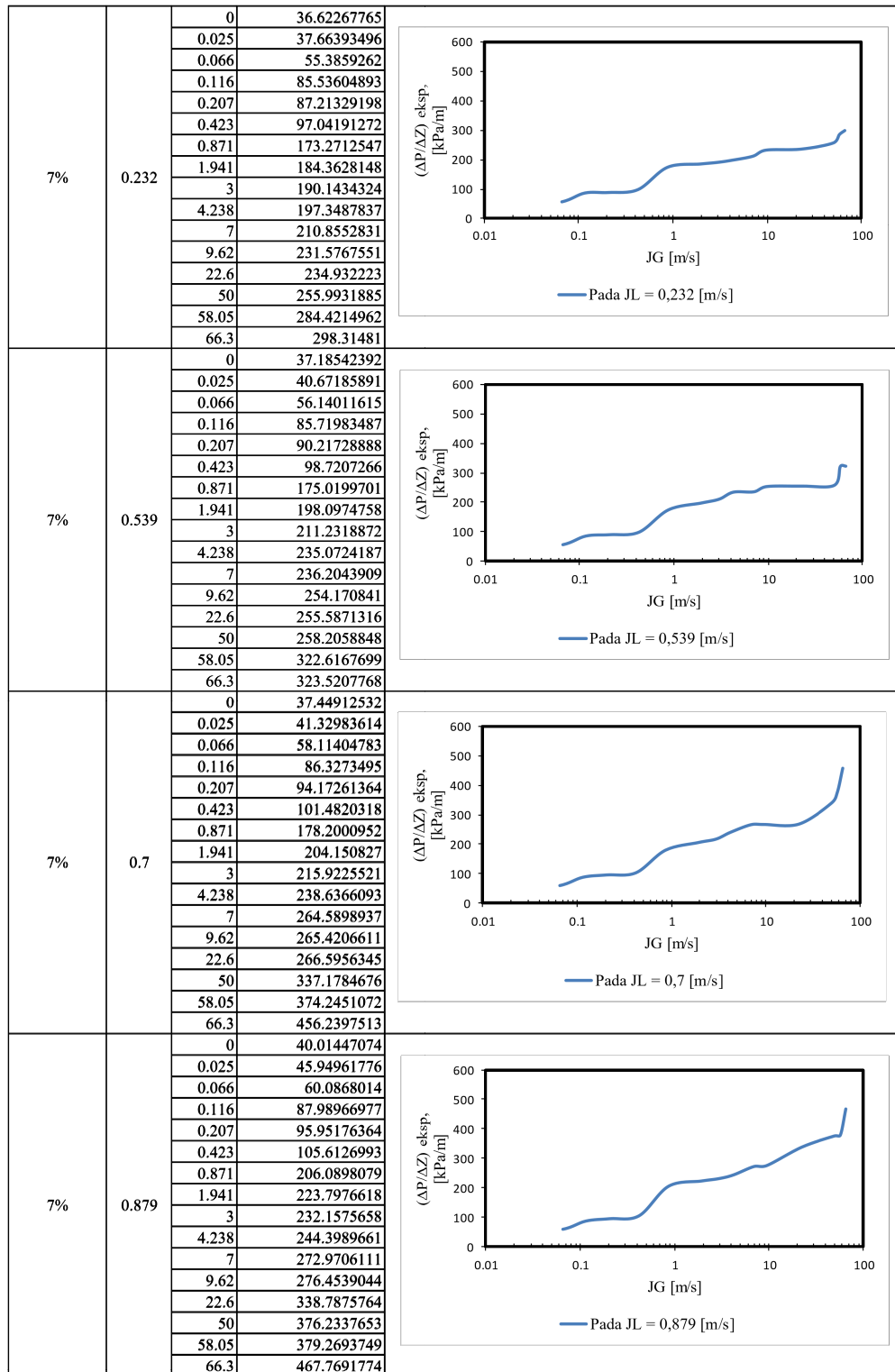
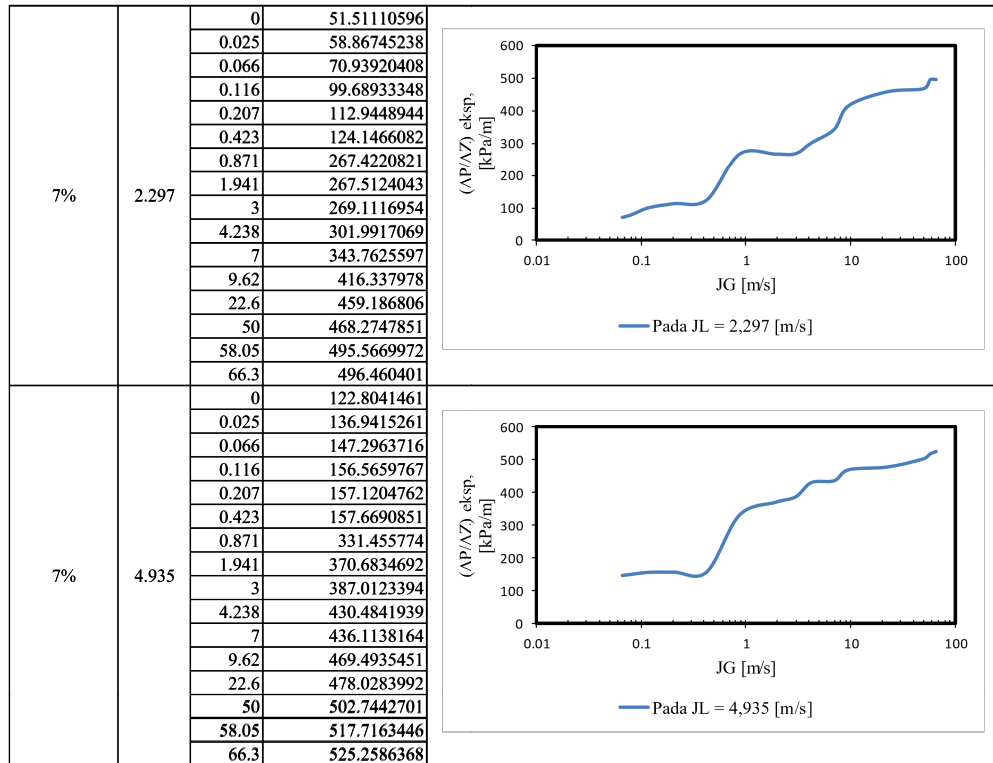


## LAMPIRAN

Lampiran 1 Tabel Variasi Kecepatan Superfisial *Gas* ( $J_G$ ) Terhadap Gradien Tekanan Pada Butanol 7%

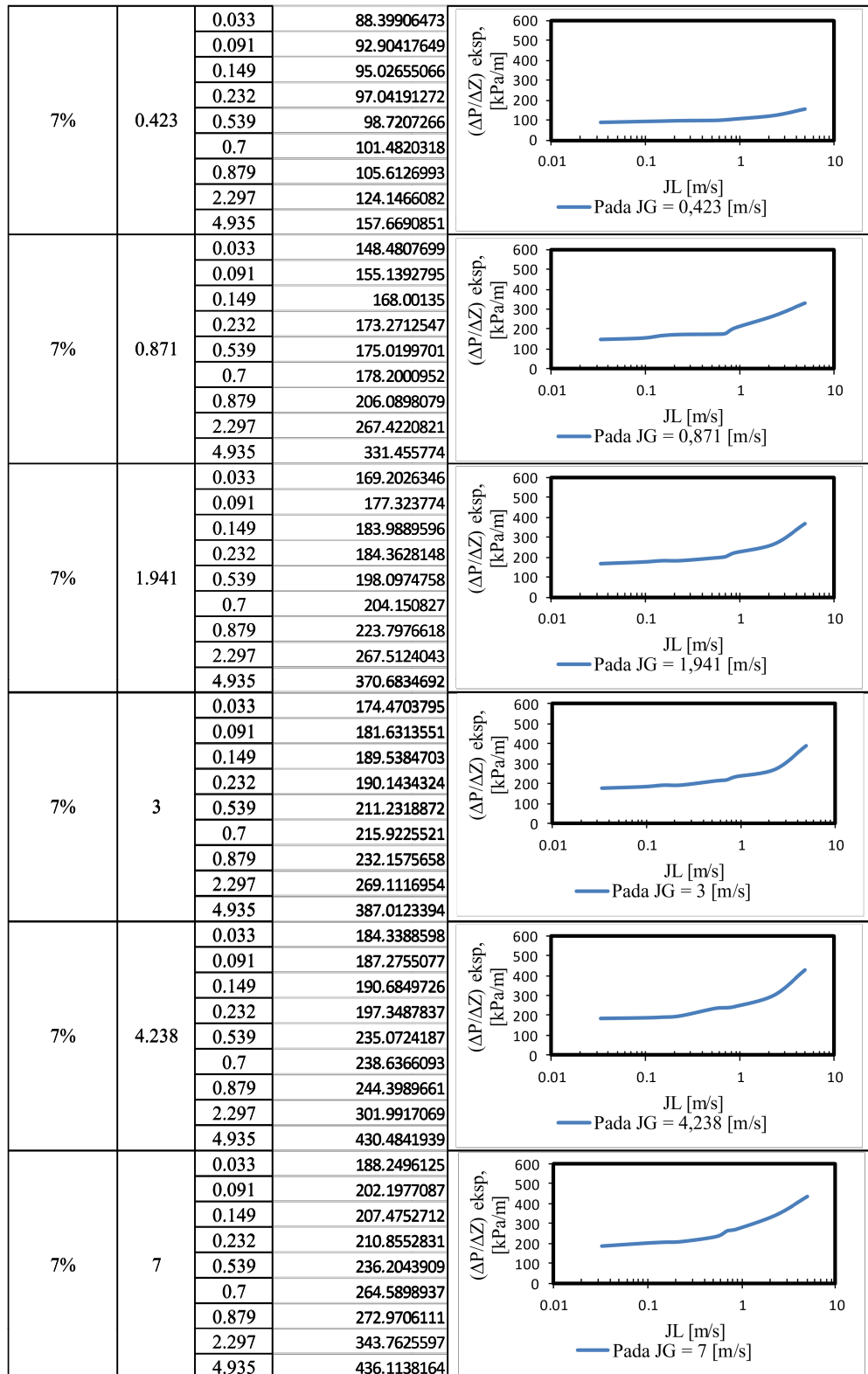
Butanol	JL (m/s)	JG (m/s)	$\Delta P/\Delta Z$ (kPa/m)	Grafik
7%	0.033	0	34.29511512	
		0.025	35.61499662	
		0.066	54.31639413	
		0.116	80.18701412	
		0.207	86.81037665	
		0.423	88.39906473	
		0.871	148.4807699	
		1.941	169.2026346	
		3	174.4703795	
		4.238	184.3388598	
		7	188.2496125	
		9.62	197.758375	
		22.6	213.4630407	
		50	221.1380672	
		58.05	224.8673902	
66.3	249.1550164			
7%	0.091	0	35.62775953	
		0.025	36.11000127	
		0.066	55.00834034	
		0.116	82.67126595	
		0.207	86.94585988	
		0.423	92.90417649	
		0.871	155.1392795	
		1.941	177.323774	
		3	181.6313551	
		4.238	187.2755077	
		7	202.1977087	
		9.62	225.014851	
		22.6	227.6145581	
		50	233.9221858	
		58.05	249.7790246	
66.3	254.795831			
7%	0.149	0	36.12747665	
		0.025	36.74225632	
		0.066	55.07608195	
		0.116	83.18983291	
		0.207	86.97747263	
		0.423	95.02655066	
		0.871	168.00135	
		1.941	183.9889596	
		3	189.5384703	
		4.238	190.6849726	
		7	207.4752712	
		9.62	228.1584545	
		22.6	230.8724387	
		50	234.2797437	
		58.05	263.5093659	
66.3	274.0652763			

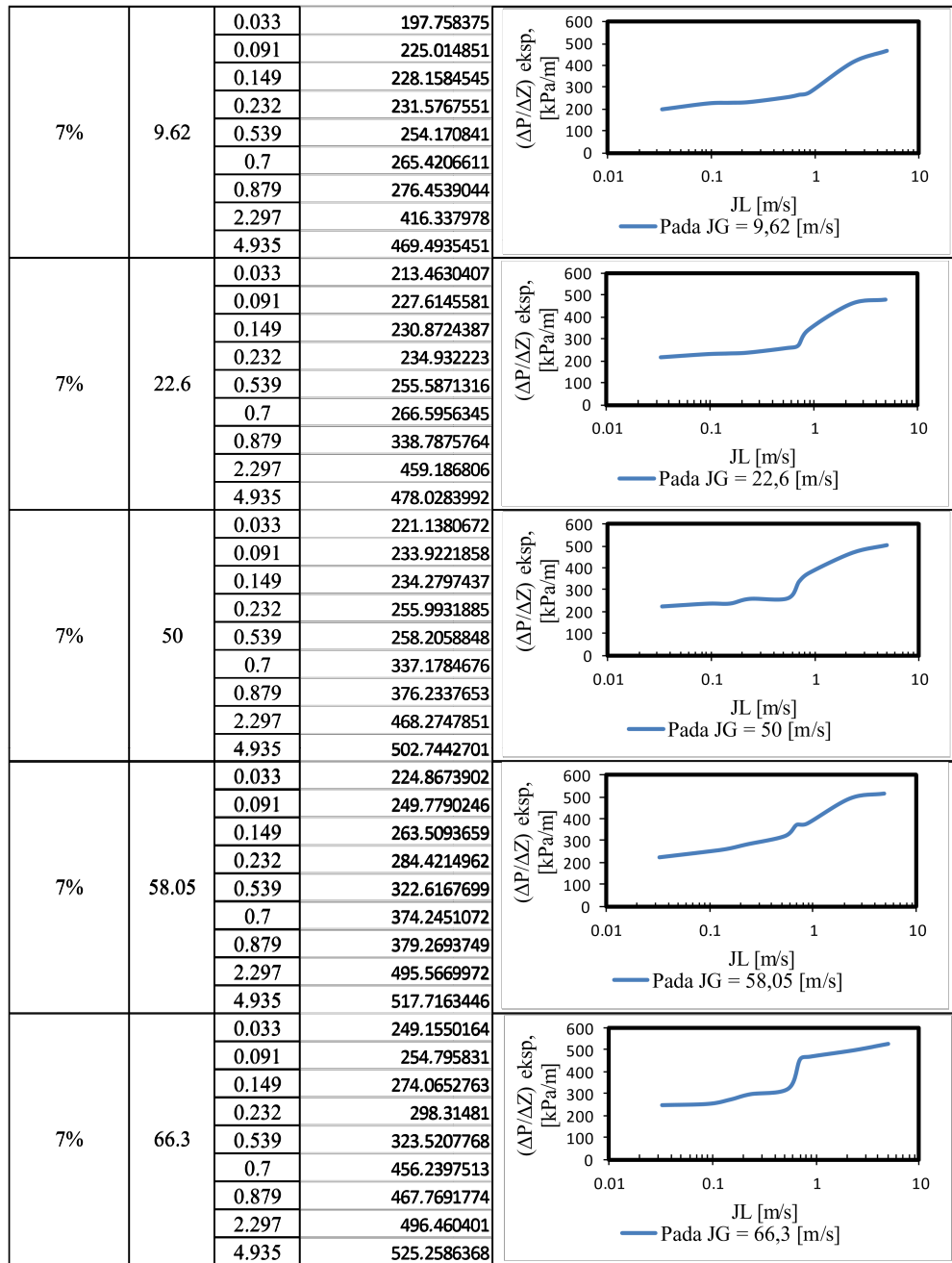




Lampiran 2 Tabel Variasi Kecepatan Superfisial cairan ( $J_L$ ) Terhadap Gradien Tekanan Pada Butanol 7%

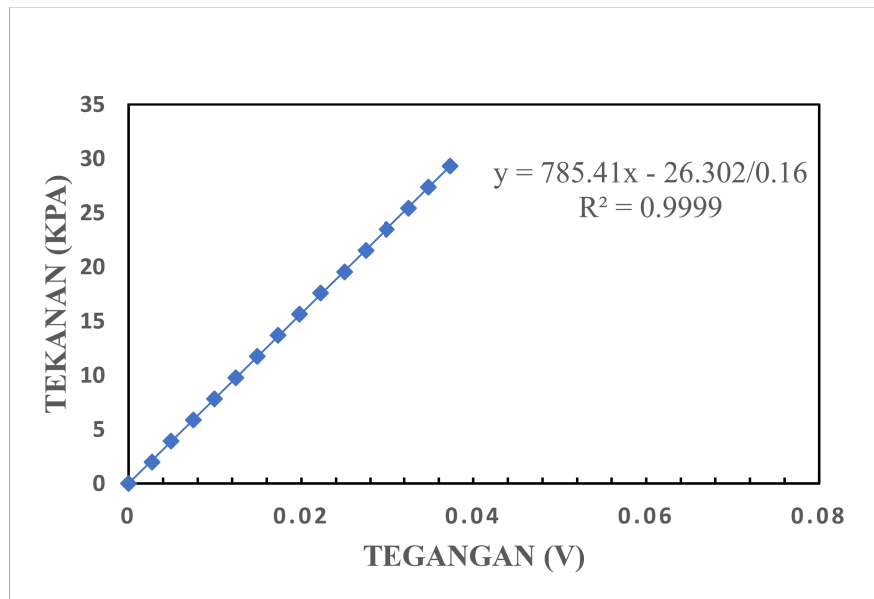
Butanol	JG (m/s)	$J_L$ (m/s)	$\Delta P/\Delta Z$ (kPa/m)	Grafik
7%	0	0.033	34.29511512	<p>Pada JG = 0 [m/s]</p>
		0.091	35.62775953	
		0.149	36.12747665	
		0.232	36.62267765	
		0.539	37.18542392	
		0.7	37.44912532	
		0.879	40.01447074	
		2.297	51.51110596	
		4.935	122.8041461	
7%	0.025	0.033	35.61499662	<p>Pada JG = 0,025 [m/s]</p>
		0.091	36.11000127	
		0.149	36.74225632	
		0.232	37.66393496	
		0.539	40.67185891	
		0.7	41.32983614	
		0.879	45.94961776	
		2.297	58.86745238	
		4.935	136.9415261	
7%	0.066	0.033	54.31639413	<p>Pada JG = 0,066 [m/s]</p>
		0.091	55.00834034	
		0.149	55.07608195	
		0.232	55.3859262	
		0.539	56.14011615	
		0.7	58.11404783	
		0.879	60.0868014	
		2.297	70.93920408	
		4.935	147.2963716	
7%	0.116	0.033	80.18701412	<p>Pada JG = 0,116 [m/s]</p>
		0.091	82.67126595	
		0.149	83.18983291	
		0.232	85.53604893	
		0.539	85.71983487	
		0.7	86.3273495	
		0.879	87.98966977	
		2.297	99.68933348	
		4.935	156.5659767	
7%	0.207	0.033	86.81037665	<p>Pada JG = 0,207 [m/s]</p>
		0.091	86.94585988	
		0.149	86.97747263	
		0.232	87.21329198	
		0.539	90.21728888	
		0.7	94.17261364	
		0.879	95.95176364	
		2.297	112.9448944	
		4.935	157.1204762	





Lampiran 3 Hasil Kalibrasi *Pressure Transducer MPX System*

No	h (m)	Beda Tekanan (Volt)	Tekanan (Pa)	Tekanan (Kpa)	$\rho$ (g/cm <sup>3</sup> )	g (m/s <sup>2</sup> )
1	0	0.033494959	0	0	996	9.81
2	0.2	0.036206748	1954.152	1.954152	996	9.81
3	0.4	0.038415708	3908.304	3.908304	996	9.81
4	0.6	0.04096836	5862.456	5.862456	996	9.81
5	0.8	0.043403393	7816.608	7.816608	996	9.81
6	1	0.045901646	9770.76	9.77076	996	9.81
7	1.2	0.048378447	11724.912	11.724912	996	9.81
8	1.4	0.05076496	13679.064	13.679064	996	9.81
9	1.6	0.053245502	15633.216	15.633216	996	9.81
10	1.8	0.055694268	17587.368	17.587368	996	9.81
11	2	0.058473666	19541.52	19.54152	996	9.81
12	2.2	0.060975207	21495.672	21.495672	996	9.81
13	2.4	0.063400916	23449.824	23.449824	996	9.81
14	2.6	0.065966688	25403.976	25.403976	996	9.81
15	2.8	0.068292817	27358.128	27.358128	996	9.81
16	3	0.070786566	29312.28	29.31228	996	9.81



Lampiran 4 Matriks Pengambilan Data Pola Aliran

JG(ml/menit)	JL(ml/menit)		3,979008	10,97242	17,96582	27,97363	64,99046	84,4032	105,9863	276,9631	595,0426
	JG	JL									
0	0	0	1	2	3	4	5	6	7	8	9
3,0144	0,025	10	10	11	12	13	14	15	16	17	18
7,958016	0,066	19	20	21	22	23	24	25	26	27	27
13,98682	0,116	28	29	30	31	32	33	34	35	36	36
24,95923	0,207	37	38	39	40	41	42	43	44	45	45
51,00465	0,423	46	47	48	49	50	51	52	53	54	54
105,0217	0,871	55	56	57	58	59	60	61	62	63	63
234,038	1,941	64	65	66	67	68	69	70	71	72	72
361,728	3	73	74	75	76	77	78	79	80	81	81
511,0011	4,238	82	83	84	85	86	87	88	89	90	90
844,032	7	91	92	93	94	95	96	97	98	99	99
1159,941	9,620	100	101	102	103	104	105	106	107	108	108
2725,018	22,6	109	110	111	112	113	114	115	116	117	117
6028,8	50	118	119	120	121	122	123	124	125	126	126
6999,437	58,05	127	128	129	130	131	132	133	134	135	135
7994,189	66,3	136	137	138	139	140	141	142	143	144	144



Lampiran 5 Tabel Kecepatan Superfisial Terbentuknya Pola Aliran

No	<i>Annular</i>		<i>Bubbly</i>		<i>Slug annular</i>	
	J <sub>G</sub>	J <sub>L</sub>	J <sub>G</sub>	J <sub>L</sub>	J <sub>G</sub>	J <sub>L</sub>
1	50	0.033	0.025	2.297	1.941	0.033
2	50	0.091	0.025	4.935	1.941	0.091
3	50	0.149	0.066	2.297	1.941	0.149
4	50	0.232	0.066	4.935	1.941	0.232
5	58.05	0.033	0.116	2.297	3	0.149
6	58.05	0.091	0.116	4.935	3	0.232
7	58.05	0.149	0.207	2.297	4.238	0.232
8	58.05	0.232	0.207	4.935	3	0.033
9	66.3	0.033	0.423	2.297	3	0.091
10	66.3	0.091	0.423	4.935	4.238	0.033
11	66.3	0.149	0.025	0.879	4.238	0.091
12	66.3	0.232	0.066	0.879	4.238	0.149
13	22.6	0.033	0.116	0.879	7	0.033
14	22.6	0.091	0.207	0.879	7	0.091
15	22.6	0.149	0.423	0.879	7	0.149
16	22.6	0.232			7	0.232
17					9.62	0.033
18					9.62	0.091
19					9.62	0.149

No	<i>Plug</i>		<i>Churn</i>	
	J <sub>G</sub>	J <sub>L</sub>	J <sub>G</sub>	J <sub>L</sub>
1	0.025	0.033	3	0.539
2	0.025	0.091	3	4.935
3	0.025	0.149	4.238	2.297
4	0.025	0.232	4.238	4.935
5	0.025	0.539	7	0.539
6	0.025	0.7	7	0.7
7	0.066	0.033	7	0.89
8	0.066	0.091	7	2.297
9	0.066	0.149	7	4.935
10	0.066	0.232	9.62	0.539
11	0.066	0.539	9.62	0.7
12	0.066	0.7	9.62	0.89
13	0.116	0.033	9.62	2.297
14	0.116	0.091	9.62	4.935
15	0.116	0.149	22.6	0.539
16	0.116	0.232	22.6	0.7
17	0.116	0.539	22.6	0.89
18	0.116	0.7	22.6	2.297
19	0.207	0.033	22.6	4.935
20	0.207	0.091	50	0.539
21	0.207	0.149	50	0.7
22	0.207	0.232	50	0.89
23	0.207	0.539	50	2.297
24	0.207	0.7	50	4.935
25	0.423	0.033	58.05	0.539
26	0.423	0.091	58.05	0.7
27	0.423	0.149	58.05	0.89
28	0.423	0.232	58.05	2.297
29	0.423	0.539	58.05	4.935
30	0.423	0.7	66.3	0.539
31	0.871	0.033	66.3	0.7
32	0.871	0.091	66.3	0.89
33	0.871	0.149	66.3	2.297
34	0.871	0.232	66.3	4.935
35	0.871	0.539	3	2.297
36	0.871	0.7	4.238	0.539
37	1.941	0.539	4.238	0.7

38	4.238	0.89
39	0.871	0.89
40	0.871	2.297
41	0.871	4.935
42	1.941	0.7
43	1.941	0.89
44	1.941	2.297
45	1.941	4.935
46	3	0.7
47	3	0.89

Lampiran 6 Hasil Uji Laboratorium Campuran Aquades dan Butanol

<b>Fluida %</b>	<b>SurfaceTension [mN/m]</b>	<b>Index</b>
Aquades	71.00	A
Aquades + 1% Butanol	55.07	B1
Aquades + 2% Butanol	46.03	B2
Aquades + 3% Butanol	42.9	B3
Aquades + 4% Butanol	36.50	B4
Aquades + 5% Butanol	33.10	B5
Aquades + 6% Butanol	30.85	B6
Aquades + 7% Butanol	30.4	B7
Aquades + 8% Butanol	26.57	B8
Aquades + 10% Butanol	25.03	B10
Aquades + 100% Butanol	24.37	B100