

## LAMPIRAN

## Lampiran 1. Surat Determinasi Laboratorium LIPI Bogor


**ORGANISASI RISET ILMU PENGETAHUAN HAYATI**  
 Pusat Riset Biologi

 Jl. Raya Jakarta-Bogor km. 46, Cibinong, Kabupaten Bogor, Jawa Barat 16911  
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 https://www.brin.go.id

Cibinong, 29 Oktober 2021

 Nomor : B-485/V/DI.05.07/10/2021  
 Lampiran : -  
 Perihal : Hasil identifikasi/determinasi Tumbuhan

 Kepada Yth.  
 Bpk./Ibu/Sdr(i). **Dwi Evi Indriani**  
 NIM : 20180311145  
 Universitas Esa Unggul  
 Fakultas Ilmu-ilmu Kesehatan  
 Jl. Arjuna Utara 9, Kebun Jeruk  
 Jakarta 11510

Dengan hormat,

Bersama ini kami sampaikan hasil identifikasi/determinasi tumbuhan yang Saudara kirimkan ke "Herbarium Bogoriense", Bidang Botani Pusat Penelitian Biologi-LIPI Bogor, adalah sebagai berikut :

No.	No. Kol.	Jenis	Suku
1.	Jahe Merah	<i>Zingiber officinale</i> Roscoe	Zingiberaceae

Demikian, semoga berguna bagi Saudara.



Kepala Pusat Penelitian Biologi LIPI

Dr. Agus Setiawan Achmadi, S.KH., M.Sc.

197810262005021003

**Lampiran 2. Proses Pengolahan Simplisia Jahe Merah dan Perhitungan Rendemen Simplisia**

Gambar	Keterangan
	<p>Pengumpulan rimpang jahe merah</p>
	<p>Sortasi basah</p>
	
	<p>Proses penimbangan simplisia jahe merah</p>
	<p>Proses perajangan simplisia jahe merah</p>



Proses pengeringan simplisia jahe merah dengan cara di angin-anginkan

#### Data Rendemen Simplisia

No	Jenis Pengeringan	Suhu	Berat simplisia basah	Berat simplisia kering	Rendemen simplisia
1	Suhu Ruang	25-30°C	7000,10 gr	441 gr	6,2%

#### Perhitungan Rendemen Simplisia

$$\begin{aligned}
 \text{Redemen simplisia} &= \frac{\text{simplisia kering}}{\text{simplisia basah}} \times 100\% \\
 &= \frac{441 \text{ gr}}{7000,10 \text{ gr}} \times 100\% \\
 &= 6,2\%
 \end{aligned}$$

**Lampiran 3. Penimbangan Sampel Untuk Uji Kadar Air dan Kadar Abu, Pengujian Kadar Air dan Kadar Abu Simplisia dan Menghitung Hasil Pengujian Kadar Air & Abu Simplisia**

**Data Pengujian Kadar Air**

No	Berat Cawan Kosong (g)	Berat Sampel (g)	Berat Cawan + Sampel (g)
1	11,3491	1,0008	12,3499
2	11,7109	1,0015	12,7124
3	11,6252	1,0013	12,6265

No.	Simplisia	Berat Sampel (g)	Kadar Air (g)
1	Jahe Merah Angin-angin	1,0008	12,2402
			12,2381
			12,2213
		1,0015	12,6063
			12,6035
			12,5908
		1,0013	12,5197
			12,5175
			12,5062

**Perhitungan Kadar Air**

1.

$$\begin{aligned}
 \text{Kadar air} &= \frac{(A + B - C)}{B} \times 100\% \\
 &= \frac{11,3491 + 1,0008 - 12,2213}{1,0008} \times 100\% \\
 &= \frac{12,3499 - 12,2213}{1,0008} \times 100\% \\
 &= 12,8\%
 \end{aligned}$$

2.

$$\begin{aligned}
 \text{kadar air} &= \frac{(A + B - C)}{B} \times 100\% \\
 &= \frac{11,7109 + 1,0015 - 12,5908}{1,0015} \times 100\% \\
 &= \frac{12,7124 - 12,5908}{1,0015} \times 100\% \\
 &= 12\%
 \end{aligned}$$

3.

$$\begin{aligned}
 \text{kadar air} &= \frac{(A + B - C)}{B} \times 100\% \\
 &= \frac{11,6252 + 1,0013 - 12,5062}{1,0013} \times 100\% \\
 &= \frac{12,6265 - 12,5062}{1,0013} \times 100\% \\
 &= 12\%
 \end{aligned}$$

**Data Pengujian Kadar Abu**

No	Berat Cawan Kosong (gr)	Berat Sampel (gr)	Berat Cawan + Sampel (gr)
1	10,9603	2,0019	12,9622
2	11,7395	2,0023	13,7418
3	12,0572	2,0022	14,0594

No.	Simplisia	Berat Sampel (gr)	Kadar Abu (gr)
1	Jahe Merah Angin-angin	2.0019	11,4774
			11.4657
		2.0023	12.2157
			12.2037
		2.0022	12,5215
12.5072			

**Perhitungan Kadar Abu**

1.

$$\begin{aligned} \text{kadar abu} &= \frac{W1 - W2}{W} \times 100\% \\ &= \frac{11,4657 - 10,9603}{2,0019} \times 100\% \\ &= 25\% \end{aligned}$$

2.

$$\begin{aligned} \text{kadar abu} &= \frac{W1 - W2}{W} \times 100\% \\ &= \frac{12,2037 - 11,7395}{2,0023} \times 100\% \\ &= 23\% \end{aligned}$$

3.

$$\begin{aligned} \text{kadar abu} &= \frac{W1 - W2}{W} \times 100\% \\ &= \frac{12,5072 - 12,0572}{2,0022} \times 100\% \\ &= 22\% \end{aligned}$$





**Lampiran 4. Proses Ekstraksi Jahe Merah Dengan Metode Maserasi Bertingkat**

Gambar	Keterangan
	<p>Proses ekstraksi simplisia jahe merah dengan metode maserasi bertingkat</p>
	<p>Proses penyaringan untuk memisahkan ampas simplisia dan filtrat ekstrak</p>
	<p>Hasil filtrat ekstrak yang sudah di saring</p>

**Lampiran 5. Proses Pengeringan Ekstrak Sampai Kental Menggunakan Rotary Evaporator dan Waterbath Serta Proses Penimbangan dan Perhitungan Ekstrak**

Gambar	Keterangan
	<p>Proses pemisahan pelarut menggunakan <i>rotary evaporator</i></p>
	<p>Proses pengentalan ekstrak menggunakan <i>waterbath</i></p>
	<p>Proses penimbangan ekstrak <i>n</i>-heksan</p>



	<p>Proses penimbangan ekstrak etil asetat</p>
	<p>Proses penimbangan ekstrak etanol 96%</p>

**Data Rendemen Ekstrak**

No	Sampel Ekstrak	Berat Sampel (gr)	Berat Ekstrak (gr)	Rendemen Ekstrak (%)
1	n-hexan	200	19, 2075	9,6
2	Etil asetat	200	11, 2662	5,6
3	Etanol 96%	200	14, 6304	7,3

**Perhitungan Rendemen Ekstrak****1. Rendemen ekstrak *n*-heksan**

$$\begin{aligned} \text{Rendemen ekstrak} &= \frac{\text{berat ekstrak}}{\text{berat sampel}} \times 100\% \\ &= \frac{19,2075}{200} \times 100\% \\ &= 9,6\% \end{aligned}$$

**2. Rendemen ekstrak etil asetat**

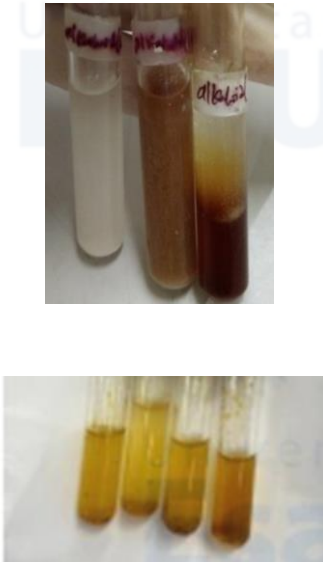
$$\begin{aligned} \text{Rendemen ekstrak} &= \frac{\text{berat ekstrak}}{\text{berat sampel}} \times 100\% \\ &= \frac{11,2662}{200} \times 100\% \\ &= 5,6\% \end{aligned}$$

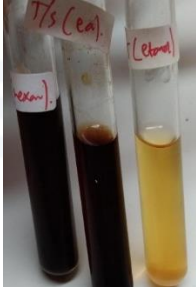
**3. Rendemen ekstrak etanol 96%**

$$\begin{aligned} \text{Rendemen ekstrak} &= \frac{\text{berat ekstrak}}{\text{berat sampel}} \times 100\% \\ &= \frac{14,6304}{200} \times 100\% \\ &= 7,3\% \end{aligned}$$

## Lampiran 6. Pengujian Skrining Fitokimia Jahe Merah

No	Gol. Senyawa Kimia	Sampel			Parameter
		N-hexan	etil asetat	etanol 96%	
1	Alkaloid				
	a. Perekasi mayer	(+)	(+)	(+)	Endapan putih
	b. Perekasi wagner	(+)	(+)	(+)	Endapan coklat
2	Flavonoid	(+)	(+)	(+)	Warna Merah/Kuning/Orange
3	Saponin	(+)	(+)	(+)	Terdapat Busa
4	Fenolik	(+)	(+)	(+)	Endapan Biru Kehitaman/ Biru Kehijauan
5	Steroid	(+)	(+)	(+)	Adanya perubahan warna merah kecoklatan

Gambar	Keterangan
	<p>Hasil skrining fitokimia pada uji alkaloid menandakan positif adanya alkaloid pada sampel dengan terbentuknya endapan putih dengan reagen pereaksi mayer dan endapan coklat dengan reagen pereaksi wagner</p>

	<p>Hasil skrining fitokimia pada uji flavonoid menandakan positif adanya flavonoid pada sampel</p>
	<p>Hasil skrining fitokimia pada uji saponin menandakan positif adanya saponin pada sampel</p>
	<p>Hasil skrining fitokimia pada uji fenolik menandakan positif adanya fenol pada sampel</p>
	<p>Hasil skrining fitokimia pada uji Steroid menandakan positif adanya Steroid pada sampel</p>

**Lampiran 7. Pengujian Kadar Total Fenol**

- **Optimasi Panjang Gelombang, Konsentrasi dan Waktu Inkubasi**

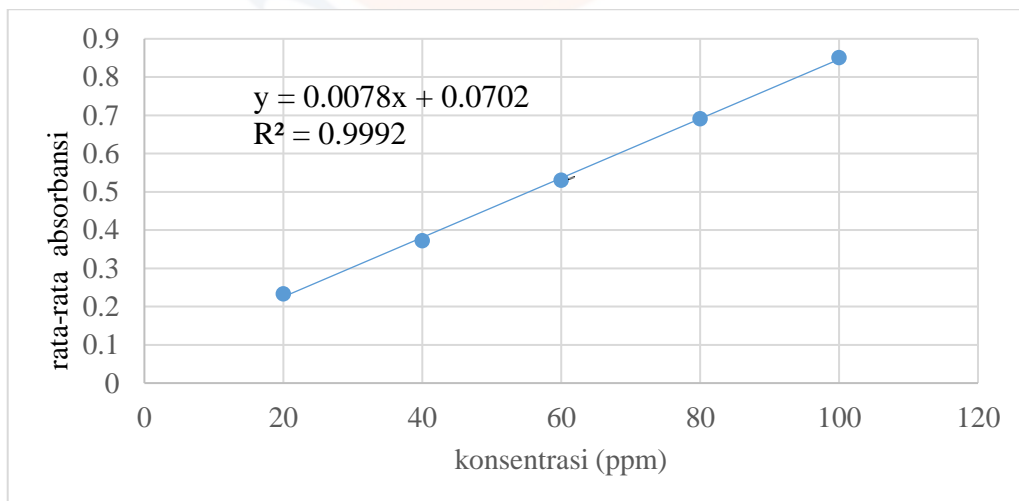
**Hasil optimasi panjang gelombang**

Waktu	Konsentrasi	Absorbansi				
		766 nm	767 nm	768 nm	769 nm	770 nm
30 menit	20 ppm	0,2047	0,2048	0,2052	0,2044	0,2045

**Hasil optimasi konsentrasi dan waktu inkubasi asam galat**

Volume Asam Galat (µL)	Volume Folin-Cicoaltea (µL)	Volume Natrium Karbonat (µL)	Total Volume Sumuran (µL)	Waktu Inkubasi (menit)	Absorbansi
20	125 (10%)	100 (15%)	250	10	0,1826
				30	0,2052
				60	0,2276
	125 (100)	100 (7,5%)	250	10	0,1509
				30	0,1776
				60	0,1987

**Gambar grafik kurva kalibrasi asam galat**



**Hasil pengukuran asam galat**

Konsentrasi (ppm)	Absorbansi			Absorbansi rata-rata (As)	Absorbansi Blanko (Ab)	Selisih (As-Ab)
	1	2	3			


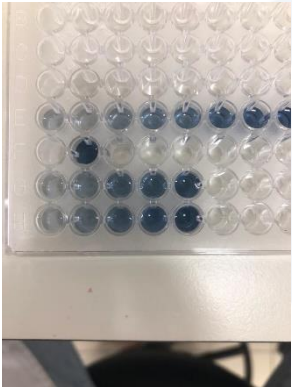


20	0,2052	0,2228	0,2742	0,234067	0,0545	0,179567
40	0,3301	0,3565	0,4307	0,372433	0,0545	0,317933
60	0,4903	0,541	0,6494	0,560233	0,0545	0,505733
80	0,7100	0,652	0,8114	0,724467	0,0545	0,669967
100	0,8439	0,8054	0,9033	0,850867	0,0545	0,796367

Tabel Kadar Total Fenol Jahe Merah

<b>Absorbansi Ekstrak Jahe Merah Maserasi Bertingkat</b>			
<b>Sampel</b>	<b>1</b>	<b>2</b>	<b>3</b>
N- heksan	0,2007	0,2138	0,3358
Etil asetat	0,1970	0,2349	0,2527
Etanol 96%	0,2450	0,2382	0,3492

<b>Sampel</b>	<b>Konsentrasi</b>	<b>KTFe (mGAE/gr)</b>	<b>Rata-rata KTFe (mGAE/gr)</b>
Ekstrak N- heksan	100 ppm	154,2308	195,855
		145,5128	
		287,8205	
Ekstrak etil asetat		92,6923	132,692
		141,282	
		164,1026	
Ekstrak etanol 96%		97,4359	113,761
		114,2308	
		129,6154	

Gambar	Keterangan
 <p>The image shows three clear plastic test tubes standing upright. Each tube has a white label with handwritten text. The first tube on the left is labeled 'D', the middle one '100 ppm', and the one on the right '100 ppm'. The tubes contain a clear, colorless liquid.</p>	<p>Sampel yang akan diuji dengan konsentrasi 100 ppm</p>
 <p>The image shows a 96-well microplate with a grid of wells. The wells are arranged in 8 rows and 12 columns. The first four rows show a color change from colorless to a dark blue color, indicating a positive reaction. The remaining four rows show a colorless liquid, serving as a control.</p>	<p>Warna/reaksi sampel setelah diinkubasi dan dikeluarkan dari spektrofotometer UV-Vis</p>

## Lampiran 8. Pengujian Kadar Total Flavonoid

- Optimasi Panjang Gelombang, Konsentrasi dan Waktu Inkubasi

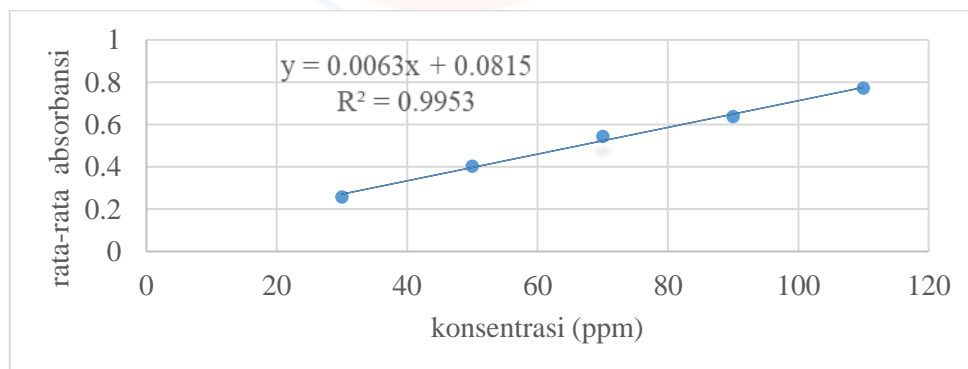
## Hasil optimasi panjang gelombang

Waktu	Konsentrasi	Absorbansi				
		437	438	439	440	441
30 menit	30 ppm	0,2322	0,2325	0,2326	0,2324	0,2320

## Hasil optimasi konsentrasi dan waktu inkubasi

Kuersetin 30 ppm ( $\mu\text{L}$ ) + metanol ( $\mu\text{L}$ )	$\text{AlCl}_3$	Metanol ( $\mu\text{L}$ )	Total sumuran ( $\mu\text{L}$ )	Waktu Inkubasi (menit)	Absorbansi
40 + 100	10 (5%)	100	250	15	0,1356
				30	0,1659
				60	0,1978
40 + 100	10 (10%)	100	250	15	0,1965
				30	0,2326
				60	0,2453

## Gambar grafik kurva kalibrasi kuersetin





Konsentrasi ppm	Absorbansi			Absorbansi rata-rata (As)	Absorbansi Blanko (Ab)	Selisih (As- Ab)
	1	2	3			
30	0,2326	0,2622	0,2816	0,2588	0,0479	0,2109
50	0,4119	0,3890	0,4097	0,4035	0,0479	0,3556

70	0,4720	0,5722	0,5869	0,5437	0,0479	0,4958
90	0,6242	0,6078	0,6809	0,6376	0,0479	0,5897
110	0,7189	0,7914	0,8082	0,7728	0,0479	0,7249

Tabel Kadar Total Flavonoid Pada Jahe Merah

<b>Absorbansi Ekstrak Jahe Merah Maserasi Bertingkat</b>			
<b>Sampel</b>	<b>1</b>	<b>2</b>	<b>3</b>
N- heksan	0,3240	0,3655	0,2717
Etil asetat	0,7413	0,7790	0,7623
Etanol 96%	0,1346	0,1363	0,1366

<b>Sampel</b>	<b>Konsentrasi</b>	<b>KTF (mQE/gr)</b>	<b>Rata-rata KTF (mQE/gr)</b>
Ekstrak N- heksan	30.00 ppm	1,029	1,010
		1,249	
		0,752	
Ekstrak etil asetat		3,237	3,341
		3,436	
		3,348	
Ekstrak etanol 96%		0,027	0,034
		0,036	
		0,038	

Gambar	Keterangan
	<p>Sampel yang akan diuji dengan konsentrasi 30.000 ppm</p>
	<p>Warna/reaksi sampel setelah diinkubasi dan dikeluarkan dari spektrofotometer UV-Vis</p>



**Lampiran 9. Pengujian Aktivitas Antioksidan**

- **Optimasi Panjang Gelombang, Konsentrasi dan Waktu Inkubasi Vitamin C**

**Hasil optimasi Panjang gelombang**

Waktu	Konsentrasi	Absorbansi				
		512 nm	514 nm	516 nm	518 nm	520 nm
60 menit	1 ppm	0,8643	0,8646	0,8657	0,8644	0,8640

**Hasil optimasi vitamin C**

Volume vitamin C 1 ppm	Volume DPPH 100 ppm (µL)	Total sumuran (µL)	Waktu Inkubasi (menit)	Absorbansi
100	150	250	15	1,3908
			30	1,0817
			60	0,8761
125	125	250	15	0,9181
			30	0,8657
			60	0,6320

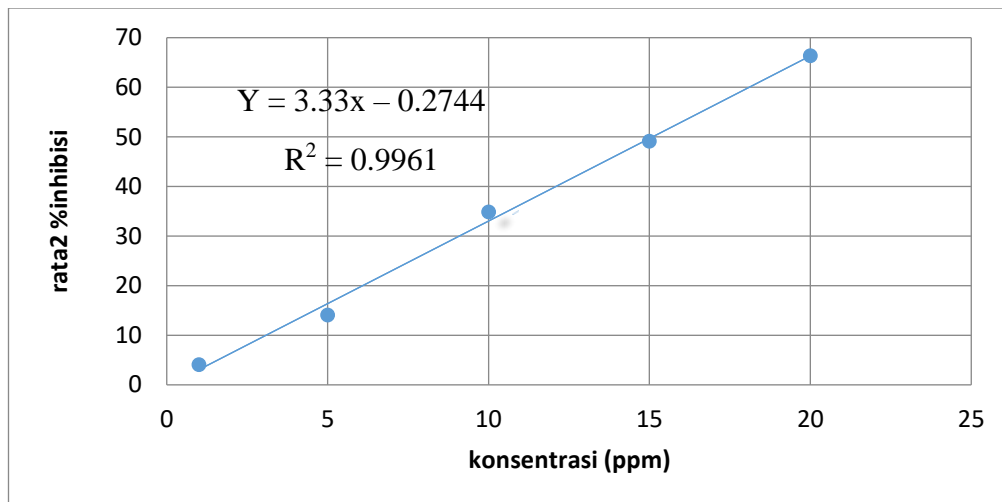
	1	2	3	Rata-Rata
<b>DPPH</b>	0,9038	0,9187	0,9014	0,908
<b>Blanko</b>	0,0448	0,0472	0,0454	0,046
<b>Kontrol</b>				0,862

**Hasil pengukuran kontrol vitamin C**

Vitamin C								
Konsentrasi	A.Sampel			% Inhibisi			Rata-rata % inhibisi	IC <sub>50</sub>
	1	2	3	1	2	3		
1	0,827	0,829	0,826	4,1137	3,8817	4,18326	4,0595	14,933

5	0,753	0,718	0,751	12,662	16,675	12,8707	14,069
10	0,470	0,632	0,583	45,521	26,662	32,3797	34,854
15	0,409	0,509	0,398	52,527	40,986	53,8604	49,124
20	0,335	0,288	0,247	61,144	66,584	71,3280	66,352

**Grafik kontrol positif vitamin C**



**Perhitungan**

Contoh perhitungan inhibisi :

$$\begin{aligned} \% \text{ Inhibisi} &= \frac{(A. \text{Kontrol} - A. \text{sampel})}{A. \text{kontrol}} \times 100\% \\ &= \frac{0,862 - 0,753}{0,862} \times 100\% \\ &= 12,662\% \end{aligned}$$

Contoh perhitungan  $IC_{50}$  :

$$\begin{aligned} IC_{50} &= \frac{50 - b}{a} \times 100\% \\ &= \frac{50 - 0,2744}{3,33} \\ &= 14,933 \end{aligned}$$

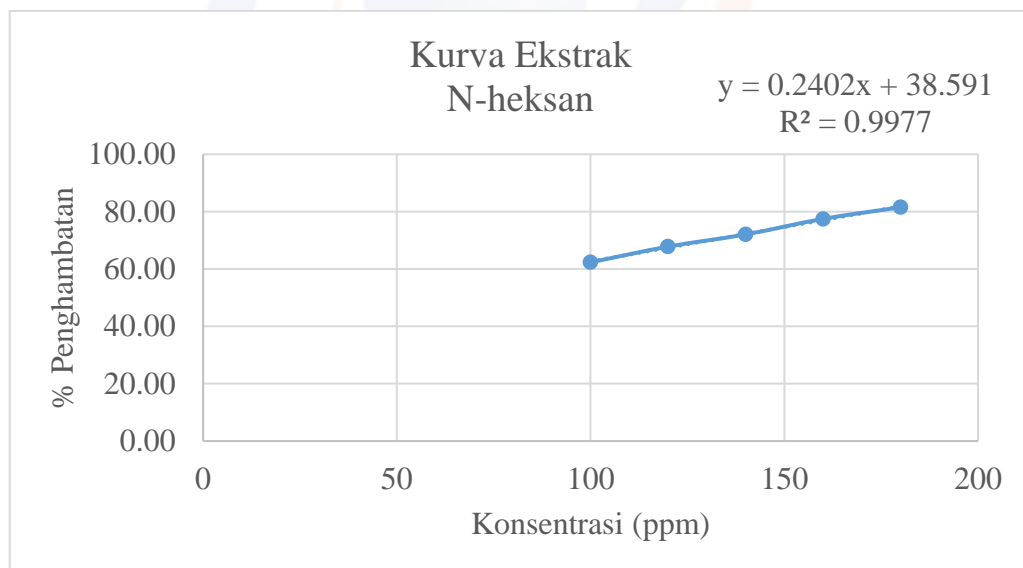
**Blanko dan kontrol pada sampel**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	rata-rata
<b>DPPH</b>	0,8157	0,8019	0,8239	0,8226	0,8160

<b>Blanko</b>	0,0452	0,0446	0,0443	0,0419	0,0440
<b>Kontrol</b>					0,7720

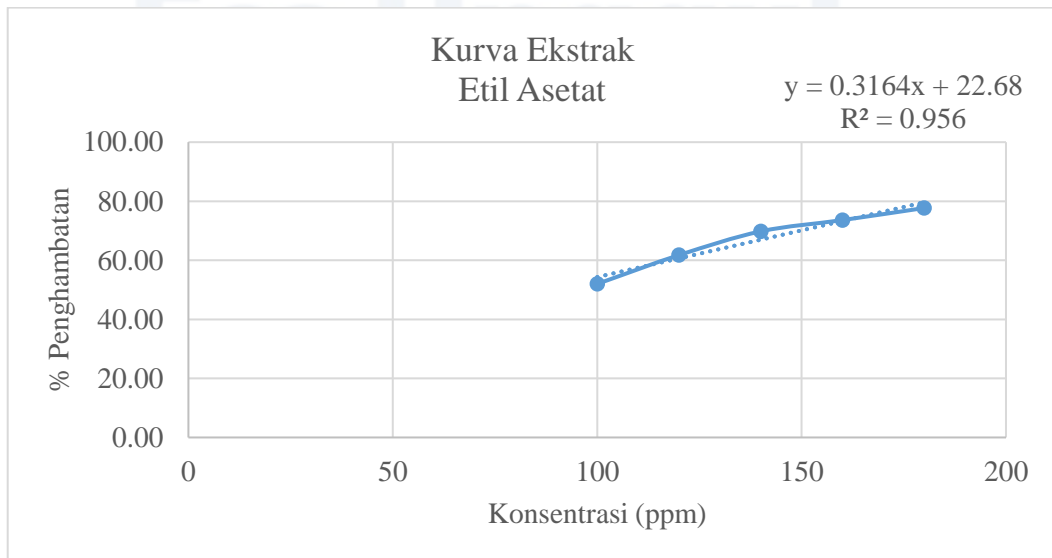
**Hasil pengukuran aktivitas antioksidan pada ekstrak N-heksan**

A.Sampel			% Inhibisi			Rata2 % inhibisi	IC <sub>50</sub>
1	2	3	1	2	3		
0,2910	0,2826	0,2990	62,307	63,395	61,271	62,32	47,498
0,2494	0,2488	0,2479	67,695	67,773	67,890	67,79	
0,2201	0,2176	0,2099	71,491	71,814	72,812	72,04	
0,1715	0,1661	0,1845	77,786	78,485	76,102	77,46	
0,1389	0,1480	0,1413	82,008	80,830	81,697	81,51	



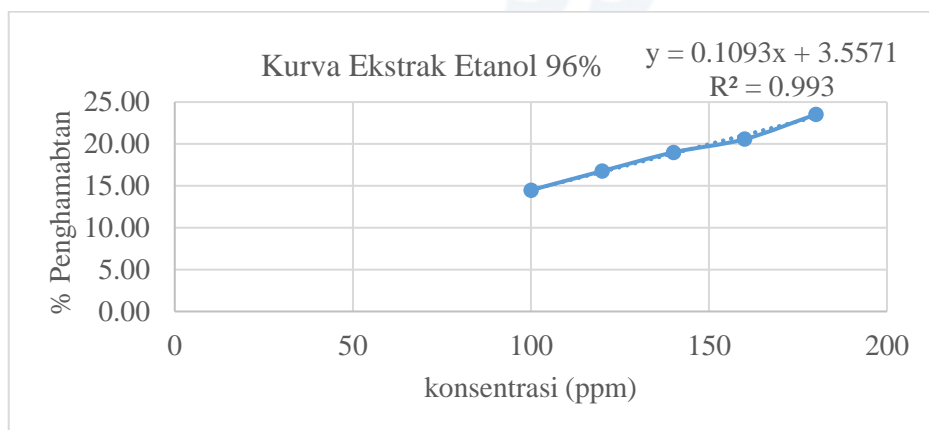
**Hasil pengukuran aktivitas antioksidan pada ekstrak etil asetat**

A.Sampel			% Inhibisi			Rata2 % inhibisi	IC 50
1	2	3	1	2	3		
0,3980	0,3676	0,3463	48,447	52,385	55,144	51,99	86,346
0,3104	0,2909	0,2846	59,794	62,320	63,136	61,75	
0,2550	0,2437	0,2009	66,970	68,434	73,978	69,79	
0,2136	0,2095	0,1880	72,333	72,864	75,648	73,61	
0,1784	0,1779	0,1603	76,892	76,957	79,236	77,70	

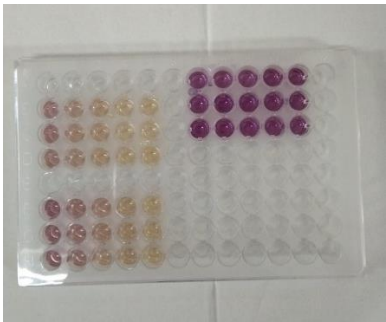


**Hasil pengukuran aktivitas antioksidan pada ekstrak etanol 96%**

A.Sampel			% Inhibisi			Rata2 % inhibisi	IC 50
1	2	3	1	2	3		
0,6556	0,6784	0,6466	15,080	12,127	16,246	14,48	424,912
0,6428	0,6499	0,6351	16,738	15,819	17,736	16,76	
0,6078	0,6407	0,6277	21,272	17,010	18,694	18,99	
0,5727	0,6398	0,6272	25,818	17,127	18,759	20,57	
0,5685	0,5886	0,6143	26,362	23,759	20,430	23,52	



No	Sampel	IC <sub>50</sub>	Aktivitas Antioksidan
1	Ekstrak <i>n</i> -heksan	47,498	Sangat kuat
2	Ekstrak etil asetat	86,346	Kuat
3	Ekstrak etanol 96%	424,912	Lemah

Gambar	Keterangan
	Warna/reaksi sampel setelah diinkubasi dan dikeluarkan dari spektrofotometer UV-Vis



## Lampiran 10. Sertifikat Analisis Bahan Yang Digunakan

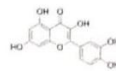
Sigma-Aldrich

3050 Spruce Street, Saint Louis, MO 63103, USA  
 Website: [www.sigmaaldrich.com](http://www.sigmaaldrich.com)  
 Email USA: [techserv@sial.com](mailto:techserv@sial.com)  
 Outside USA: [eurtechserv@sial.com](mailto:eurtechserv@sial.com)

## Certificate of Analysis

Product Name:  
 Quercetin -  $\geq 95\%$  (HPLC), solid

Product Number: Q4951  
 Batch Number: SLCJ0103  
 Brand: SIGMA  
 CAS Number: 117-39-5  
 Formula: C<sub>15</sub>H<sub>10</sub>O<sub>7</sub>  
 Formula Weight: 302.24 g/mol  
 Quality Release Date: 10 DEC 2020



Test	Specification	Result
Appearance (Color) Yellow	Conforms	Conforms
Appearance (Form) 1H NMR Spectrum	Powder Conforms to Structure	Powder Conforms
Loss on Drying	$\leq 4\%$	3 %
Purity (HPLC)	$\geq 95\%$	97 %

Brian Dulle, Supervisor  
 Quality Assurance  
 St. Louis, Missouri US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.



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3050 Spruce Street, Saint Louis, MO 63103, USA

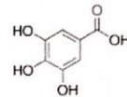
Website: www.sigmaaldrich.com

Email USA: techserv@sial.com

Outside USA: eurtechserv@sial.com

**Certificate of Analysis**Product Name:  
Gallic acid - 97.5-102.5% (titration)

Product Number:	G7384
Batch Number:	SLBW1278
Brand:	SIGMA
CAS Number:	149-91-7
MDL Number:	MFCD00002510
Formula:	C <sub>7</sub> H <sub>6</sub> O <sub>5</sub>
Formula Weight:	170.12 g/mol
Quality Release Date:	20 OCT 2017



Test	Specification	Result
Appearance (Color)	White to Beige	Off-White
Appearance (Form)	Powder	Powder
Solubility (Color)	Colorless to Faint Yellow	Almost Colorless
Solubility (Turbidity)	Clear to Very Slightly Hazy	Clear
50 mg/mL, EtOH		
Loss on Drying	≤ 10 %	3 %
Purity (GC)	≥ 98.5 %	100.0 %
Titration by NaOH (dry basis)	97.5 - 102.5 %	99.5 %

Rodney Burbach, Manager  
Analytical Services  
St. Louis, Missouri US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Version Number: 1

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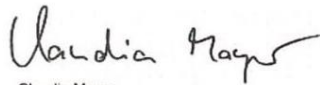
Sigma-Aldrich

www.sigmaaldrich.com

## Certificate of Analysis

**Product Name:** 2,2-Diphenyl-1-picrylhydrazyl  
**Product Number:** D9132  
**Batch Number:** STBJ3113  
**CAS Number:** 1898-66-4  
**Formula:**  $C_{18}H_{12}N_5O_6$   
**Formula Weight:** 394.32  
**Storage Temperature:** 2-8 C  
**Quality Release Date:** 04 JUL 2019  
**Date retested:** 21 MAR 2022  
**Recommended Retest Date:** MAR 2025

TEST	SPECIFICATION	RESULT
APPEARANCE (COLOR)	GREEN TO VERY DARK GREEN AND BLACK	BLACK
APPEARANCE (FORM)	POWDER	POWDER
SOLUBILITY (COLOR)	DARK PURPLE	DARK PURPLE
SOLUBILITY (METHOD)	50MG/ML, CHCL3	50MG/ML CHCL3
CARBON CONTENT	51.5 -58.1 % GEW.	56.4 %
NITROGEN CONTENT	15.8 -18.8 % GEW.	16.2 %
INFRARED SPECTRUM	CONFORMS TO STRUCTURE	CONFORMS



Claudia Mayer  
 Manager Quality Control  
 Steinheim, Germany

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**TAHAPAN PENELITIAN**

