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### Lampiran 1 . Tabel Data Biji yang diproses

No	Tanggal	Jumlah Biji yang diproses (kg)	Jumlah Biji yang diproses (ton)
1	29 April 2022	12.893,35	12,893
2	28 April 2022	52.192,37	52,192
3	27 April 2022	52.500,27	52,500
4	26 April 2022	54.205,23	54,205
5	25 April 2022	58.258,04	58,258
6	24 April 2022	49.260,66	49,261
7	23 April 2022	46.345,070	46,345
8	22 April 2022	46.799,66	46,800
9	21 April 2022	52.597,96	52,598
10	20 April 2022	53.031,53	53,032
11	19 April 2022	50.504,71	50,505
12	18 April 2022	59.671,77	59,672
13	17 April 2022	31.189,33	31,189
14	16 April 2022	31.091,85	31,092
15	15 April 2022	19.675,16	19,675
16	14 April 2022	9.875,86	9,876
17	13 April 2022	19.730,61	19,731
18	12 April 2022	35.730,63	35,731
19	11 April 2022	33.262,96	33,263
20	10 April 2022	80.499,91	80,500
21	09 April 2022	33.849,20	33,849
22	08 April 2022	36.492,99	36,493
23	07 April 2022	35.317,12	35,317
24	06 April 2022	32.064,90	32,065
25	05 April 2022	31.758,97	31,759
26	04 April 2022	43.359,57	43,360
27	03 April 2022	54.871,11	54,871
28	02 April 2022	54.750,45	54,750
29	01 April 2022	53.248,05	53,248
30	31 March 2022	53.381,74	53,382
31	30 March 2022	40.203,11	40,203
32	29 March 2022	32.322,82	32,323
33	28 March 2022	50.331,27	50,331
34	27 March 2022	52.647,86	52,648
35	26 March 2022	61.600,10	61,600
36	25 March 2022	61.207,29	61,207
37	24 March 2022	60.561,75	60,562

38	23 March 2022	36.762,93	36,763
39	22 March 2022	47.619,79	47,620
40	21 March 2022	50.595,75	50,596
41	20 March 2022	83.868,64	83,869
42	19 March 2022	50.201,65	50,202
43	18 March 2022	50.305,88	50,306
44	17 March 2022	50.389,18	50,389
45	16 March 2022	50.575,34	50,575
46	15 March 2022	40.084,18	40,084
47	14 March 2022	22.002,52	22,003
48	13 March 2022	26.478,46	26,478
49	12 March 2022	18.081,85	18,082
50	11 March 2022	24.519,05	24,519
51	10 March 2022	24.579,27	24,579
52	09 March 2022	24.638,91	24,639
53	08 March 2022	24.638,89	24,639
54	07 March 2022	26.980,63	26,981
55	06 March 2022	25.285,72	25,286
56	05 March 2022	27.495,12	27,495
57	04 March 2022	30.686,80	30,687
58	03 March 2022	30.704,37	30,704
59	02 March 2022	30.731,55	30,732
60	01 March 2022	30.731,55	30,732
61	28 February 2022	24.585,25	24,585
62	27 February 2022	33.944,17	33,944
63	26 February 2022	29.406,70	29,407
64	25 February 2022	45.483,62	45,484
65	24 February 2022	50.822,52	50,823
66	23 February 2022	53.707,81	53,708
67	22 February 2022	52.608,09	52,608
68	21 February 2022	53.332,82	53,333
69	20 February 2022	52.091,49	52,091
70	19 February 2022	52.459,96	52,460
71	18 February 2022	49.295,23	49,295
72	17 February 2022	50.928,06	50,928
73	16 February 2022	53.665,39	53,665
74	15 February 2022	45.837,00	45,837
75	14 February 2022	50.269,81	50,270
76	13 February 2022	51.775,28	51,775
77	12 February 2022	50.247,06	50,247
78	11 February 2022	48.008,22	48,008

79	10 February 2022	21.572,05	21,572
80	08 February 2022	24.420,24	24,420
81	07 February 2022	24.420,24	24,420
82	06 February 2022	24.565,18	24,565
83	05 February 2022	24.491,62	24,492
84	04 February 2022	24.439,12	24,439
85	03 February 2022	30.575,63	30,576
86	01 February 2022	20.827,43	20,827
87	31 January 2022	25.126,93	25,127
88	30 January 2022	29.419,25	29,419
89	25 January 2022	12.870,90	12,871
90	24 January 2022	40.451,23	40,451
	Total	3.616.891,54	3.616,89

## Lampiran 2 : Tabel Data cangkang Kakao

No	Tanggal	Jumlah shell (kg)	Jumlah shell (ton)
1	29 April 2022	1.682,58	1,68
2	28 April 2022	6.811,10	6,81
3	27 April 2022	6.851,29	6,85
4	26 April 2022	7.073,78	7,07
5	25 April 2022	7.602,67	7,60
6	24 April 2022	6.428,52	6,43
7	23 April 2022	6.048,03	6,05
8	22 April 2022	6.107,36	6,11
9	21 April 2022	6.864,03	6,86
10	20 April 2022	6.920,61	6,92
11	19 April 2022	6.590,86	6,59
12	18 April 2022	7.787,17	7,79
13	17 April 2022	4.070,21	4,07
14	16 April 2022	4.057,49	4,06
15	15 April 2022	2.567,61	2,57
16	14 April 2022	1.288,80	1,29
17	13 April 2022	2.574,84	2,57
18	12 April 2022	4.662,85	4,66
19	11 April 2022	4.340,82	4,34
20	10 April 2022	10.505,24	10,51
21	09 April 2022	4.417,32	4,42
22	08 April 2022	4.762,34	4,76
23	07 April 2022	4.608,88	4,61
24	06 April 2022	4.184,47	4,18
25	05 April 2022	4.144,55	4,14
26	04 April 2022	5.658,42	5,66
27	03 April 2022	7.160,68	7,16
28	02 April 2022	7.144,93	7,14
29	01 April 2022	6.948,87	6,95
30	31 March 2022	6.966,32	6,97
31	30 March 2022	5.246,51	5,25
32	29 March 2022	4.218,13	4,22
33	28 March 2022	6.568,23	6,57
34	27 March 2022	6.870,55	6,87
35	26 March 2022	8.038,81	8,04
36	25 March 2022	7.987,55	7,99
37	24 March 2022	7.903,31	7,90
38	23 March 2022	4.797,56	4,80

39	22 March 2022	6.214,38	6,21
40	21 March 2022	6.602,75	6,60
41	20 March 2022	10.944,86	10,94
42	19 March 2022	6.551,32	6,55
43	18 March 2022	6.564,92	6,56
44	17 March 2022	6.575,79	6,58
45	16 March 2022	6.600,08	6,60
46	15 March 2022	5.230,99	5,23
47	14 March 2022	2.871,33	2,87
48	13 March 2022	3.455,44	3,46
49	12 March 2022	2.359,68	2,36
50	11 March 2022	3.199,74	3,20
51	10 March 2022	3.207,59	3,21
52	09 March 2022	3.215,38	3,22
53	08 March 2022	3.215,38	3,22
54	07 March 2022	3.520,97	3,52
55	06 March 2022	3.299,79	3,30
56	05 March 2022	3.588,11	3,59
57	04 March 2022	4.004,63	4,00
58	03 March 2022	4.006,92	4,01
59	02 March 2022	4.010,47	4,01
60	01 March 2022	4.010,47	4,01
61	28 February 2022	3.208,38	3,21
62	27 February 2022	4.429,71	4,43
63	26 February 2022	3.837,57	3,84
64	25 February 2022	5.935,61	5,94
65	24 February 2022	6.632,34	6,63
66	23 February 2022	7.008,87	7,01
67	22 February 2022	6.865,36	6,87
68	21 February 2022	6.959,93	6,96
69	20 February 2022	6.797,94	6,80
70	19 February 2022	6.846,02	6,85
71	18 February 2022	6.433,03	6,43
72	17 February 2022	6.646,11	6,65
73	16 February 2022	7.003,33	7,00
74	15 February 2022	5.981,73	5,98
75	14 February 2022	6.560,21	6,56
76	13 February 2022	6.756,67	6,76
77	12 February 2022	6.557,24	6,56
78	11 February 2022	6.265,07	6,27
79	10 February 2022	2.815,15	2,82



80	08 February 2022	3.186,84	3,19
81	07 February 2022	3.186,84	3,19
82	06 February 2022	3.205,76	3,21
83	05 February 2022	3.196,16	3,20
84	04 February 2022	3.189,31	3,19
85	03 February 2022	3.990,12	3,99
86	01 February 2022	2.717,98	2,72
87	31 January 2022	3.279,06	3,28
88	30 January 2022	3.839,21	3,84
89	25 January 2022	1.679,65	1,68
90	24 January 2022	5.278,89	5,28
	Total	472.004,35	472,00

**Lampiran 3 : Tabel Data Cangkang Kakao yang dibakar**

No	Tanggal	Shell yang dibakar (kg)	Shell yang dibakar (ton)
1	29 April 2022	511,46	0,51
2	28 April 2022	5.306,49	5,31
3	27 April 2022	5.458,32	5,46
4	26 April 2022	5.428,03	5,43
5	25 April 2022	5.991,81	5,99
6	24 April 2022	4.881,27	4,88
7	23 April 2022	4.556,25	4,56
8	22 April 2022	4.345,98	4,35
9	21 April 2022	5.627,07	5,63
10	20 April 2022	5.301,20	5,30
11	19 April 2022	4.837,00	4,84
12	18 April 2022	6.214,92	6,21
13	17 April 2022	2.869,97	2,87
14	16 April 2022	3.776,30	3,78
15	15 April 2022	2.389,67	2,39
16	14 April 2022	1.199,49	1,20
17	13 April 2022	2.396,41	2,40
18	12 April 2022	4.339,71	4,34
19	11 April 2022	4.040,00	4,04
20	10 April 2022	9.777,22	9,78
21	09 April 2022	4.111,20	4,11
22	08 April 2022	4.432,31	4,43
23	07 April 2022	4.289,49	4,29
24	06 April 2022	2.795,30	2,80
25	05 April 2022	2.656,66	2,66
26	04 April 2022	4.072,23	4,07
27	03 April 2022	5.435,67	5,44
28	02 April 2022	5.766,09	5,77
29	01 April 2022	5.318,09	5,32
30	31 March 2022	5.211,82	5,21
31	30 March 2022	3.648,84	3,65
32	29 March 2022	2.857,34	2,86
33	28 March 2022	4.887,69	4,89
34	27 March 2022	5.397,97	5,40
35	26 March 2022	6.256,36	6,26
36	25 March 2022	6.580,76	6,58

37	24 March 2022	6.444,61	6,44
38	23 March 2022	3.256,09	3,26
39	22 March 2022	4.989,62	4,99
40	21 March 2022	4.733,56	4,73
41	20 March 2022	9.502,67	9,50
42	19 March 2022	4.888,31	4,89
43	18 March 2022	4.841,81	4,84
44	17 March 2022	5.266,84	5,27
45	16 March 2022	6.142,70	6,14
46	15 March 2022	4.868,48	4,87
47	14 March 2022	2.672,35	2,67
48	13 March 2022	3.215,98	3,22
49	12 March 2022	2.196,16	2,20
50	11 March 2022	2.977,99	2,98
51	10 March 2022	2.985,31	2,99
52	09 March 2022	2.992,55	2,99
53	08 March 2022	2.992,55	2,99
54	07 March 2022	3.276,97	3,28
55	06 March 2022	3.071,11	3,07
56	05 March 2022	3.339,46	3,34
57	04 March 2022	3.727,11	3,73
58	03 March 2022	3.729,24	3,73
59	02 March 2022	3.732,54	3,73
60	01 March 2022	3.732,54	3,73
61	28 February 2022	2.986,03	2,99
62	27 February 2022	2.402,01	2,40
63	26 February 2022	2.767,67	2,77
64	25 February 2022	4.640,62	4,64
65	24 February 2022	4.974,81	4,97
66	23 February 2022	5.691,16	5,69
67	22 February 2022	5.430,79	5,43
68	21 February 2022	5.238,73	5,24
69	20 February 2022	5.176,54	5,18
70	19 February 2022	5.171,37	5,17
71	18 February 2022	5.119,29	5,12
72	17 February 2022	4.877,95	4,88
73	16 February 2022	5.237,90	5,24
74	15 February 2022	4.038,34	4,04
75	14 February 2022	4.866,83	4,87
76	13 February 2022	5.027,29	5,03
77	12 February 2022	4.762,65	4,76

78	11 February 2022	4.614,46	4,61
79	10 February 2022	2.620,06	2,62
80	08 February 2022	2.965,99	2,97
81	07 February 2022	2.965,99	2,97
82	06 February 2022	2.983,60	2,98
83	05 February 2022	2.974,66	2,97
84	04 February 2022	2.968,29	2,97
85	03 February 2022	2.924,96	2,92
86	01 February 2022	2.529,62	2,53
87	31 January 2022	3.051,83	3,05
88	30 January 2022	3.573,15	3,57
89	25 January 2022	1.461,25	1,46
90	24 January 2022	4.913,06	4,91
	Total	381.499,81	381,50

**Lampiran 4 : Tabel Data Abu hasil pembakaran**

No	Tanggal	Abu Pembakaran ( kg )	Abu Pembakaran (Ton)
1	29 April 2022	116,60	0,12
2	28 April 2022	472,01	0,47
3	27 April 2022	474,79	0,47
4	26 April 2022	490,21	0,49
5	25 April 2022	526,87	0,53
6	24 April 2022	445,50	0,45
7	23 April 2022	419,13	0,42
8	22 April 2022	423,24	0,42
9	21 April 2022	475,68	0,48
10	20 April 2022	479,60	0,48
11	19 April 2022	456,75	0,46
12	18 April 2022	539,65	0,54
13	17 April 2022	282,07	0,28
14	16 April 2022	281,18	0,28
15	15 April 2022	177,94	0,18
16	14 April 2022	89,31	0,09
17	13 April 2022	178,44	0,18
18	12 April 2022	323,14	0,32
19	11 April 2022	300,82	0,30
20	10 April 2022	728,01	0,73
21	09 April 2022	306,12	0,31
22	08 April 2022	330,03	0,33
23	07 April 2022	319,40	0,32
24	06 April 2022	289,98	0,29
25	05 April 2022	287,22	0,29
26	04 April 2022	392,13	0,39
27	03 April 2022	496,24	0,50
28	02 April 2022	495,14	0,50
29	01 April 2022	481,56	0,48
30	31 March 2022	482,77	0,48
31	30 March 2022	363,58	0,36
32	29 March 2022	292,32	0,29
33	28 March 2022	455,18	0,46
34	27 March 2022	476,13	0,48
35	26 March 2022	557,09	0,56
36	25 March 2022	553,54	0,55
37	24 March 2022	547,70	0,55

38	23 March 2022	332,47	0,33
39	22 March 2022	430,66	0,43
40	21 March 2022	457,57	0,46
41	20 March 2022	758,48	0,76
42	19 March 2022	454,01	0,45
43	18 March 2022	454,95	0,45
44	17 March 2022	455,70	0,46
45	16 March 2022	457,39	0,46
46	15 March 2022	362,51	0,36
47	14 March 2022	198,98	0,20
48	13 March 2022	239,46	0,24
49	12 March 2022	163,53	0,16
50	11 March 2022	221,74	0,22
51	10 March 2022	222,29	0,22
52	09 March 2022	222,83	0,22
53	08 March 2022	222,83	0,22
54	07 March 2022	244,00	0,24
55	06 March 2022	228,68	0,23
56	05 March 2022	248,66	0,25
57	04 March 2022	277,52	0,28
58	03 March 2022	277,68	0,28
59	02 March 2022	277,93	0,28
60	01 March 2022	277,93	0,28
61	28 February 2022	222,34	0,22
62	27 February 2022	306,98	0,31
63	26 February 2022	265,94	0,27
64	25 February 2022	411,34	0,41
65	24 February 2022	459,62	0,46
66	23 February 2022	485,71	0,49
67	22 February 2022	475,77	0,48
68	21 February 2022	482,32	0,48
69	20 February 2022	471,10	0,47
70	19 February 2022	474,43	0,47
71	18 February 2022	445,81	0,45
72	17 February 2022	460,58	0,46
73	16 February 2022	485,33	0,49
74	15 February 2022	414,53	0,41
75	14 February 2022	454,62	0,45
76	13 February 2022	468,24	0,47
77	12 February 2022	454,42	0,45
78	11 February 2022	434,17	0,43

79	10 February 2022	195,09	0,20
80	08 February 2022	220,85	0,22
81	07 February 2022	220,85	0,22
82	06 February 2022	222,16	0,22
83	05 February 2022	221,49	0,22
84	04 February 2022	221,02	0,22
85	03 February 2022	276,52	0,28
86	01 February 2022	188,36	0,19
87	31 January 2022	227,24	0,23
88	30 January 2022	266,06	0,27
89	25 January 2022	116,40	0,12
90	24 January 2022	365,83	0,37
		32.709,90	32,71

**Lampiran 5 : Tabel Rata-rata penggunaan Cangkang Kakao**

Jumlah shell (kg)	472.004	Jumlah shell (ton)	472,00	Jumlah shell yang dibagging (kg)	59.187	Jumlah shell yang dibagging (ton)	59,187	Abu Pembakaran (kg)	32.710	Abu Pembakaran (Ton)	32,710	Shell yang dibakar (kg)	381.500	Shell yang dibakar (ton)	381,50
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Jumlah shell (kg)	7.867	Jumlah shell (ton)	7,87	Jumlah shell yang dibagging (kg)	986	Jumlah shell yang dibagging (ton)	0,99	Abu Pembakaran (kg)	545,17	Abu Pembakaran (Ton)	0,55	Shell yang dibakar (kg)	6.358	Shell yang dibakar (ton)	6,36
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Jumlah shell (kg)	327,78	Jumlah shell (ton)	0,33	Jumlah shell yang dibagging (kg)	41,10	Jumlah shell yang dibagging (ton)	0,04	Abu Pembakaran (kg)	22,72	Abu Pembakaran (Ton)	0,02	Shell yang dibakar (kg)	264,93	Shell yang dibakar (ton)	0,26
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## Lampiran 6 : Tabel Engineering Calculator

TLV A Steam Specialist Company English (International)

Products Services Training & Resources Company

Home > Engineering Calculator > Calculator: Saturated Steam Table by Temperature

**Engineering Calculator**

- Steam
- Condensate Recovery
- Water
- Air
- Gas
- Steam Tables

Saturated Steam Table (by Pressure)

**Saturated Steam Table (by Temperature)**

Superheated Steam Table


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Product Solutions

Success Stories

**SteamAqua Offers Instantaneous Hot Water via Indirect Heating with Steam**

### Calculator: Saturated Steam Table by Temperature



**Input Data** Units

Steam Temperature [?]  °C

**Result**

Steam Pressure	-0.478488	<input type="text" value="barG"/>
Latent Heat of Steam	2300.47	<input type="text" value="kJ/kg"/>
Specific Enthalpy of Saturated Steam	2648.01	<input type="text" value="kJ/kg"/>
Specific Enthalpy of Saturated Water	347.544	<input type="text" value="kJ/kg"/>
Specific Volume of Saturated Steam	3.04257	<input type="text" value="m³/kg"/>
Specific Volume of Saturated Water	0.00103105	<input type="text" value="m³/kg"/>

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**Engineering Calculator**

- Steam
- Condensate Recovery
- Water
- Air
- Gas
- Steam Tables

Saturated Steam Table (by Pressure)

**Saturated Steam Table (by Temperature)**

Superheated Steam Table

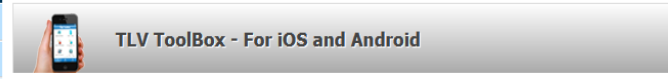
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Product Solutions

Success Stories

**Water Hammer: The**

### Calculator: Saturated Steam Table by Temperature



**Input Data** Units

Steam Temperature [?]  °C

**Result**

Steam Pressure	5.16814	<input type="text" value="barG"/>
Latent Heat of Steam	2081.86	<input type="text" value="kJ/kg"/>
Specific Enthalpy of Saturated Steam	2757.43	<input type="text" value="kJ/kg"/>
Specific Enthalpy of Saturated Water	675.575	<input type="text" value="kJ/kg"/>

### Lampiran 7. Perhitungan Nilai kalori

Nilai Kalor Bahan Bakar dapat dihitung dengan menggunakan Rumus Dulong dan Petit :

Nilai Kalor Pembakaran Tinggi

$$\begin{aligned}
 \text{HHV} &= 33.950 C + 144.200 ( H_2 - O_2 / 8 ) + 9.400 S \\
 &= 33.950 ( 0, 4727 ) + 144. 200 ( 0,0497 - ( 0,395/8 ) ) + 9.400 \\
 &\quad (0,00203) \\
 &= 16.049,18 + 144.200 ( 0,000349 ) + 19,082 \\
 &= 16.049,18 + 50,28975 + 19,082 \\
 &= 16.118,555 \text{ kJ/kg}
 \end{aligned}$$

Nilai Kalor Pembakaran Rendah

$$\begin{aligned}
 \text{LHV} &= \text{HHV} - 2.400 ( H_2O + 9 H_2 ) \text{ Kj/kg} \\
 &= 16.118,555 - 2.400 ((0,0971)+(9 \times 0,0497)) \\
 &= 16.118,555 - 2.400( 0,0971 + 0,447 ) \\
 &= 16.124,015 - 1.305,984 \text{ kJ/kg} \\
 &= 14.812,57 \text{ kJ/kg}
 \end{aligned}$$

Jumlah Kalor yang dibutuhkan Boiler

$$\begin{aligned}
 Q_b &= m_s ( h_s - h_w ) \\
 &= 1.500 ( 2752,43 - 347,544 ) \text{ kJ/kg} \\
 &= 3.607.329 \text{ kJ/jam}
 \end{aligned}$$

Jumlah Bahan Bakar Yang dibutuhkan Boiler

$$\begin{aligned}
 m_f &= Q_b / \eta_b \cdot \text{LHV} \\
 &= 3.607.329 / ( 0,87 \times 14.812,57 ) \text{ kg/jam} \\
 &= 279,92 \text{ kg/jam}
 \end{aligned}$$

Jumlah Kalor Hasil Pembakaran

$$Q_{in} = mf \times LHV$$

$$\begin{aligned} Q_{in} &= 279,92 \text{ kg/jam} \times 14.812,57 \text{ kJ/kg} \\ &= 4.146.354,05 \text{ kJ/jam} \end{aligned}$$

## CURICULUM VITAE

### A. Data Pribadi

1. Nama : David Pirade
2. Tempat, tanggal lahir : Madandan, 22 April 2022
3. Alamat : Perum Citra Sudiang Esate E2 No. 6  
Makassar
4. Status Sipil :
  - a. Nama Istri : Emmy Ivone Sopacua
  - b. Nama Anak : Gavriel Masokan Putra Pirade

### B. Riwayat Pendidikan

- a. Pendidikan Formal :
  - Tamat SD Tahun 1983 di SD Neg No 24 Kapolang Tana Toraja
  - Tamat SLTP Tahun 1986 di SMP Neg Ulusalu Tana Toraja
  - Tamat SLTA Tahun 1989 di SMA Neg. 161 Rantepao Tana Toraja
  - Tamat Sarjana S1 Tahun 1999 di Universitas Atma Jaya Makassar

### C. Pekerjaan : Wiraswasta