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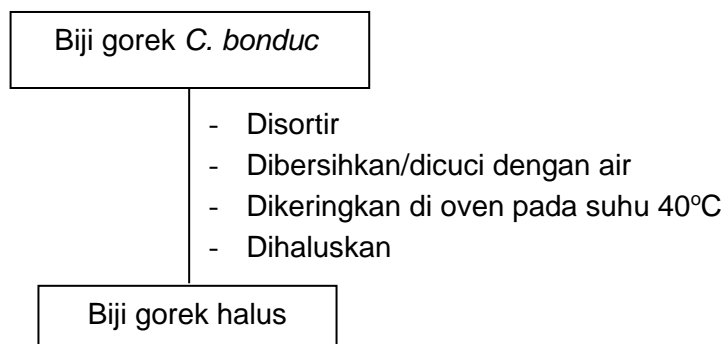
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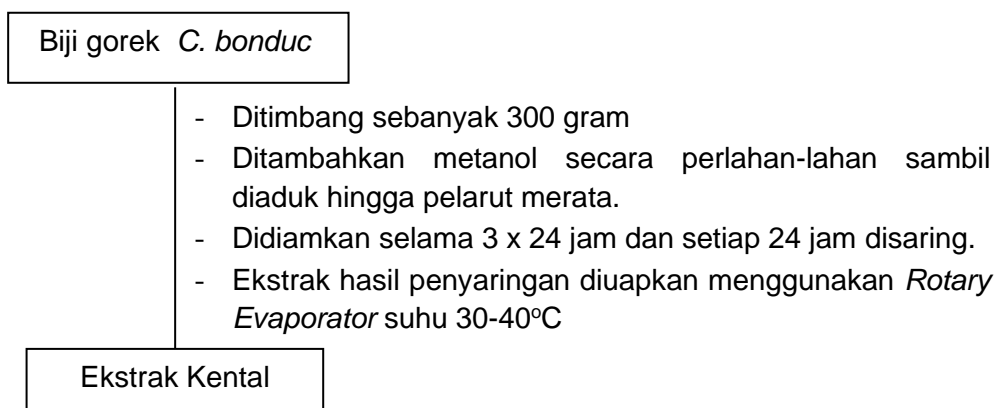
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LAMPIRAN

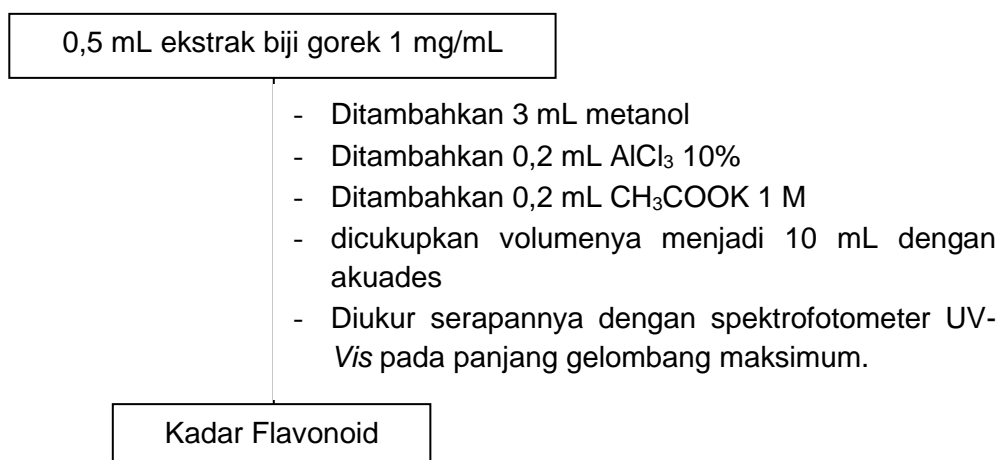
1. Bagan Preparasi Sampel



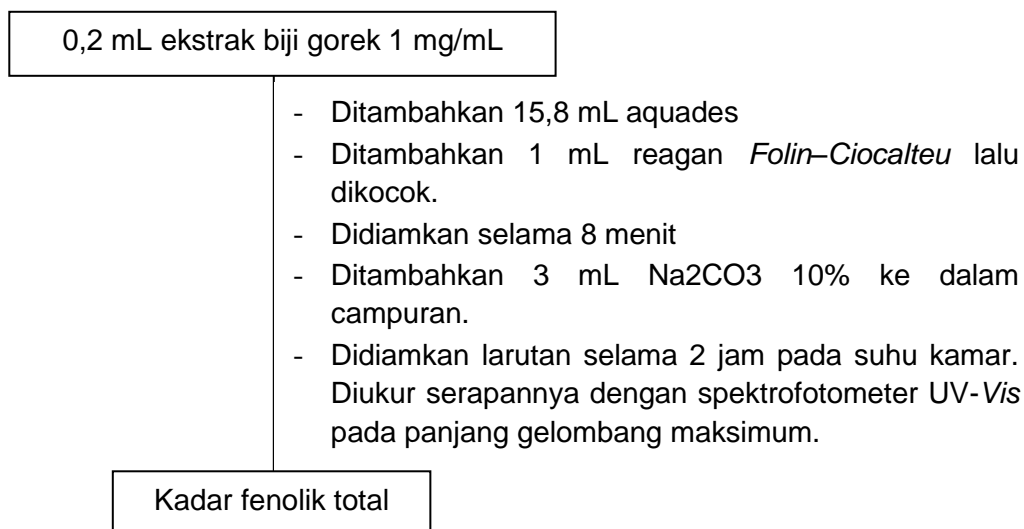
2. Bagan Ekstraksi Sampel



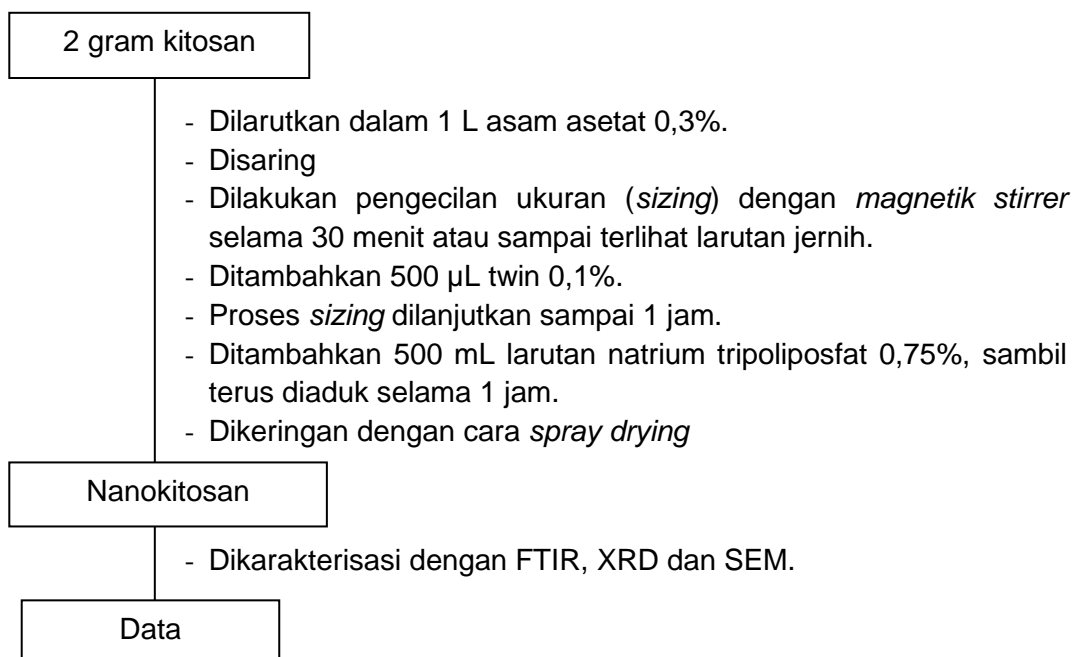
3. Bagan Penentuan Kandungan Flavonoid



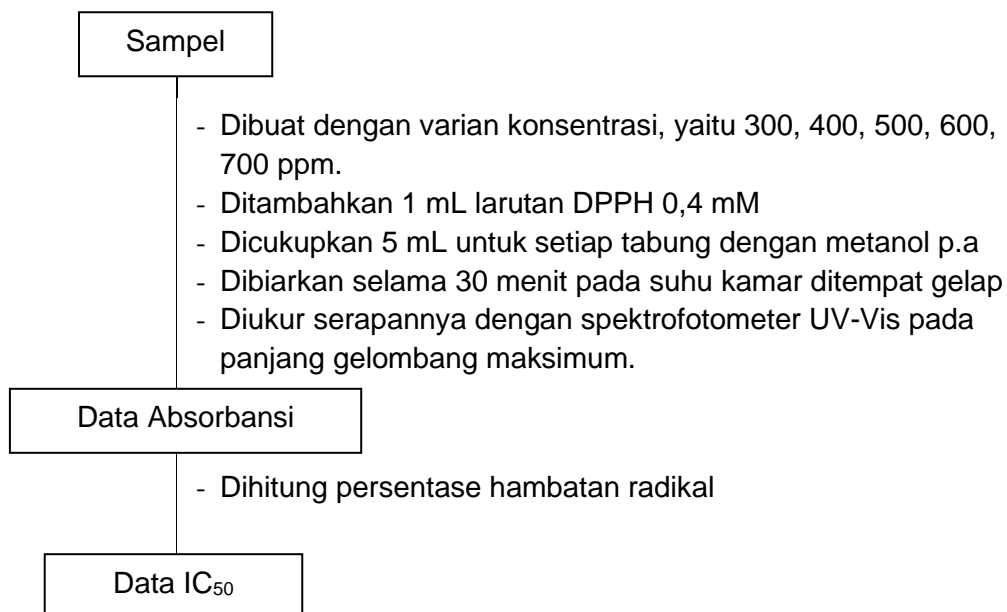
4. Bagan Penentuan Kandungan Fenolik Total



5. Bagan Pembuatan Nanokitosan Dengan Metode Gelasi Ionik



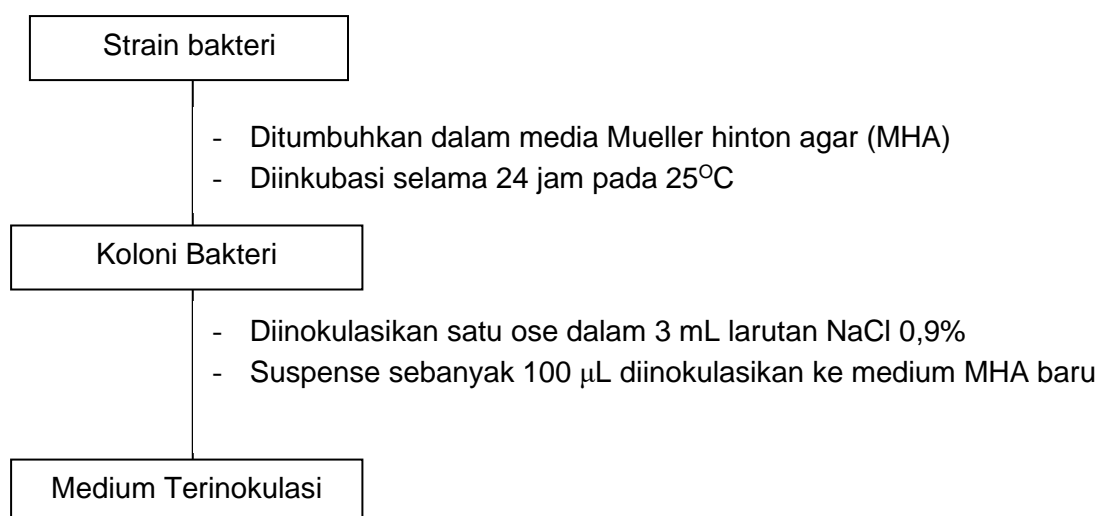
6. Bagan Uji Aktivitas Antioksidan

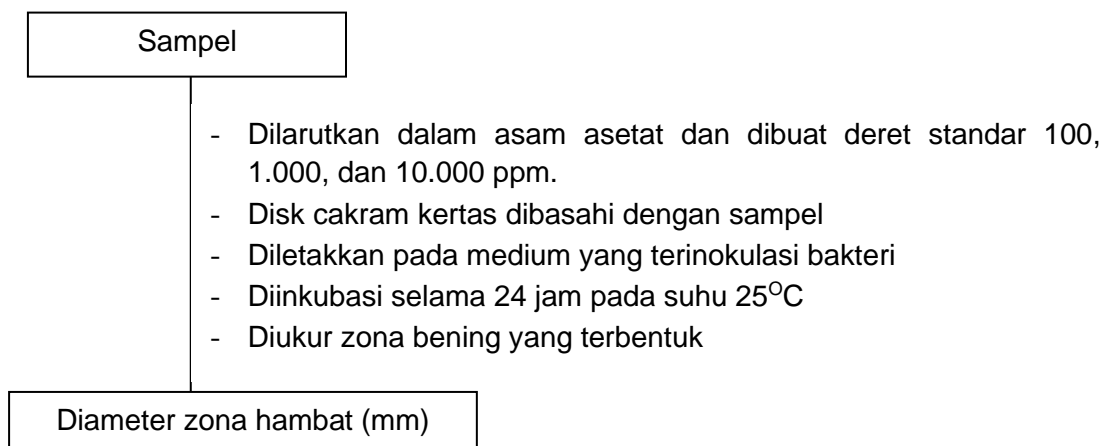


Catatan: sampel berupa ekstrak biji gorek *C. bonduc*, nanokitosan, ekstrak difortifikasi nanokitosan, dan kontrol positif. Nanokitosan dan ekstrak difortifikasi nanokitosan dibuat dengan konsentrasi 250, 500, 1.000, 2.000, dan 4.000 ppm.

7. Bagan Uji Aktivitas Antibakteri

a) Peremajaan strain bakteri

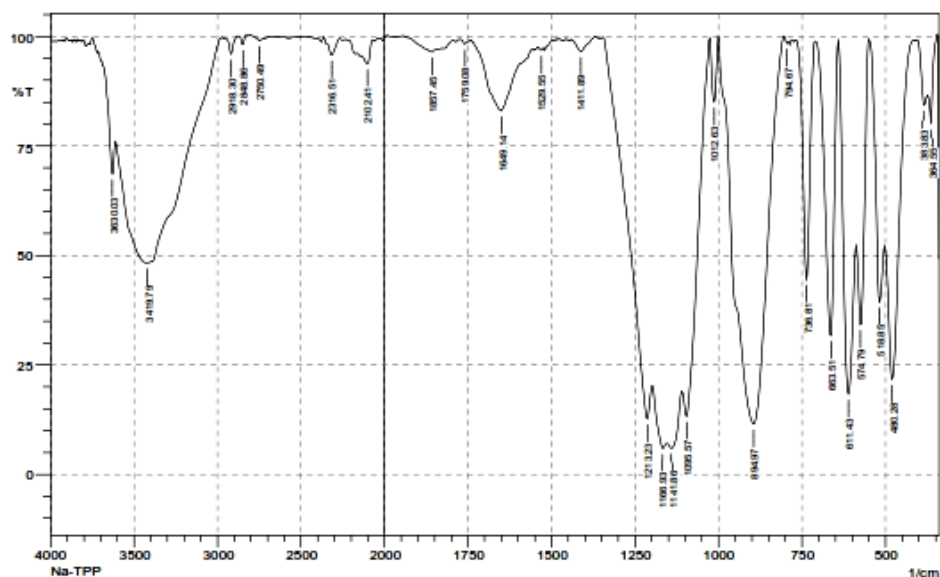


b) Uji daya hambat sampel terhadap pertumbuhan bakteri**Catatan:**

1. Sampel berupa ekstrak metanol biji goreng *C. bonduc*, nanokitosan, dan fortifikasinya (10.000 ppm).
2. Bakteri yang digunakan adalah *E. coli* dan *S. aureus*.
3. Kontrol positif adalah kloramfenikol dan kontrol negatif adalah pelarut asam asetat.

8. Hasil Spektroskopi FTIR

1. Na-TPP



	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	364.55	50.026	10.565	372.26	347.19	1.104	0.393
2	363.83	54.293	6.469	403.12	374.19	1.454	0.441
3	400.28	21.737	41.96	501.49	416.62	22.504	11.202
4	516.05	39.403	28.565	549.71	503.42	9.892	3.356
5	574.79	34.231	33.107	566.36	551.64	9.437	4.642
6	611.43	16.36	54.347	640.37	566.29	21.777	13.977
7	663.51	31.727	67.253	707.86	642.3	12.925	12.623
8	736.81	44.554	54.347	767.67	713.66	7.337	7.064
9	794.07	96.468	0.768	804.32	790.81	0.049	0.02
10	894.97	11.545	58.132	999.13	806.25	75.307	75.012
11	1012.63	55.03	14.717	1026.13	1001.06	1.026	0.996
12	1095.57	13.291	19.1	1109.07	1026.06	33.072	5.925
13	1141.86	6.021	4.262	1153.43	1111	44.636	5.503
14	1166.93	5.96	4.733	1197.79	1155.36	43.662	4.17
15	1213.23	12.722	14.901	1344.38	1199.72	48.741	5.355
16	1411.89	96.596	3.05	1440.53	1309.46	0.553	0.461
17	1529.55	96.877	0.602	1543.05	1523.76	0.237	0.025
18	1649.14	83.044	12.845	1741.72	1593.2	6.629	4.519
19	1759.06	96.319	0.715	1774.51	1751.36	0.119	0.031
20	1857.45	96.467	0.271	1863.24	1845.86	0.251	0.006
21	2102.41	93.835	3.791	2140.99	2073.46	1.365	0.595
22	2316.51	95.799	2.672	2341.58	2270.22	0.819	0.46
23	2750.49	99.095	1.145	2819.93	2652.12	0.154	0.299
24	2846.86	96.154	2.108	2875.86	2819.93	0.111	0.176
25	2916.3	95.99	3.734	2945.3	2875.86	0.473	0.41
26	3419.79	48.314	34.882	3610.74	2974.23	116.509	78.553
27	3630.03	66.645	11.263	3695.61	3612.67	7.447	1.607

Comment:

Na-TPP

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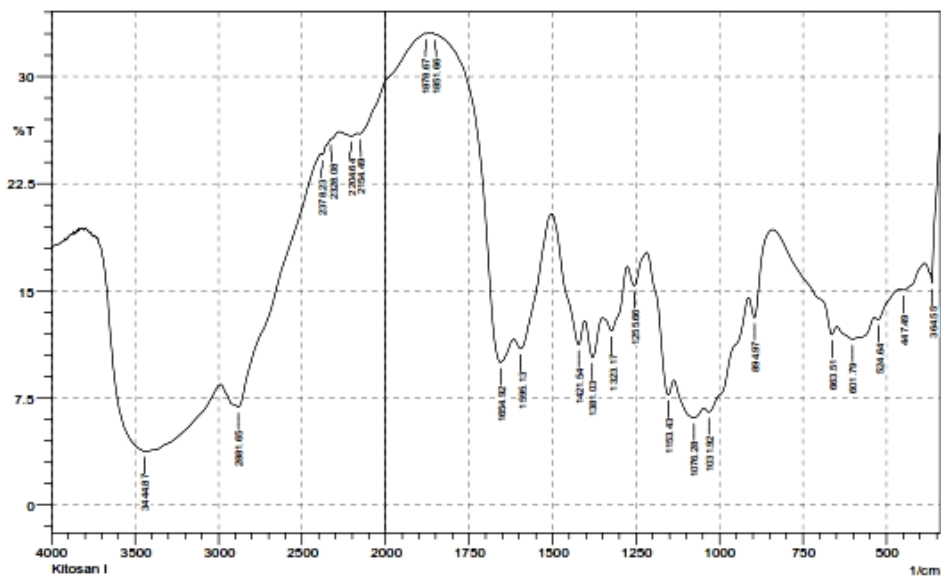
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Resolution;

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2. Kitosan

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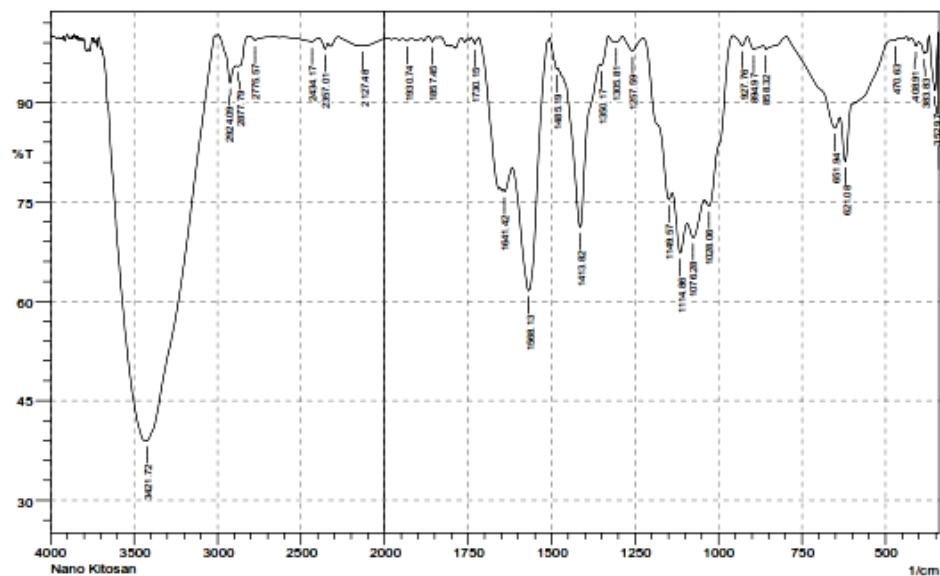
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	364.55	15.497	2.065	365.4	339.47	19.792	0.254
2	447.49	15.044	0.345	459.06	367.69	57.335	0.562
3	524.64	12.979	0.41	534.26	460.99	62.36	0.219
4	601.79	11.612	1.142	645.06	536.21	103.022	3.166
5	663.51	11.923	1.036	640.96	650.01	153.815	0.525
6	694.97	13.111	2.602	912.33	642.69	54.623	1.461
7	1031.92	6.507	1.054	1045.42	914.26	135.851	4.49
8	1076.26	6.107	1.299	1136.07	1047.35	103.918	4.937
9	1153.43	7.713	2.752	1217.08	1136	74.029	2.79
10	1255.66	15.345	1.66	1274.95	1219.01	43.69	1.113
11	1323.17	12.186	2.236	1350.17	1276.66	63.776	3.039
12	1361.03	10.326	2.646	1402.25	1352.1	46.955	2.505
13	1421.54	11.211	3.009	1502.55	1404.16	82.03	4.223
14	1595.13	10.946	2.333	1616.35	1504.46	94.677	4.137
15	1654.92	9.97	5.009	1649.73	1616.26	155.263	5.97
16	1651.66	32.957	0.026	1659.36	1649.73	4.643	0.003
17	1676.67	33	0.04	1682.52	1661.31	10.203	0.005
18	2154.49	25.963	0.367	2167.99	1804.45	152.296	1.369
19	2204.64	25.646	0.206	2276	2169.92	62.135	0.202
20	2326.06	25.61	0.041	2331.94	2277.93	31.716	0.027
21	2376.23	24.526	0.239	2367.67	2331.94	33.66	0.099
22	2661.65	6.654	4.451	2967.74	2369.6	524.722	24.711
23	3444.87	3.763	0.516	3724.54	3435.22	331.456	21.657

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3. Nanokitosan

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No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	352.97	91.515	5.5	370.33	341.4	0.555	0.602
2	383.83	97.389	0.547	401.19	379.98	0.159	0.012
3	406.91	96.52	0.839	422.41	401.19	0.086	0.034
4	470.63	99.344	0.22	476.42	462.92	0.03	0.006
5	621.08	81.085	7.796	636.51	476.42	5.766	1.195
6	651.94	86.145	2.627	794.67	636.44	4.858	0.36
7	856.32	97.952	0.751	866.04	794.67	0.372	0.147
8	894.97	97.992	1.404	914.26	866.04	0.303	0.147
9	927.76	96.573	1.422	956.69	914.26	0.119	0.124
10	1028.08	74.399	4.934	1041.56	956.62	6.002	1.133
11	1076.28	69.61	3.38	1093.64	1043.49	7.242	0.588
12	1114.86	67.273	6.562	1136	1095.57	6.426	0.853
13	1149.57	75.36	3.64	1224.8	1139.93	5.447	0.463
14	1257.99	97.783	2.065	1286.52	1226.73	0.318	0.277
15	1305.81	99.092	0.937	1330.68	1206.52	0.106	0.113
16	1350.17	95.607	1.159	1355.96	1330.68	0.32	0.069
17	1413.82	71.183	24.336	1481.33	1355.96	7.988	5.482
18	1485.19	94.993	0.924	1506.41	1481.33	0.331	0.05
19	1565.13	61.619	27.097	1616.35	1506.41	12.993	7.75
20	1641.42	76.572	0.802	1645.28	1616.28	2.895	0.08
21	1730.15	96.616	0.842	1741.72	1722.43	0.052	0.026
22	1857.45	99.162	0.764	1869.02	1845.66	0.036	0.026
23	1930.74	99.293	0.295	1946.18	1924.96	0.049	0.012
24	2127.48	96.532	1.003	2274.07	2034.9	1.091	0.677
25	2357.01	96.073	1.129	2393.66	2339.65	0.257	0.104
26	2434.17	99.12	0.631	2542.18	2393.66	0.351	0.184
27	2775.57	99.37	0.618	2816.07	2696.46	0.125	0.105
28	2877.79	95.444	0.803	2889.37	2816.07	0.902	0.182
29	2924.09	92.965	4.053	2993.52	2891.3	1.608	0.615
30	3421.72	39.001	0.905	3427.51	3020.53	83.997	2.672

Comment;
Nano Kitosan

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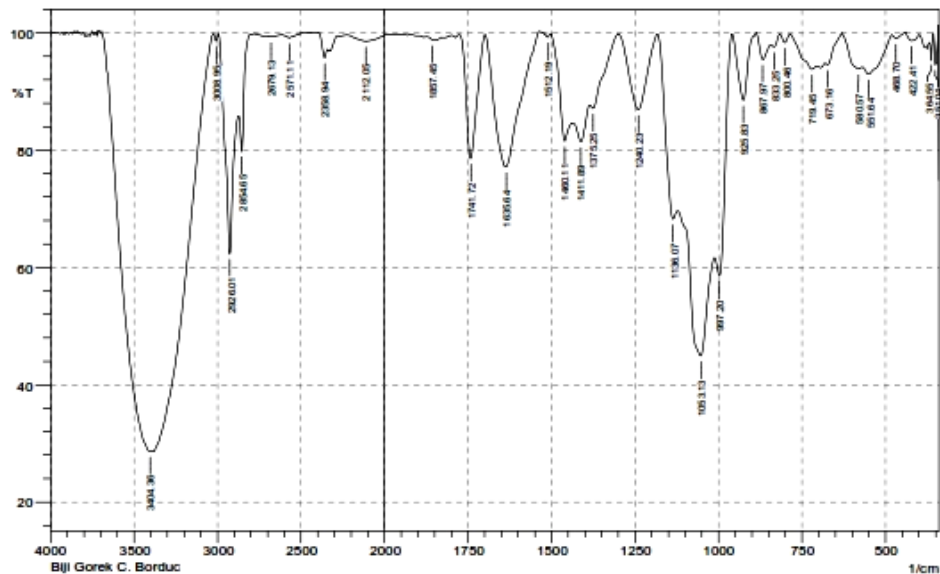
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4. Ekstrak metanol biji goreng *C. bonduc*

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No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	351.04	94.613	5.547	356.53	341.4	0.196	0.235
2	364.55	95.508	3.366	365.4	356.83	0.116	0.072
3	422.41	96.664	1.309	439.77	399.26	0.162	0.152
4	468.7	99.046	0.764	482.2	439.77	0.09	0.072
5	551.64	92.95	2.304	569	482.2	1.852	0.675
6	580.57	93.852	1.23	630.72	570.93	1.119	0.307
7	673.16	94.564	1.072	680.87	630.72	0.641	0.063
8	719.45	93.815	1.325	785.03	707.88	1.371	0.336
9	800.46	96.342	1.452	815.89	785.03	0.125	0.096
10	833.25	97.621	0.999	842.89	815.89	0.192	0.059
11	867.97	95.463	3.621	889.18	842.89	0.556	0.353
12	825.83	88.512	11.089	958.62	896.9	1.64	1.535
13	997.2	58.616	13.273	1010.7	960.55	6.745	1.775
14	1053.13	44.938	19.681	1122.57	1012.63	27.843	7.626
15	1136.07	66.244	7.416	1182.36	1124.5	5.729	1.134
16	1240.23	86.905	12.876	1298.09	1184.29	3.492	3.384
17	1375.25	87.12	1.94	1384.89	1300.02	2.538	0.204
18	1411.89	81.45	4.738	1438.9	1386.82	3.964	0.595
19	1460.11	81.572	7.793	1502.55	1440.83	3.171	0.871
20	1512.19	99.286	0.493	1517.98	1502.55	0.032	0.017
21	1635.64	77.136	22.808	1699.29	1537.27	8.903	8.906
22	1741.72	76.592	21.043	1776.44	1701.22	3.572	3.449
23	1857.45	96.778	0.221	1872.88	1851.66	0.088	0.005
24	2112.05	96.588	1.101	2225.85	1994.4	0.965	0.653
25	2358.94	95.775	2.352	2393.66	2341.58	0.55	0.228
26	2571.11	99.145	0.625	2617.4	2441.88	0.241	0.142
27	2679.13	99.355	0.178	2715.77	2617.4	0.228	0.039
28	2854.65	79.877	9.332	2872.01	2800.64	2.758	0.8
29	2926.01	62.392	29.474	2995.45	2873.94	11.816	7.7
30	3008.95	96.811	1.29	3024.38	2995.45	0.095	0.083
31	3404.36	28.679	0.008	3406.29	3396.64	5.23	0.001

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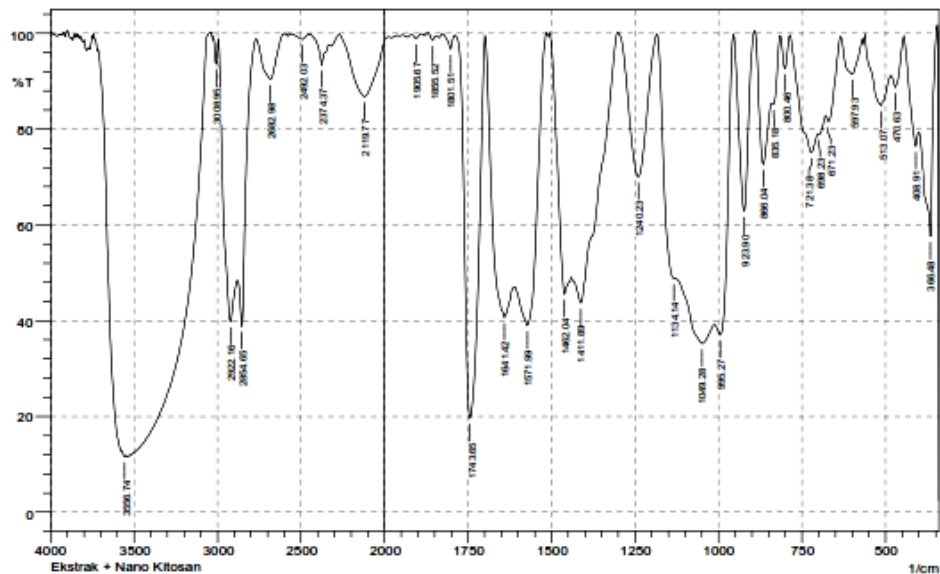
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5. Fortifikasi ekstrak dan nanokitosan

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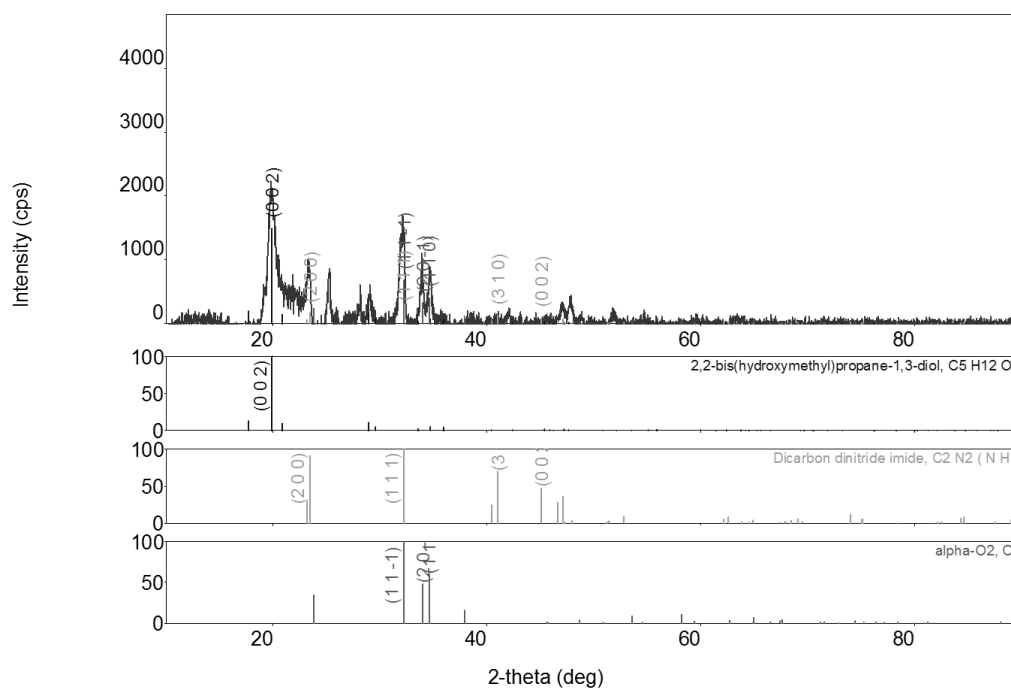
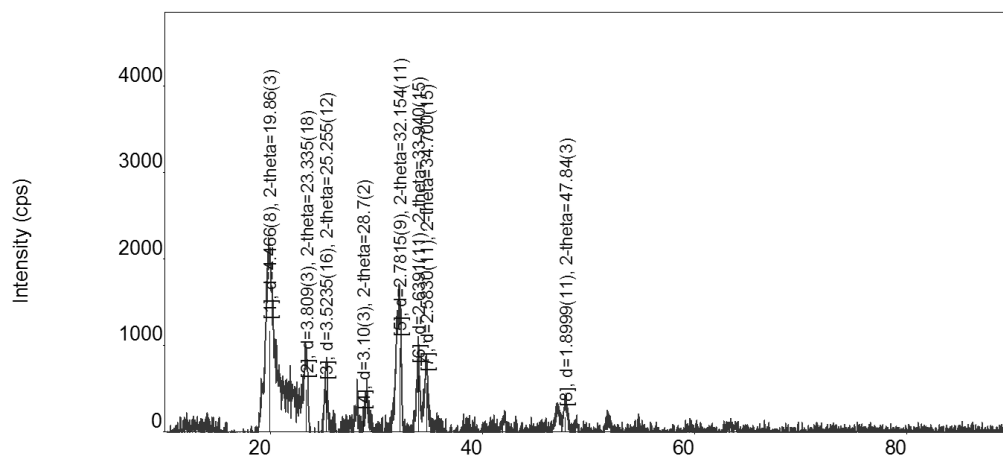
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	3556.74	57.6165	35.4545	399.26	347.19	7.0762	4.6919
2	470.63	76.4294	6.3549	445.56	401.19	3.1615	0.7802
3	513.07	86.7155	4.8925	482.2	447.49	1.2525	0.4039
4	597.93	91.4593	7.3397	634.55	570.93	1.6676	1.3496
5	671.23	81.5829	3.5079	677.01	636.51	2.1937	0.5409
6	696.23	76.9485	0.451	700.15	675.94	1.9634	0.0549
7	721.38	75.1005	5.7255	785.03	702.09	7.0199	2.6122
8	721.38	75.1005	5.7255	785.03	702.09	7.0199	2.6122
9	800.46	92.6212	6.9333	815.89	785.03	0.517	0.4572
10	835.18	85.2085	3.4783	840.96	815.89	1.1479	0.2643
11	899.04	72.6589	20.3111	891.11	840.96	4.3992	2.672
12	923.9	62.8215	37.3641	954.76	893.04	5.7036	5.7565
13	995.27	37.054	19.3043	1010.7	956.69	15.366	4.7477
14	1049.26	35.2361	6.941	1130.29	1012.63	46.5548	4.2779
15	1134.14	46.6392	1.9039	1184.29	1132.21	9.4037	1.2926
16	1240.23	70.0255	29.9319	1301.95	1186.22	6.5126	6.496
17	1411.89	43.6865	16.1857	1440.63	1303.66	27.7758	6.9606
18	1462.04	45.5794	14.6211	1506.41	1448.54	11.0262	1.8663
19	1571.99	38.9472	30.0809	1610.56	1517.96	25.4246	10.557
20	1641.42	40.6835	23.9711	1697.36	1612.49	24.3608	9.9173
21	1743.65	19.6286	79.8306	1786.01	1699.29	26.0772	25.6672
22	1801.51	96.712	3.0429	1826.59	1789.94	0.2166	0.1669
23	1855.52	96.5854	1.0951	1870.95	1845.66	0.078	0.0512
24	1905.67	96.9071	0.0697	1917.24	1888.31	0.0717	0.0465
25	2119.77	86.8159	12.6471	2270.22	1988.61	9.6416	6.9999
26	2374.37	93.4343	4.9162	2449.6	2335.8	1.4215	0.7708
27	2492.03	96.7715	1.0926	2961.47	2449.6	0.3093	0.2502
28	2662.96	90.413	9.0252	2769.76	2601.97	4.0445	3.6234
29	2854.65	36.8892	21.9244	2881.65	2771.71	19.1366	3.9681
30	2922.16	39.8194	26.254	2993.52	2883.58	29.9766	12.0573
31	3008.95	93.686	5.3455	3026.31	2995.45	0.4957	0.3695
32	3556.74	11.6022	0.4922	3572.17	3550.95	19.5949	0.2414

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No. of Scans;

Resolution;

9. Hasil analisis XRD nanokitosan



Peak list

No.	2-theta	d(ang.)	Height(cps)	FWHM(deg)	Int. I(cps deg)	Int. W(deg)	Asym. factor
1	19.86	4.466(8)	1177(63)	0.93(5)	1690(58)	1.44(13)	0.91(17)
2	23.335	3.809(3)	493(41)	0.43(7)	322(32)	0.65(12)	2.0(13)
3	25.255	3.5235(16)	480(40)	0.28(3)	143(16)	0.30(6)	1.8(11)
4	28.7	3.10(3)	137(21)	1.7(2)	255(35)	1.9(5)	1.4(3)
5	32.154	2.7815(9)	979(57)	0.517(14)	539(18)	0.55(5)	2.8(3)
6	33.94	2.6391(11)	661(47)	0.27(2)	239(11)	0.36(4)	2.1(5)
7	34.7	2.5830(11)	568(44)	0.31(2)	231(14)	0.41(6)	2.5(5)
8	47.84	1.8999(11)	171(24)	1.25(8)	238(13)	1.4(3)	3.9(13)

Perhitungan diameter partikel nanokitosan hasil analisis XRD

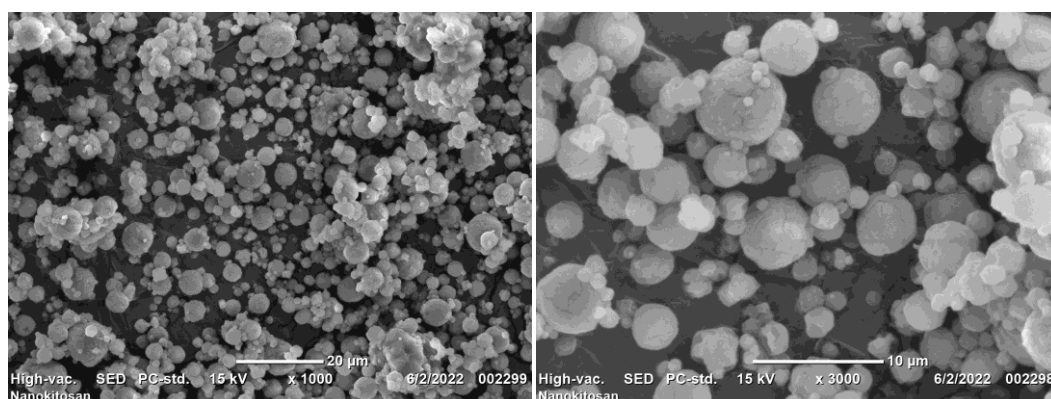
No.	2-Theta	Theta (θ)	FWHM	k	λ (nm)	cos θ	β	Diameter (nm)
1	19.86	0.1733	0.93	0.98	0.15406	0.9850	0.0162	9.4430
2	23.335	0.2036	0.43	0.98	0.15406	0.9793	0.0075	20.5418
3	25.255	0.2204	0.28	0.98	0.15406	0.9758	0.0049	31.6603
4	28.7	0.2505	1.7	0.98	0.15406	0.9688	0.0297	5.2524
5	32.154	0.2806	0.517	0.98	0.15406	0.9609	0.0090	17.4130
6	33.94	0.2962	0.27	0.98	0.15406	0.9565	0.0047	33.4972
7	34.7	0.3028	0.31	0.98	0.15406	0.9545	0.0054	29.2348
8	47.84	0.4175	1.25	0.98	0.15406	0.9141	0.0218	7.5706

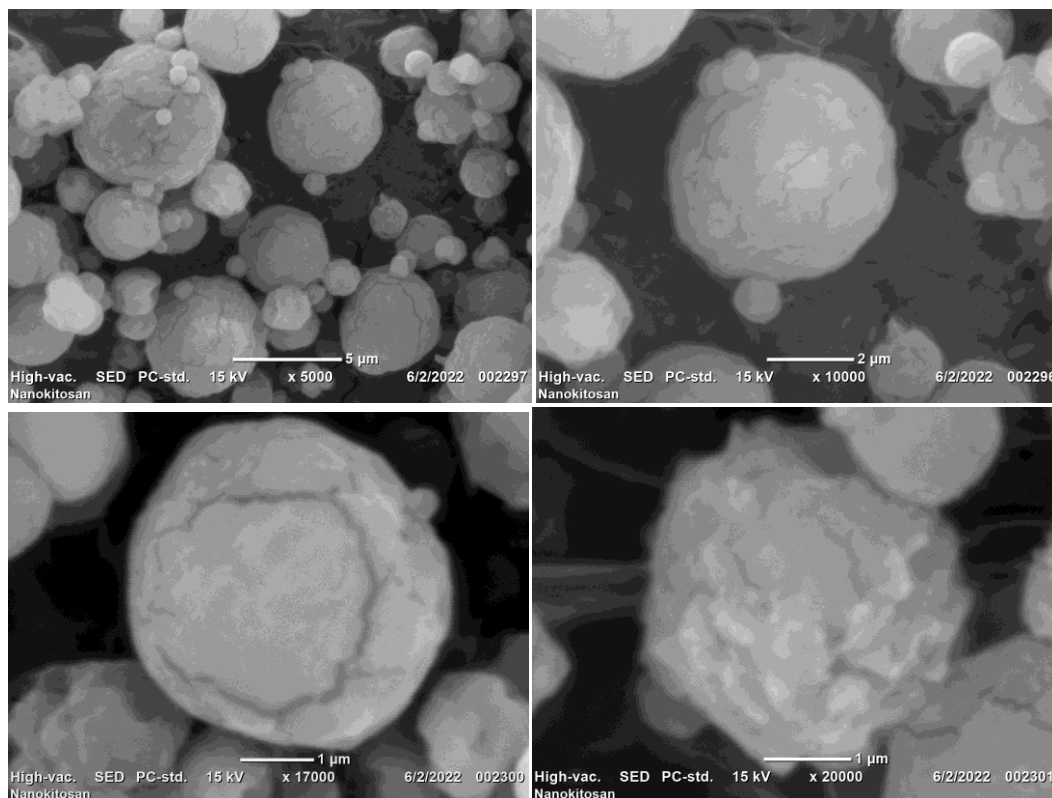
Menghitung %Kristalinitas atau derajat Kristalinitas

$$\text{Derajat Kristalinitas} = \frac{\text{Fraksi luas kristalin}}{\text{Luas difraktogram}} \times 100$$

Integral Result Area	Fraksi Luas Kristalin	Luas Difraktogram	Kristalinitas
5499.26467	30504.57983	65333.49549	46.6905675
4021.11009			
2988.67198			
3752.97518			
2993.17516			
4562.22791			
1331.79479			
5355.36005			

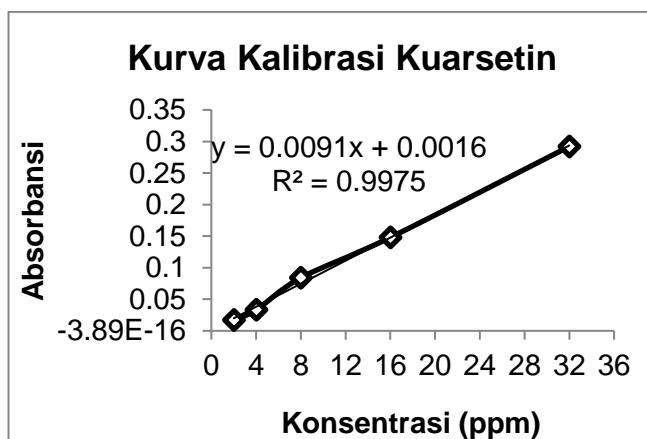
10. Hasil analisis SEM nanokitosan





11. Pengukuran kandungan Flavonoid

Standar	Konsentrasi (ppm)	Absorban	panjang gelombang	Absorban
Quarsetin	2	0.017	428	0.017
	4	0.033	361	0.033
	8	0.084	358	0.084
	16	0.148	354	0.148
	32	0.292		
Sampel 1	2.3	0.023		
Sampel 2	2.5	0.024		



$$y = 0.009x + 0.001$$

$$0.0235 = 0.009x + 0.001$$

$$0.0235 = 0.009x + 0.001$$

$$0.0225 = 0.009x$$

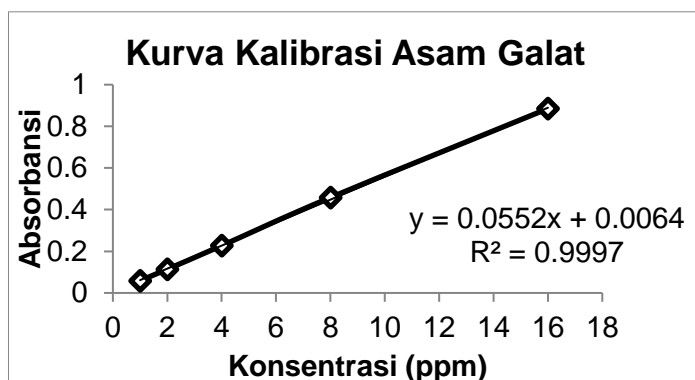
$$x = 2.5 \text{ mg/L}$$

$$2,5 \text{ mg/L} \times 0,01 \text{ L} = 0,025 \text{ mg}$$

$$0,025 \text{ mg} / 0,05 \text{ g} = 0.5 \text{ mgQE/g}$$

12. Pengukuran kandungan Fenolik Total

Standar	Konsentrasi (ppm)	Absorbansi	panjang gelombang	Absorbansi
	1	0.059	750	0.252
Asam galat	2	0.114		
	4	0.227		
	8	0.458		
	16	0.885		
Sampel 1	2.8	0.161		
Sampel 2	2.7	0.154		



$$y = 0.055x + 0.006$$

$$0.1575 = 0.055x + 0.006$$

$$0.1575 - 0.006 = 0.055x$$

$$0.1515 = 0.055x$$

$$x = 2,7545 \text{ mg/L}$$

$$2,7545 \text{ mg/L} \times 0.01 \text{ L}$$

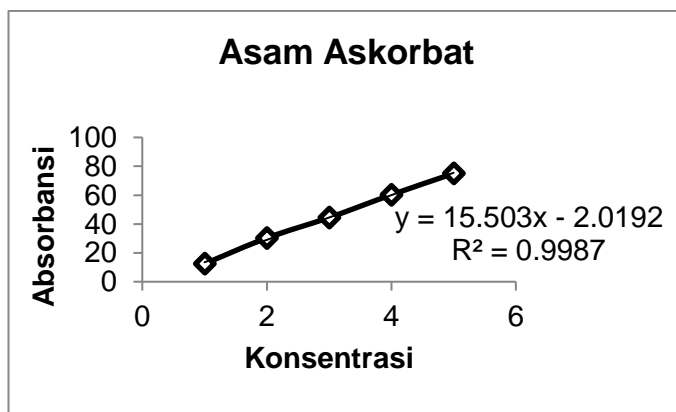
$$0.027545 \text{ mg} / 0.05 \text{ g}$$

$$0,55 \text{ mg GAE/g}$$

13. Pengukuran Aktivitas Antioksidan

a. Asam askorbat

Larutan	Konsentrasi	Absorbansi 1	Absorbansi 2	Absorbansi rata-rata	Absorbansi rata-rata	Inhibisi
Sampel	1	0.638	0.641	0.6395	0.091	12.45722108
	2	0.515	0.503	0.509	0.2215	30.32169747
	3	0.401	0.411	0.406	0.3245	44.42162902
	4	0.291	0.29	0.2905	0.44	60.23271732
	5	0.179	0.186	0.1825	0.548	75.01711157
Kontrol		0.734	0.727	0.7305	0.7305	



$$y = 15.50x - 2.019$$

$$50 = 15.50x - 2.019$$

$$50 + 2.019 = 15.50x$$

$$52.019 = 15.50x$$

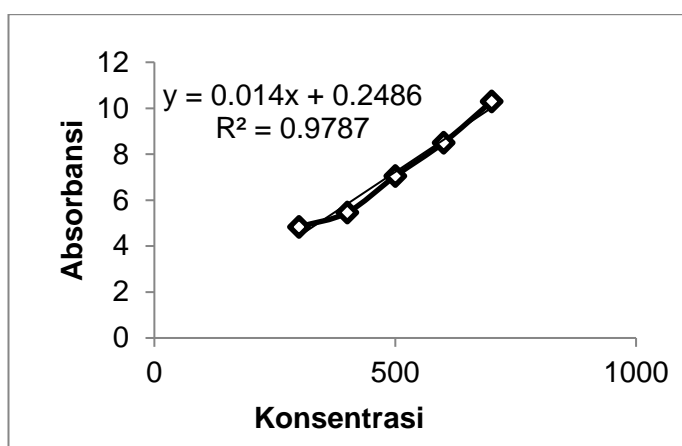
$$52.019 / 15.50 = x$$

$$x = 3.3561$$

$$IC_{50} = 3.36 \text{ ppm}$$

b. Ekstrak metanol biji goreng *C. bonduc*

Larutan	Konsentrasi	Absorbansi 1	Absorbansi 2	Absorbansi rata-rata	Absorbansi rata-rata	Inhibisi
Sampel	300	0.688	0.69	0.689	0.035	4.834254144
	400	0.685	0.684	0.6845	0.0395	5.455801105
	500	0.674	0.672	0.673	0.051	7.044198895
	600	0.662	0.663	0.6625	0.0615	8.494475138
	700	0.649	0.65	0.6495	0.0745	10.29005525
Kontrol		0.724	0.724	0.724	0.724	



$$y = 0.014x + 0.248$$

$$50 = 0.014x + 0.248$$

$$50 - 0.248 = 0.014x$$

$$49.752 = 0.014x$$

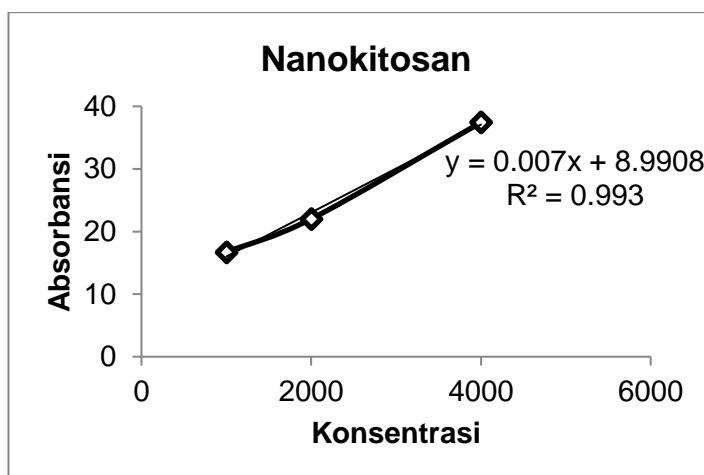
$$49.752 / 0.014 = x$$

$$x = 3553,714$$

$$IC_{50} = 3553,714 \text{ ppm}$$

c. Nanokitosan

Larutan	Konsentrasi	Absorbansi	Absorbansi	Inhibisi
nanokitosan	1000	0.454	0.091	16.69724771
	2000	0.425	0.12	22.01834862
	4000	0.341	0.204	37.43119266
kontrol		0.545		



$$y = 0.007x + 8.990$$

$$50 = 0.007x + 8.990$$

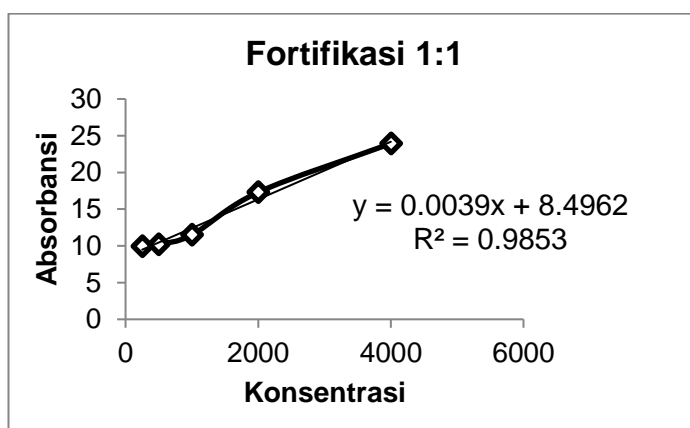
$$41.01 = 0.007x$$

$$X = 5858.571429$$

$$IC_{50} = 5858.57 \text{ ppm}$$

d. Fortifikasi 1:1

Larutan	Konsentrasi	Absorbansi	Absorbansi	Inhibisi
Fortifikasi 1:1	250	0.76	0.084	9.952606635
	500	0.758	0.086	10.18957346
	1000	0.747	0.097	11.492891
	2000	0.698	0.146	17.2985782
	4000	0.642	0.202	23.93364929
Kontrol		0.844		



$$y = 0.003x + 8.496$$

$$50 = 0.003x + 8.496$$

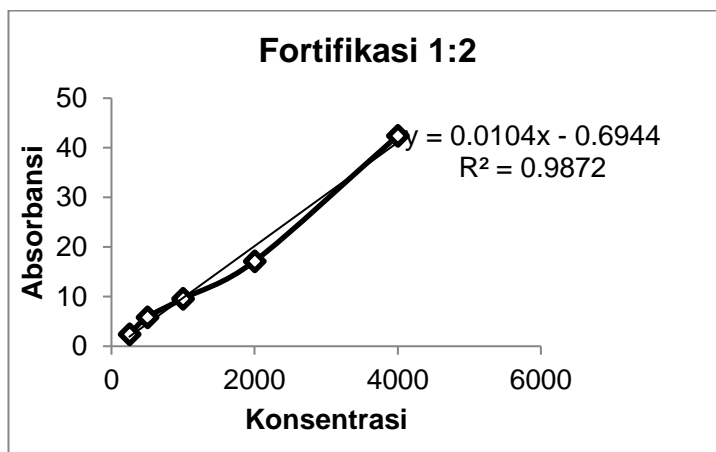
$$0.003x = 41.504$$

$$X = 13834.67$$

$$IC_{50} = 13834.67 \text{ ppm}$$

a. Fortifikasi 1:2

Larutan	Konsentrasi	Absorbansi	Absorbansi	Inhibisi
Fortifikasi 1:2	250	0.802	0.02	2.433090024
	500	0.774	0.048	5.839416058
	1000	0.743	0.079	9.610705596
	2000	0.681	0.141	17.15328467
	4000	0.473	0.349	42.45742092
kontrol		0.822		



$$y = 0.010x - 0.694$$

$$50 = 0.010x - 0.694$$

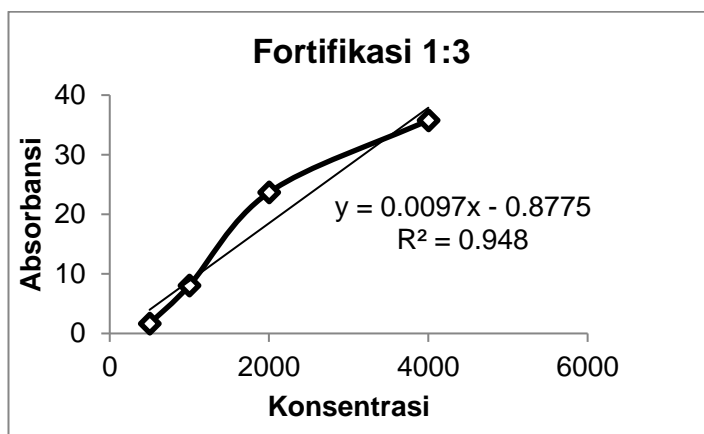
$$0.010x = 50.694$$

$$X = 5069.4$$

$$IC_{50} = 5069.4 \text{ ppm}$$

b. Fortifikasi 1:3

Larutan	Konsentrasi	Absorbansi	Absorbansi	Inhibisi
	250	0.532	0.013	2.385321101
Fortifikasi 1:3	500	0.536	0.009	1.651376147
	1000	0.501	0.044	8.073394495
	2000	0.416	0.129	23.66972477
	4000	0.35	0.195	35.77981651
kontrol		0.545		



$$y = 0.009x - 0.877$$

$$50 = 0.009x - 0.877$$

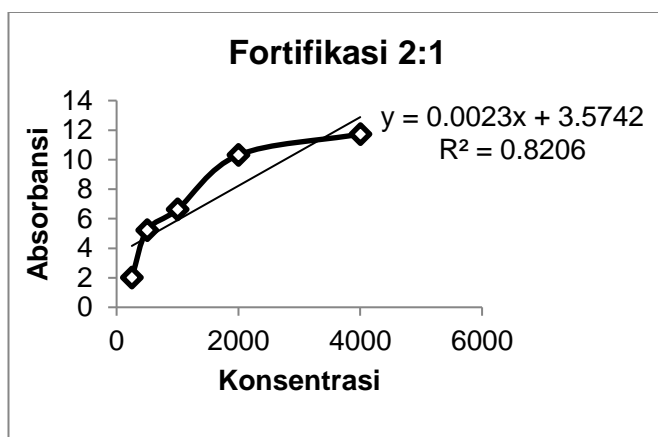
$$0.009x = 49.123$$

$$X = 5458.1111111,$$

$$IC_{50} = 5458.11 \text{ ppm}$$

c. Fortifikasi 2:1

Larutan	Konsentrasi	Absorbansi	Absorbansi	Inhibisi
Fortifikasi 2:1	250	0.827	0.017	2.014218009
	500	0.8	0.044	5.213270142
	1000	0.788	0.056	6.63507109
	2000	0.757	0.087	10.30805687
	4000	0.745	0.099	11.72985782
kontrol		0.844		



$$y = 0.002x + 3.574$$

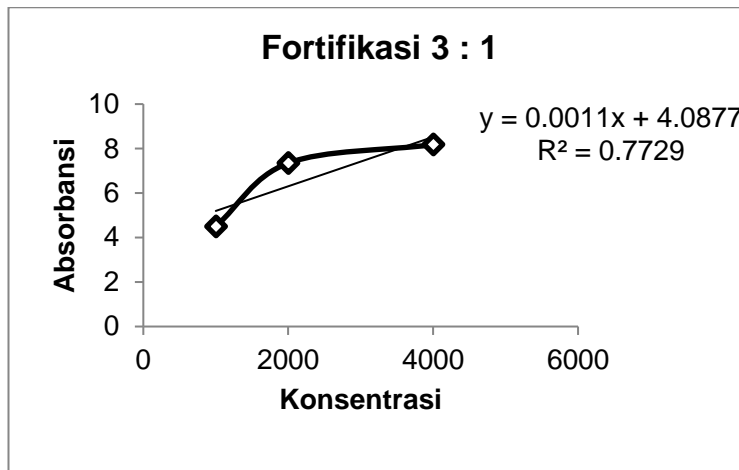
$$50 = 0.002x + 3.574$$

$$0.002x = 46.426$$

$$X = 23213$$

a. Fortifikasi 3:1

Larutan	Konsentrasi	Absorbansi	Absorbansi	Inhibisi
Fortifikasi 3:1	250	0.797	0.047	5.568720379
	500	0.803	0.041	4.857819905
	1000	0.806	0.038	4.502369668
	2000	0.782	0.062	7.345971564
	4000	0.775	0.069	8.17535545
Kontrol		0.844		



$$y = 0.001x + 4.087$$

$$50 = 0.001x + 4.087$$

$$0.001x = 45.913$$

$$X = 45913$$

$$IC_{50} = 45913 \text{ ppm}$$

14. Dokumentasi Penelitian

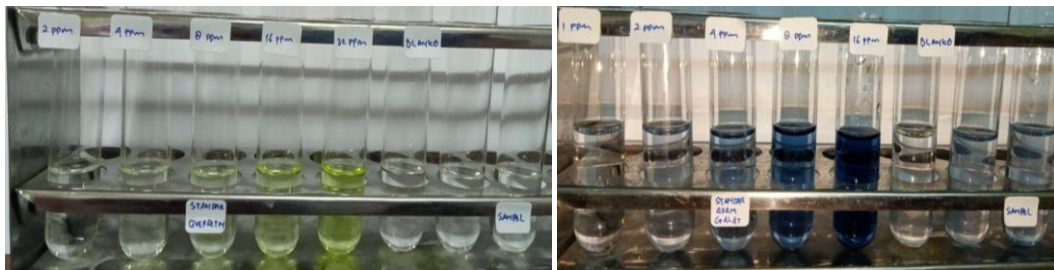
a. proses ekstraksi



b. Uji fitokimia



c. Penentuan kadar flavonoid fenolik total



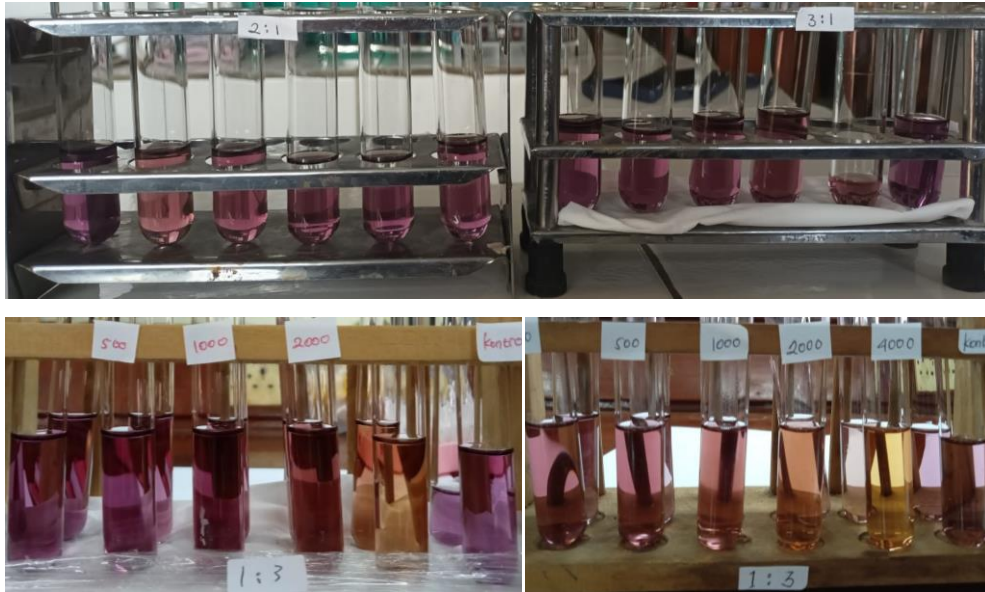
d. Sintesis nanokitosan



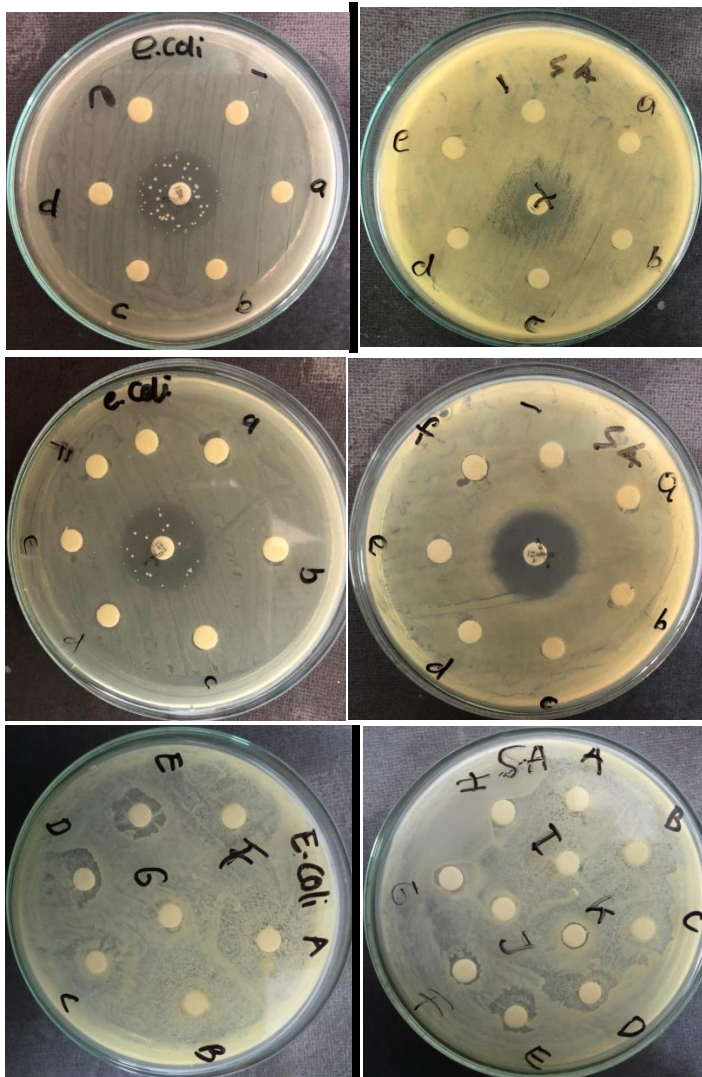


e. Uji antioksidan





f. Uji antibakteri



Fortifikasi

- A. 1:1
- B. 1:2
- C. 1:3
- D. 2:1
- E. 3:1

Ekstrak dan Nanokitosan

- a. Ekstrak 100 ppm
- b. Ekstrak 1.000 ppm
- c. Ekstrak 10.000 ppm
- d. Nanokitosan 100 ppm
- e. Nanokitosan 1.000 ppm
- f. Nanokitosan 10.000 ppm

- A. Fortifikasi 1:1
- B. Fortifikasi 1:2
- C. Fortifikasi 1:3
- D. Fortifikasi 2:1
- E. Fortifikasi 3:1