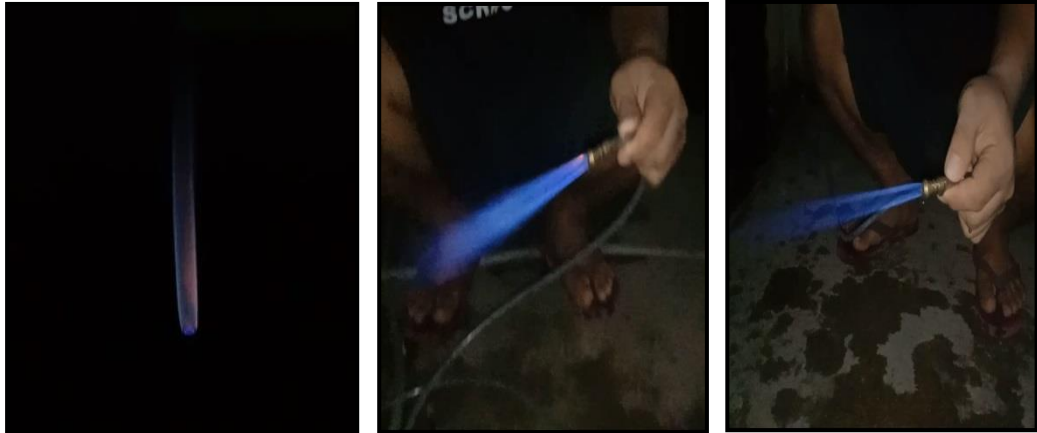
Lampiran 3. Dokumentasi Pengerjaan Alat



Lampiran 4. Dokumentasi Pengujian Aliran Biogas



Lampiran 5. Dokumentasi Nyala Api Biogas



Lampiran 6. Kandungan Gas dari Hasil Penelitian dengan Perlakuan Berbeda

- Perlakuan dengan campuran kotoran sapi dan air bersih (Gas Kode A1).

GAS KODE A1					
GasVision				Dräger	
Instrument type	X-am 7000		Serial number	ARHF0321	
Time interval	10/30/2019 8:20:11 PM – 10/30/2019 8:26:51 PM				
DL setting	Avg.	Location	1	Personal ID	PERSONAL-ID
	ch4		O2	CO	SO2
Sensor type	HPP-IR		EC	EC	EC
Serial number	ARHE0046		ARHE0110	ARHE0116	ARHE0020
Part number	6810460		6809130	6809105	6809160
Cal. Date	7/27/2016		7/27/2016	7/27/2016	7/27/2016
Meas. Range	100.00 %LEL		25.00 Vol%	2000.00 ppm	20.00 ppm
A1 setting	20.00 %LEL		19.00 Vol%	30.00 ppm	2.00 ppm
A2 setting	40.00 %LEL		23.00 Vol%	60.00 ppm	4.00 ppm
Date	time	ch4	O2	CO	SO2
10/30/2019	8:20:11 PM	0.000	20.89	0.000	0.000
10/30/2019	8:20:21 PM	0.000	20.89	0.000	0.000
10/30/2019	8:20:31 PM	0.000	20.89	0.000	0.000
10/30/2019	8:20:41 PM	0.000	20.89	0.000	0.000
10/30/2019	8:20:51 PM	0.000	20.89	0.000	0.000
10/30/2019	8:21:02 PM	Pump on(2,255)			
10/30/2019	8:21:11 PM	0.000	20.89	0.000	0.000
10/30/2019	8:21:21 PM	0.000	20.89	0.000	0.000
10/30/2019	8:21:31 PM	0.000	20.89	0.000	0.000
10/30/2019	8:21:41 PM	0.000	20.89	0.000	0.000
10/30/2019	8:21:51 PM	0.000	20.89	0.000	0.000
10/30/2019	8:22:01 PM	0.000	20.89	0.000	0.000
10/30/2019	8:22:11 PM	0.000	20.89	0.000	0.000
10/30/2019	8:22:21 PM	0.000	20.89	0.000	0.000
10/30/2019	8:22:31 PM	0.000	20.89	0.000	0.000
10/30/2019	8:22:41 PM	0.000	20.89	0.000	0.000
10/30/2019	8:22:51 PM	Pump off(2,255)			
10/30/2019	8:23:03 PM	Pump on(2,255)			
10/30/2019	8:23:11 PM	0.000	20.89	0.000	0.000
10/30/2019	8:23:21 PM	0.000	20.89	0.000	0.000
10/30/2019	8:23:31 PM	0.000	20.89	0.000	0.000
10/30/2019	8:23:41 PM	5.300	20.89	0.000	0.000
10/30/2019	8:23:44 PM	Alarm A1 on (3,0)			
10/30/2019	8:23:46 PM	Alarm A2 on (3,0)			
10/30/2019	8:23:51 PM	76.86	20.81	0.000	0.000
10/30/2019	8:24:01 PM	89.09	20.79	0.000	0.000
10/30/2019	8:24:11 PM	59.68	20.74	0.000	0.000
10/30/2019	8:24:12 PM	Alarm A2 off (3,0)			
10/30/2019	8:24:14 PM	Alarm acknowledged(3,0)			
10/30/2019	8:24:16 PM	Alarm A1 off (3,0)			
10/30/2019	8:24:21 PM	14.30	20.80	0.000	0.000
10/30/2019	8:24:31 PM	10.90	20.86	0.000	0.000
10/30/2019	8:24:41 PM	5.100	20.89	0.000	0.000

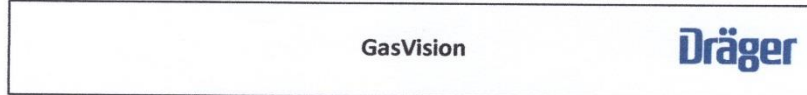
10/30/2019 8:32:03 PM

1 (X-am 7000 ARHF0321 30 10 2019.txt)

10/30/2019	8:24:51 PM	4.400		20.89	0.000	0.000
10/30/2019	8:25:01 PM	3.100		20.89	0.000	0.000
10/30/2019	8:25:11 PM	2.000		20.89	0.000	0.000
10/30/2019	8:25:21 PM	0.900		20.89	0.000	0.000
10/30/2019	8:25:31 PM	0.320		20.89	0.000	0.000
10/30/2019	8:25:41 PM	0.100		20.89	0.000	0.000
10/30/2019	8:25:51 PM	0.000		20.89	0.000	0.000
10/30/2019	8:25:54 PM	Pump off(2,255)				
10/30/2019	8:26:01 PM	0.000		20.89	0.000	0.000
10/30/2019	8:26:11 PM	0.000		20.89	0.000	0.000
10/30/2019	8:26:21 PM	0.000		20.89	0.000	0.000
10/30/2019	8:26:31 PM	0.000		20.89	0.000	0.000
10/30/2019	8:26:41 PM	0.000		20.89	0.000	0.000
10/30/2019	8:26:51 PM	0.000		20.89	0.000	0.000

- Perlakuan dengan campuran kotoran sapi, air bersih dan katalis kulit singkong (Gas Kode A2).

GAS KODE A.2



Instrument type	X-am 7000		Serial number	ARHF0321	
Time interval	10/30/2019 8:30:00 PM – 10/30/2019 8:35:50 PM				
DL setting	Avg.	Location	1	Personal ID	PERSONAL-ID

	ch4		O2	CO	SO2
Sensor type	HPP-IR		EC	EC	EC
Serial number	ARHE0046		ARHE0110	ARHE0116	ARHE0020
Part number	6810460		6809130	6809105	6809160
Cal. Date	7/27/2016	7/27/2016	7/27/2016	7/27/2016	7/27/2016
Meas. Range	100.00 %LEL		25.00 Vol%	2000.00 ppm	20.00 ppm
A1 setting	20.00 %LEL		19.00 Vol%	30.00 ppm	2.00 ppm
A2 setting	40.00 %LEL		23.00 Vol%	60.00 ppm	4.00 ppm

Date	time	ch4		O2	CO	SO2
10/30/2019	8:30:00 PM	0.000		20.89	0.000	0.000
10/30/2019	8:30:10 PM	0.000		20.89	0.000	0.000
10/30/2019	8:30:20 PM	0.000		20.89	0.000	0.000
10/30/2019	8:30:30 PM	0.000		20.89	0.000	0.000
10/30/2019	8:30:40 PM	0.000		20.89	0.000	0.000
10/30/2019	8:30:50 PM	0.000		20.89	0.000	0.000
10/30/2019	8:31:00 PM	0.000		20.89	0.000	0.000
10/30/2019	8:31:10 PM	0.000		20.89	0.000	0.000
10/30/2019	8:31:20 PM	0.000		20.89	0.000	0.000
10/30/2019	8:31:30 PM	Pump on(2,255)				
10/30/2019	8:31:40 PM	0.000		20.89	0.000	0.000
10/30/2019	8:31:50 PM	0.000		20.89	0.000	0.000
10/30/2019	8:31:00 PM	6.500		20.89	0.000	0.000
10/30/2019	8:32:10 PM	Alarm A1 on (3,0)				
10/30/2019	8:32:12 PM	Alarm A2 on (3,0)				
10/30/2019	8:32:20 PM	95.06		20.88	0.000	0.000
10/30/2019	8:32:30 PM	112.18		20.77	0.000	0.000
10/30/2019	8:32:40 PM	122.01		20.70	0.000	0.000
10/30/2019	8:32:50 PM	101.76		20.72	0.000	0.000
10/30/2019	8:33:03 PM	Alarm A2 off (3,0)				
10/30/2019	8:33:05 PM	Alarm acknowledged(3,0)				
10/30/2019	8:33:06 PM	Alarm A1 off (3,0)				
10/30/2019	8:33:07 PM	Alarm acknowledged(3,0)				
10/30/2019	8:33:10 PM	34.10		20.79	0.000	0.000
10/30/2019	8:33:20 PM	20.31		20.84	0.000	0.000
10/30/2019	8:33:30 PM	15.10		20.89	0.000	0.000
10/30/2019	8:33:40 PM	8.400		20.89	0.000	0.000
10/30/2019	8:33:50 PM	4.400		20.89	0.000	0.000
10/30/2019	8:34:00 PM	3.000		20.89	0.000	0.000
10/30/2019	8:34:10 PM	2.130		20.89	0.000	0.000
10/30/2019	8:34:20 PM	1.320		20.89	0.000	0.000
10/30/2019	8:34:30 PM	0.560		20.89	0.000	0.000
10/30/2019	8:34:40 PM	0.100		20.89	0.000	0.000

10/30/2019 8:46:00 PM

1 (X-am 7000 ARHF0321 30 10 2019.txt)

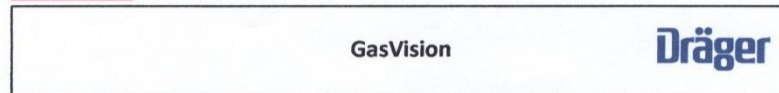
10/30/2019	8:34:50 PM	0.000		20.89	0.000	0.000
10/30/2019	8:35:00 PM	0.000		20.89	0.000	0.000
10/30/2019	8:35:10 PM	0.000		20.89	0.000	0.000
10/30/2019	8:35:20 PM	0.000		20.89	0.000	0.000
10/30/2019	8:35:30 PM	Pump off(2,255)				
10/30/2019	8:35:40 PM	0.000		20.89	0.000	0.000
10/30/2019	8:35:50 PM	0.000		20.89	0.000	0.000

10/30/2019 8:46:00 PM

2 (X-am 7000 ARHF0321 30 10 2019.txt)

- Perlakuan dengan campuran kotoran sapi, air bersih dan katalis kulit singkong serta penambahan tabung purifikator arang aktif (Gas Kode A3).

GAS KODE A.3



Instrument type	X-am 7000		Serial number	ARHF0321	
Time interval	10/30/2019 8:40:00 PM – 10/30/2019 8:47:00 PM				
DL setting	Avg.	Location	1	Personal ID	PERSONAL-ID

	ch4	O2	CO	SO2
Sensor type	HPP-IR	EC	EC	EC
Serial number	ARHE0046	ARHE0110	ARHE0116	ARHE0020
Part number	6810460	6809130	6809105	6809160
Cal. Date	7/27/2016	7/27/2016	7/27/2016	7/27/2016
Meas. Range	100.00 %LEL	25.00 Vol%	2000.00 ppm	20.00 ppm
A1 setting	20.00 %LEL	19.00 Vol%	30.00 ppm	2.00 ppm
A2 setting	40.00 %LEL	23.00 Vol%	60.00 ppm	4.00 ppm

Date	time	ch4	O2	CO	SO2
10/30/2019	8:40:00 PM	0.000	20.89	0.000	0.000
10/30/2019	8:40:10 PM	0.000	20.89	0.000	0.000
10/30/2019	8:40:20 PM	0.000	20.89	0.000	0.000
10/30/2019	8:40:30 PM	0.000	20.89	0.000	0.000
10/30/2019	8:40:40 PM	0.000	20.89	0.000	0.000
10/30/2019	8:40:50 PM	0.000	20.89	0.000	0.000
10/30/2019	8:41:00 PM	0.000	20.89	0.000	0.000
10/30/2019	8:41:10 PM	0.000	20.89	0.000	0.000
10/30/2019	8:41:20 PM	0.000	20.89	0.000	0.000
10/30/2019	8:41:30 PM	0.000	20.89	0.000	0.000
10/30/2019	8:41:40 PM	0.000	20.89	0.000	0.000
10/30/2019	8:41:50 PM	0.000	20.89	0.000	0.000
10/30/2019	8:42:00 PM	0.000	20.89	0.000	0.000
10/30/2019	8:42:11 PM	Pump on(2,255)			
10/30/2019	8:42:20 PM	0.000	20.89	0.000	0.000
10/30/2019	8:42:30 PM	7.200	20.89	0.000	0.000
10/30/2019	8:42:41 PM	Alarm A1 on (3,0)			
10/30/2019	8:42:53 PM	Alarm A2 on (3,0)			
10/30/2019	8:43:00 PM	115.00	20.75	0.000	0.000
10/30/2019	8:43:10 PM	160.07	20.10	0.000	0.000
10/30/2019	8:43:20 PM	123.56	20.47	0.000	0.000
10/30/2019	8:43:23 PM	Alarm A2 off (3,0)			
10/30/2019	8:43:26 PM	Alarm A1 off (3,0)			
10/30/2019	8:43:30 PM	54.11	20.79	0.000	0.000
10/30/2019	8:43:33 PM	Alarm acknowledged(3,0)			
10/30/2019	8:43:40 PM	31.03	20.85	0.000	0.000
10/30/2019	8:43:50 PM	17.16	20.89	0.000	0.000
10/30/2019	8:44:00 PM	12.44	20.89	0.000	0.000
10/30/2019	8:44:10 PM	9.960	20.89	0.000	0.000
10/30/2019	8:44:20 PM	7.700	20.89	0.000	0.000
10/30/2019	8:44:30 PM	4.670	20.89	0.000	0.000
10/30/2019	8:44:40 PM	2.220	20.89	0.000	0.000
10/30/2019	8:44:50 PM	1.540	20.89	0.000	0.000

10/30/2019 8:51:00 PM

1 (X-am 7000 ARHF0321 30 10 2019.txt)

10/30/2019	8:45:00 PM	1.100		20.89	0.000	0.000
10/30/2019	8:45:10 PM	0.400		20.89	0.000	0.000
10/30/2019	8:45:20 PM	0.000		20.89	0.000	0.000
10/30/2019	8:45:30 PM	0.000		20.89	0.000	0.000
10/30/2019	8:45:40 PM	0.000		20.89	0.000	0.000
10/30/2019	8:45:52 PM	Pump off(2,255)				
10/30/2019	8:46:00 PM	0.000		20.89	0.000	0.000
10/30/2019	8:46:10 PM	0.000		20.89	0.000	0.000
10/30/2019	8:46:20 PM	0.000		20.89	0.000	0.000
10/30/2019	8:46:30 PM	0.000		20.89	0.000	0.000
10/30/2019	8:46:40 PM	0.000		20.89	0.000	0.000
10/30/2019	8:46:50 PM	0.000		20.89	0.000	0.000
10/30/2019	8:47:00 PM	0.000		20.89	0.000	0.000

Lampiran 7. Data sekunder untuk menentukan kandungan gas

Day 10								
sample	Temp °C	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Balance (%)	CO (ppm)	H ₂ (ppm)	H ₂ S (ppm)
A1	26	36.5	23.2	1.1	39.2	2	low	6
A2	26	34.6	22.7	1.1	41.6	1	low	4
A3	26	34.2	31.5	1.1	33.2	4	low	249
B1	26	51.4	27.1	2.8	18.7	3	low	1
B2	26	49.0	32.5	0.9	17.6	4	low	276
B3	26	50.8	32.7	0.5	16.0	4	low	232
C1	26	45.4	32.4	0.5	21.7	3	low	>>
C2	26	48.1	29.3	0.5	22.1	3	low	>>
C3	26	39.7	29.4	0.4	30.5	3	low	>>

Table 2- 3: Biogas composition (Rakican, 2007)

Gas component	Concentration range	Mean value
Methane (CH ₄)	45 - 70%	60%
Carbon dioxide (CO ₂)	25 - 55%	35%
Water vapour	0 - 10%	3-10%
Nitrogen (N ₂)	0.01 – 5%	1%
Oxygen (O ₂)	0.01 – 2%	0.3%
Hydrogen (H ₂)	0 - 1%	<1%
Ammonia (NH ₃)	0.01 - 2.5 mg/m ³ _n	0.7%
Hydrogen sulphide (H ₂ S)	10 - 30000 mg/m ³ _n	<500mg/m ³ _n