

DAFTAR ISI

LAPORAN PRARANCANGAN PABRIK KIMIA.....	1
LEMBAR PENGESAHAN	i
PERNYATAAN BEBAS PLAGIASI	ii
KATA PENGANTAR.....	iii
DAFTAR ISI	iv
DAFTAR GAMBAR.....	xiii
DAFTAR TABEL	xvi
DAFTAR CODE DAN STANDAR YANG DIGUNAKAN	xxi
INTISARI	xxii
ABSTRACT	xxiii
EXECUTIVE SUMMARY.....	xxiv
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang	1
1.2 Analisis Pasar.....	2
1.3 Pemilihan Proses	5
1.4 Lokasi Pabrik	12
BAB II URAIAN PROSES.....	17
2.1 Tahap Pembuatan Asam Stearat dari <i>Crude Palm Oil</i>	17
2.2 Tahap Pembuatan Steramida dari Asam Stearat	19
BAB III SPESIFIKASI BAHAN DAN PRODUK	22
3.1 Bahan.....	22
3.2 Bahan Penunjang	25
3.3 Produk Utama	26
3.4 Produk Samping.....	27
BAB IV DIAGRAM ALIR.....	28
4.1 Diagram Alir Kualitatif	29
4.2 Diagram Alir Kuantitatif.....	30
4.3 <i>Process Engineering Flow Diagram</i> (terlampir)	31
BAB V NERACA MASSA	32
5.1 Neraca Massa Total.....	32
5.2 Neraca Massa Tiap Alat	33
BAB VI NERACA PANAS	58
6.1 Keadaan Referensi	58

6.2	Neraca Panas Tiap Alat	58
BAB VII	SPESIFIKASI ALAT	82
7.1	<i>Accumulator-101 (AC-101)</i>	<i>82</i>
7.2	<i>Accumulator-102 (AC-102)</i>	<i>82</i>
7.3	<i>Accumulator-103 (AC-103)</i>	<i>83</i>
7.4	<i>Ball Mill (BM-101).....</i>	<i>83</i>
7.5	<i>Belt Conveyor-101 (BC-101).....</i>	<i>84</i>
7.6	<i>Belt Conveyor-102 (BC-102).....</i>	<i>84</i>
7.7	<i>Belt Conveyor-103 (BC-103).....</i>	<i>85</i>
7.8	<i>Belt Conveyor-104 (BC-104).....</i>	<i>85</i>
7.9	<i>Belt Conveyor-105 (BC-105).....</i>	<i>85</i>
7.10	<i>Belt Conveyor-106 (BC-106).....</i>	<i>86</i>
7.11	<i>Belt Conveyor-107 (BC-107).....</i>	<i>86</i>
7.12	<i>Belt Conveyor-108 (BC-108).....</i>	<i>87</i>
7.13	<i>Silo Urea (SL-101)</i>	<i>87</i>
7.14	<i>Silo Stearamida (SL-102).....</i>	<i>88</i>
7.15	<i>Blower-101 (BL-101)</i>	<i>88</i>
7.16	<i>Blower-102 (BL-102)</i>	<i>88</i>
7.17	<i>Bubble Slurry Reactor (R-102)</i>	<i>89</i>
7.18	<i>Bucket Elevator-101 (BE-101).....</i>	<i>89</i>
7.19	<i>Bucket Elevator-102 (BE-102).....</i>	<i>90</i>
7.20	<i>Bucket Elevator-103 (BE-103).....</i>	<i>90</i>
7.21	<i>Centrifuge-101 (CF-101)</i>	<i>91</i>
7.22	<i>Centrifuge-102 (CF-102)</i>	<i>91</i>
7.23	<i>Condenser-101 (CD-101).....</i>	<i>92</i>
7.24	<i>Condenser-102 (CD-102).....</i>	<i>92</i>
7.25	<i>Condenser-103 (CD-103).....</i>	<i>93</i>
7.26	<i>Condenser-104 (CD-104).....</i>	<i>94</i>
7.27	<i>Condenser-105 (CD-105).....</i>	<i>95</i>
7.28	<i>Condenser-106 (CD-106).....</i>	<i>96</i>
7.29	<i>Condenser-107 (CD-107).....</i>	<i>97</i>
7.30	<i>Crystallizer-101 (CRY-101).....</i>	<i>98</i>
7.31	<i>Crystallizer-102 (CRY-102).....</i>	<i>98</i>
7.32	<i>Cyclone (CY-101).....</i>	<i>99</i>
7.33	<i>Evaporator-101 & Evaporator-102 (EVP-101 & EVP-102)</i>	<i>99</i>

7.34	<i>Evaporator-103 & Evaporator-104 (EVP-103 & EVP-104)</i>	101
7.35	<i>Expansion Valve-101 (EV-101)</i>	102
7.36	<i>Expansion Valve-102 (EV-102)</i>	103
7.37	<i>Expansion Valve-103 (EV-103)</i>	103
7.38	<i>Flaker-101 (FL-101)</i>	103
7.39	<i>Flash Drum-101 (FD-101)</i>	104
7.40	<i>Gudang Asam Palmitat-101 (G-101)</i>	104
7.41	<i>Gudang Urea-102 (G-102)</i>	105
7.42	<i>Gudang Stearamida-103 (G-103)</i>	105
7.43	<i>Heat Exchanger-101 (HE-101)</i>	105
7.44	<i>Heat Exchanger-102 (HE-102)</i>	107
7.45	<i>Heat Exchanger-103 (HE-103)</i>	107
7.46	<i>Heat Exchanger-104 (HE-104)</i>	108
7.47	<i>Heat Exchanger-105 (HE-105)</i>	109
7.48	<i>Heat Exchanger-106 (HE-106)</i>	110
7.49	<i>Heat Exchanger-107 (HE-107)</i>	111
7.50	<i>Kompresor (K-101)</i>	112
7.51	<i>Melter Urea (M-101)</i>	112
7.52	<i>Menara Distilasi (MD-101)</i>	113
7.53	<i>Mixing Tank-101 (MT-101)</i>	114
7.54	<i>Mixing Tank-102 (MT-102)</i>	114
7.55	<i>Mixing Tank-103 (MT-103)</i>	115
7.56	<i>Plate and Frame Filter (F-101)</i>	115
7.57	<i>Pompa-101 (P-101)</i>	116
7.58	<i>Pompa-102 (P-102)</i>	116
7.59	<i>Pompa-103 (P-103)</i>	117
7.60	<i>Pompa-104 (P-104)</i>	117
7.61	<i>Pompa-105 (P-105)</i>	118
7.62	<i>Pompa-106 (P-106)</i>	118
7.63	<i>Pompa-107 (P-107)</i>	119
7.64	<i>Pompa-108 (P-108)</i>	119
7.65	<i>Pompa-109 (P-109)</i>	120
7.66	<i>Pompa-110 (P-110)</i>	120
7.67	<i>Pompa-111 (P-111)</i>	121
7.68	<i>Pompa-112 (P-112)</i>	121

7.69	Pompa-113 (P-113)	122
7.70	Pompa-114 (P-114)	122
7.71	Pompa-115 (P-115)	123
7.72	Reaktor Amidasi (R-103).....	123
7.73	Reaktor Amidasi (R-104).....	124
7.74	Reboiler-101 (RB-101).....	125
7.75	Rotary Cooler (RC-101).....	125
7.76	Rotary Drum Vacuum Filter -101 (RDVF-101)	126
7.77	Rotary Dryer-101 (RD-101)	126
7.78	Rotary Dryer-102 (RD-102)	127
7.79	Screener (S-101).....	127
7.80	Screw Conveyor-101 (SC-101).....	127
7.81	Screw Conveyor-102 (SC-102).....	128
7.82	Spray Column Reactor (R-101)	128
7.83	Steam Ejector-101 (SE-101)	129
7.84	Steam Ejector-102 (SE-102)	130
7.85	Steam Ejector-103 (SE-103)	130
7.86	Tangki Penyimpanan Air (TP-101)	130
7.87	Tangki Penyimpanan CPO (TP-102)	131
7.88	Tangki Penyimpanan Gliserol (TP-103)	132
7.89	Tangki Penyimpanan Kloroform (TP-104)	132
7.90	Tangki Penyimpanan Etanol (TP-105).....	133
7.91	Thickener-101 (T-101).....	134
BAB VIII UTILITAS.....		135
8.1	Unit Penyediaan dan Pengolahan Air (<i>Water Treatment System</i>).....	135
8.2	Spesifikasi Alat Utilitas.....	150
8.3	Unit Pembangkit dan Pendistribusian Listrik	164
8.4	Unit Penyedia <i>Steam</i> dan Bahan Bakar	169
8.5	Unit Penyedia Udara.....	178
8.6	Unit Pengolahan Limbah.....	185
8.7	Unit Penyedia <i>Downtherm-A</i>	191
BAB IX TATA LETAK PABRIK DAN ANALISIS AREA		193
9.1	Tata Letak Pabrik	193
9.2	Tata Letak Alat Proses	195

BAB X PERTIMBANGAN ASPEK KESELAMATAN, KESEHATAN KERJA, DAN LINGKUNGAN	203
10.1 <i>Safety, Health, and Environment (SHE) Management</i>	203
10.2 Struktur Organisasi Manajemen SHE	218
10.3 Identifikasi <i>Hazard</i> Bahan, Potensi Paparan Bahan Kimia, Dan Limbah	220
10.4 <i>Process Hazard Analysis</i> dengan Metode HAZOP	300
10.5 <i>Safety Layer</i>	326
BAB XI MANAJEMEN PERUSAHAAN.....	332
11.1 Bentuk Perusahaan	332
11.2 Struktur Organisasi Perusahaan	333
11.3 Tugas dan Wewenang Perangkat Perusahaan	337
11.4 Perhitungan Jumlah Alat Proses dan Kebutuhan Operator	353
11.5 Penggolongan Gaji Karyawan	355
11.6 Penyaluran Kesejahteraan Sosial	357
11.7 Manajemen Produksi.....	359
BAB XII ANALISIS EKONOMI	363
12.1 Perhitungan Indeks Harga	363
12.2 Perhitungan Harga Alat	366
12.3 Biaya <i>Raw Material</i> dan Produk	377
12.4 Perhitungan Biaya Pekerja	378
12.5 Perhitungan Harga Tanah dan Bangunan	379
12.6 Perhitungan Fixed Capital	380
12.7 Biaya Produksi atau Manufaktur (<i>Manufacturing Cost</i>)	382
12.8 Modal Kerja (<i>Working Capital</i>).....	384
12.9 Pengeluaran Umum (General Expenses)	385
12.10 Analisis Keuntungan.....	386
12.11 Analisis Kelayakan.....	387
BAB XIII KESIMPULAN.....	400
DAFTAR PUSTAKA.....	401
LAMPIRAN PERHITUNGAN ALAT PROSES.....	406
<i>SPRAY COLUMN REACTOR</i> (R-101)	408
<i>BUBBLE SLURRY REACTOR</i> (R-102)	452
REAKTOR AMIDASI (R-103 dan R-104)	497
MENARA DISTILASI (MD-101).....	520
TANGKI PENYIMPANAN AIR (TP-101)	565

TANGKI PENYIMPANAN CPO (TP-102)	566
TANGKI PENYIMPANAN GLISEROL (TP-103)	567
TANGKI PENYIMPANAN KLOROFORM (TP-104)	568
TANGKI PENYIMPANAN ETANOL (TP-105)	574
SILO UREA (SL-101)	575
SILO STEARAMIDA (SL-102)	576
GUDANG ASAM PALMITAT (G-101)	581
GUDANG UREA (G-102)	582
GUDANG STEARAMIDA (G-103)	583
MIXING TANK-01 (MT-101)	586
MIXING TANK-102 (MT-102)	592
MIXING TANK-103 (MT-103)	593
MELTER UREA (M-101)	594
EVAPORATOR-101 & 102 (EVP-101 & EVP-102)	603
EVAPORATOR-103 & 104 (EVP-103 & EVP-104)	633
CONDENSER-101 (CD-101)	635
CONDENSER-102 (CD-102)	646
CONDENSER-103 (CD-103)	647
CONDENSER-104 (CD-104)	648
CONDENSER-105 (CD-105)	649
CONDENSER-106 (CD-106)	650
CONDENSER-107 (CD-107)	651
REBOILER-101 (RB-101)	652
ROTARY COOLER (RC-101)	653
POMPA-101 (P-101)	664
POMPA-102 (P-102)	665
POMPA-103 (P-103)	666
POMPA-104 (P-104)	667
POMPA-105 (P-105)	668
POMPA-106 (P-106)	669
POMPA-107 (P-107)	670
POMPA-108 (P-108)	671
POMPA-109 (P-109)	672
POMPA-110 (P-110)	673
POMPA-111 (P-111)	674

POMPA-112 (P-112)	675
POMPA-113 (P-113)	681
POMPA-114 (P-114)	682
POMPA-115 (P-115)	683
FLASH DRUM-101 (FD-101)	684
ROTARY DRUM VACUUM FILTER (RDVF-101)	690
CENTRIFUGE-101 (CF-101)	710
CENTRIFUGE-102 (CF-102)	718
CYCLONE (CY-101)	719
CRYSTALLIZER-101 (CRY-101)	727
CRYSTALLIZER-102 (CRY-102)	738
FLAKER (FL-101)	739
THICKENER-101 (T-101)	744
ROTARY DRYER-101 (RD-101)	750
ROTARY DRYER-102 (RD-102)	755
BALL MILL (BM-101)	756
SCREEN (S-101)	760
HEAT EXCHANGER-101 (HE-101)	764
HEAT EXCHANGER-102 (HE-102)	766
HEAT EXCHANGER-103 (HE-103)	773
HEAT EXCHANGER-104 (HE-104)	774
HEAT EXCHANGER-105 (HE-105)	775
HEAT EXCHANGER-106 (HE-106)	776
HEAT EXCHANGER-107 (HE-107)	777
BELT CONVEYOR-101 (BC-101)	778
BELT CONVEYOR-102 (BC-102)	784
BELT CONVEYOR-103 (BC-103)	785
BELT CONVEYOR-104 (BC-104)	786
BELT CONVEYOR-105 (BC-105)	787
BELT CONVEYOR-106 (BC-106)	788
BELT CONVEYOR-108 (BC-108)	791
BUCKET ELEVATOR-101 (BE-101)	792
BUCKET ELEVATOR-102 (BE-102)	795
BUCKET ELEVATOR-103 (BE-103)	796
SCREW CONVEYOR-101 (SC-101)	797

SCREW CONVEYOR-102 (SC-102)	801
BLOWER-101 (BL-101)	802
BLOWER-102 (BL-102)	805
KOMPRESOR (K-101)	806
STEAM EJECTOR-101 (SE-101)	810
STEAM EJECTOR-102 (SE-102)	814
STEAM EJECTOR-103 (SE-103)	818
EXPANSION VALVE-101 (EV-101)	819
EXPANSION VALVE-102 (EV-102)	824
EXPANSION VALVE-103 (EV-103)	825
ACCUMULATOR-101 (AC-101)	826
ACCUMULATOR-102 (AC-102)	832
ACCUMULATOR-103 (AC-103)	833
LAMPIRAN PERHITUNGAN ALAT UNIT PENGOLAHAN AIR	834
SCREENER (S-201)	834
BAK EKUALISASI (B-201)	836
BAK SEDIMENTASI (B-202)	838
SAND FILTER (SF-201)	841
CARBON FILTER (CF-201)	844
MIXER KLOORINASI (MT-201)	847
MIXER DEKLOORINASI (MT-202)	851
COLD BASIN (B-203)	855
HOT BASIN (B-204)	856
COOLING TOWER (CT-201)	857
SEA WATER REVERSE OSMOSIS (RO-201)	868
CATION EXCHANGER (X-201)	869
ANION EXCHANGER (XA-202)	874
DEAERATOR (DA-201)	879
TANGKI PENYIMPANAN NaOCl 15% (TP-201)	884
TANGKI PENYIMPANAN NaHSO₃ 15% (TP-202)	885
TANGKI PENYIMPANAN AIR HYDRANT (TP-203)	887
TANGKI PENYIMPANAN AIR KEBUTUHAN UMUM (TP-204)	889
TANGKI PENYIMPANAN HCl (TP-205)	891
TANGKI PENYIMPANAN NaOH (TP-206)	893
TANGKI PENYIMPANAN AIR DEMIN (TP-207)	895

TANGKI PENYIMPANAN <i>HYDRAZINE</i> (TP-208)	896
TANGKI PENYIMPANAN <i>BOILER FEED WATER</i> (BFW) (TP-209)	898
TANGKI PENYIMPANAN AIR KONDENSAT (TP-210)	900
<i>HEAT EXCHANGER</i> UTILITAS-201 (HEU-201)	901
<i>HEAT EXCHANGER</i> UTILITAS-202 (HEU-202)	905
POMPA UTILITAS (PU)	906