

Lampiran 1 Tabel A-1

TABLE A-1

Molar mass, gas constant, and critical-point properties

Substance	Formula	Molar mass, <i>M</i> kg/kmol	Gas constant, <i>R</i> kJ/kg · K*	Critical-point properties		
				Temperature, K	Pressure, MPa	Volume, m ³ /kmol
Air	—	28.97	0.2870	132.5	3.77	0.0883
Ammonia	NH ₃	17.03	0.4882	405.5	11.28	0.0724
Argon	Ar	39.948	0.2081	151	4.86	0.0749
Benzene	C ₆ H ₆	78.115	0.1064	562	4.92	0.2603
Bromine	Br ₂	159.808	0.0520	584	10.34	0.1355
<i>n</i> -Butane	C ₄ H ₁₀	58.124	0.1430	425.2	3.80	0.2547
Carbon dioxide	CO ₂	44.01	0.1889	304.2	7.39	0.0943
Carbon monoxide	CO	28.011	0.2968	133	3.50	0.0930
Carbon tetrachloride	CCl ₄	153.82	0.05405	556.4	4.56	0.2759
Chlorine	Cl ₂	70.906	0.1173	417	7.71	0.1242
Chloroform	CHCl ₃	119.38	0.06964	536.6	5.47	0.2403
Dichlorodifluoromethane (R-12)	CCl ₂ F ₂	120.91	0.06876	384.7	4.01	0.2179
Dichlorofluoromethane (R-21)	CHCl ₂ F	102.92	0.08078	451.7	5.17	0.1973
Ethane	C ₂ H ₆	30.070	0.2765	305.5	4.48	0.1480
Ethyl alcohol	C ₂ H ₅ OH	46.07	0.1805	516	6.38	0.1673
Ethylene	C ₂ H ₄	28.054	0.2964	282.4	5.12	0.1242
Helium	He	4.003	2.0769	5.3	0.23	0.0578
<i>n</i> -Hexane	C ₆ H ₁₄	86.179	0.09647	507.9	3.03	0.3677
Hydrogen (normal)	H ₂	2.016	4.1240	33.3	1.30	0.0649
Krypton	Kr	83.80	0.09921	209.4	5.50	0.0924
Methane	CH ₄	16.043	0.5182	191.1	4.64	0.0993
Methyl alcohol	CH ₃ OH	32.042	0.2595	513.2	7.95	0.1180
Methyl chloride	CH ₃ Cl	50.488	0.1647	416.3	6.68	0.1430
Neon	Ne	20.183	0.4119	44.5	2.73	0.0417
Nitrogen	N ₂	28.013	0.2968	126.2	3.39	0.0899
Nitrous oxide	N ₂ O	44.013	0.1889	309.7	7.27	0.0961
Oxygen	O ₂	31.999	0.2598	154.8	5.08	0.0780
Propane	C ₃ H ₈	44.097	0.1885	370	4.26	0.1998
Propylene	C ₃ H ₆	42.081	0.1976	365	4.62	0.1810
Sulfur dioxide	SO ₂	64.063	0.1298	430.7	7.88	0.1217
Tetrafluoroethane (R-134a)	CF ₃ CH ₂ F	102.03	0.08149	374.2	4.059	0.1993
Trichlorofluoromethane (R-11)	CCl ₃ F	137.37	0.06052	471.2	4.38	0.2478
Water	H ₂ O	18.015	0.4615	647.1	22.06	0.0560
Xenon	Xe	131.30	0.06332	289.8	5.88	0.1186

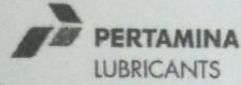
*The unit kJ/kg · K is equivalent to kPa · m³/kg · K. The gas constant is calculated from $R = R_u/M$, where $R_u = 8.31447$ kJ/kmol · K and M is the molar mass.

Source: K. A. Kobe and R. E. Lynn, Jr., *Chemical Review* 52 (1953), pp. 117–236; and ASHRAE, *Handbook of Fundamentals* (Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1993), pp. 16.4 and 36.1.

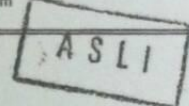
Lampiran 2 Data Presentase Gas Propana Butana dalam LPG

Lampiran 2. Komposisi *Liquified Petroleum Gas* (LPG)

PT. PERTAMINA LUBRICANTS



LABORATORIUM PRODUCTION UNIT GRESIK
Jalan Harun Tohir Desa Pulau Pancikan Gresik - 61113
Phone 031-3293892, Fax. 031-3294965, Email : labplm@pertamina.com



CERTIFICATE OF ANALYSIS

Type of Sample	: LPG MIX	COA No	: 0193/PL2203/COA-G/2014
Customer	: LPG & Gas Products Region V	Date of COA	: 04.02.2014
Ex. Storage Location	: Tanki Timbun III A (MT/LPG C NAVIGATOR GLOBAL)	Sample Drawn by	: -
Sample No.	: -	Sample Drawn	: -
Sample Delivery No	: 08/F15451/TD-B/02/2014	Received Date	: 03.02.2014
Sample Delivery Date	: 29.01.2014	Type Test	: -

NO	TEST	UNIT	METHOD	LIMIT	RESULT
1	Specific Gravity at 60 / 60 °F	-	ASTM D 1657	Reported	-
2	Vapor Pressure at 100 °F	psig	ASTM D 1267	Max. 145	106
3	Copper Corrosion 1 hr / 100 °F	-	ASTM D 1838	ASTM No. 1	ASTM No.1
4	Composition :		ASTM D 2163 Gas Chromatography		
	C2	% Vol		Max. 0.8	0,11
	C3			-	49,57
	C4			-	50,11
	C5	% Vol		Max. 2.0	0,21
5.	Molekul Weight [In Liquid]	-		-	50,17

Note : This report relates only to the sample tested and does not guarantee the bulk of material to be of equality.

*) Sesuai dengan Spesifikasi Dirjen Migas No. 22394.K/10/DJM.T/2009, tanggal 11 Nopember 2009

Distribusi :

To : LPG & Gas Products Region V
Cc : File

Surabaya, 04 April 2013

 Junior Analyst QC. Lab. Prod. Unit Gresik
M. BIKO TP.

Lampiran 3 Data Presentase Gas Metana



Valued Quality. Delivered.

COMPANY : PT Pgas Solution, Wilayah Surabaya
 SOURCE : PT WONOSARI JAYA
 JOB NO. : PF160051-H

Compositional Analysis of Gas

Component	Mole %
H2S Hydrogen Sulphide	0.0000
CO2 Carbon Dioxide	0.1256
N2 Nitrogen	0.3209
C1 Methane	98.9906
C2 Ethane	0.3380
C3 Propane	0.1370
iC4 i-Butane	0.0487
nC4 n-Butane	0.0221
iC5 i-Pentane	0.0092
nC5 n-Pentane	0.0022
C6+ Hexanes plus	0.0057
Totals	100.0000

Sample Information	
Sampling Date	03-May-2016
Sampling Time	08:47
Sampling Location	PT WONOSARI JAYA
Sample Description	GAS
Cylinder Number	14
Sampling Conditions	21 Bar @ 23.83°C

Additional Sample Information	
Opening Pressure (psig)	324
Opening Temperature (F)	120

Notes	
Specific Gravity Gas	0.5617 @ 14.73 psia, 60°F
Net Calorific Value.	915.6315 Btu/cuft @ 14.73 psia, 60°F
Gross Calorific Value.	1016.6709 Btu/cuft @ 14.73 psia, 60°F
Gas Compressibility Factor, Z	0.9980 @ 14.73 psia, 60°F
Wobbe Index	1356.5 @ 14.73 psia, 60°F

Analyzed by GPA 2261-00 Method

COMPANY : PT Pgas Solution, Wilayah Surabaya
 SOURCE : PT WONOSARI JAYA
 JOB NO. : PF160055-H

Compositional Analysis of Gas

Component		Mole %	Sample Information	
H2S	Hydrogen Sulphide	0.0000	Sampling Date	16-May-2016
CO2	Carbon Dioxide	0.1267	Sampling Time	08:30
N2	Nitrogen	0.3807	Sampling Location	PT WONOSARI JAYA
C1	Methane	98.9387	Sample Description	GAS
C2	Ethane	0.3377	Cylinder Number	5
C3	Propane	0.1363	Sampling Conditions	23 Bar @ 24.54 °C
iC4	i-Butane	0.0429	Additional Sample Information	
nC4	n-Butane	0.0201	Opening Pressure (psig)	345
iC5	i-Pentane	0.0087	Opening Temperature (F)	120
nC5	n-Pentane	0.0019	Notes	
C6+	Hexanes plus	0.0063	Specific Gravity Gas	0.5618 @ 14.73 psia, 60°F
Totals		100.0000	Net Calorific Value.	914.9035 Btu/cuft @ 14.73 psia, 60°F
			Gross Calorific Value.	1015.8689 Btu/cuft @ 14.73 psia, 60°F
			Gas Compressibility Factor, Z	0.9980 @ 14.73 psia, 60°F
			Wobbe Index	1355.3 @ 14.73 psia, 60°F

