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LAMPIRAN

Lampiran 1 : Data Selama Proses Penyangraian

Tanggal : : 17 Maret 2021
Kapasitas mesin penyangrai : 2 kg
Varietas Biji kakao : Forestero
Suhu awal penyangraian : 135 ^oC
Kadar air biji sebelum penyangraian : 14 %
Berat biji awal (gram) : 1000 gram

Parameter pengamatan	Waktu penyangraian (menit)											
	0			10			14			18		
	A	B	C	A	B	C	A	B	C	A	B	C
Berat biji setelah di roasting (gram)				858	903	893	852	865	868	835	865	
Suhu biji setelah diroasting (*C)		Kontrol		164	149	145	180	150	162	164	162	
Suhu akhir *Roaster (*C)*					183	176		188	186	190	188	

Keterangan :

Tidak dilakukan penyangraian (biru)
Suhu tidak dicatat (hijau)
Penyangraian dianggap *over cook* (merah)

Kode (A) : pengulangan I
Kode (B) : pengulangan II
Kode (C) : pengulangan III

Data pada kode (C) untuk penyangraian 10 dan 14 menit, akan digunakan untuk menggantikan data pada kode (A) pada penyangraian 10 dan 14 menit

Lampiran 2 : Keterangan Performa Alat GC-MS yang digunakan

===== Analytical Line 1 =====

[GC-2010]

Column Oven Temp.	:60.0 °C	
Injection Temp.	:260.00 °C	
Injection Mode	:Splitless	
Sampling Time	:1.00 min	
Flow Control Mode	:Pressure	
Pressure	:38.9 kPa	
Total Flow	:37.5 mL/min	
Column Flow	:0.78 mL/min	
Linear Velocity	:32.2 cm/sec	
Purge Flow	:3.0 mL/min	
Split Ratio	:-1.0	
High Pressure Injection	:OFF	
Carrier Gas Saver	:OFF	
Oven Temp. Program		
Rate	Temperature(°C)	Hold Time(min)
-	60.0	3.00
5.00	220.0	5.00

< Ready Check Heat Unit >
Column Oven : Yes
SPL1 : Yes
MS : Yes
< Ready Check Detector(FTD) >
< Ready Check Baseline Drift >
< Ready Check Injection Flow >
SPL1 Carrier : Yes
SPL1 Purge : Yes
< Ready Check APC Flow >
< Ready Check Detector APC Flow >
External Wait :No
Equilibrium Time :3.0 min

[GC Program]

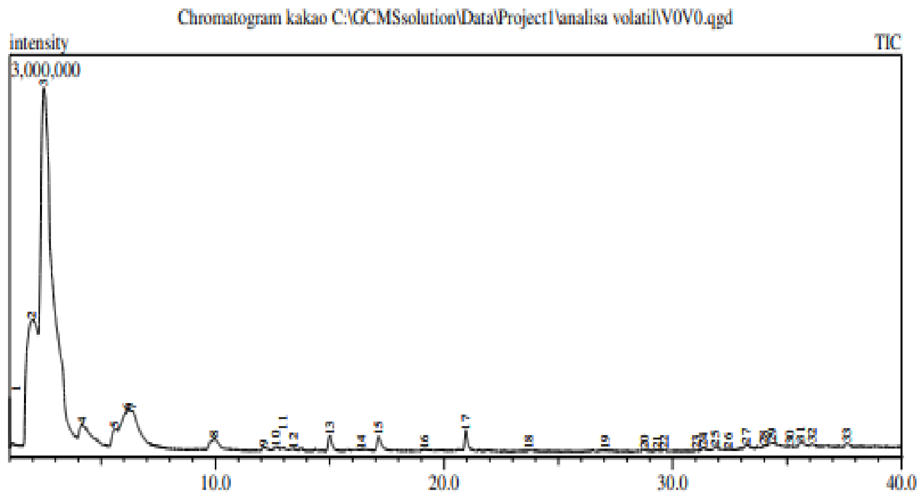
[GCMS-QP2010 Plus]
IonSourceTemp :200.00 °C
Interface Temp. :200.00 °C
Solvent Cut Time :1.00 min
Detector Gain Mode :Relative
Detector Gain :0.00 kV
Threshold :1000

[MS Table]
--Group 1 - Event 1--
Start Time :1.00min
End Time :40.00min
ACQ Mode :Scan
Event Time :0.60sec
Scan Speed : 555
Start m/z :30.00
End m/z :350.00

Sample Inlet Unit :GC

[MS Program]
Use MS Program :OFF

Lampiran 3. Analisa Senyawa Volatil Biji Kakao Fermentasi pada perlakuan penyangraian 0 menit menggunakan metode ekstraksi HS-SPME/GC-MS



Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Name
1	1.096	282032	0.18	29068	0.54	Acetic acid, hydrazide
2	1.980	16901282	10.83	940093	17.39	2-Pyridinepropanoic acid, .alpha.-methyl-.beta
3	2.497	103227147	66.15	2673631	49.45	Acetic acid (CAS) Ethylic acid
4	4.178	3267273	2.09	108288	2.00	Propanoic acid, 2-methyl- (CAS) Isobutyric ac
5	5.608	1854546	1.19	130273	2.41	1,3-Butanediol (CAS) 1,3-Butylene glycol
6	6.146	7517630	4.82	270576	5.00	Hydrazine, 1,2-dimethyl- (CAS) sym-Dimethy
7	6.358	7088221	4.54	270628	5.01	1-Butanol, 3-methyl-, acetate (CAS) Isoamyl a
8	9.952	1960558	1.26	83826	1.55	Acetic acid, ethyl ester (CAS) Acetic acid ethy
9	12.117	359572	0.23	23487	0.43	N-benzylidene-dimethylammonium chloride
10	12.641	441509	0.28	28961	0.54	Ethane, 1,1'-oxybis[2-ethoxy- (CAS) Bis(2-eth
11	12.943	337897	0.22	21624	0.40	Butanoic acid, 4-chloro-
12	13.412	261428	0.17	15592	0.29	Butane, 2,2-dimethyl- (CAS) 2,2-Dimethylbut
13	14.999	1291971	0.83	112885	2.09	Pyrazine, tetramethyl- (CAS) Tetramethylpyra
14	16.380	361148	0.23	12056	0.22	Pentanoic acid (CAS) Valeric acid
15	17.142	1538564	0.99	108459	2.01	Benzeneethanol (CAS) Phenethyl alcohol
16	19.154	109247	0.07	7380	0.14	1-Butanamine (CAS) Butylamine
17	20.957	1304324	0.84	150518	2.78	Acetic acid, 2-phenylethyl ester (CAS) Phenet
18	23.720	79312	0.05	7811	0.14	5,5-dimethyl-4,4-pentylene-2-phenyl-1,3,6-ox
19	27.070	221687	0.14	7056	0.13	1-Pentanol, 3-methyl- (CAS) 3-Methyl-1-pent
20	28.759	191294	0.12	14962	0.28	2-chloro-1,1,1-trifluoro-2-tridecene
21	29.309	124068	0.08	9946	0.18	Butanoic acid, 2-methylpropyl ester (CAS) Iso
22	29.621	145460	0.09	13417	0.25	Butanoic acid, 3-hexenyl ester, (Z)- (CAS) cis
23	31.019	59108	0.04	8580	0.16	Butanoic acid, 2-ethyl- (CAS) 2-Ethylbutanoic
24	31.352	364100	0.23	24659	0.46	1H-Imidazole, 2-phenyl- (CAS) 2-Phenylimid
25	31.872	567587	0.36	34916	0.65	Cyclododecanol (CAS) Cyclododecanol (6CI,
26	32.440	173896	0.11	10635	0.20	4,4,7,7-Tetramethyldeca-1,9-diene
27	33.220	730138	0.47	43955	0.81	Phosphonic acid, dioctadecyl ester (CAS) Di(r
28	33.980	328912	0.21	32323	0.60	METHYL 11-(2,3-DIDEUTEROCYCLOPEN
29	34.347	1975337	1.27	51346	0.95	Hexadecane (CAS) n-Hexadecane
30	35.125	336927	0.22	24818	0.46	Dodecanoic acid, ethyl ester (CAS) Ethyl laur
31	35.608	1396320	0.89	55078	1.02	Octadecanoic acid (CAS) Stearic acid
32	36.096	630081	0.40	40941	0.76	Tetradecanal (CAS) Myristaldehyde
33	37.618	611424	0.39	39235	0.73	1-Dodecanol (CAS) n-Dodecanol
		156040000	100.00	5407023	100.00	

Lampiran 4. Analisa Senyawa Volatil Biji Kakao Fermentasi pada perlakuan penyangraian 10 menit menggunakan metode ekstraksi HS-SPME/GC-MS

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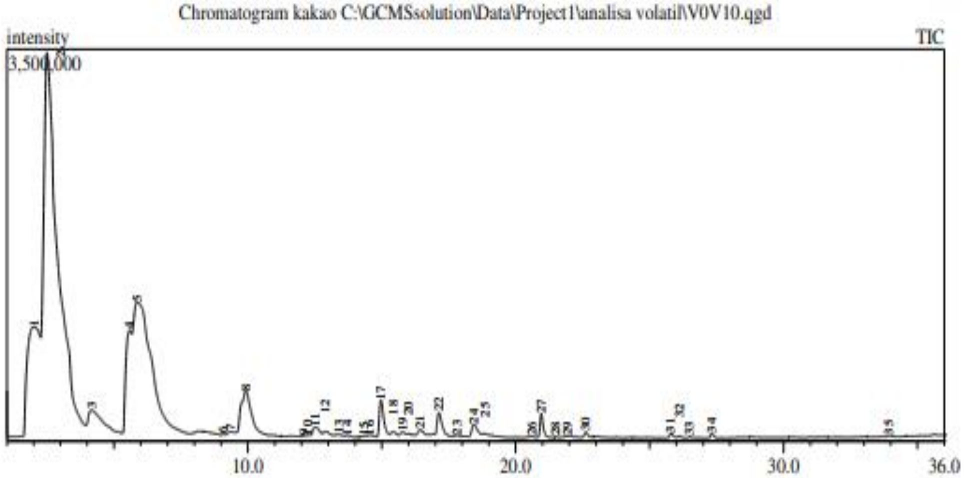

Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Name
1	2.035	30868750	11.61	978746	11.42	Oxygen (CAS) Oxygen molecule
2	2.502	132916830	50.00	3426306	39.98	Acetic acid (CAS) Ethylic acid
3	4.174	4649762	1.75	148155	1.73	Propane, 1-(1-methylethoxy)- (CAS) Propyl is
4	5.589	13695977	5.15	929754	10.85	2,3-Butanediol (CAS) Butane-2,3-diol
5	5.866	55845264	21.01	1180437	13.77	2,3-Butanediol (CAS) Butane-2,3-diol
6	9.070	62469	0.02	5448	0.06	1,1-Ethanediol, diacetate (CAS) Ethylidene di
7	9.340	509922	0.19	28144	0.33	Propane, 1-(1-methylethoxy)- (CAS) Propyl is
8	9.925	10728277	4.04	399711	4.66	1-Methoxy-2-propyl ester of acetic acid
9	12.110	99621	0.04	11838	0.14	Benzaldehyde (CAS) Phenylmethanal
10	12.230	117908	0.04	17451	0.20	2-(3-OXO-3-PHENYLPROPYL)-3-METHYI
11	12.523	1528824	0.58	86597	1.01	Pyrazine, trimethyl- (CAS) Trimethylpyrazine
12	12.889	866556	0.33	48125	0.56	Butanoic acid, 4-chloro-
13	13.409	345282	0.13	22896	0.27	Oxirane, tetramethyl- (CAS) TETRAMETHY
14	13.717	157694	0.06	19659	0.23	Acetic acid, 1-methylpropyl ester (CAS) 2-Bu
15	14.338	94949	0.04	14333	0.17	1,3-Dioxolane, 2,2-dimethyl- (CAS) Acetone,
16	14.554	260572	0.10	19731	0.23	Cyclohexanone, 3-methyl- (CAS) 3-Methylcy
17	14.969	3691065	1.39	328019	3.83	Pyrazine, tetramethyl- (CAS) Tetramethylpyra
18	15.421	534056	0.20	40574	0.47	2,5-Dimethyl-4-hydroxy-3(2H)-furanone
19	15.778	426715	0.16	32742	0.38	2(3H)-Furanone, dihydro-3-hydroxy-4,4-dimet
20	16.003	135446	0.05	17249	0.20	Pentanoic acid, ethyl ester (CAS) Ethyl n-vale
21	16.431	632712	0.24	49174	0.57	ACETYLPYRROLE
22	17.138	2359277	0.89	199735	2.33	Benzeneethanol (CAS) Phenethyl alcohol
23	17.820	151729	0.06	16472	0.19	N-(3-METHYLBUTYL)ACETAMIDE
24	18.436	1529020	0.58	108424	1.27	2,4,5-Trimethyl-1,3-dioxolane
25	18.860	132082	0.05	12177	0.14	2-Pyrrolidinone (CAS) Pyrrolidone
26	20.612	154875	0.06	12138	0.14	5-O-Benzyl-2-O-tosyl-D-ribonolactone
27	20.954	1734706	0.65	214471	2.50	Acetic acid, 2-phenylethyl ester (CAS) Phenet
28	21.510	35692	0.01	6567	0.08	Ethyl Hept-6-enoate
29	21.946	248886	0.09	15440	0.18	Benzene, methyl- (CAS) Toluene
30	22.615	336597	0.13	45612	0.53	(5Z,7E)-nona-1,5,7-triene-3-yne
31	25.796	387999	0.15	42998	0.50	3,4-DIHYDRO-5-METHYL-2H-PYRAN-2-C
32	26.123	120530	0.05	17941	0.21	1H-Imidazole, 2,4-dimethyl- (CAS) 2,4-Dimet
33	26.493	72232	0.03	13867	0.16	Nonanoic acid, ethyl ester (CAS) Ethyl nonan
34	27.325	313618	0.12	43751	0.51	Benzenebutanol (CAS) 4-Phenylbutanol
35	33.936	102872	0.04	15262	0.18	Nonanoic acid, 7-methyl-, methyl ester (CAS)
		265848766	100.00	8569944	100.00	

Lampiran 5. Analisa Senyawa Volatil Biji Kakao Fermentasi pada perlakuan penyangraian 14 menit menggunakan metode ekstraksi HS-SPME/GC-MS

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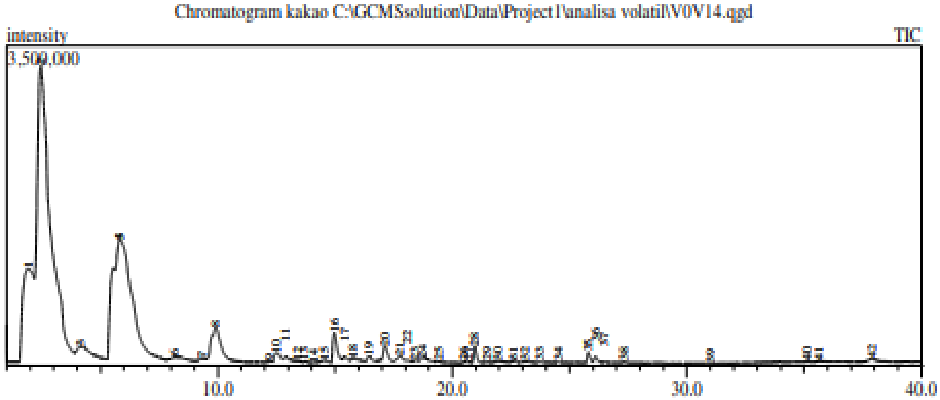
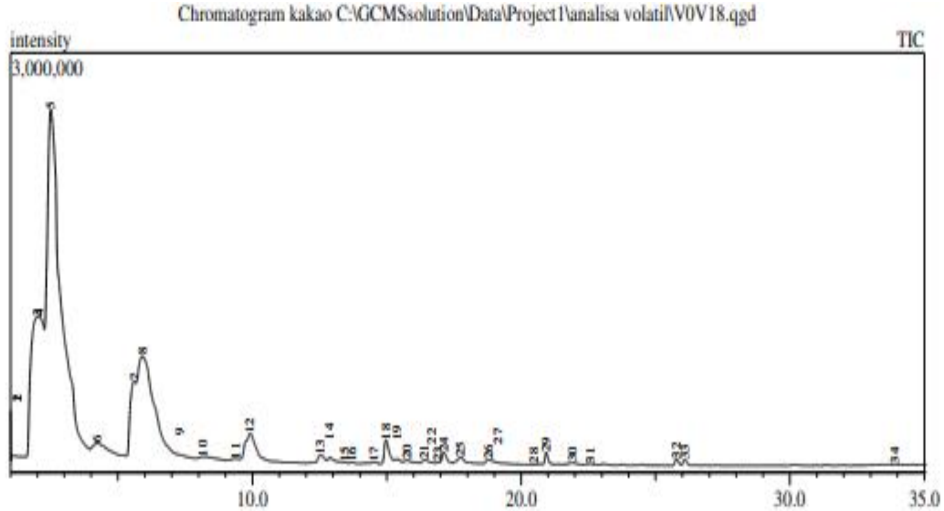


Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Name
1	1.925	32360328	12.31	1014438	11.16	Oxygen (CAS) Oxygen molecule
2	2.458	130797555	49.78	3225147	35.48	Acetic acid (CAS) Ethylic acid
3	4.165	2868812	1.09	89816	0.99	Propanoic acid, 2-methyl- (CAS) Isobutyric ac
4	5.804	13975150	5.32	1302116	14.33	2,3-Butanediol (CAS) Butane-2,3-diol
5	5.842	46715402	17.78	1301110	14.32	Propane, 2,2'-oxybis- (CAS) Isopropyl ether
6	8.157	795539	0.30	27759	0.31	2-Furanmethanol (CAS) Furfuryl alcohol
7	9.345	413510	0.16	27048	0.30	Propane, 1-(1-methylethoxy)- (CAS) Propyl is
8	9.913	10343400	3.94	367085	4.04	1-Methoxy-2-propyl ester of acetic acid
9	12.229	96302	0.04	10828	0.12	Pyrazine, 2-ethyl-5-methyl- (CAS) 2-Methyl-5
10	12.511	1653108	0.63	99540	1.10	Pyrazine, trimethyl- (CAS) Trimethylpyrazine
11	12.888	1041695	0.40	56494	0.62	Butanoic acid, 4-chloro-
12	13.400	201045	0.08	17331	0.19	Oxirane, (propoxymethyl)- (CAS) Glycidyl pr
13	13.708	95763	0.04	11988	0.13	Acetic acid, 1-methylpropyl ester (CAS) 2-Bu
14	14.100	63918	0.02	5078	0.06	(E)-2-Methyl-2,5-nonadiene-4-one
15	14.535	588122	0.22	30477	0.34	2H-PYRAN-2-ONE, TETRAHYDRO-4,6-DI
16	14.971	4196603	1.60	326356	3.59	Pyrazine, tetramethyl- (CAS) Tetramethylpyra
17	15.412	992767	0.38	65692	0.72	2,5-Dimethyl-4-hydroxy-3(2H)-furanone
18	15.775	1315889	0.50	55047	0.61	2(3H)-Furanone, dihydro-3-hydroxy-4,4-dime
19	16.433	1105086	0.42	63869	0.70	ACETYLPYRROLE
20	17.137	2922283	1.11	189184	2.08	Benzeneethanol (CAS) Phenethyl alcohol
21	17.759	1423021	0.54	77893	0.86	ACETAMIDE, N-(3-METHYL-2-OXOBUTY
22	18.080	306579	0.12	27900	0.31	4H-Pyran-4-one, 2-hydroxy-3-methyl- (CAS)
23	18.405	471880	0.18	30355	0.33	2,4,5-TRIMETHYL-1,3-DIOXOLANE
24	18.760	1279070	0.49	58107	0.64	2-Pyrrolidinone (CAS) Pyrrolidone
25	19.420	163930	0.06	13666	0.15	4(1H)-Pyridinone, 2,3-dihydro-1-methyl- (CA
26	20.494	191440	0.07	16710	0.18	Heptanenitrile (CAS) N-HEXYLCYANIDE
27	20.720	103977	0.04	12536	0.14	Pyrrolidine, 1-acetyl- (CAS) N-Acetylpyrrolid
28	20.957	1612484	0.61	190599	2.10	Acetic acid, 2-phenylethyl ester (CAS) Phenet
29	21.503	165868	0.06	12544	0.14	2-Propanol, 1,1'-iminobis-
30	21.958	684253	0.26	25146	0.28	ETHINYLCYCLOPENTENE-(2)
31	22.610	461749	0.18	34938	0.38	CINNAMYL ISO VALERATE
32	23.103	424214	0.16	22144	0.24	4-(1-hydroxy-ethyl) .gamma. butanolactone
33	23.755	114674	0.04	10827	0.12	3(S)-3-(Benzoyloxy)-N-hydroxypyrrolodine
34	24.529	93418	0.04	8294	0.09	[Cyano-13C]-1,3,5-cycloheptatrien-7-carbonit
35	25.791	980799	0.37	110811	1.22	2,4(1H,3H)-Pyrimidinedione (CAS) Ura
36	26.109	653245	0.25	63988	0.70	1H-Imidazole, 2-ethyl-4,5-dihydro- (CAS) 2-E
37	26.498	70053	0.03	12026	0.13	Heptanoic acid, 2-ethyl- (CAS) 2-ETHYL-HE
38	27.324	137526	0.05	18706	0.21	Benzene, 4-hexenyl- (CAS) 6-Phenyl-2-hexen
39	31.015	41958	0.02	5600	0.06	Octanoic acid, 2-methyl-, methyl ester (CAS)
40	35.133	43091	0.02	7240	0.08	Heptanoic acid, 2-ethyl- (CAS) 2-ETHYL-HE
41	35.630	153731	0.06	11126	0.12	Octadecanoic acid (CAS) Stearic acid
42	37.901	653274	0.25	31475	0.35	1,7-Dihydro-2-methyl-7-phenyl-1-phenylmeth
		262772511	100.00	9089034	100.00	

Lampiran 6. Analisa Senyawa Volatil Biji Kakao Fermentasi pada perlakuan penyangraian 18 menit menggunakan metode ekstraksi HS-SPME/GC-MS.

Chromatogram kakao C:\GCMSsolution\Data\Project1\analisa volatil\V0V18.qgd



Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Name
1	1.089	39614	0.02	8311	0.12	Acetic acid (CAS) Ethylic acid
2	1.180	9926	0.01	3550	0.05	TRIDEUTEROACETONITRILE
3	1.989	17598437	9.82	1003139	14.78	2-Pyridinepropanoic acid, .alpha.-methyl-.beta
4	2.062	14579199	8.13	1004876	14.80	Carbonic dihydrazide (CAS) Carbohydrazide
5	2.503	92330490	51.50	2482533	36.57	Acetic acid (CAS) Ethylic acid
6	4.222	1758368	0.98	55067	0.81	Propane, 1-(1-methylethoxy)- (CAS) Propyl is
7	5.619	7515092	4.19	535739	7.89	1,3-Butanediol (CAS) 1,3-Butylene glycol
8	5.916	31122080	17.36	717300	10.57	2,3-Butanediol (CAS) Butane-2,3-diol
9	7.290	26260	0.01	2314	0.03	2-Pyridinamine (CAS) 2-Pyridylamine
10	8.160	90489	0.05	7856	0.12	2-Furanmethanol (CAS) Furfuryl alcohol
11	9.382	204357	0.11	13957	0.21	Ethanol, 2-propoxy- (CAS) 2-Propoxyethanol
12	9.920	5160596	2.88	195416	2.88	Propane, 1-(1-methylethoxy)- (CAS) Propyl is
13	12.539	828639	0.46	55329	0.81	Pyrazine, trimethyl- (CAS) Trimethylpyrazine
14	12.884	634801	0.35	36790	0.54	Butanoic acid, 4-chloro-
15	13.440	81713	0.05	7977	0.12	2-Methyl-4-penten-2-ol
16	13.704	62578	0.03	9195	0.14	Propane, 2-methyl-1-propoxy- (CAS) Ether, is
17	14.524	129152	0.07	11362	0.17	Aziridine, 2,2-dimethyl- (CAS) 2,2-DIMETH'
18	14.969	2180644	1.22	173421	2.55	Pyrazine, tetramethyl- (CAS) Tetramethylpyra
19	15.372	383628	0.21	28080	0.41	2,5-Dimethyl-4-hydroxy-3(2H)-furanone
20	15.765	176022	0.10	15399	0.23	Furan, 2-butyltetrahydro- (CAS) Octane, 1,4-e
21	16.413	342566	0.19	24680	0.36	ACETYLPYRROLE
22	16.680	18290	0.01	5276	0.08	4.alpha.-methyl-1-azabicyclo[3.2.0]heptane-3,'
23	16.909	63286	0.04	10402	0.15	4-VINYL-4,5-DIHYDRO-3H-PYRAZOLE
24	17.124	861682	0.48	75047	1.11	Benzeneethanol (CAS) Phenethyl alcohol
25	17.753	609434	0.34	40459	0.60	Guanidine, methyl-, hydrochloride (CAS) N-M
26	18.794	517784	0.29	28581	0.42	2-Pyrrolidinone (CAS) Pyrrolidone
27	19.140	21894	0.01	6694	0.10	(2S,5.beta.)-3,4-Diiodo-2-methyl-3,4-secochol
28	20.486	26698	0.01	5774	0.09	Heptanenitrile (CAS) N-HEXYLCYANIDE
29	20.934	647833	0.36	86848	1.28	Acetic acid, 2-phenylethyl ester (CAS) Phenet
30	21.913	160010	0.09	12108	0.18	1-BENZYLBENZIMIDAZOLE-3-OXIDE
31	22.593	80554	0.04	9401	0.14	4-(1-hydroxy-ethyl) .gamma. butanolactone
32	25.771	436230	0.24	50370	0.74	3,4-DIHYDRO-5-METHYL-2H-PYRAN-2-C
33	26.081	357348	0.20	42373	0.62	CIS-CYCLOHEXEN-3,5-DIOL
34	33.913	33026	0.02	7133	0.11	Decanoic acid, 8-methyl-, methyl ester (CAS)
35	35.590	206682	0.12	16216	0.24	10-BROMO-7-HYDROXY-11-IODOLAURE
		179295402	100.00	6788973	100.00	

Lampiran 7 : Hasil uji kadar air biji kakao selama perlakuan penyangraian menggunakan metode oven

Perlakuan	Berat cawan petri kosong (w2)	Berat cawan petri + sampel awal	Berat sampel awal (W))	Berat cawan petri + sampel kering (W1)	W-(W1-W2)	W1-W2	Kadar air berat basah	Kadar air berat kering	Nilai rata-rata (%)	Keterangan
K_0K_0	83.5973	85.5982	2.0009	85.483	0.1152	1.8857	5.757	6.109	6.109	0 menit penyangraian
K_1K_{10}	77.1357	79.137	2.0013	79.11	0.027	1.9743	1.349	1.368	1.378	10 menit penyangraian
K_2K_{10}	83.467	85.4679	2.0009	85.4405	0.0274	1.9735	1.369	1.388		
K_1K_{14}	81.2265	83.2261	1.9996	83.2038	0.0223	1.9773	1.115	1.128	1.025	14 menit penyangraian
K_2K_{14}	86.1323	88.1365	2.0042	88.1182	0.0183	1.9859	0.913	0.921		
K_1K_{18}	94.0515	96.0528	2.0013	96.029	0.0238	1.9775	1.189	1.204	1.125	18 menit penyangraian
K_2K_{18}	96.6536	98.6539	2.0003	98.6332	0.0207	1.9796	1.035	1.046		

Keterangan:

K_0K_0 : penyangraian 0 menit

K_1K_{10} : Penyangraian 10 menit ulangan I

K_2K_{10} : Penyangraian 10 menit ulangan II

K_1K_{14} : Penyangraian 14 menit ulangan I

K_2K_{14} :Penyangraian 14 menit ulangan II

K_1K_{18} :Penyangraian 18 menit ulangan I

K_2K_{18} :Penyangraian 18 menit ulangan II

Lampiran 8 : Hasil Konversi sampel biji kakao berdasarkan total padatan terlarut

PERLAKUAN	BERAT CAWAN PETRI KOSONG (W2)	BERAT Cawan petri + sampel awal	berat sampel awal (W))	BERAT Cawan petri + sampel KERING (W1)	W-(W1-W2)	W1-W2	KADAR AIR BERAT BASAH	KADAR AIR BERAT KERING	padatan dalam sampel (100-kadar air basis kering)%	**Total padatan dalam sampel (berat sampel x padatan) mg**
K0K0	83.5973	85.5982	2.0009	85.483	0.1152	1.8857	5.757	6.109	0.9424	474.9827
K1K10	77.1357	79.137	2.0013	79.11	0.027	1.9743	1.349	1.368	0.9865	502.1330
K2K10	83.467	85.4679	2.0009	85.4405	0.0274	1.9735	1.369	1.388	0.9863	496.1120
K1K14	81.2265	83.2261	1.9996	83.2038	0.0223	1.9773	1.115	1.128	0.9888	494.4239
K2K14	86.1323	88.1365	2.0042	88.1182	0.0183	1.9859	0.913	0.921	0.9909	501.3798
K1K18	94.0515	96.0528	2.0013	96.029	0.0238	1.9775	1.189	1.204	0.9881	501.9587
K2K18	96.6536	98.6539	2.0003	98.6332	0.0207	1.9796	1.035	1.046	0.9897	497.7947

K_0K_0 : penyangraian 0 menit

K_1K_{10} : Penyangraian 10 menit ulangan I

K_2K_{10} : Penyangraian 10 menit ulangan II

K_1K_{14} : Penyangraian 14 menit ulangan I

K_2K_{14} :Penyangraian 14 menit ulangan II

K_1K_{18} :Penyangraian 18 menit ulangan I

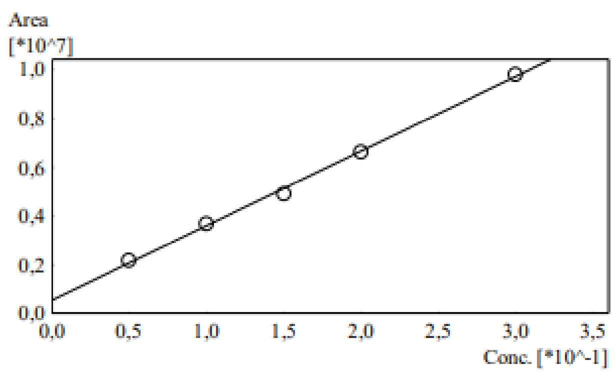
K_2K_{18} :Penyangraian 18 menit ulangan II

Lampiran 9 : Kurva standar asam amino

Asam Amino asam aspartat

Calibration Curve

ID# : 1 m/z : 134,00
Name : asam aspartat
Quantitative Method : External Standard
Function : f(x)=3,04814e+007*x+558187
Rr1=0,9989208 Rr2=0,9978427
MeanRF: 3,574048e+007 RF SD: 4,633500e+006 RF %RSD: 12,964293
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	2171193	2171193
2	0,1	3681742	3681742
3	0,15	4907283	4907283
4	0,2	6615933	6615933
5	0,3	9799866	9799866

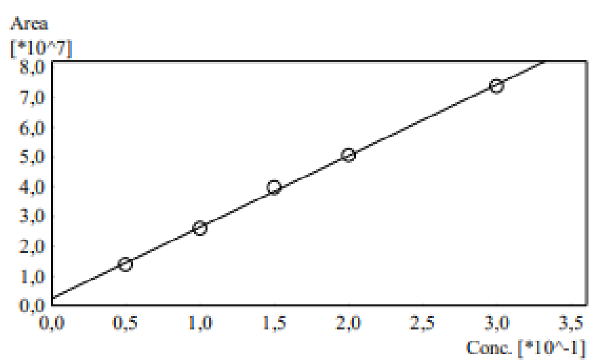
ID#1 Compound Name: asam aspartat

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	4,437	2171193	44834	0,050	0,05
STD 0,1mM.lcd	4,482	3681742	75806	0,100	0,1
STD 0,15mM.lcd	4,459	4907283	103986	0,148	0,15
STD 0,2mM.lcd	4,503	6615933	145313	0,203	0,2
STD 0,3mM.lcd	4,517	9799866	208270	0,303	0,3
A0A0.lcd	4,059	4254054	93657	0,121	--
A1A10.lcd	4,189	5118518	121666	0,150	--
A1A14.lcd	4,252	4065986	78538	0,115	--
A1A18.lcd	4,255	5419136	114746	0,159	--
A2A10.lcd	4,242	4977265	112712	0,145	--
A2A14.lcd	4,255	5434731	111772	0,160	--
A2A18.lcd	4,262	5165395	105616	0,151	--
Average	4,326	5134259	109743	0,150	
%RSD	3,406	35,730	36,656	40,586	
Maximum	4,517	9799866	208270	0,303	
Minimum	4,059	2171193	44834	0,050	
Standard Deviation	0,147	1834458	40227	0,061	

Asam Amino Asam Glutamat

Calibration Curve

ID# : 1 m/z : 148,00
Name : asam glutamat
Quantitative Method : External Standard
Function : f(x)=2,39386e+008*x+2,47526e+006
Rr1=0,9993932 Rr2=0,9987867
MeanRF: 2,602896e+008 RF SD: 1,245939e+007 RF %RSD: 4,786742
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	13931406	13931406
2	0,1	25951981	25951981
3	0,15	39687081	39687081
4	0,2	50603005	50603005
5	0,3	73711402	73711402

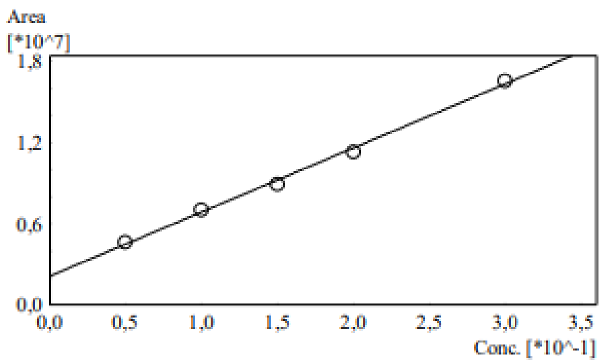
ID#1 Compound Name: asam glutamat

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	4,510	13931406	381576	0,050	0,05
STD 0,1mM.lcd	4,506	25951981	678161	0,100	0,1
STD 0,15mM.lcd	4,507	39687081	1043147	0,151	0,15
STD 0,2mM.lcd	4,530	50603005	1346281	0,198	0,2
STD 0,3mM.lcd	4,525	73711402	1910418	0,298	0,3
A0A0.lcd	3,983	27085659	680750	0,103	--
A1A10.lcd	4,083	39666980	1033673	0,155	--
A1A14.lcd	4,095	25987450	656248	0,098	--
A1A18.lcd	4,107	39228908	1040008	0,154	--
A2A10.lcd	4,112	39950402	1045747	0,157	--
A2A14.lcd	4,121	40113004	1044941	0,157	--
A2A18.lcd	4,128	36998330	947671	0,144	--
Average	4,267	37742967	984052	0,147	
%RSD	5,212	39,441	39,516	41,798	
Maximum	4,530	73711402	1910418	0,298	
Minimum	3,983	13931406	381576	0,050	
Standard Deviation	0,222	14886329	388854	0,061	

Asam Amino Arginin

Calibration Curve

ID# : 1 m/z : 175,00
Name : arginin
Quantitative Method : External Standard
Function : f(x)=4,73003e+007*x+2,11916e+006
Rr1=0,9983726 Rr2=0,9967479
MeanRF: 6,678926e+007 RF SD: 1,551868e+007 RF %RSD: 23,235293
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	4621444	4621444
2	0,1	7032878	7032878
3	0,15	8919319	8919319
4	0,2	11311043	11311043
5	0,3	16551392	16551392

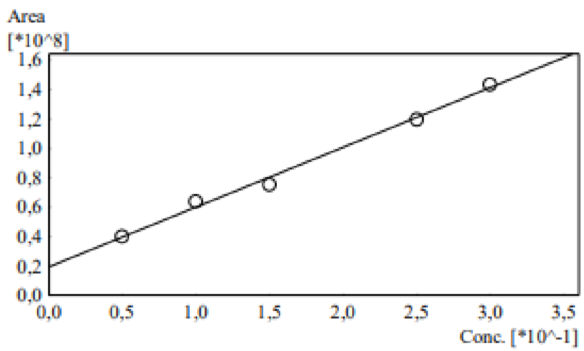
ID#1 Compound Name: arginin

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	3,070	4621444	136074	0,050	0,05
STD 0,1mM.lcd	3,064	7032878	207388	0,100	0,1
STD 0,15mM.lcd	3,064	8919319	266740	0,148	0,15
STD 0,2mM.lcd	3,058	11311043	343022	0,201	0,2
STD 0,3mM.lcd	3,064	16551392	495685	0,305	0,3
A0A0.lcd	3,138	4407860	125972	0,048	--
A1A10.lcd	3,143	5280225	155691	0,067	--
A1A14.lcd	3,129	4197234	117869	0,044	--
A1A18.lcd	3,133	5585534	154244	0,073	--
A2A10.lcd	3,120	5191091	150109	0,065	--
A2A14.lcd	3,128	5416139	151278	0,070	--
A2A18.lcd	3,126	5203288	148611	0,065	--
Average	3,103	6976454	204390	0,103	
%RSD	1,131	52,523	55,203	76,283	
Maximum	3,143	16551392	495685	0,305	
Minimum	3,058	4197234	117869	0,044	
Standard Deviation	0,035	3664224	112829	0,079	

Asam Amino Metionin

Calibration Curve

ID# : 1 m/z : 150,00
Name : metionin
Quantitative Method : External Standard
Function : f(x)=4,06513e+008*x+1,92828e+007
Rr1=0,9970133 Rr2=0,9940355
MeanRF: 5,784580e+008 RF SD: 1,385212e+008 RF %RSD: 23,946629
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	39851434	39851434
2	0,1	63551194	63551194
3	0,15	75439834	75439834
4	0,25	119687648	119687648
5	0,3	143419930	143419930

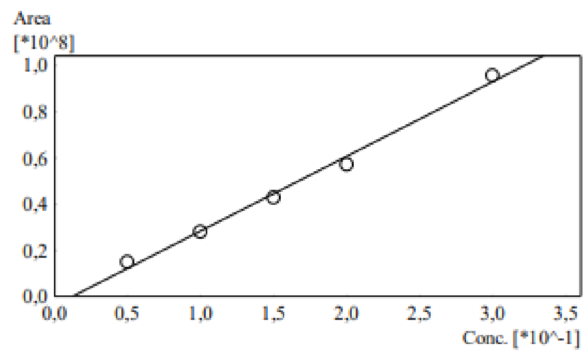
ID#1 Compound Name: metionin

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	4,003	39851434	985994	0,050	0,05
STD 0,1mM.lcd	4,004	63551194	1562420	0,100	0,1
STD 0,15mM.lcd	4,022	75439834	1843420	0,144	0,15
STD 0,2mM.lcd	4,044	119687648	2698157	0,253	0,25
STD 0,3mM.lcd	4,030	143419930	3406434	0,305	0,3
A0A0.lcd	3,612	30199506	764484	0,027	--
A1A10.lcd	3,652	38709427	927192	0,048	--
A1A14.lcd	3,663	26215328	632093	0,017	--
A1A18.lcd	3,662	32987304	782576	0,034	--
A2A10.lcd	3,653	39540236	951900	0,050	--
A2A14.lcd	3,684	39745392	956680	0,050	--
A2A18.lcd	3,691	35660498	852931	0,040	--
Average	3,810	57083978	1363690	0,093	
%RSD	4,912	66,203	64,022	100,938	
Maximum	4,044	143419930	3406434	0,305	
Minimum	3,612	26215328	632093	0,017	
Standard Deviation	0,187	37791457	873056	0,094	

Asam Amino

Calibration Curve

ID# : 1 m/z : 147,00
Name : lisin
Quantitative Method : External Standard
Function : f(x)=3,22858e+008*x-4,04745e+006
Rr1=0,9960089 Rr2=0,9920337
MeanRF: 2,927347e+008 RF SD: 1,604637e+007 RF %RSD: 5,481541
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	14835756	14835756
2	0,1	27849444	27849444
3	0,15	42657228	42657228
4	0,2	57036870	57036870
5	0,3	95669482	95669482

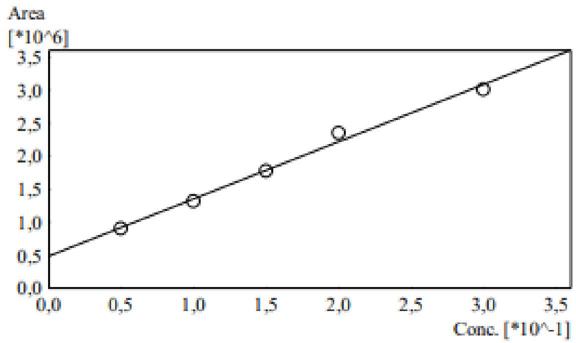
ID#1 Compound Name: lisin

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	3,117	14835756	421982	0,050	0,05
STD 0,1mM.lcd	3,114	27849444	768746	0,100	0,1
STD 0,15mM.lcd	3,114	42657228	1240356	0,151	0,15
STD 0,2mM.lcd	3,108	57036870	1649740	0,201	0,2
STD 0,3mM.lcd	3,125	95669482	2618296	0,309	0,3
A0A0.lcd	3,155	4156350	119389	0,025	--
A1A10.lcd	3,170	4340616	123915	0,026	--
A1A14.lcd	3,161	2786184	82649	0,021	--
A1A18.lcd	3,169	3369127	97588	0,023	--
A2A10.lcd	3,152	4671391	131679	0,027	--
A2A14.lcd	3,161	3821860	109787	0,024	--
A2A18.lcd	3,162	3623017	104713	0,024	--
Average	3,142	22068110	622403	0,082	
%RSD	0,778	133,042	131,086	113,608	
Maximum	3,170	95669482	2618296	0,309	
Minimum	3,108	2786184	82649	0,021	
Standard Deviation	0,024	29359761	815884	0,093	

Asam Amino Alanin

Calibration Curve

ID# : 1 m/z : 90,00
Name : alanin
Quantitative Method : External Standard
Function : f(x)=8,66012e+006*x+487993
Rr1=0,9955172 Rr2=0,9910545
MeanRF: 1,297463e+007 RF SD: 3,023337e+006 RF %RSD: 23,301909
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	900308	900308
2	0,1	1316953	1316953
3	0,15	1781055	1781055
4	0,2	2354778	2354778
5	0,3	3014964	3014964

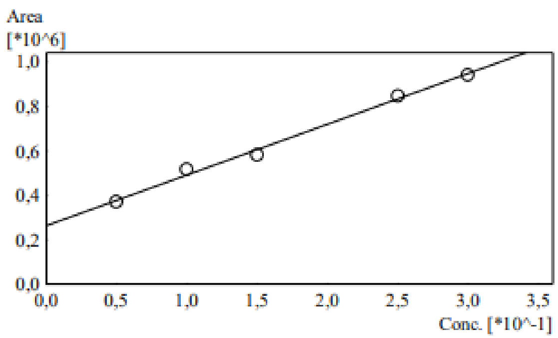
ID#1 Compound Name: alanin

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	3,998	900308	20617	0,050	0,05
STD 0,1mM.lcd	4,021	1316953	29354	0,100	0,1
STD 0,15mM.lcd	4,030	1781055	38598	0,151	0,15
STD 0,2mM.lcd	4,054	2354778	48768	0,204	0,2
STD 0,3mM.lcd	4,047	3014964	55809	0,292	0,3
A0A0.lcd	3,648	1524867	35873	0,120	--
A1A10.lcd	3,699	1837588	46331	0,156	--
A1A14.lcd	3,701	1492202	33424	0,116	--
A1A18.lcd	3,708	1927837	47551	0,166	--
A2A10.lcd	3,702	2204680	49111	0,198	--
A2A14.lcd	3,725	1876553	46372	0,160	--
A2A18.lcd	3,733	1920190	42784	0,165	--
Average	3,839	1845998	41216	0,157	
%RSD	4,439	29,099	24,139	38,558	
Maximum	4,054	3014964	55809	0,292	
Minimum	3,648	900308	20617	0,050	
Standard Deviation	0,170	537158	9949	0,060	

Asam Amino Glisin

Calibration Curve

ID# : 1 m/z : 76,00
Name : glisin
Quantitative Method : External Standard
Function : f(x)=2,26997e+006*x+264948
Rr1=0,9966509 Rr2=0,9933129
MeanRF: 4,592117e+006 RF SD: 1,752588e+006 RF %RSD: 38,165147
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	369650	369650
2	0,1	517397	517397
3	0,15	581811	581811
4	0,25	845511	845511
5	0,3	939846	939846

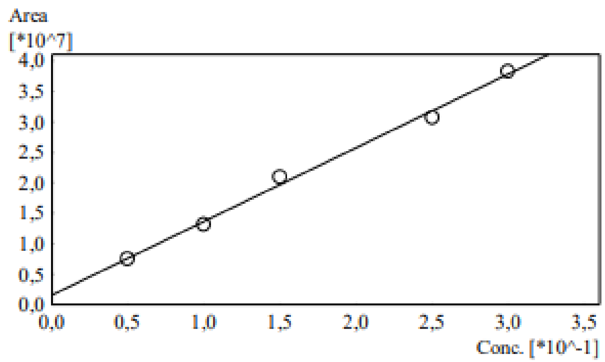
ID#1 Compound Name: glisin

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	4,092	369650	7302	0,050	0,05
STD 0,1mM.lcd	4,128	517397	9706	0,100	0,1
STD 0,15mM.lcd	4,134	581811	10663	0,143	0,15
STD 0,25mM.lcd	4,181	845511	15090	0,253	0,25
STD 0,3mM.lcd	4,156	939846	15599	0,297	0,3
A0A0.lcd	3,707	553813	11919	0,127	--
A1A10.lcd	3,763	633338	14818	0,162	--
A1A14.lcd	3,773	497527	10715	0,102	--
A1A18.lcd	3,774	759051	16186	0,218	--
A2A10.lcd	3,765	729574	15377	0,205	--
A2A14.lcd	3,785	719235	15621	0,200	--
A2A18.lcd	3,792	671818	13920	0,179	--
Average	3,921	651548	13076	0,170	
%RSD	4,952	24,457	22,242	41,264	
Maximum	4,181	939846	16186	0,297	
Minimum	3,707	369650	7302	0,050	
Standard Deviation	0,194	159347	2908	0,070	

Asam Amino Prolin

Calibration Curve

ID# : 1 m/z : 116,00
Name : proline
Quantitative Method : External Standard
Function : f(x)=1,20579e+008*x+1,62622e+006
Rr1=0,9973338 Rr2=0,9946747
MeanRF: 1,344322e+008 RF SD: 1,083478e+007 RF %RSD: 8,059657
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	7506666	7506666
2	0,1	13178706	13178706
3	0,15	20999537	20999537
4	0,25	30675326	30675326
5	0,3	38262757	38262757

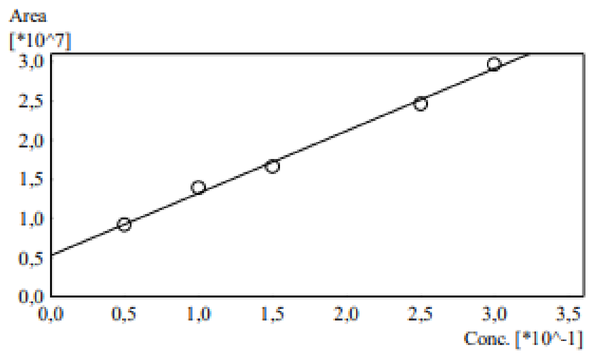
ID#1 Compound Name: proline

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	4,493	7506666	182863	0,050	0,05
STD 0,1mM.lcd	4,505	13178706	335259	0,100	0,1
STD 0,15mM.lcd	4,506	20999537	522610	0,153	0,15
STD 0,25mM.lcd	4,503	30675326	786235	0,245	0,25
STD 0,3mM.lcd	4,523	38262757	952814	0,304	0,3
A0A0.lcd	4,040	10958952	275249	0,077	--
A1A10.lcd	4,128	15840790	402955	0,118	--
A1A14.lcd	4,153	10273636	252581	0,072	--
A1A18.lcd	4,163	15905750	400883	0,118	--
A2A10.lcd	4,160	16262526	405255	0,121	--
A2A14.lcd	4,166	15722020	389100	0,117	--
A2A18.lcd	4,178	14786584	358610	0,109	--
Average	4,293	17531104	438701	0,132	
%RSD	4,455	50,078	50,614	55,152	
Maximum	4,523	38262757	952814	0,304	
Minimum	4,040	7506666	182863	0,050	
Standard Deviation	0,191	8779171	222045	0,073	

Asam Amino Valin

Calibration Curve

ID# : 1 m/z : 118,00
Name : valine
Quantitative Method : External Standard
Function : f(x)=7,94221e+007*x+5,29649e+006
Rr1=0,9973316 Rr2=0,9946703
MeanRF: 1,261416e+008 RF SD: 3,593016e+007 RF %RSD: 28,483980
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	9152372	9152372
2	0,1	13949437	13949437
3	0,15	16643856	16643856
4	0,25	24583068	24583068
5	0,3	29662515	29662515

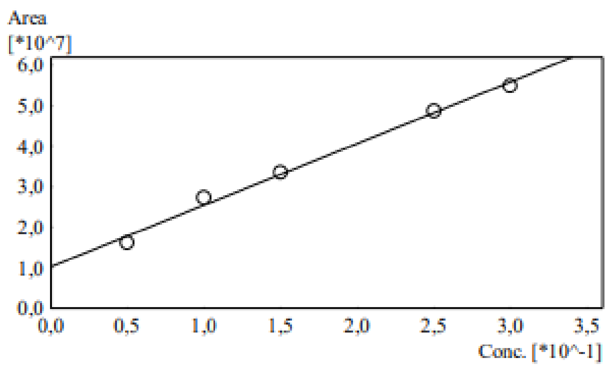
ID#1 Compound Name: valine

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	3,932	9152372	217962	0,050	0,05
STD 0,1mM.lcd	3,938	13949437	330949	0,100	0,1
STD 0,15mM.lcd	3,950	16643856	390213	0,145	0,15
STD 0,25mM.lcd	3,957	24583068	571891	0,250	0,25
STD 0,3mM.lcd	3,941	29662515	730546	0,307	0,3
A0A0.lcd	3,565	8903550	197709	0,045	--
A1A10.lcd	3,623	9461053	222778	0,052	--
A1A14.lcd	3,630	6779055	147457	0,019	--
A1A18.lcd	3,632	9335245	192133	0,051	--
A2A10.lcd	3,626	9774015	220417	0,056	--
A2A14.lcd	3,648	9600940	217208	0,054	--
A2A18.lcd	3,658	9170619	192423	0,049	--
Average	3,758	13084644	302641	0,098	
%RSD	4,393	54,470	59,035	92,440	
Maximum	3,957	29662515	730546	0,307	
Minimum	3,565	6779055	147457	0,019	
Standard Deviation	0,165	7127186	178664	0,091	

Asam Amino Leusin-Isoleusin

Calibration Curve

ID# : 1 m/z : 132,00
Name : leusin-isoleusin
Quantitative Method : External Standard
Function : f(x)=1,51563e+008*x+1,03735e+007
Rr1=0,9960071 Rr2=0,9920302
MeanRF: 2,395674e+008 RF SD: 5,804916e+007 RF %RSD: 24,230828
FitType : Linear
ZeroThrough : Not Through
Weighted Regression : None



#	Conc.(Ratio)	MeanArea	Area
1	0,05	16128193	16128193
2	0,1	27356012	27356012
3	0,15	33554271	33554271
4	0,25	48738183	48738183
5	0,3	54919538	54919538

ID#1 Compound Name: leusin-isoleusin

Title	Ret. Time	Area	Height	Conc.	Std. Conc.
STD 0,05mM.lcd	3,898	16128193	409703	0,050	0,05
STD 0,1mM.lcd	3,894	27356012	641399	0,100	0,1
STD 0,15mM.lcd	3,900	33554271	793618	0,145	0,15
STD 0,25mM.lcd	3,922	48738183	1199268	0,247	0,25
STD 0,3mM.lcd	3,928	54919538	1371592	0,294	0,3
A0A0.lcd	3,574	16357438	397007	0,039	--
A1A10.lcd	3,611	21154535	479598	0,071	--
A1A14.lcd	3,612	14113846	313639	0,025	--
A1A18.lcd	3,619	18218900	400170	0,052	--
A2A10.lcd	3,611	20149146	468864	0,064	--
A2A14.lcd	3,636	19341706	447634	0,059	--
A2A18.lcd	3,637	17641968	401916	0,048	--
Average	3,737	25639478	610367	0,100	
%RSD	4,082	52,259	56,016	86,627	
Maximum	3,928	54919538	1371592	0,294	
Minimum	3,574	14113846	313639	0,025	
Standard Deviation	0,153	13399013	341905	0,086	

Lampiran : Hasil analisa asam amino pada sampel biji kakao berdasarkan total padatan

Asam Amino Asam Aspartat

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Aspartic acid (mM)	Aspartic acid (ppm)	Aspartic acid (%)	Kadar air berat basah	Massa Aspartic acid (mg)	Aspartic acid (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.1210	16.106	0.799	5.757	4.02658	0.8477	0.8477
2	A1A10	509	25	0.1500	19.967	0.981	1.349	4.99163	0.9941	0.9833
3	A2A10	503	25	0.1450	19.301	0.959	1.369	4.82524	0.9726	
4	A1A14	500	25	0.1150	15.308	0.765	1.115	3.82691	0.7740	0.9180
5	A2A14	506	25	0.1600	21.298	1.052	0.913	5.3244	1.0619	
6	A1A18	508	25	0.1590	21.164	1.042	1.189	5.29112	1.0541	1.0318
7	A2A18	503	25	0.1510	20.100	0.999	1.035	5.0249	1.0094	

Asam Amino Asam Glutamat

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Glutamic acid (mM)	Glutamic acid (ppm)	Glutamic acid (%)	Kadar air berat basah	Massa Glutamic acid (mg)	Glutamic acid (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.1030	15.154	0.752	5.757	3.7886	0.7976	0.7976
2	A1A10	509	25	0.1550	22.805	1.120	1.349	5.70129	1.1354	
3	A2A10	503	25	0.1570	23.099	1.148	1.369	5.77485	1.1640	1.1497
4	A1A14	500	25	0.0980	14.419	0.721	1.115	3.60469	0.7291	
5	A2A14	506	25	0.1570	23.099	1.141	0.913	5.77485	1.1518	0.9404
6	A1A18	508	25	0.1540	22.658	1.115	1.189	5.66451	1.1285	
7	A2A18	503	25	0.1440	21.187	1.053	1.035	5.29668	1.0640	1.0963

Asam Amino Arginin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Arginine (mM)	Arginine (ppm)	Arginine (%)	Kadar air berat basah	Massa Arginine (mg)	Arginine (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.0480	8.362	0.415	5.757	2.0904	0.4401	0.4401
2	A1A10	509	25	0.0670	11.671	0.573	1.349	2.91785	0.5811	0.5758
3	A2A10	503	25	0.0650	11.323	0.563	1.369	2.83075	0.5706	
4	A1A14	500	25	0.0440	7.665	0.383	1.115	1.9162	0.3876	0.4978
5	A2A14	506	25	0.0700	12.194	0.602	0.913	3.0485	0.6080	
6	A1A18	508	25	0.0730	12.717	0.626	1.189	3.17915	0.6333	0.6010
7	A2A18	503	25	0.0650	11.323	0.563	1.035	2.83075	0.5687	

Asam Amino Metionin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Methionine (mM)	Methionine (ppm)	Methionine (%)	Kadar air berat basah	Massa Methionine (mg)	Methionine (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.0270	4.029	0.200	5.757	1.00717	0.2120	0.2120
2	A1A10	509	25	0.0480	7.162	0.352	1.349	1.79052	0.3566	0.3663
3	A2A10	503	25	0.0500	7.461	0.371	1.369	1.86513	0.3759	
4	A1A14	500	25	0.0170	2.537	0.127	1.115	0.63414	0.1283	0.2501
5	A2A14	506	25	0.0500	7.461	0.369	0.913	1.86513	0.3720	
6	A1A18	508	25	0.0340	5.073	0.250	1.189	1.26829	0.2527	0.2762
7	A2A18	503	25	0.0400	5.968	0.297	1.035	1.4921	0.2997	

Asam Amino Lisin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Lysine (mM)	Lysine (ppm)	Lysine (%)	Kadar air berat basah	Massa Lysine (mg)	Lysine (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.0250	3.655	0.181	5.757	0.91369	0.1924	0.1924
2	A1A10	509	25	0.0260	3.801	0.187	1.349	0.95024	0.1892	
3	A2A10	503	25	0.0270	3.947	0.196	1.369	0.98678	0.1989	0.1941
4	A1A14	500	25	0.0210	3.070	0.153	1.115	0.7675	0.1552	
5	A2A14	506	25	0.0240	3.509	0.173	0.913	0.87714	0.1749	0.1651
6	A1A18	508	25	0.0230	3.362	0.165	1.189	0.84059	0.1675	
7	A2A18	503	25	0.0240	3.509	0.174	1.035	0.87714	0.1762	0.1718

Asam Amino Alanin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Alanine (mM)	Alanine (ppm)	Alanine (%)	Kadar air berat basah	Massa Alanin (mg)	Alanine (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.1200	10.691	0.530	5.757	2.6727	0.5627	0.5627
2	A1A10	509	25	0.1560	13.898	0.683	1.349	3.4745	0.6920	
3	A2A10	503	25	0.1980	17.640	0.877	1.369	4.4100	0.8889	0.7904
4	A1A14	500	25	0.1160	10.334	0.517	1.115	2.5836	0.5225	
5	A2A14	506	25	0.1600	14.254	0.704	0.913	3.5636	0.7108	0.6167
6	A1A18	508	25	0.1660	14.789	0.728	1.189	3.6972	0.7366	
7	A2A18	503	25	0.1650	14.700	0.731	1.035	3.6750	0.7382	0.7374

Asam Amino Glisin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Glycine (mM)	Glycine (ppm)	Glycine (%)	Kadar air berat basah	Massa Glycine (mg)	Glycine (%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.1270	9.534	0.473	5.757	2.38347	0.5018	0.5018
2	A1A10	509	25	0.1620	12.161	0.597	1.349	3.04034	0.6055	0.6905
3	A2A10	503	25	0.2050	15.389	0.765	1.369	3.84734	0.7755	
4	A1A14	500	25	0.1020	7.657	0.383	1.115	1.91429	0.3872	0.5679
5	A2A14	506	25	0.2000	15.014	0.742	0.913	3.7535	0.7486	
6	A1A18	508	25	0.2180	16.365	0.805	1.189	4.09132	0.8151	0.7450
7	A2A18	503	25	0.1790	13.438	0.668	1.035	3.35938	0.6749	

Asam Amino Prolin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Proline (mM)	Proline (ppm)	Proline (%)	Kadar air berat basah	Massa Proline (mg)	Proline(%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.0770	8.865	0.440	5.757	2.21625	0.4666	0.4666
2	A1A10	509	25	0.1180	13.585	0.667	1.349	3.39634	0.6764	0.6892
3	A2A10	503	25	0.1210	13.931	0.692	1.369	3.48268	0.7020	
4	A1A14	500	25	0.0720	8.289	0.414	1.115	2.07234	0.4191	0.5454
5	A2A14	506	25	0.1170	13.470	0.666	0.913	3.36755	0.6717	
6	A1A18	508	25	0.1180	13.585	0.669	1.189	3.39634	0.6766	0.6534
7	A2A18	503	25	0.1090	12.549	0.624	1.035	3.13729	0.6302	

Asam Amino Valin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Valine (mM)	Valine (ppm)	Valine (%)	Kadar air berat basah	Massa Valine (mg)	Valine(%) berdasarkan total padatan	Rerata
1	A0A0	504	25	0.0450	5.272	0.261	5.757	1.31795	0.2775	0.2775
2	A1A10	509	25	0.0520	6.092	0.299	1.349	1.52296	0.3033	0.3169
3	A2A10	503	25	0.0560	6.560	0.326	1.369	1.64011	0.3306	
4	A1A14	500	25	0.0190	2.226	0.111	1.115	0.55647	0.1125	0.2140
5	A2A14	506	25	0.0540	6.326	0.313	0.913	1.58154	0.3154	
6	A1A18	508	25	0.0510	5.975	0.294	1.189	1.49368	0.2976	0.2929
7	A2A18	503	25	0.0490	5.740	0.285	1.035	1.4351	0.2883	

Asam Amino Leusin-isoleusin

No	Sampel	Berat Sampel (mg)	Volume Ekstrak (ml)	Leucine-Isoleucine (mM)	Leucine-Isoleucine (ppm)	Leucine-Isoleucine (%)	Kadar air berat basah	Massa Leucine-Isoleucine (mg)	**Leucine-Isoleucine(%) berdasarkan total padatan**	Rerata
1	A0A0	504	25	0.0390	5.116	0.254	5.757	1.27891	**0.2693**	0.2693
2	A1A10	509	25	0.0710	9.313	0.457	1.349	2.32827	**0.4637**	0.4434
3	A2A10	503	25	0.0640	8.395	0.417	1.369	2.09872	**0.4230**	
4	A1A14	500	25	0.0250	3.279	0.164	1.115	0.81981	**0.1658**	0.2758
5	A2A14	506	25	0.0590	7.739	0.382	0.913	1.93476	**0.3859**	
6	A1A18	508	25	0.0520	6.821	0.336	1.189	1.70521	**0.3397**	0.3280
7	A2A18	503	25	0.0480	6.296	0.313	1.035	1.57404	**0.3162**	

Keterangan:

A_0A_0 : penyangraian 0 menit

A_1A_{10} : Penyangraian 10 menit ulangan I

A_2A_{10} : Penyangraian 10 menit ulangan II

A_1A_{14} : Penyangraian 14 menit ulangan I

A_2A_{14} :Penyangraian 14 menit ulangan II

A_1A_{18} :Penyangraian 18 menit ulangan I

A_2A_{18} :Penyangraian 18 menit ulangan II

Lampiran 11 : Data hasil perhitungan asam amino hidrofobik, asam amino hidrofilik dan total asam amino

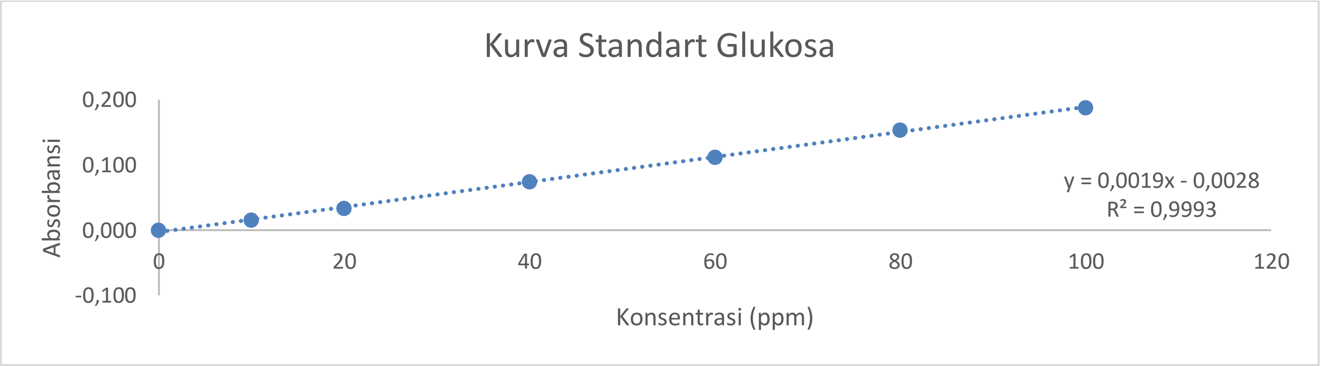
Asam Amino Hidrofilik	Kandungan asam amino berdasarkan total padatan (%)			
	0 menit	10 menit	14 menit	18 mneit
Asam aspartat	0.85	0.98	0.92	1.01
Asam glutamat	0.80	1.15	0.94	1.10
Arginin	0.44	0.58	0.50	0.60
Metionin	0.21	0.37	0.25	0.28
Lisin	0.19	0.19	0.17	0.17
total hidrofilik	**2.49**	**3.27**	**2.77**	**3.16**

Asam Amino Hidrofobik	Kandungan asam amino berdasarkan total padatan (%)			
	0 menit	10 menit	14 menit	18 mneit
Alanin	0.56	0.79	0.62	0.74
Glisin	0.50	0.69	0.57	0.75
Prolin	0.47	0.69	0.55	0.65
Valin	0.28	0.32	0.21	0.29
Leusin-Isoleusin	0.27	0.44	0.28	0.33
Totak Hidrofobik	**2.08**	**2.93**	**2.22**	**2.76**

Variabel X/Y	Kandungan asam amino berdasarkan total padatan (%)			
	0 menit	10 menit	14 menit	18 mneit
Total Asam Amino	4.57	6.2	4.99	5.92
Total Hidrofilik	2.49	3.27	2.77	3.16
Total Hidrofobik	2.08	2.93	2.22	2.76

Lampiran 12: Hasil pengujian gula reduksi menggunakan Spektrofotometer UV-Vis

Konsentrasi ppm	Abs
0	0.000
10	0.015
20	0.033
40	0.074
60	0.112
80	0.153
100	0.188



Sampel	Kode		Berat (mg)	ml Ekstrak	FP	Absor bansi	ppm Kurva	% Karbo hidrat	Kadar air berat basah	padatan dalam sampel (100-kadar air basis kering)%	Total padatan dalam sampel (berat sampel x padatan) mg	massa gula reduksi (mg)	% Karbohi drat (total padatan)	Rata-Rata nilai % Karbohi drat (total padatan)
G_0G_0	A	1	2004.0	250	1	0.141	75.684	0.944	5.7574	0.9424	1888.6217	18.921053	1.0018	0.9757
			2004.0	250	1	0.140	75.158	0.938	5.7574	0.9424	1888.6217	18.789474	0.9949	
		2	2004.0	250	1	0.135	72.526	0.905	5.7574	0.9424	1888.6217	18.131579	0.9600	
			2004.0	250	1	0.133	71.474	0.892	5.7574	0.9424	1888.6217	17.868421	0.9461	
G_1G_{10}	B	1	2002.0	250	1	0.097	52.526	0.656	1.3491	0.9865	1974.9910	13.131579	0.6649	0.6985
			2002.0	250	1	0.099	53.579	0.669	1.3491	0.9865	1974.9910	13.394737	0.6782	
		2	2011.0	250	1	0.103	55.684	0.692	1.3491	0.9865	1983.8696	13.921053	0.7017	
			2011.0	250	1	0.103	55.684	0.692	1.3491	0.9865	1983.8696	13.921053	0.7017	
G_2G_{10}	E	1	2007.0	250	1	0.101	54.632	0.681	1.3694	0.9863	1979.5161	13.657895	0.6900	
			2007.0	250	1	0.100	54.105	0.674	1.3694	0.9863	1979.5161	13.526316	0.6833	
		2	2005.0	250	1	0.108	58.316	0.727	1.3694	0.9863	1977.5435	14.578947	0.7372	
			2005.0	250	1	0.107	57.789	0.721	1.3694	0.9863	1977.5435	14.447368	0.7306	
G_1G_{14}	C	1	2021.0	250	1	0.144	77.263	0.956	1.1152	0.9888	1998.4618	19.315789	0.9665	0.5917
			2021.0	250	1	0.141	75.684	0.936	1.1152	0.9888	1998.4618	18.921053	0.9468	
		2	2003.0	250	1	0.139	74.632	0.931	1.1152	0.9888	1980.6625	18.657895	0.9420	
			2003.0	250	1	0.140	75.158	0.938	1.1152	0.9888	1980.6625	18.789474	0.9486	
G_2G_{14}	F	1	2007.0	250	1	0.030	17.263	0.215	0.9131	0.9909	1988.6741	4.3157895	0.2170	
			2007.0	250	1	0.030	17.263	0.215	0.9131	0.9909	1988.6741	4.3157895	0.2170	
		2	2027.0	250	1	0.035	19.895	0.245	0.9131	0.9909	2008.4915	4.9736842	0.2476	

			2027.0	250	1	0.035	19.895	0.245	0.9131	0.9909	2008.4915	4.9736842	0.2476	
G_1G_{18}	D	1	2010.0	250	1	0.045	25.158	0.313	1.1892	0.9881	1986.0971	6.2894737	0.3167	0.2739
			2010.0	250	1	0.045	25.158	0.313	1.1892	0.9881	1986.0971	6.2894737	0.3167	
		2	2047.0	250	1	0.042	23.579	0.288	1.1892	0.9881	2022.6571	5.8947368	0.2914	
			2047.0	250	1	0.044	24.632	0.301	1.1892	0.9881	2022.6571	6.1578947	0.3044	
G_2G_{18}	G	1	2003.0	250	1	0.035	19.895	0.248	1.0348	0.9897	1982.2730	4.9736842	0.2509	
			2003.0	250	1	0.036	20.421	0.255	1.0348	0.9897	1982.2730	5.1052632	0.2575	
		2	2069.0	250	1	0.032	18.316	0.221	1.0348	0.9897	2047.5900	4.5789474	0.2236	
			2069.0	250	1	0.033	18.842	0.228	1.0348	0.9897	2047.5900	4.7105263	0.2301	

Keterangan :

G_0G_0 : penyangraian 0 menit

G_1G_{10} : Penyangraian 10 menit ulangan I

G_2G_{10} : Penyangraian 10 menit ulangan II

G_1G_{14} : Penyangraian 14 menit ulangan I

G_2G_{14} : Penyangraian 14 menit ulangan II

G_1G_{18} : Penyangraian 18 menit ulangan I

G_2G_{18} : Penyangraian 18 menit ulangan II

Lampiran 13 : Hasil Uji Anova pada sampel asam amino dan gula reduksi

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Alanine	Between Groups	.066	3	.022	2.387	.210
	Within Groups	.037	4	.009		
	Total	.104	7			
as_aspartat	Between Groups	.038	3	.013	1.200	.417
	Within Groups	.043	4	.011		
	Total	.081	7			
Glisin	Between Groups	.074	3	.025	1.105	.445
	Within Groups	.090	4	.022		
	Total	.164	7			
as_glutamat	Between Groups	.152	3	.051	2.211	.229
	Within Groups	.092	4	.023		
	Total	.244	7			
leusin_isoleusin	Between Groups	.039	3	.013	2.050	.250
	Within Groups	.025	4	.006		
	Total	.064	7			
Lisin	Between Groups	.001	3	.000	6.102	.057
	Within Groups	.000	4	.000		
	Total	.002	7			

Metionin	Between Groups	.026	3	.009	1.111	.443
	Within Groups	.031	4	.008		
	Total	.057	7			
Prolin	Between Groups	.062	3	.021	2.487	.200
	Within Groups	.033	4	.008		
	Total	.095	7			
Valin	Between Groups	.012	3	.004	.738	.582
	Within Groups	.021	4	.005		
	Total	.033	7			
Ariginin	Between Groups	.033	3	.011	1.640	.315
	Within Groups	.026	4	.007		
	Total	.059	7			
gula_reduksi	Between Groups	1.488	3	.496	11.327	.000
	Within Groups	1.051	24	.044		
	Total	2.539	27			

Lampiran 14: Uji lanjut Tukey Test untuk Gula reduksi

gula_reduksi

Tukey HSD[a,b]

		Subset for alpha = 0.05		
Perlakuan	N	1	2	3
penyangraian 18 menit	8	.273913		
penyangraian 14 menit	8	.591637	.591637	
penyangraian 10 menit	8		.698450	.698450
penyangraian 0 menit	4			.975700
Sig.		.055	.798	.110

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6.400.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Lampiran 15: Dokumentasi-dokumentasi selama penelitian

1. Persiapan sampel biji kakao

2. Penyangraian biji Kakao

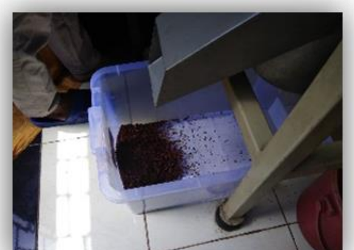
3. Biji Kakao yang telah disangrai dengan beberapa perlakuan waktu penyangraian







4. **Pemisahan Kulit dengan Nib biji Kakao sekaligus penimbangan untuk keperluan analisa sampel**

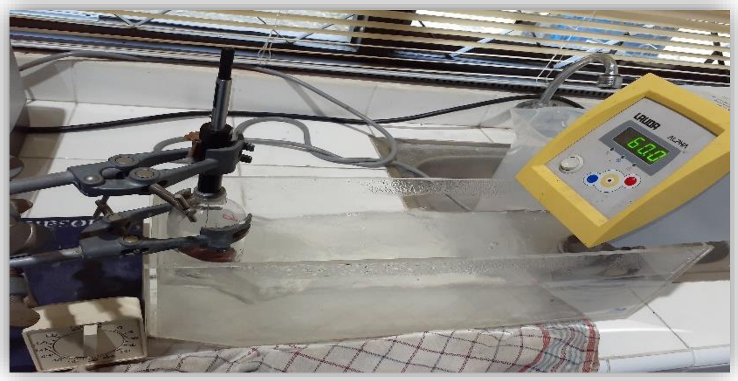


Lampiran 16 : Dokumentasi Pengujian Senyawa Volatil Dengan Alat GCMS-QP 2010 Plus Shimadzu

1. Proses Grinding/penghalusan sampel

2. Setelah dihaluskan sampel dimasukkan dalam tabung *vial* sebanyak masing-masing 5 gram

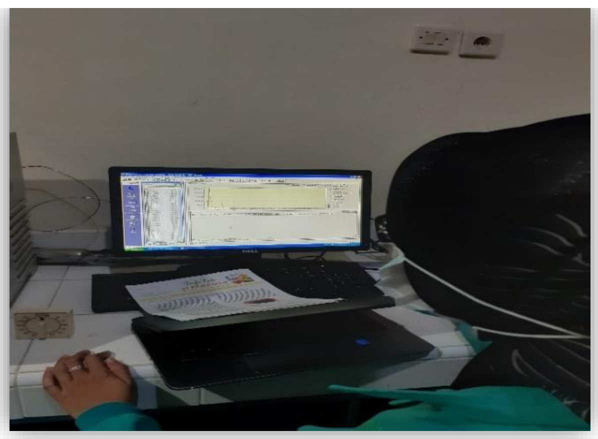
3. **Proses inkubasi sampel yang sudah dipasangkan SPME dalam waterbath dengan suhu 60 ºC selama 30 menit**



4. **Alat SPME yang digunakan**

5. **Proses injeksi SPME ke dalam injector port GCMS**

6. Pengolahan data senyawa volatile



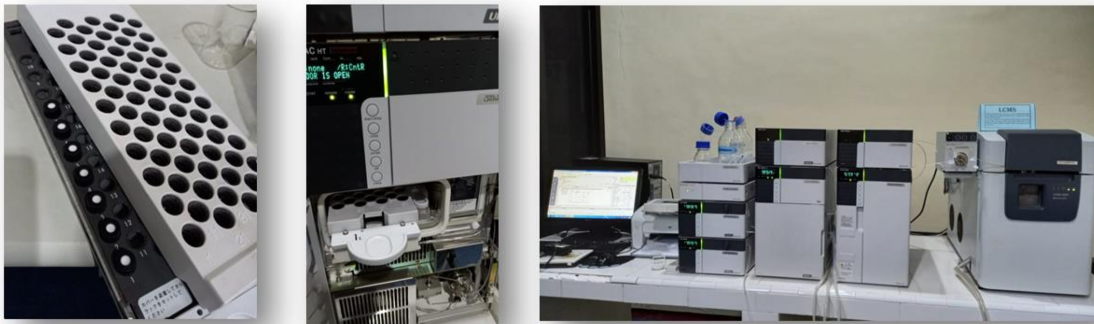
Lampiran 17 : Dokumentasi Pengujian Asam Amino dengan Alat UFLC-LCMS 2020, Shimadzu

1. **Biji kakao dihaluskan lalu ditimbang kemudian dimasukkan ke dalam Erlenmeyer lalu dimasukkan ke dalam penangas air**

2. **Sampel disaring menggunakan kertas saring, filtrat yang sudah terpisah diambil menggunakan jarum suntik dan disaring kembali**

3. **Filter kemudian diencerkan lalu dimasukkan ke dalam tabung *vial* untuk dianalisa menggunakan alat kromatografi *Liquid chromatography–mass spectrometry* (LC–MS)**

4. Alat kromatografi *Liquid chromatography–mass spectrometry* (LC–MS) UFLC/LCMC 2020 Shimadzu



5. Pengolahan data senyawa Asam Amino

Lampiran 18 : Analisa Gula pereduksi

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1. Biji kakao digerus hingga halus, lalu di timbang dan dimasukkan ke dalam labu takar, setelah itu ditambahkan aquades lalu dikocok sedikit. Kemudian ditambahkan dengan larutan Pb acetat




Sampel diberikan (NH4)4HPO4 10% sambil dilihat apakah terjadi endapan. Setelah itu ditambahkan air hingga tanda tera, kemudian labu ukur digoyang sebanyak 12 kali lalu sampel disaring untuk mendapatkan filtratnya



3. Larutan standar dan larutan sampel masing-masing diambil sebanyak 1 ml

Lampiran 19 : Profil Fermentasi biji kakao yang dilaksanakan oleh petani di kecamatan palolo

1. Biji kakao fermentasinya di ambil di dearah sentra produksi biji kakao Desa Sukaria, kec. Palolo, kab, Sigi Sulawesi Tengah.
2. Biji kakaonya dari Tanaman kakao tipe Kakao Lindak, jenis forestero, dari Klon Sulawesi -1 dan Sulawesi 2, jenis Hibrida.
3. Fermentasi dilakukan dalam kotak kayu dengan kapasitas 20 kg untuk setiap kotaknya.
4. Pengadukan biji kakao fermentasi dilakukan setiap 12 jam.
5. Fermentasi dilakukan selama 5-6 Malam dengan rincian sebagai berikut:
   - Lama waktu fermentasi di kotak atas selama 12 jam
   - Pengadukan dilakukan 1 kali setiap 12 jam
   - Setelah 24 jam biji kakao dipindah ke kotak bawah.
   - Biji kakao di kotak bawah selama 3 hari
   - Pengadukan dilakukan 1 kali 12 jam setiap hari setelah biji kakao dipindah ke kotak
6. Kadar air biji kakao fermentasi setelah di keringkan berkisar 6-8 %