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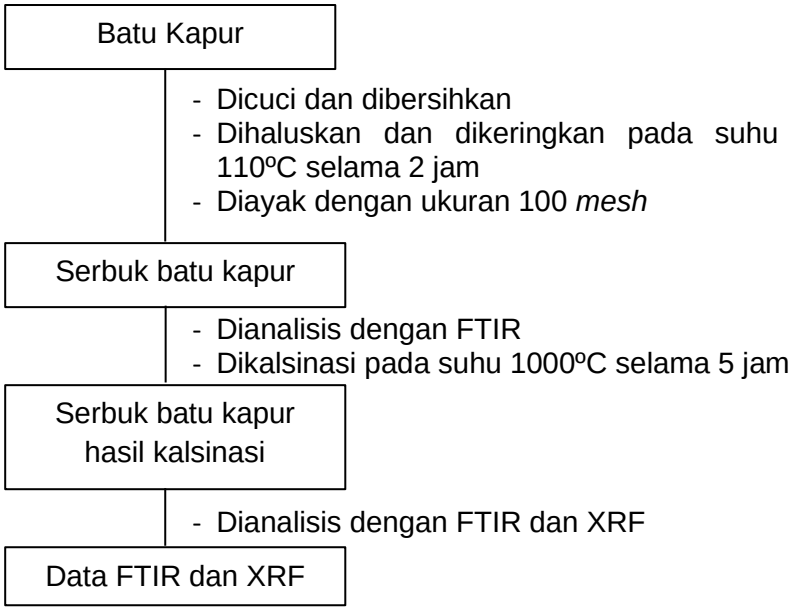
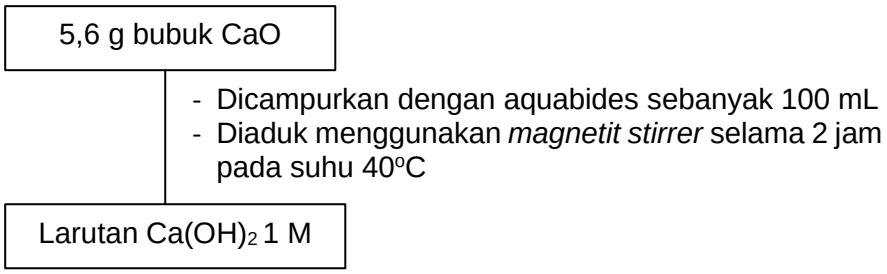
LAMPIRAN 1. Bagan Kerja Penelitian

1. Preparasi baru kapur

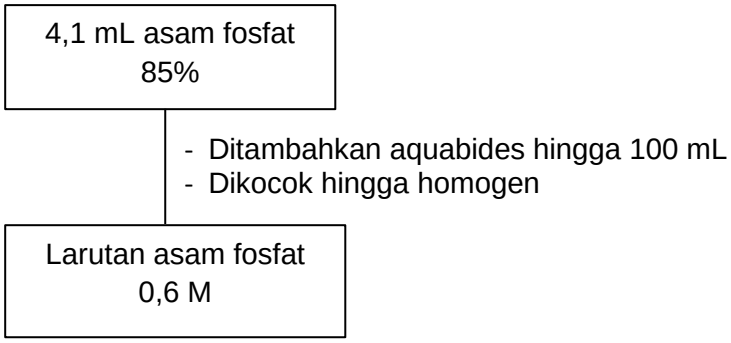


2. Pembuatan Larutan Kalsium dan Laruran Fosfat

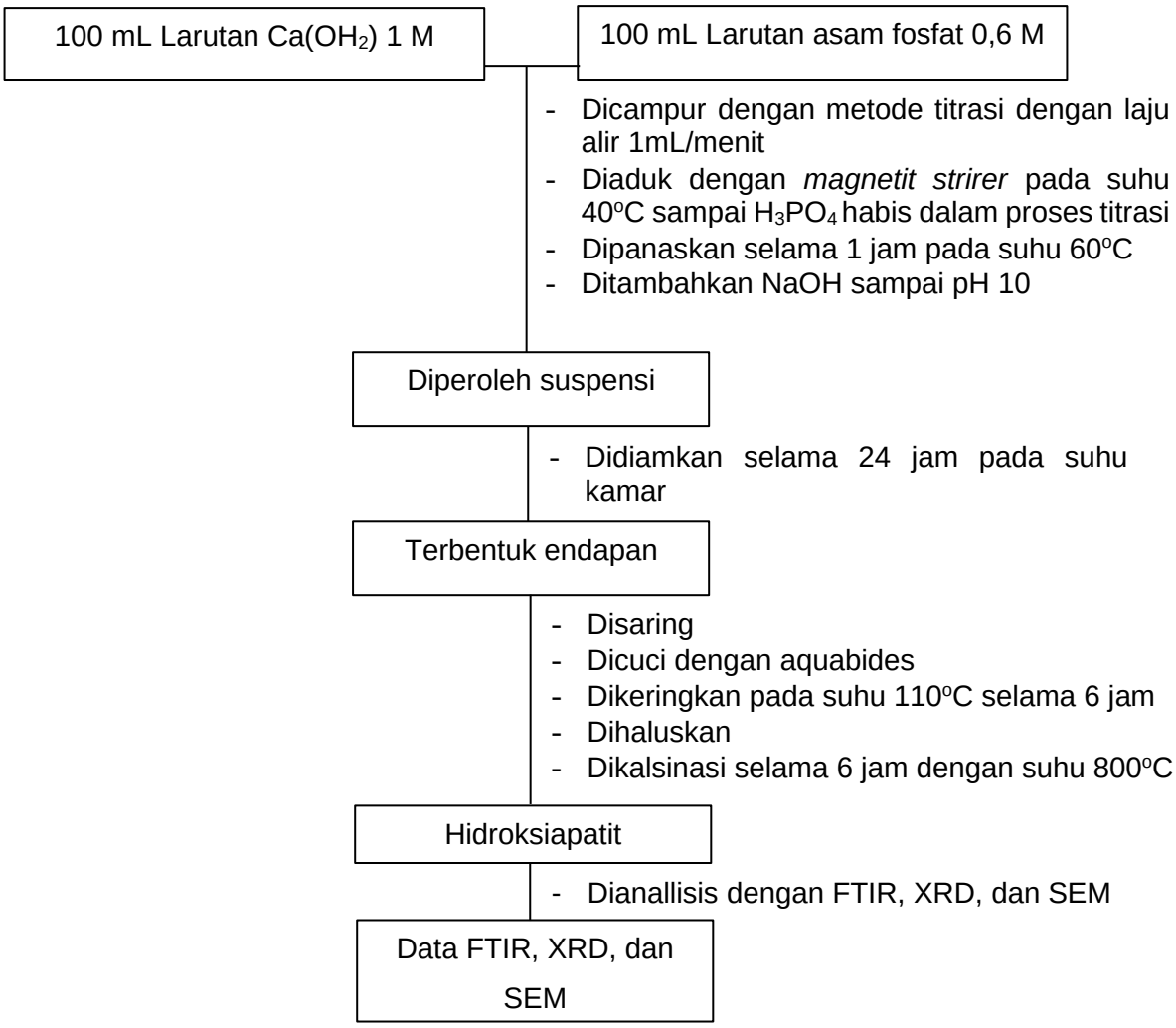
a. Pembuatan Larutan Kalsium



b. Pembuatan Larutan Fosfat

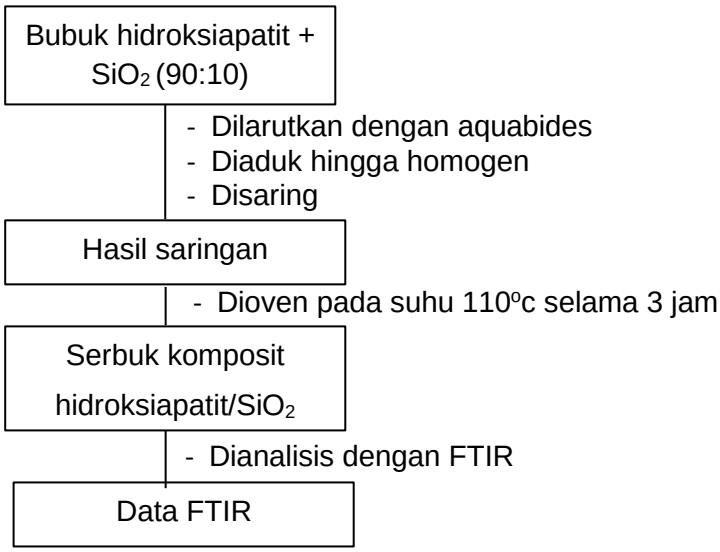


3. Sintesis hidroksiapatit

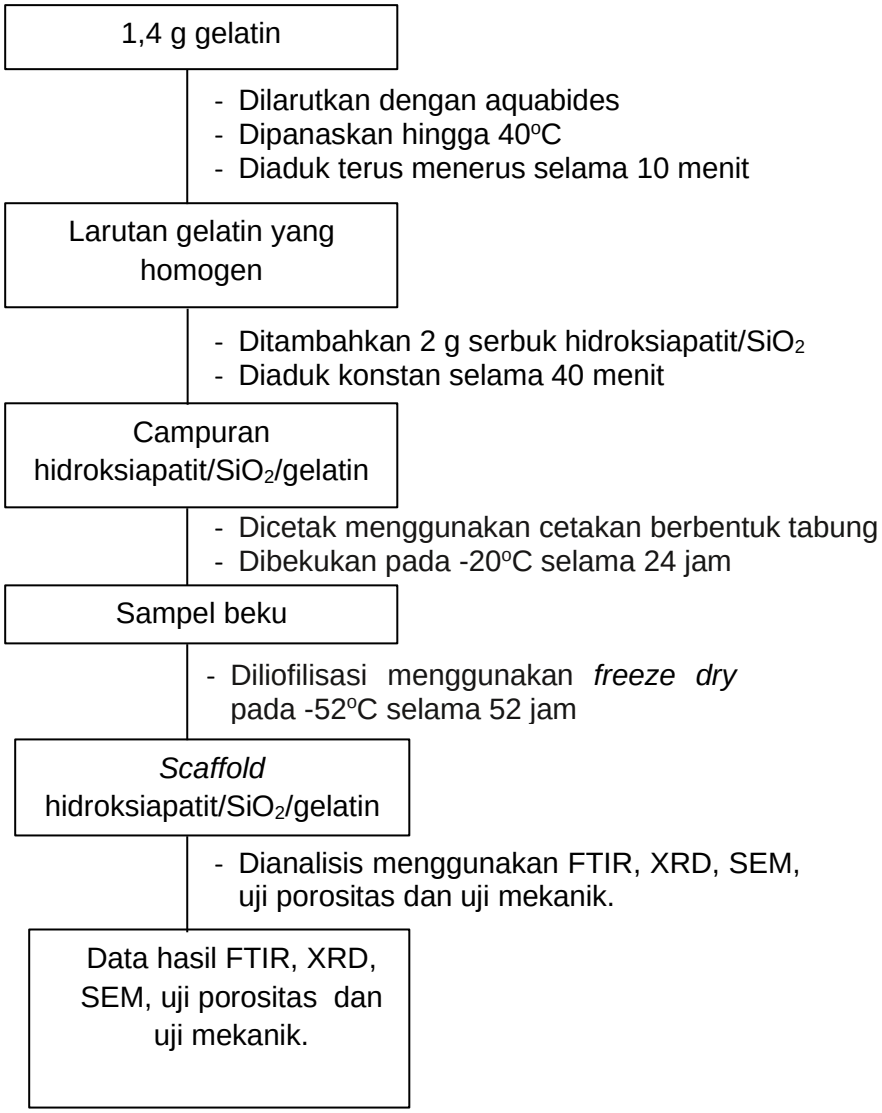


4. Sintesis *Scaffold*

a. Sintesis komposit hidroksiapatit/SiO_2

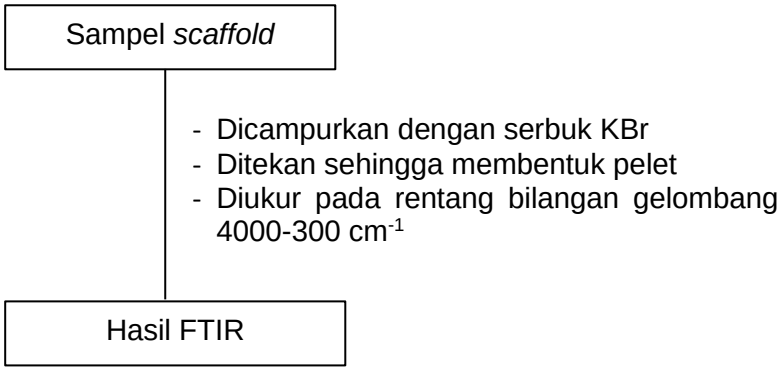


b. Sintesis *Scaffold* hidroksiapatit/SiO_2/gelatin

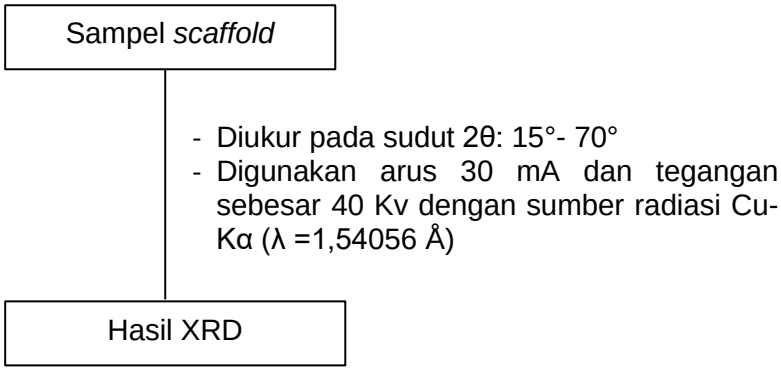


5. Karakterisasi

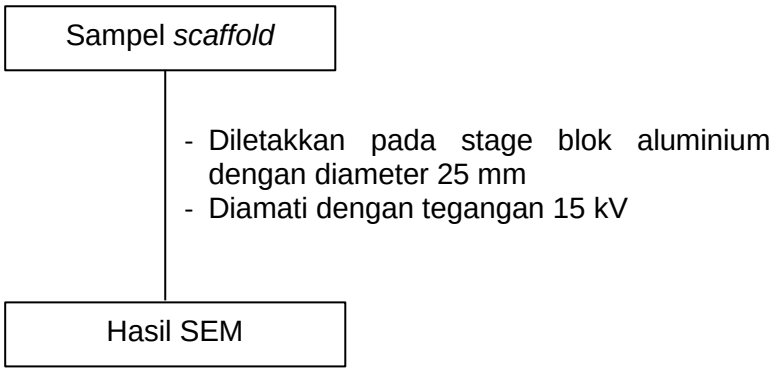
a. Karakterisasi dengan *Fourier Transform Infrared* (FTIR)



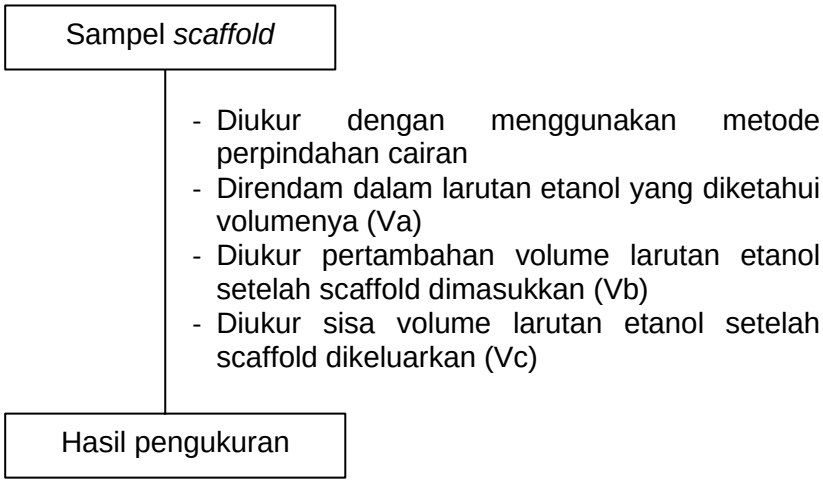
b. Karakterisasi dengan *X-Ray Diffraction* (XRD)



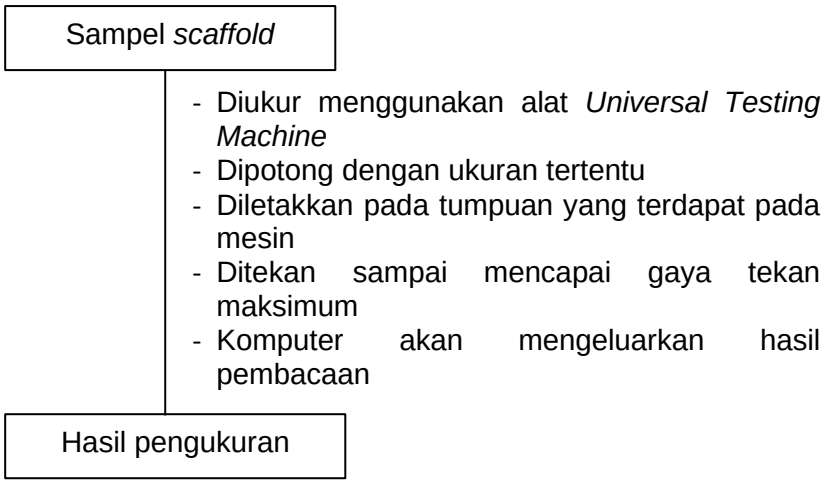
c. Karakterisasi dengan *Scanning Electron Microscope (SEM)*



d. Uji Porositas



e. Uji Mekanik



LAMPIRAN 2. Data Analisis dan Hasil Analisis

Data analisa

1. Pembuatan larutan kalsium hidroksida ($Ca(OH)_2$) 1 M dalam 100 mL

$$M = \frac{g\ CaO}{Mr\ CaO} \times \frac{1000}{V}$$

$$g\ CaO = \frac{M\ x\ Mr\ CaO\ x\ V}{1000}$$

$$g\ CaO = \frac{1\ mol/L\ x\ 56\ g/mol\ x\ 100\ mL}{1000\ mL/L}$$

$$CaO = 5{,}6\ g$$

2. Pembuatan larutan asam fosfat (H_3PO_4) 0,6 M dalam 100 mL

$$M = \frac{\%\ x\ BJ\ x\ 1000}{Mr}$$

$$= \frac{85\%\ x\ 1{,}6845\ g/mL\ x\ 1000\ mL/L}{98\ g/mol}$$

$$= \frac{0.85\ x\ 1{,}6845\ g/mL\ x\ 1000\ mL/L}{98\ g/mol}$$

$$= 14{,}6\ mol/L = 14{,}6\ M$$

$$V_1 \times M_1 = V_2 \times M_2$$

$$V_1 \times 14{,}6\ M = 100\ mL \times 0{,}6\ M$$

$$V_1 = \frac{100\ mL \times 0{,}6\ M}{14{,}6\ M}$$

$$= 4{,}1\ mL$$

3. Pembuatan larutan NaOH 1 M dalam 100 mL

$$M = \frac{g\ NaOH}{Mr\ NaOH} \times \frac{1000}{V}$$

$$g\ NaOH = \frac{M\ x\ Mr\ NaOH\ x\ V}{1000}$$

$$= \frac{1\ mol/L\ x\ 40\ g/mol\ x\ 100\ mL}{1000\ mL/L}$$

$$= 4\ g$$

4. Persentase porositas *scaffold*

$$\% \text{ porositas} = \left(\frac{Va - Vc}{Vb - Vc}\right) \times 100\%$$

$$= \left(\frac{20\ mL - 17 mL}{21\ mL - 17\ mL}\right) \times 100\%$$

$$= \left(\frac{3}{4}\right) \times 100\%$$

$$= 75\%$$

Hasil Analisa

1. Karakterisasi XRF sampel batu kapur

LABORATORIUM PENELITIAN DAN PENGEMBANGAN SAINS
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS HASANUDDIN
Jl. Perintis Kemerdekaan Km. 10 Tamalanrea, Makassar 90245
Telp. 0411-586016 • Fax. 0411-588551 • Email : lpps.fmipa.unhas@gmail.com

KAN Komite Akreditasi Nasional Laboratorium Penguji LP-1484-IDN

LAPORAN HASIL PENGUJIAN

CERTIFICATE OF ANALYSIS

Nomor Pekerjaan : **LPPS.XJ-2208-11/1**
Job Number

Dipersembahkan Kepada
Presented To

Kepada Yth *Attention*	: **Indah Wahda**	**Jabatan** *Job Title*	: **Mahasiswa**
Nama Pelanggan *Customer Name*	: **Indah Wahda**	**Tujuan Pengujian** *Purpose of analysis*	: **Analisis Unsur dan Oksida**
Alamat/Universitas *Address/University*	: **Universitas Hasanuddin**	**No. Faks/** *Fax No.*	: -
		No. Telp./ *Phone No.*	: **082291169609**
Tanggal Sampel Diterima *Date of Sample Receipt*	: **11 Agustus 2022**	**Tanggal Sampel Dianalisis** *Date of Sample Analysed*	: **18 Agustus 2022**
Email *Email*	: **indahwahda99@gmail.com**	**Total Halaman**	: **2**
Nama Pengujian *Name of analysis*	: **Analisis Unsur dan Oksida pada Batu Kapur dengan XRF**		

Hasil hanya berhubungan dengan contoh yang diuji dan laporan ini tidak boleh digandakan kecuali seluruhnya.
The result relate only to the samples tested and this report shall not be reproduced except in full

LABORATORIUM PENELITIAN DAN PENGEMBANGAN SAINS
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Telp. 0411-586016 • Fax. 0411-588551 • Email : lpps.fmipa.unhas@gmail.com

LAPORAN HASIL PENGUJIAN
CERTIFICATE OF ANALYSIS

Nomor Pekerjaan : LPPS.XJ-2208-11/1

I. Pelanggan / *Principal*

1.1 Nama / *Name*	: Indah Wahda
1.2 Alamat / *Address*	: Perumahan Gerhana Alauddin Blok L.5
1.3 Telepon / *Phone*	: 082291169609
1.4 Personil Penghubung / *Contact Person*	: -
1.5 Email / *Email*	: indahwahda99@gmail.com

II. Contoh Uji / *Sample*

2.1 Kode Sampel / *Sampel Code*	: -
2.2 Kemasan / *Packaging*	: Botol vial
2.3 Nama Sampel / *Sample Name*	: Batu Kapur
2.4 Keterangan Lain / *Other Information*	: -
2.5 Tanggal Sampling / *Date of Sampling*	: -
2.6 Diterima / *Date of Received*	: 11 Agustus 2022
2.7 Tanggal Uji / *Date of Analysis*	: 18 Agustus 2022
2.8 Jenis Uji / *Type of Analysis*	: Unsur dan Oksida

III. Hasil Uji / *Result*

Parameter	Satuan	Hasil
Ca	m/m%	95.15
Si	m/m%	3.41
Fe	m/m%	1.39
Nb	m/m%	0.0184
Mo	m/m%	0.0137
Ru	m/m%	0.0058
In	m/m%	0.0058
Sb	m/m%	0.0058

Parameter	Satuan	Hasil
CaO	m/m%	92.89
SiO2	m/m%	5.86
Fe2O3	m/m%	1.2
Nb2O5	m/m%	0.016
MoO3	m/m%	0.0125

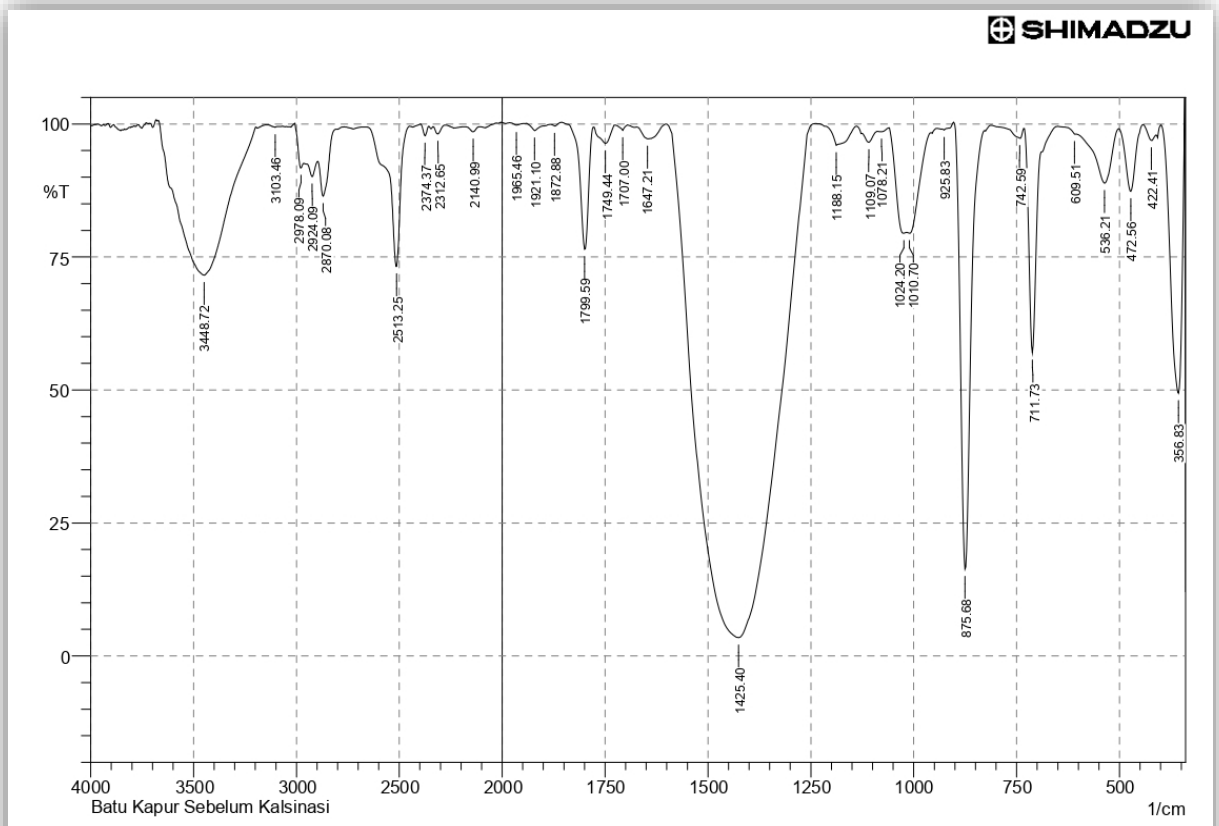
Makassar, 19 Agustus 2022
Penanggung Jawab Mutu

Prof. Dr. Nunuk Hariani Soekamto, MS
NIP. 19601215 198702 2 001

Catatan:
- Hasil Uji hanya berlaku untuk contoh tersebut di atas
- Dilarang mengutip/menyalin sebagian isi hasil uji ini

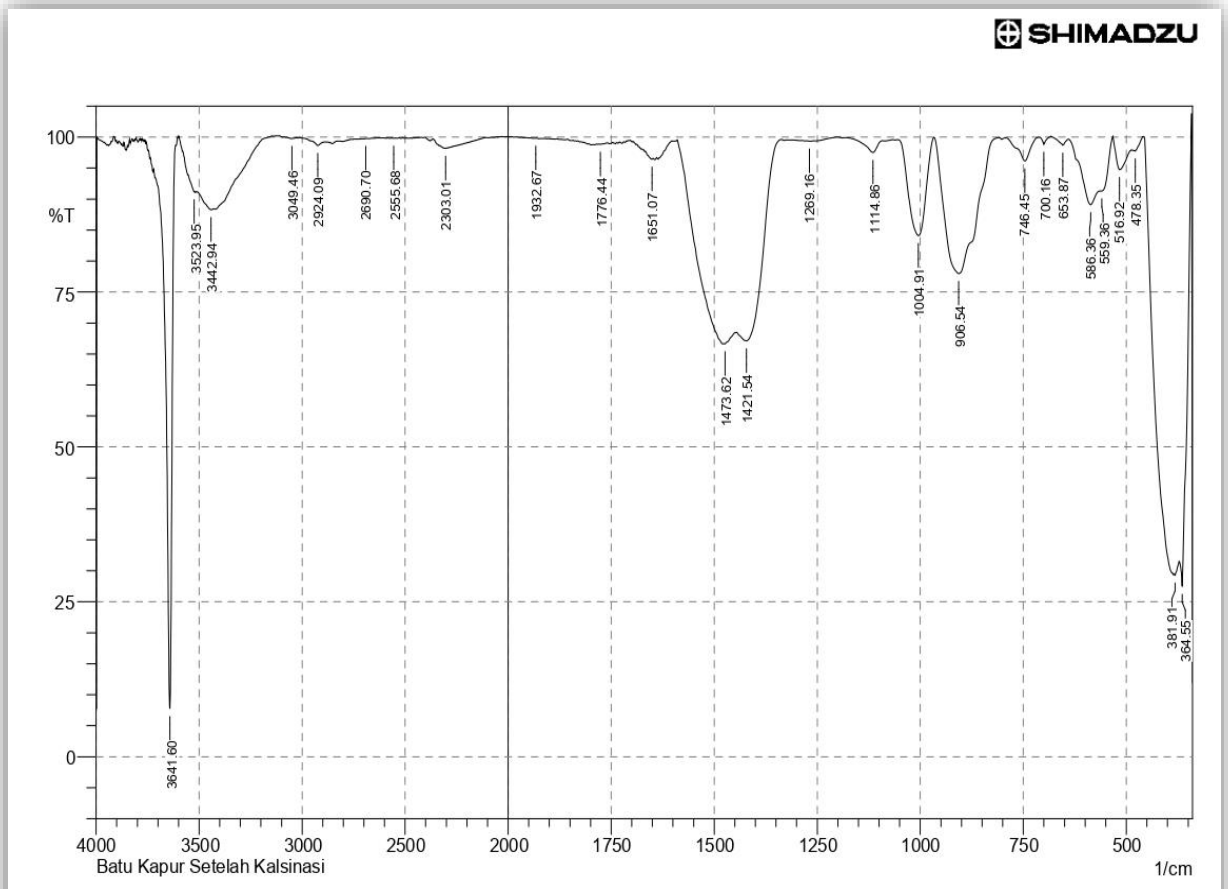
2. Karakterisasi FTIR

a. Batu kapur sebelum kalsinasi



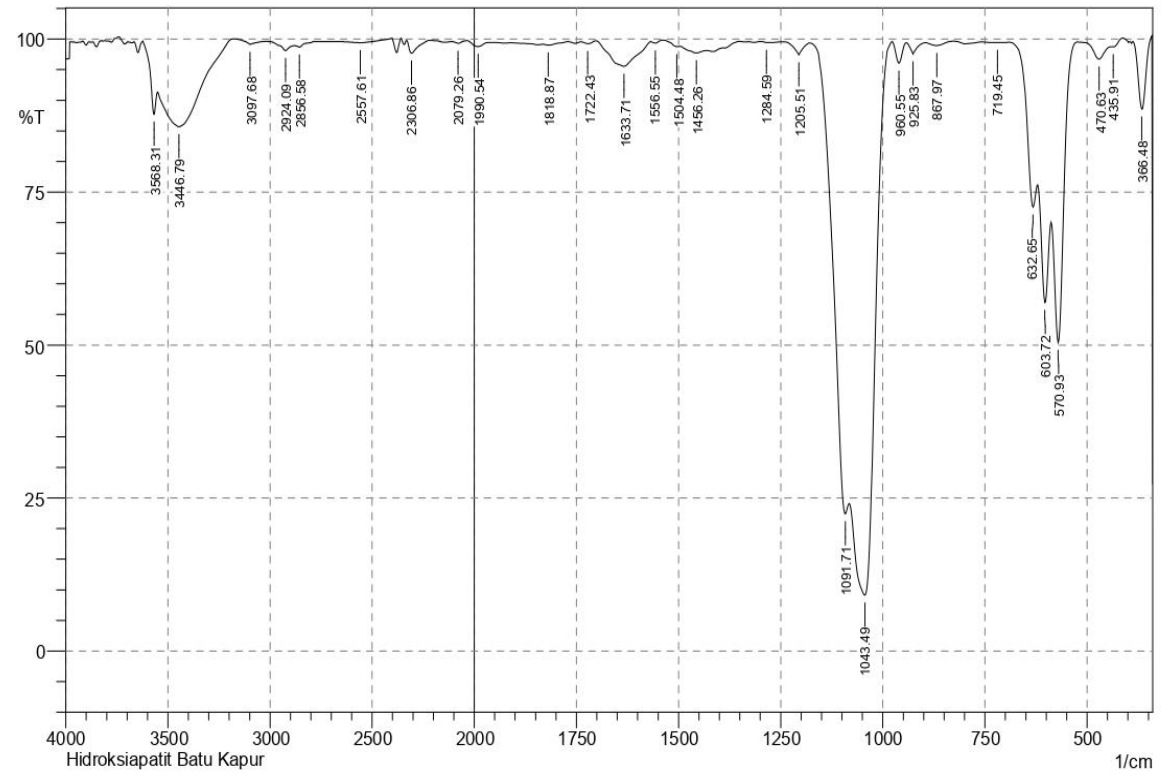
	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	356.83	49.376	46.236	399.26	343.33	8.597	7.835
2	422.41	96.893	1.755	441.7	410.84	0.271	0.121
3	472.56	87.331	12.16	501.49	443.63	1.54	1.415
4	536.21	88.899	9.854	605.65	503.42	2.565	1.934
5	609.51	98.089	0.077	650.01	607.58	0.158	-0.059
6	711.73	56.992	42.216	731.02	650.01	4.938	4.703
7	742.59	97.348	1.877	812.03	732.95	0.42	0.232
8	875.68	16.349	83.391	902.69	829.39	16.361	16.202
9	925.83	98.849	0.453	931.62	902.69	0.088	0.048
10	1010.7	79.456	2.042	1016.49	958.62	3.139	0.308
11	1024.2	79.448	2.986	1058.92	1018.41	2.651	0.501
12	1078.21	98.531	0.324	1087.85	1060.85	0.148	0.024
13	1109.07	96.578	1.842	1126.43	1087.85	0.413	0.149
14	1188.15	95.994	3.58	1215.15	1139.93	0.755	0.616
15	1425.4	3.449	96.571	1600.92	1240.23	206.689	206.722
16	1647.21	97.212	2.403	1672.28	1600.92	0.519	0.425
17	1707	98.828	0.975	1726.29	1695.43	0.076	0.049
18	1749.44	96.364	3.264	1778.37	1726.29	0.519	0.43
19	1799.59	76.437	23.236	1853.59	1778.37	2.524	2.476
20	1872.88	99.617	0.451	1882.52	1855.52	0.008	0.022
21	1921.1	98.748	1.316	1940.39	1882.52	0.124	0.131
22	1965.46	99.769	0.42	1980.89	1940.39	-0.002	0.03
23	2140.99	98.542	0.95	2183.42	2110.12	0.288	0.126
24	2312.65	98.133	1.482	2335.8	2276	0.267	0.176
25	2374.37	97.792	1.947	2397.52	2357.01	0.198	0.158
26	2513.25	73.205	26.309	2661.77	2453.45	8.336	7.874
27	2870.08	86.448	7.9	2897.08	2769.78	3.212	1.372
28	2924.09	90.114	2.596	2949.16	2899.01	1.944	0.297
29	2978.09	91.725	3.277	3007.02	2964.59	1.086	0.359
30	3103.46	99.395	0.222	3143.97	3089.96	0.092	0.021
31	3448.72	71.592	28.447	3670.54	3197.98	37.394	37.385

b. Batu kapur setelah kalsinasi



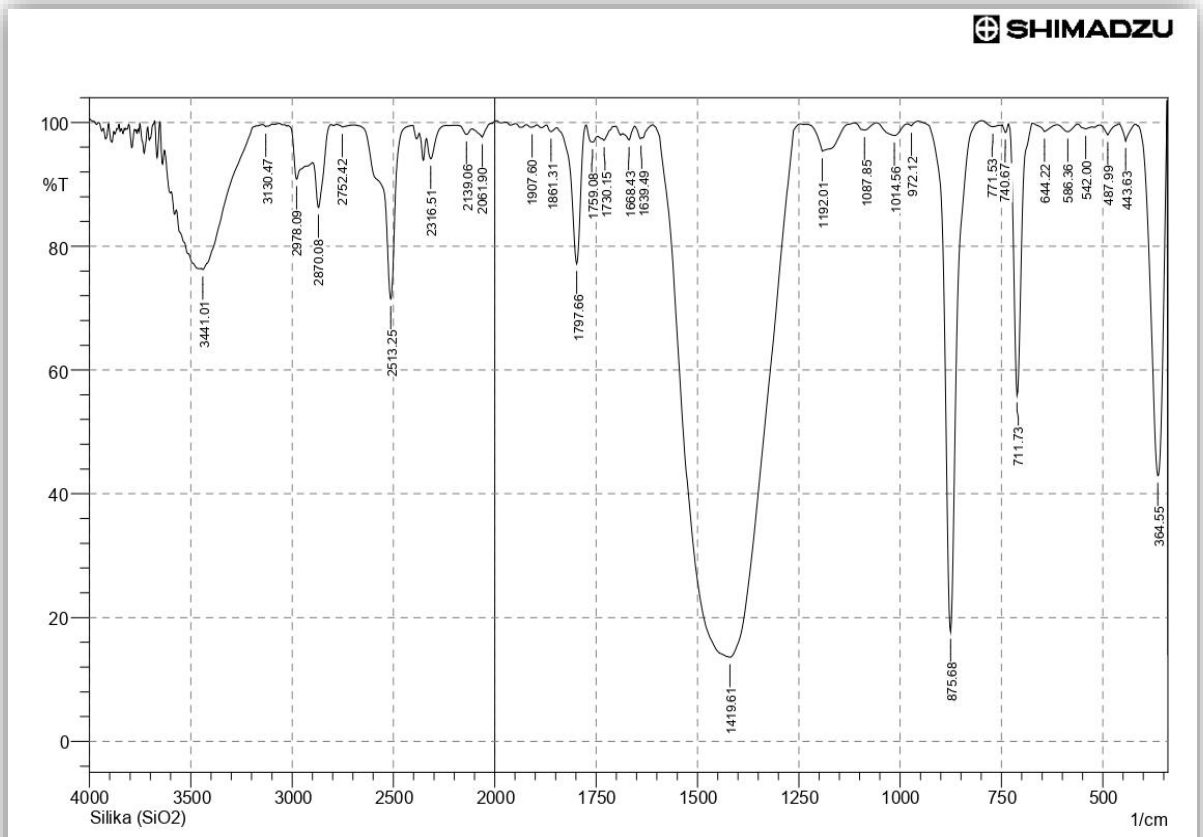
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	364.55	27.483	18.066	370.33	343.33	8.316	1.849
2	381.91	29.284	10.149	455.2	372.26	29.256	7.919
3	478.35	97.773	0.258	480.28	459.06	0.11	0.013
4	516.92	94.758	4.575	532.35	487.99	0.692	0.499
5	559.36	91.289	0.589	561.29	532.35	0.699	0.132
6	586.36	89.111	4.546	640.37	565.14	2.259	0.688
7	653.87	98.681	1.135	682.8	640.37	0.104	0.086
8	700.16	98.851	1.2	711.73	682.8	0.045	0.053
9	746.45	96.159	3.783	792.74	711.73	0.584	0.561
10	906.54	77.969	21.966	966.34	812.03	8.782	8.734
11	1004.91	84.11	15.644	1053.13	968.27	3.371	3.274
12	1114.86	97.523	2.033	1180.44	1091.71	0.411	0.285
13	1269.16	99.364	0.324	1305.81	1199.72	0.199	0.088
14	1421.54	67.106	8.154	1444.68	1338.6	10.782	2.495
15	1473.62	66.63	0.312	1477.47	1450.47	4.623	0.035
16	1651.07	96.43	0.288	1666.5	1649.14	0.238	0.019
17	1776.44	98.831	0.059	1778.37	1768.72	0.047	0.001
18	1932.67	99.806	0.033	1934.6	1928.82	0.004	0
19	2303.01	98.194	0.616	2330.01	2113.98	1	0.329
20	2555.68	99.826	0.023	2567.25	2547.97	0.014	0.001
21	2690.7	99.753	0.001	2692.63	2688.77	0.004	0
22	2924.09	98.65	0.785	2997.38	2885.51	0.354	0.126
23	3049.46	99.785	0.08	3088.03	3041.74	0.022	0.009
24	3442.94	88.309	0.534	3512.37	3431.36	3.916	0.134
25	3523.95	91.169	0.251	3599.17	3522.02	1.697	0.184
26	3641.6	7.762	89.404	3711.04	3614.6	23.648	21.947

c. Hidroksiapatit



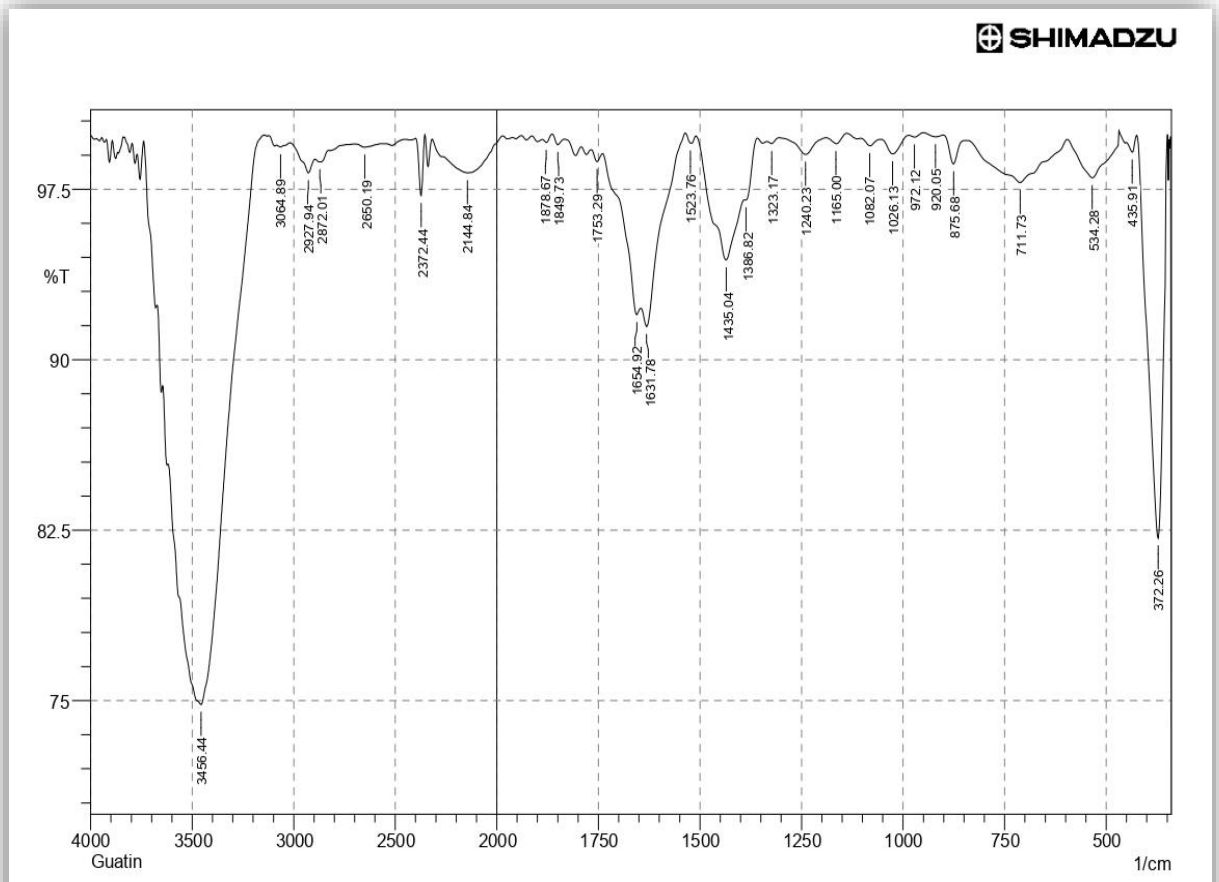
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	366.48	88.544	11.372	387.69	343.33	1.07	1.059
2	435.91	98.732	0.298	441.7	412.77	0.089	0.021
3	470.63	96.726	2.298	524.64	441.7	0.573	0.264
4	570.93	50.416	26.681	586.36	524.64	7.666	3.37
5	603.72	56.931	16.001	621.08	588.29	6.196	1.689
6	632.65	72.527	6.838	690.52	623.01	3.604	0.499
7	719.45	99.428	0.076	758.02	690.52	0.16	0.015
8	867.97	98.946	0.596	894.97	827.46	0.216	0.088
9	925.83	97.571	1.857	943.19	894.97	0.258	0.139
10	960.55	96.081	3.412	977.91	943.19	0.327	0.25
11	1043.49	9.126	42.927	1082.07	977.91	52.682	23.113
12	1091.71	22.429	7.84	1176.58	1083.99	21.708	1.14
13	1205.51	97.435	1.995	1247.94	1178.51	0.357	0.191
14	1284.59	99.436	0.153	1298.09	1247.94	0.11	0.018
15	1456.26	97.731	0.667	1496.76	1431.18	0.541	0.104
16	1504.48	98.759	0.243	1539.2	1496.76	0.133	0.008
17	1556.55	99.359	0.326	1568.13	1539.2	0.057	0.021
18	1633.71	95.554	4.101	1701.22	1568.13	1.529	1.329
19	1722.43	99.242	0.381	1737.86	1703.14	0.087	0.032
20	1818.87	99.031	0.22	1832.38	1770.65	0.201	0.033
21	1990.54	98.77	0.8	2038.76	1963.53	0.241	0.115
22	2079.26	99.318	0.346	2110.12	2038.76	0.15	0.049
23	2306.86	97.688	2.105	2331.94	2218.14	0.552	0.448
24	2557.61	99.383	0.447	2677.2	2401.38	0.446	0.285
25	2856.58	98.704	0.357	2879.72	2765.92	0.385	0.017
26	2924.09	98.137	1.014	3018.6	2879.72	0.622	0.185
27	3097.68	99.136	0.699	3178.69	3018.6	0.279	0.166
28	3446.79	85.688	8.02	3549.02	3180.62	14.088	6.872
29	3568.31	87.714	5.647	3622.32	3550.95	2.03	0.569

d. Silika (SiO_2)



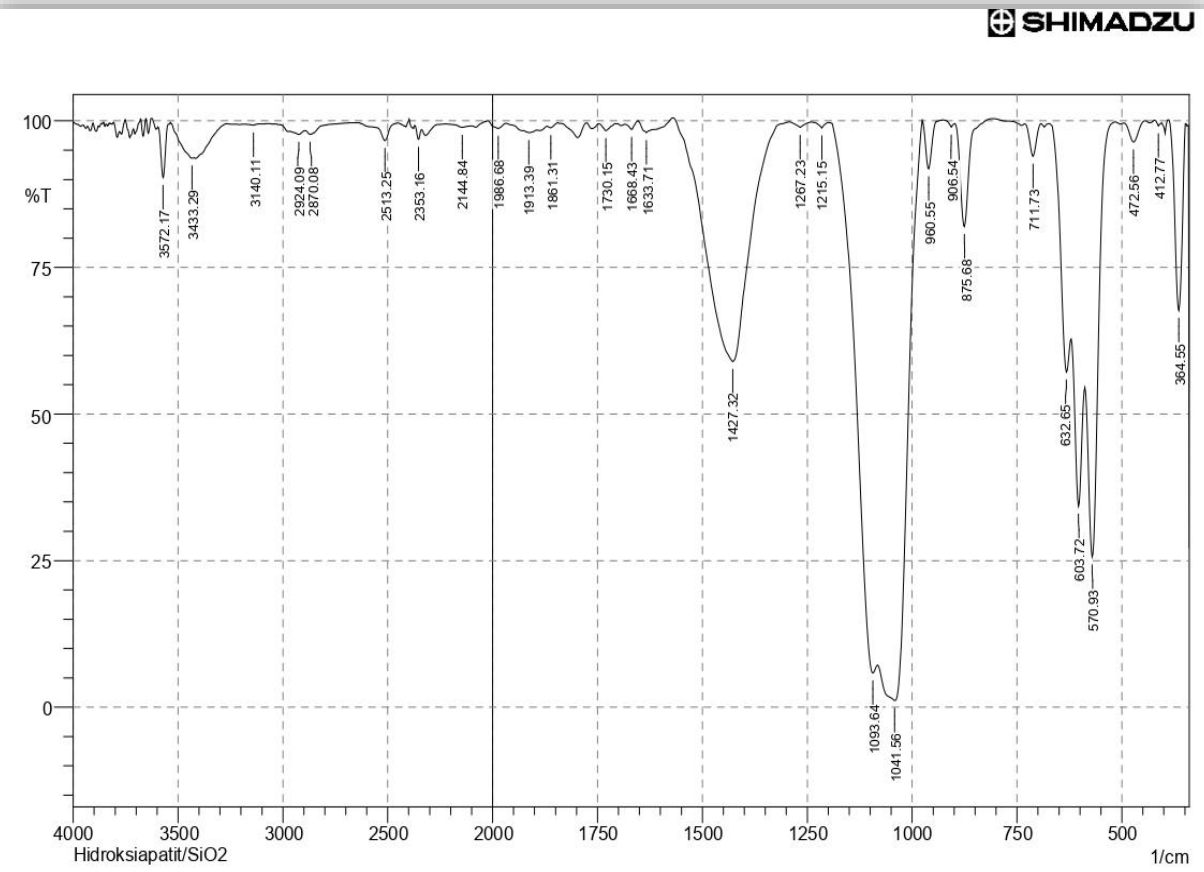
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	364.55	42.908	54.536	418.55	343.33	10.981	10.348
2	443.63	97.017	2.76	459.06	420.48	0.233	0.194
3	487.99	97.955	1.73	507.28	459.06	0.196	0.135
4	542	98.979	0.498	561.29	526.57	0.12	0.045
5	586.36	98.511	1.161	613.36	561.29	0.204	0.129
6	644.22	98.51	1.233	673.16	613.36	0.194	0.126
7	711.73	55.917	43.884	732.95	673.16	4.753	4.705
8	740.67	98.396	1.31	748.38	732.95	0.07	0.05
9	771.53	99.312	0.622	798.53	748.38	0.079	0.07
10	875.68	17.703	82.53	954.76	798.53	17.769	17.928
11	972.12	99.435	0.492	983.7	954.76	0.022	0.018
12	1014.56	97.879	1.959	1056.99	983.7	0.4	0.353
13	1087.85	98.776	1.166	1112.93	1056.99	0.158	0.145
14	1192.01	95.346	4.406	1228.66	1112.93	1.109	1.01
15	1419.61	13.607	86.084	1608.63	1247.94	146.883	146.392
16	1639.49	97.386	0.514	1654.92	1635.64	0.152	0.022
17	1668.43	97.17	1.665	1683.86	1654.92	0.248	0.096
18	1730.15	97.117	0.688	1735.93	1707	0.232	0.028
19	1759.08	96.834	1.766	1774.51	1745.58	0.316	0.146
20	1797.66	77.137	22.28	1845.88	1776.44	2.795	2.598
21	1861.31	98.498	0.903	1872.88	1845.88	0.128	0.054
22	1907.6	99.218	0.414	1923.03	1896.03	0.07	0.027
23	2061.9	97.6	1.85	2112.05	2019.47	0.542	0.305
24	2139.06	98.046	1.1	2193.06	2112.05	0.399	0.133
25	2316.51	94.129	3.586	2335.8	2235.5	1.153	0.503
26	2513.25	71.464	28.062	2694.56	2411.02	9.789	9.225
27	2752.42	99.256	0.402	2779.42	2696.48	0.187	0.058
28	2870.08	86.246	9.124	2897.08	2808.36	2.951	1.633
29	2978.09	90.817	6.644	3018.6	2899.01	3.302	1.411
30	3130.47	99.306	0.375	3143.97	3095.75	0.103	0.039
31	3441.01	76.23	0.768	3448.72	3145.9	15.182	0.335

e. Gelatin



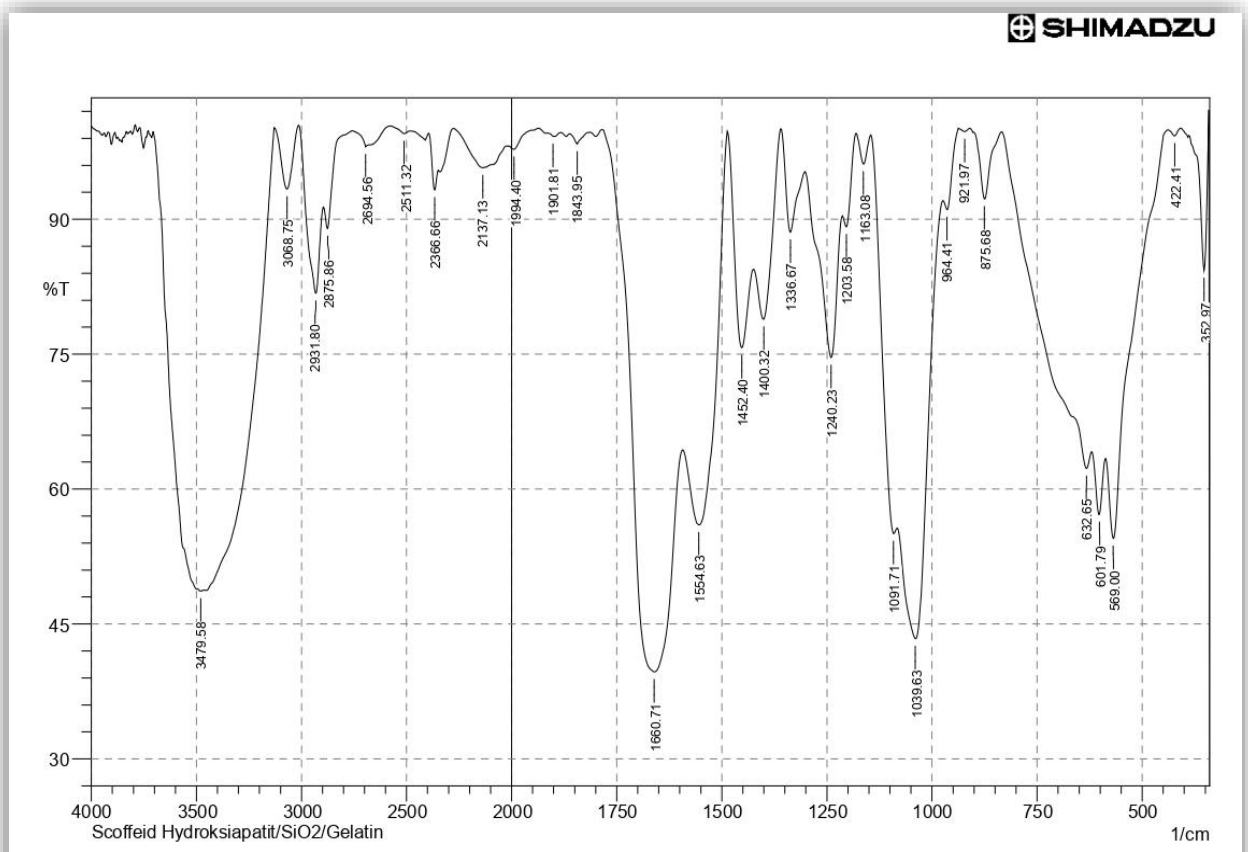
	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	372.26	82.151	17.306	424.34	351.04	3.374	3.238
2	435.91	99.134	0.602	451.34	424.34	0.068	0.034
3	534.28	98	1.877	596	468.7	0.69	0.626
4	711.73	97.796	1.876	840.96	596	1.471	1.121
5	875.68	98.617	1.165	900.76	842.89	0.17	0.111
6	920.05	99.808	0.118	948.98	900.76	0.027	0.014
7	972.12	99.796	0.119	985.62	948.98	0.02	0.009
8	1026.13	99.062	0.709	1055.06	985.62	0.167	0.102
9	1082.07	99.411	0.311	1103.28	1055.06	0.088	0.03
10	1165	99.506	0.353	1190.08	1138	0.069	0.037
11	1240.23	99.032	0.735	1305.81	1190.08	0.258	0.14
12	1323.17	99.508	0.16	1334.74	1305.81	0.049	0.009
13	1386.82	97.026	0.325	1390.68	1357.89	0.248	0.015
14	1435.04	94.394	3.681	1510.26	1390.68	1.88	1.057
15	1523.76	99.531	0.064	1535.34	1521.84	0.016	0.002
16	1631.78	91.461	1.764	1645.28	1537.27	1.969	0.188
17	1654.92	91.981	0.849	1737.86	1647.21	1.724	0.061
18	1753.29	98.711	0.438	1768.72	1739.79	0.133	0.026
19	1849.73	99.463	0.369	1863.24	1832.38	0.048	0.024
20	1878.67	99.551	0.232	1888.31	1863.24	0.033	0.012
21	2144.84	98.223	1.101	2264.43	1986.68	1.604	0.865
22	2372.44	97.225	2.606	2399.45	2355.08	0.271	0.236
23	2650.19	99.35	0.144	2696.48	2567.25	0.322	0.039
24	2872.01	98.698	0.253	2895.15	2827.64	0.336	0.045
25	2927.94	98.222	0.787	3018.6	2895.15	0.62	0.177
26	3064.89	99.36	0.107	3084.18	3018.6	0.162	0.016
27	3456.44	74.83	15.561	3618.46	3147.83	34.329	18.271

f. Komposit hidroksiapatit/SiO_2



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	364.55	67.699	32.034	387.69	349.12	3.133	3.096
2	412.77	99.135	0.729	422.41	405.05	0.028	0.02
3	472.56	96.397	3.416	495.71	445.56	0.384	0.346
4	570.93	25.622	39.924	588.29	516.92	14.83	7.077
5	603.72	34.292	23.496	621.08	590.22	10.594	3.27
6	632.65	57.15	12.472	673.16	623.01	5.818	1.122
7	711.73	93.972	5.536	732.95	692.44	0.512	0.425
8	875.68	81.954	17.802	898.83	808.17	1.881	1.867
9	906.54	98.909	0.818	925.83	898.83	0.041	0.025
10	960.55	91.804	8.289	975.98	931.62	0.584	0.603
11	1041.56	1.135	41.508	1082.07	975.98	99.82	43.057
12	1093.64	5.811	9.134	1197.79	1083.99	46.225	2.484
13	1215.15	98.76	0.992	1242.16	1197.79	0.104	0.058
14	1267.23	98.866	0.947	1292.31	1242.16	0.126	0.085
15	1427.32	58.968	41.17	1568.13	1294.24	24.173	24.344
16	1633.71	98.006	1.218	1653	1616.35	0.224	0.106
17	1668.43	98.538	1.18	1683.86	1653	0.108	0.07
18	1730.15	98.332	1.177	1745.58	1707	0.176	0.094
19	1861.31	98.848	0.473	1870.95	1845.88	0.095	0.028
20	1913.39	98.002	0.702	1969.32	1896.03	0.432	0.113
21	1986.68	98.713	1.003	2023.33	1969.32	0.17	0.121
22	2144.84	98.898	0.307	2222	2113.98	0.382	0.043
23	2353.16	96.826	2.022	2370.51	2337.72	0.303	0.141
24	2513.25	96.634	3.013	2648.26	2449.6	1.052	0.757
25	2870.08	97.692	0.769	2893.22	2650.19	0.953	-0.098
26	2924.09	97.693	0.588	2966.52	2893.22	0.644	0.089
27	3140.11	99.273	0.139	3161.33	3116.97	0.124	0.011
28	3433.29	93.634	0.568	3535.52	3423.65	2.039	0.345
29	3572.17	90.349	8.793	3593.38	3547.09	1.057	0.891

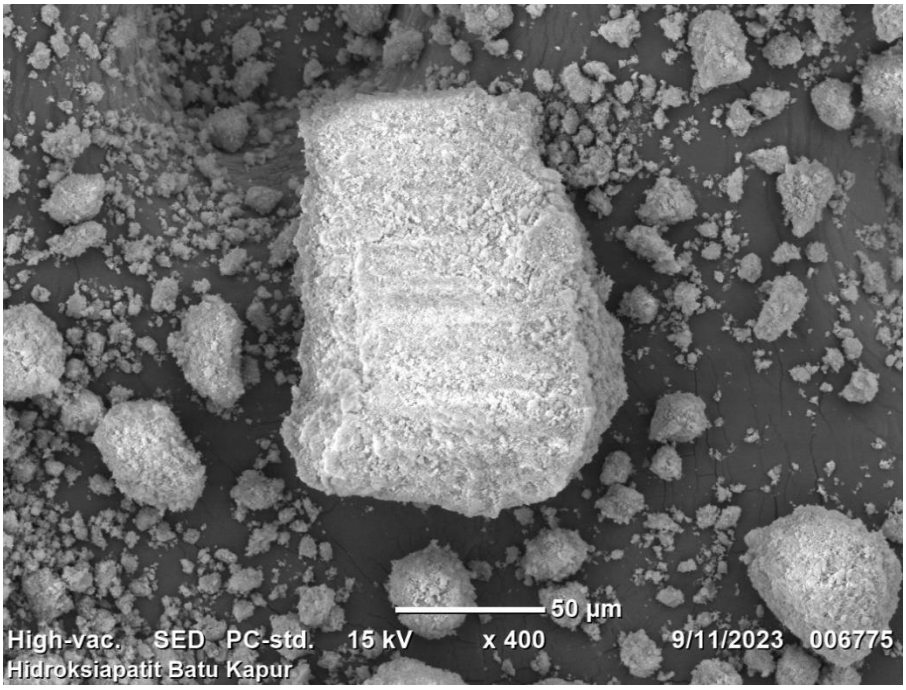
g. Scaffold hidroksiapatit/SiO_2/gelatin

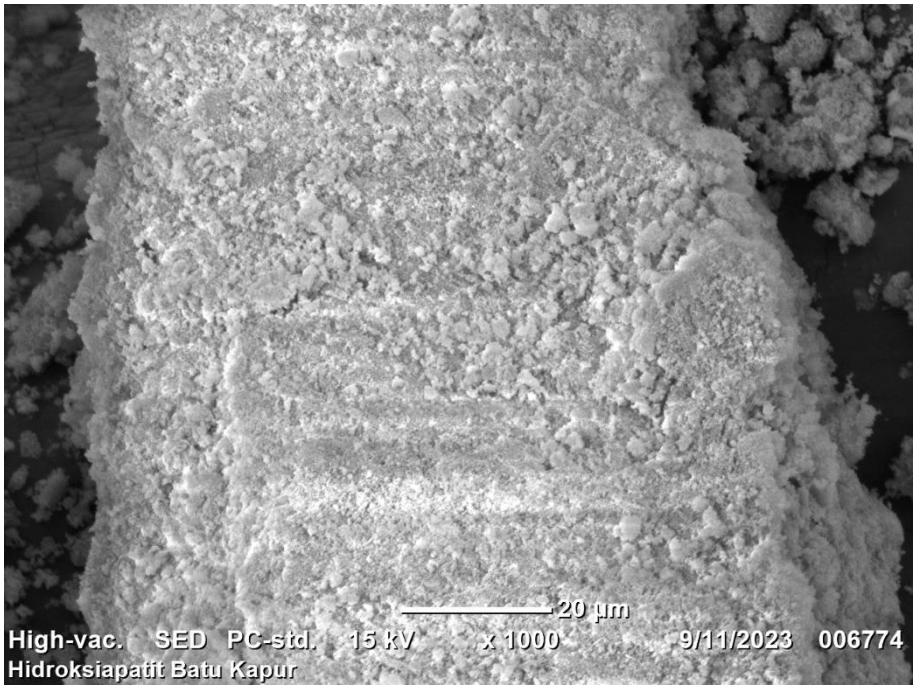


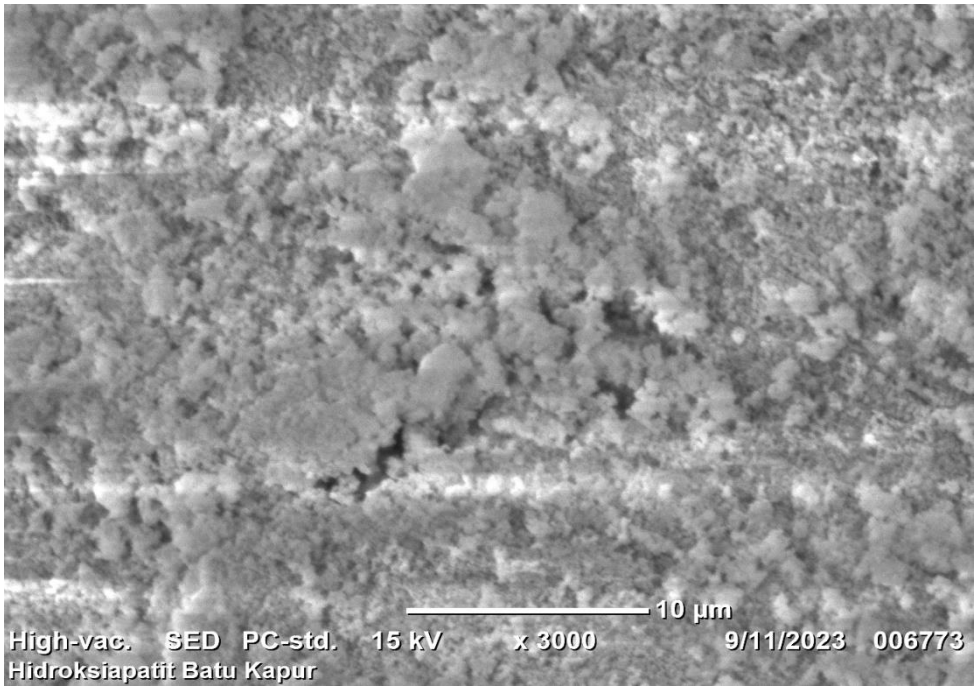
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	352.97	84.31	13.968	387.69	343.33	1.319	1.049
2	422.41	99.27	0.751	437.84	406.98	0.043	0.045
3	569	54.51	13.191	586.36	439.77	15.783	2.211
4	601.79	57.173	6.512	619.15	588.29	6.781	0.738
5	632.65	62.277	3.8	833.25	621.08	24.485	3.712
6	875.68	92.249	7.665	908.47	835.18	0.97	0.934
7	921.97	99.74	0.367	937.4	910.4	0.009	0.022
8	964.41	91.053	3.133	974.05	937.4	0.877	0.228
9	1039.63	43.384	26.57	1082.07	974.05	24.998	9.616
10	1091.71	55.072	6.024	1145.72	1083.99	9.019	1.124
11	1163.08	96.127	3.325	1180.44	1145.72	0.339	0.256
12	1203.58	89.159	3.908	1213.23	1180.44	1.031	0.278
13	1240.23	74.622	17.239	1301.95	1213.23	6.644	3.739
14	1336.67	88.556	9.51	1357.89	1303.88	1.786	1.18
15	1400.32	78.898	11.212	1423.47	1359.82	4.142	1.884
16	1452.4	75.713	15.54	1485.19	1425.4	4.88	2.554
17	1554.63	56.031	20.737	1591.27	1487.12	18.458	8.597
18	1660.71	39.686	37.26	1784.15	1593.2	42.996	24.657
19	1843.95	98.352	1.207	1861.31	1816.94	0.176	0.095
20	1901.81	99.211	0.061	1913.39	1899.88	0.034	-0.001
21	1994.4	97.769	0.864	2013.68	1936.53	0.341	0.046
22	2137.13	95.738	1.236	2276	2096.62	2.051	0.518
23	2366.66	93.271	3.715	2395.59	2349.3	0.854	0.34
24	2511.32	99.528	0.441	2578.83	2482.39	0.034	0.068
25	2694.56	98.058	1.961	2758.21	2578.83	0.648	0.722
26	2875.86	88.976	4.011	2895.15	2800.64	2.134	0.454
27	2931.8	81.762	12.295	3012.81	2897.08	6.045	3.833
28	3068.75	93.357	6.945	3128.54	3014.74	1.633	1.779
29	3479.58	48.655	2.99	3705.26	3466.08	47.87	10.372

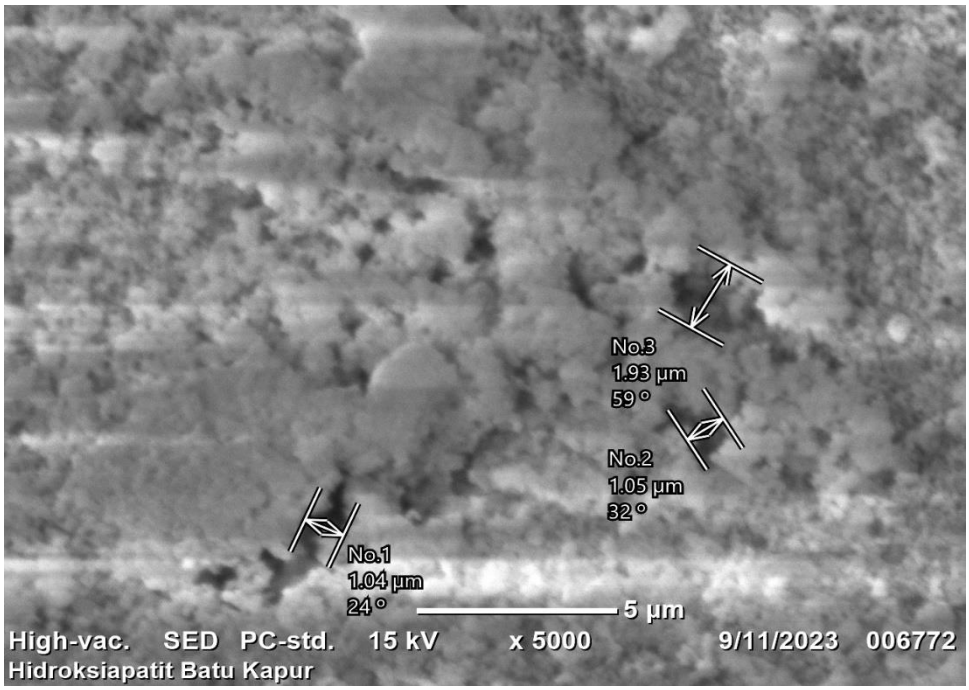
3. Karektrisasi SEM

a. Hidroksiapatit

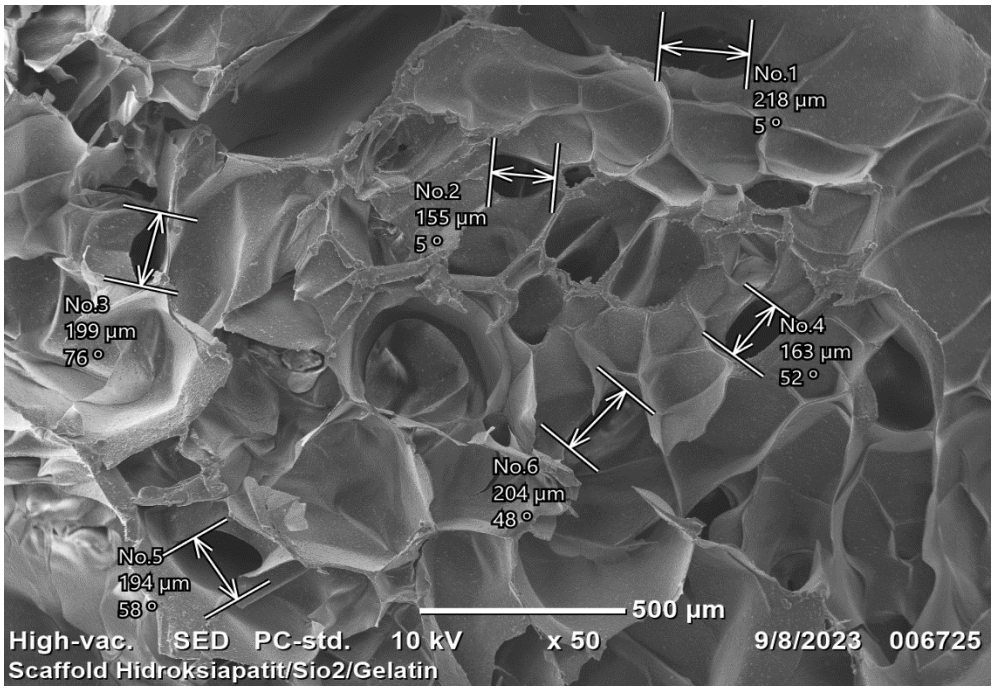


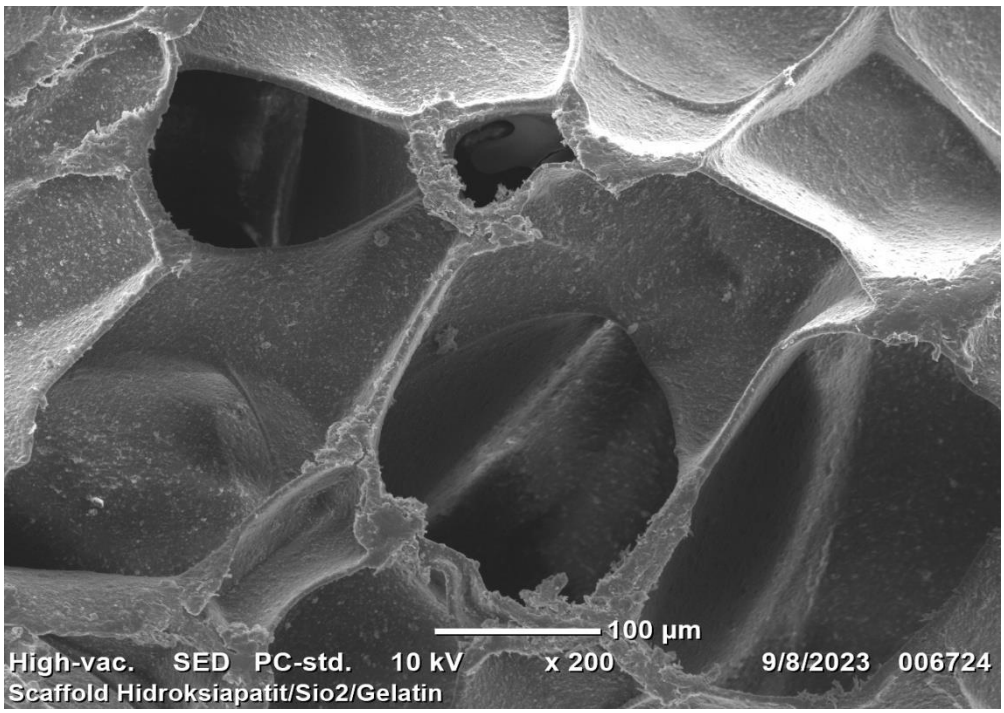


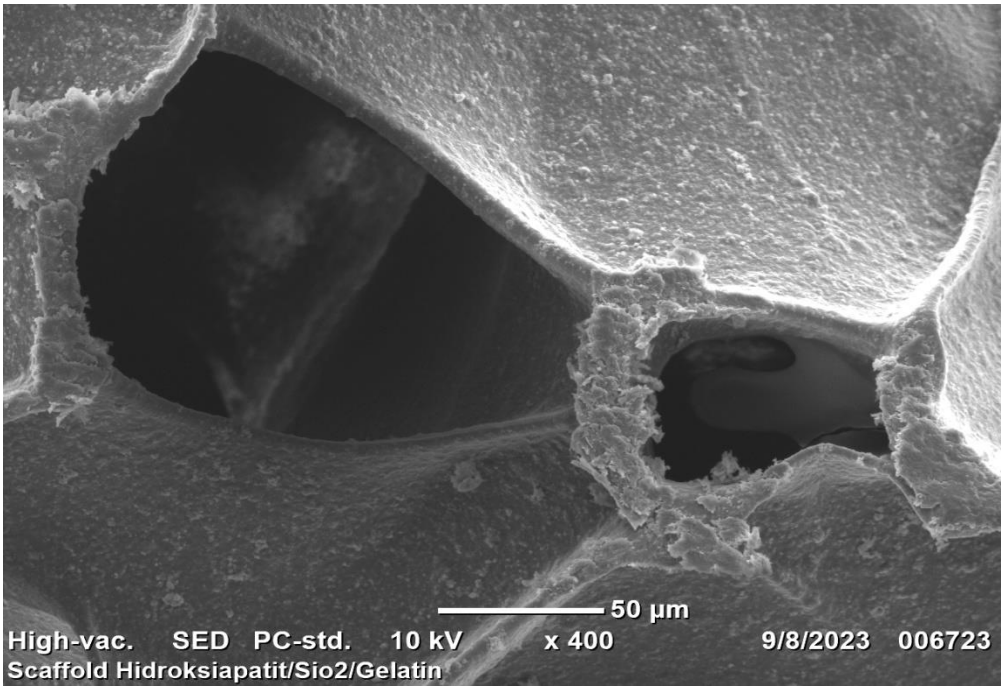

10 µm
High-vac. SED PC-std. 15 kV x 3000 9/11/2023 006773
Hidroksiapatit Batu Kapur

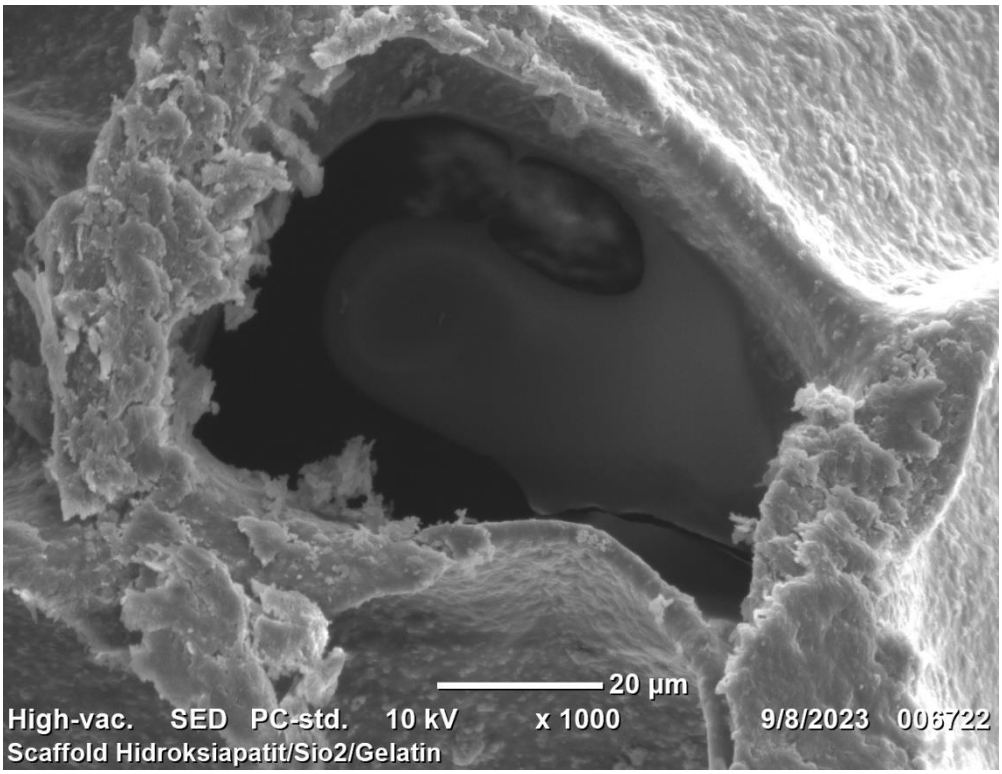

No.3
1.93 µm
59 °
No.2
1.05 µm
32 °
No.1
1.04 µm
24 °
5 µm
High-vac. SED PC-std. 15 kV x 5000 9/11/2023 006772
Hidroksiapatit Batu Kapur

b. Scaffold hidroksiapatit/SiO_2/gelatin






50 µm
High-vac. SED PC-std. 10 kV x 400 9/8/2023 006723
Scaffold Hidroksiapatit/Sio2/Gelatin


20 µm
High-vac. SED PC-std. 10 kV x 1000 9/8/2023 006722
Scaffold Hidroksiapatit/Sio2/Gelatin

4. Karakterisasi XRD
a. Hidroksiapatit

*** Basic Data Process ***

Group : Standard
Data : batu#kapur

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	16	31.8264	2.80946	100	0.65720	137	4462
2	15	31.0737	2.87578	77	0.41250	105	1898
3	17	32.8357	2.72537	62	0.48280	85	2207

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	10.3600	8.53188	4	0.04000	5	32
2	10.7600	8.21559	8	0.32000	11	230
3	13.5700	6.52001	7	0.38000	9	213
4	16.8733	5.25029	9	0.46670	12	277
5	20.1900	4.39466	4	0.10000	5	67
6	21.7500	4.08286	11	0.38000	15	304
7	22.7400	3.90730	7	0.36000	10	201
8	24.0200	3.70190	3	0.32000	4	108
9	25.7430	3.45790	48	0.41400	66	1484
10	26.4900	3.36206	11	0.38000	15	334
11	27.8275	3.20343	38	0.43500	52	1169
12	28.8500	3.09218	15	0.38000	20	382
13	29.6400	3.01153	9	0.32000	12	200
14	30.7000	2.90993	8	0.36000	11	329
15	31.0737	2.87578	77	0.41250	105	1898
16	31.8264	2.80946	100	0.65720	137	4462
17	32.8357	2.72537	62	0.48280	85	2207
18	33.9600	2.63767	23	0.44000	32	694
19	34.3800	2.60640	48	0.44000	66	1256
20	35.1200	2.55316	7	0.20000	10	129
21	35.6000	2.51983	9	0.40000	13	309
22	37.3750	2.40413	7	0.35000	9	166
23	37.8750	2.37354	4	0.27000	6	93
24	39.1500	2.29913	7	0.34000	10	184
25	39.7983	2.26315	32	0.42330	44	962
26	40.3800	2.23188	3	0.24000	4	94
27	41.1600	2.19137	11	0.32000	15	262
28	41.8350	2.15756	15	0.41000	21	489
29	43.6900	2.07016	13	0.42000	18	385
30	44.6900	2.02613	7	0.42000	9	189
31	45.2200	2.00361	7	0.44000	9	184
32	46.7775	1.94046	36	0.68500	50	1510
33	48.0650	1.89145	24	0.43000	33	641
34	48.4800	1.87622	15	0.36000	20	328
35	49.3820	1.84404	38	0.38800	52	998
36	50.4525	1.80739	18	0.36500	25	487
37	51.3350	1.77838	11	0.45000	15	390
38	52.0200	1.75656	12	0.28000	16	249
39	53.0666	1.72435	42	0.37330	58	1093
40	53.6700	1.70638	6	0.20000	8	83
41	54.5800	1.68006	4	0.12000	5	57
42	55.8400	1.64510	7	0.24000	9	164
43	56.9600	1.61539	6	0.36000	8	171
44	57.7100	1.59616	5	0.38000	7	208
45	59.7650	1.54610	18	0.43000	25	556
46	60.3900	1.53158	7	0.26000	9	157
47	61.5700	1.50503	10	0.42000	14	302
48	62.9450	1.47542	9	0.41000	12	256
49	63.8966	1.45572	13	0.59330	18	583

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
50	65.0300	1.43306	9	0.42000	13	342
51	66.3600	1.40753	9	0.36000	12	245
52	67.6400	1.38397	5	0.24000	7	137
53	69.6850	1.34828	3	0.21000	4	46
54	71.5200	1.31812	7	0.40000	9	282
55	73.8300	1.28249	7	0.38000	10	205

```
         ***  Basic Data Process  ***

# Data Infomation
          Group               : Standard
          Data                : batu#kapur
          Sample Nmae         : serbuk
          Comment             :
          Date & Time         : 10-28-22 14:39:46

# Measurement Condition
    X-ray tube
          target              : Cu
          voltage             : 40.0 (kV)
          current             : 30.0 (mA)
    Slits
          Auto Slit           : Used
          divergence slit     :   1.00000 (deg)
          scatter slit        :   1.00000 (deg)
          receiving slit      :   0.30000(mm)
    Scanning
          drive axis          : Theta-2Theta
          scan range          :   10.0000 - 75.0000 (deg)
          scan mode           : Continuous Scan
          scan speed          :    2.0000 (deg/min)
          sampling pitch      :    0.0200 (deg)
          preset time         :    0.60 (sec)

# Data Process Condition
    Smoothing                 [ AUTO ]
          smoothing points    : 33
    B.G.Subtruction           [ AUTO ]
          sampling points     : 37
          repeat times        : 30
    Ka1-a2 Separate           [ MANUAL ]
          Ka1 a2 ratio        : 50 (%)
    Peak Search               [ AUTO ]
          differential points : 35
          FWHM threhold       : 0.050 (deg)
          intensity threhold  : 30 (par mil)
          FWHM ratio  (n-1)/n : 2
    System error Correction   [ NO ]
    Precise peak Correction   [ NO ]
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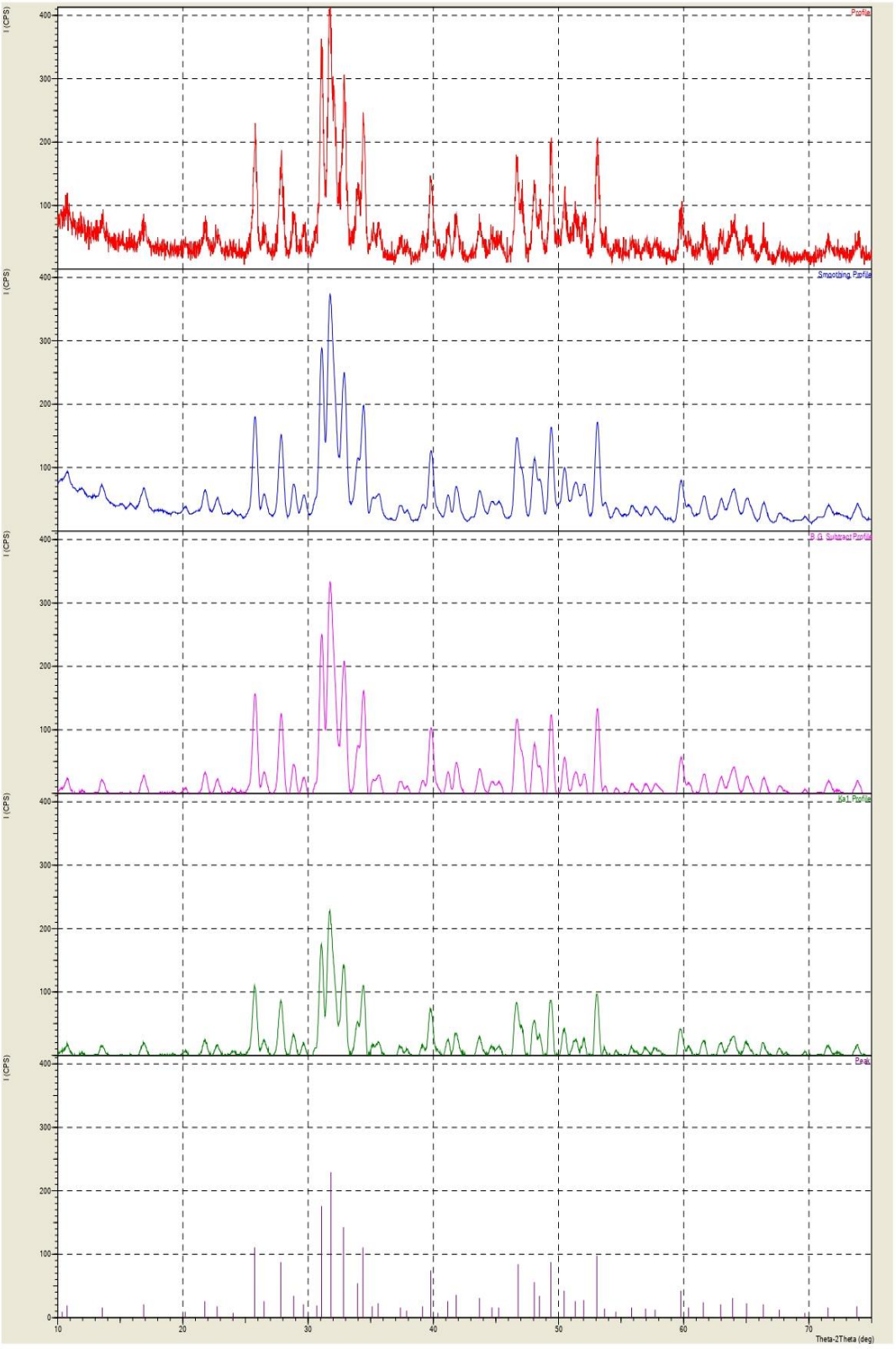
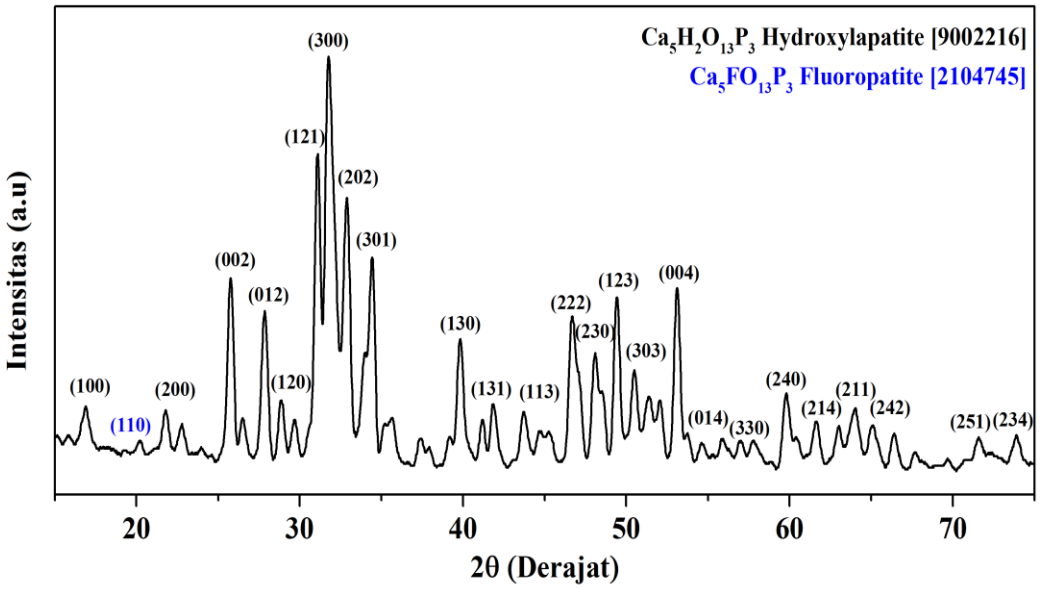
< Group: Standard Data: batu#kapur >




Ca5H2O13P3 Hydroxylapatite [9002216]
Ca5FO13P3 Fluoropatite [2104745]
Intensitas (a.u)
2θ (Derajat)
(100)
(110)
(200)
(002)
(012)
(120)
(300)
(121)
(202)
(301)
(130)
(131)
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(214)
(211)
(242)
(251)
(234)
20
30
40
50
60
70

b. Hidroksiapatit/SiO_2/gelatin

*** Basic Data Process ***

Group : Standard
Data : sh#sio2#g

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	14	32.2240	2.77570	100	0.69600	174	6111
2	15	33.2422	2.69297	60	0.46050	105	2610
3	38	64.3933	1.44569	51	0.41330	88	1884

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	17.3100	5.11880	5	0.26000	9	230
2	17.9950	4.92546	3	0.31000	6	129
3	18.5800	4.77168	3	0.08000	5	44
4	19.1450	4.63212	6	0.33000	11	248
5	19.7800	4.48482	5	0.40000	8	232
6	20.7250	4.28241	4	0.33000	7	199
7	21.4300	4.14309	4	0.22000	7	106
8	22.0700	4.02438	6	0.58000	11	365
9	23.2400	3.82435	8	0.52000	14	402
10	26.1600	3.40372	30	0.44000	53	1340
11	28.3900	3.14123	7	0.38000	12	267
12	29.5050	3.02501	17	0.79000	30	1102
13	31.3400	2.85195	3	0.28000	6	190
14	32.2240	2.77570	100	0.69600	174	6111
15	33.2422	2.69297	60	0.46050	105	2610
16	34.3600	2.60788	18	0.52000	32	945
17	35.7600	2.50892	6	0.32000	11	226
18	37.8100	2.37747	8	0.40000	14	317
19	39.6000	2.27403	9	0.52000	16	404
20	40.1225	2.24561	24	0.46500	42	991
21	42.3650	2.13179	8	0.33000	14	319
22	44.0437	2.05435	47	0.39250	81	1700
23	45.5150	1.99131	4	0.35000	7	167
24	47.0060	1.93156	30	0.46800	52	1427
25	47.8600	1.89907	4	0.00000	7	0
26	48.4100	1.87877	13	0.46000	23	539
27	48.8600	1.86251	6	0.52000	10	237
28	49.7446	1.83144	29	0.46270	50	1176
29	50.7750	1.79667	14	0.45000	25	560
30	51.5700	1.77082	10	0.42000	17	389
31	52.4000	1.74471	9	0.44000	15	377
32	53.4300	1.71348	16	0.42000	27	587
33	56.1800	1.63595	5	0.44000	9	207
34	57.4000	1.60404	4	0.36000	7	163
35	60.3400	1.53273	5	0.36000	9	248
36	61.8900	1.49801	8	0.34000	14	263
37	63.3400	1.46717	7	0.56000	13	440
38	64.3933	1.44569	51	0.41330	88	1884
39	65.3150	1.42750	8	0.45000	14	367

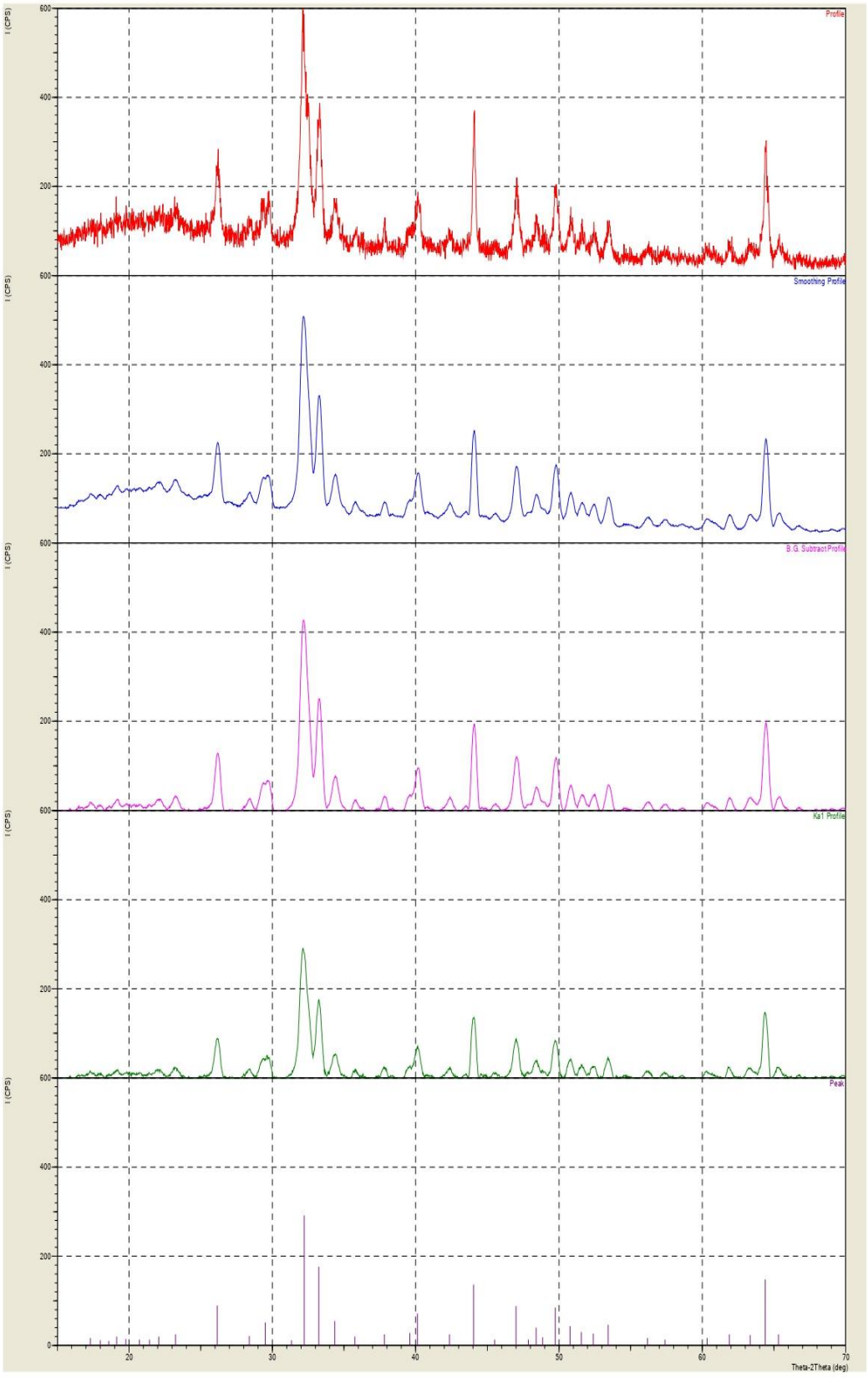
```
         ***  Basic Data Process  ***

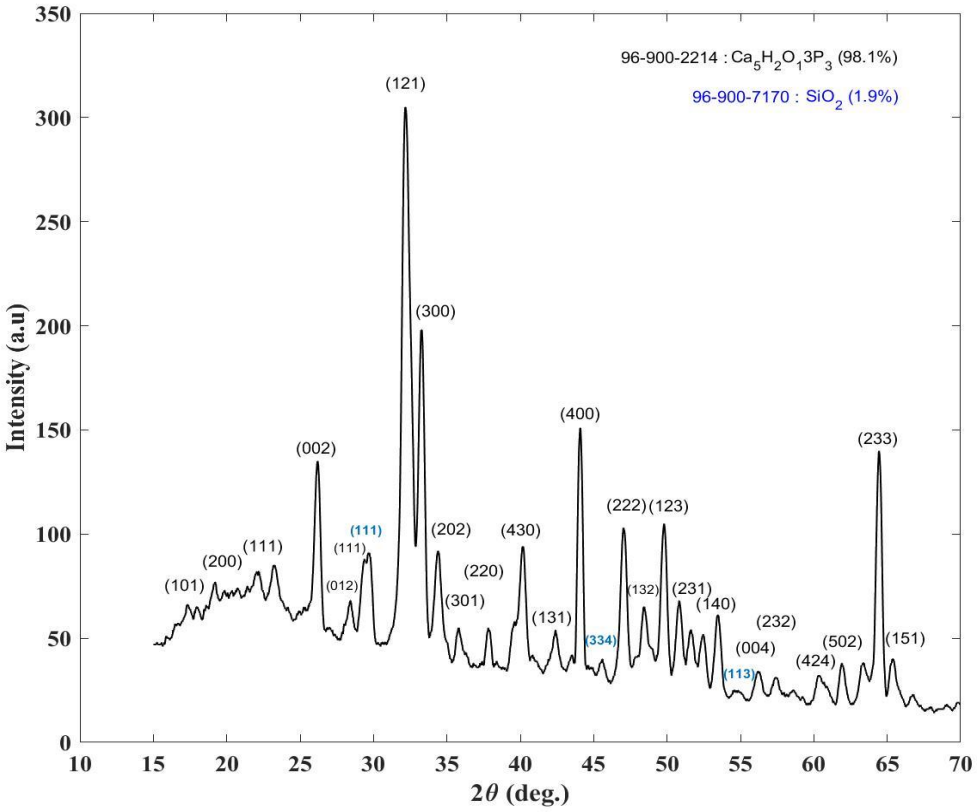
# Data Infomation
          Group               : Standard
          Data                : sh#sio2#g
          Sample Nmae         : pelet
          Comment             :
          Date & Time         : 09-02-23 09:01:58

# Measurement Condition
    X-ray tube
          target              : Cu
          voltage             : 40.0 (kV)
          current             : 30.0 (mA)
    Slits
          Auto Slit           : not Used
          divergence slit     :   1.00000 (deg)
          scatter slit        :   1.00000 (deg)
          receiving slit      :   0.30000(mm)
    Scanning
          drive axis          : Theta-2Theta
          scan range          :   15.0000 - 70.0000 (deg)
          scan mode           : Continuous Scan
          scan speed          :    2.0000 (deg/min)
          sampling pitch      :    0.0200 (deg)
          preset time         :    0.60 (sec)

# Data Process Condition
    Smoothing                 [ AUTO ]
          smoothing points    : 35
    B.G.Subtruction           [ AUTO ]
          sampling points     : 41
          repeat times        : 30
    Ka1-a2 Separate           [ MANUAL ]
          Ka1 a2 ratio        : 50 (%)
    Peak Search               [ AUTO ]
          differential points : 37
          FWHM threhold       : 0.050 (deg)
          intensity threhold  : 30 (par mil)
          FWHM ratio  (n-1)/n : 2
    System error Correction   [ NO ]
    Precise peak Correction   [ NO ]
```

< Group: Standard Data: sh#sio2#g >




96-900-2214 : Ca5H2O13P3 (98.1%)
96-900-7170 : SiO2 (1.9%)
Intensity (a.u)
2θ (deg.)
(101)
(200)
(111)
(002)
(012)
(111)
(111)
(121)
(300)
(202)
(301)
(220)
(430)
(131)
(400)
(334)
(222)
(123)
(132)
(231)
(140)
(004)
(232)
(424)
(502)
(233)
(151)
(113)

5. Uji mekanik

Kementerian Perindustrian
REPUBLIK INDONESIA

BADAN STANDARDISASI DAN KEBIJAKAN JASA INDUSTRI
LABORATORIUM PENGUJI BBSPJIHPMM
Jalan Prof. Dr. H. Abdurrahman Basalamah, MA No. 28 Makassar 90231
Telp: (0411) 441207 Fax: (0411) 441135 Website: www.bbihp.kemenperin.go.id E-mail.: bbihp@kemenperin.go.id

LAPORAN PENGUJIAN
Nomor : 2.6424/LU-BBSPJIHPMM/X/2023

Nomor Analisis	:	P. 6111
Tanggal Penerimaan	:	04 Oktober 2023
Nama Pelanggan	:	Indah Wahda
Alamat	:	Kimia, Matematika dan Ilmu Pengetahuan Alam, Universitas Hasanuddin
Nama Contoh	:	Scaffold
Keterangan Contoh	:	Kode 1474.2070.1, Scaffold Hidroksiapatit/SiO2/Gelatin, Keadaan Contoh Baik, Untuk Analisis Fisika
Pengambilan Contoh	:	-
Berita Acara	:	-
Tanggal Analisis	:	05 Oktober 2023
Tanggal Penerbitan	:	09 Oktober 2023

Setelah dilakukan pengujian, diperoleh hasil sebagai berikut :

Parameter	Satuan	Hasil	Metode Uji
Kuat Tekan	N/mm^2	1,71	IK-MT-28.01

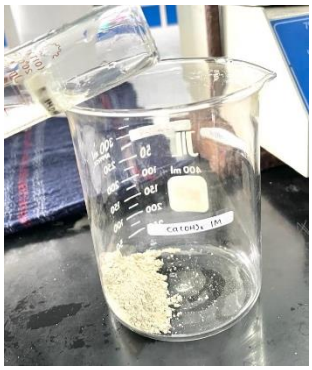
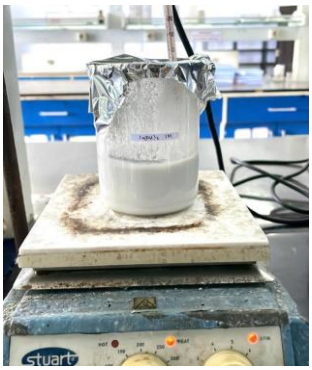
Koordinator Inspeksi Teknis, Pengujian dan Kalibrasi

MAMANG

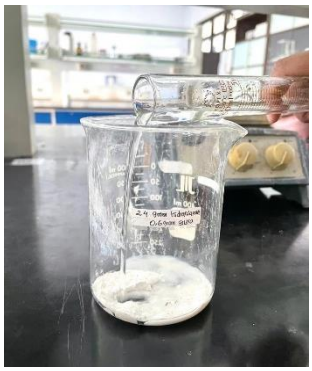
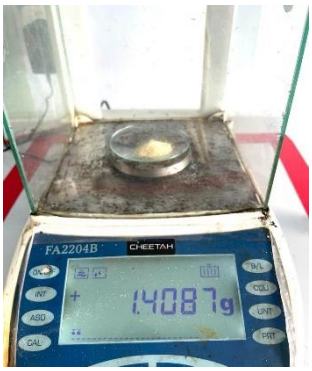
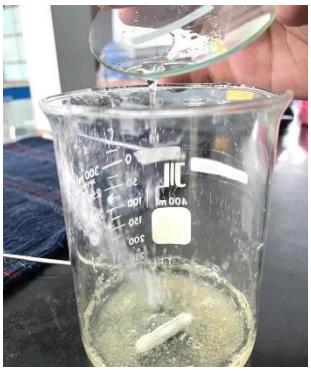
Catatan :
- *Hasil Uji hanya berlaku untuk contoh tersebut di atas*
- *Dilarang mengutip/menyalin sebagian isi hasil uji ini*

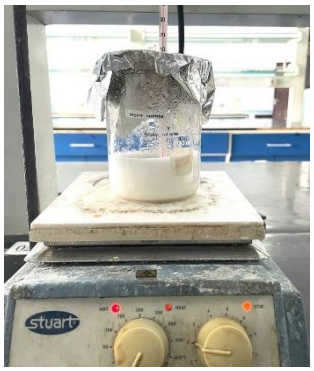
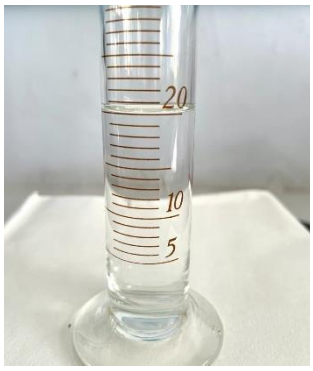
Halaman 1 dari 1

LAMPIRAN 3. Dokumentasi penelitian

 Sampel batu kapur	 Sampel batu kapur yang telah halus dioven	 Sampel batu sebelum kalsinasi
 Sampel batu dikalsinasi	 Sampel batu setelah kalsinasi (CaO)	 Penimbangan serbuk serbuk CaO
 Pelarutan serbuk CaO menjadi larutan $Ca(OH)_2$ 1M	 Pengadukan larutan $Ca(OH)_2$	 Titrasi larutan $Ca(OH)_2$ dengan larutan H_3PO_4

		
Pengukuran pH suspensi	Suspensi setelah diendapkan selama 24 jam	Endapan disaring
		
Endapan hasil penyaringan	Endapan yang telah dikeringkan dlakukan kalsinasi lebih lanjut	Sampel hasil kalsinasi digerus untuk analisis dan komposit
		
Serbuk hidroksiapatit yang diperoleh	Penimbangan serbuk hidroksiapatit untuk komposit	Penimbangan serbuk SiO_2 untuk komposit

 Pelarutan serbuk hidroksiapatit + SiO_2	 Pengadukan komposit hidroksiapatit + SiO_2	 Komposit hidroksiapatit/ SiO_2 disaring
 Hasil komposit hidroksiapatit/ SiO_2	 Penimbangan gelatin untuk scaffold komposit	 Pelarutan gelatin
 Pengadukan gelatin	 Penimbangan komposit hidroksiapatit/SiO_2	 Penambahan komposit hidroksiapatit/SiO_2 kedalam gelatin

 Pengadukan larutan komposit hidroksiapatit/SiO_2/gelatin	 komposit dicetak pada tabung dan dilakukan pembekuan dan pengeringan dengan menggunakan *freeze-dryer*	 Sampel hasil *freeze-dryer*
 Sampel hasil *freeze-dryer*	 Hasil scaffold hidroksiapatit/SiO_2/ Gelatin	 Persiapan larutan etanol untuk uji porositas (Va)
 Perendaman scaffold dengan larutan etanol (Vb)	 Scaffold telah jenuh dengan perendaman larutan etanol	 Sisa volume larutan etanol setelah scaffold dikeluarkan (Vc)