

BAB V

KESIMPULAN DAN SARAN

5.1 Kesimpulan

Berdasarkan hasil penelitian ini dapat disimpulkan bahwa :

1. Uji FTIR pada komposit hidroksiapatit-gelatin dengan variasi perendaman menurunkan transmitansi dari gugus fungsi pembentuk HA. Pada perendaman 15 hari didapat hasil bahwa nilai transmitansi gugus fungsi CO_3^{2-} dan PO_4^{3-} yaitu sebesar 18% dan 40% pada bilangan gelombang $1457,22 \text{ cm}^{-1}$ dan $1050,88 \text{ cm}^{-1}$.
2. Semakin lama waktu perendaman yaitu 15 hari dapat meningkatkan kristalinitas sebesar 89,75% didukung dengan peningkatan rasio Ca/P sebesar 1,59. Ukuran pori yang dihasilkan antara $170,3\mu\text{m}$ - $212,5\mu\text{m}$ yang sesuai dengan kandidat *bone graft*.
3. Hasil MTT Assay menunjukkan bahwa seluruh sampel tidak menyebabkan toksik dengan OD antara 86,14%-99,10%.

5.2 Saran

Berdasarkan hasil yang diperoleh pada penelitian ini, dapat disarankan bahwa perlu dilakukannya variasi komposisi hidroksiapatit pada komposit dan variasi waktu yang lebih lama untuk mendapatkan karakterisasi sampel yang “optimal”.

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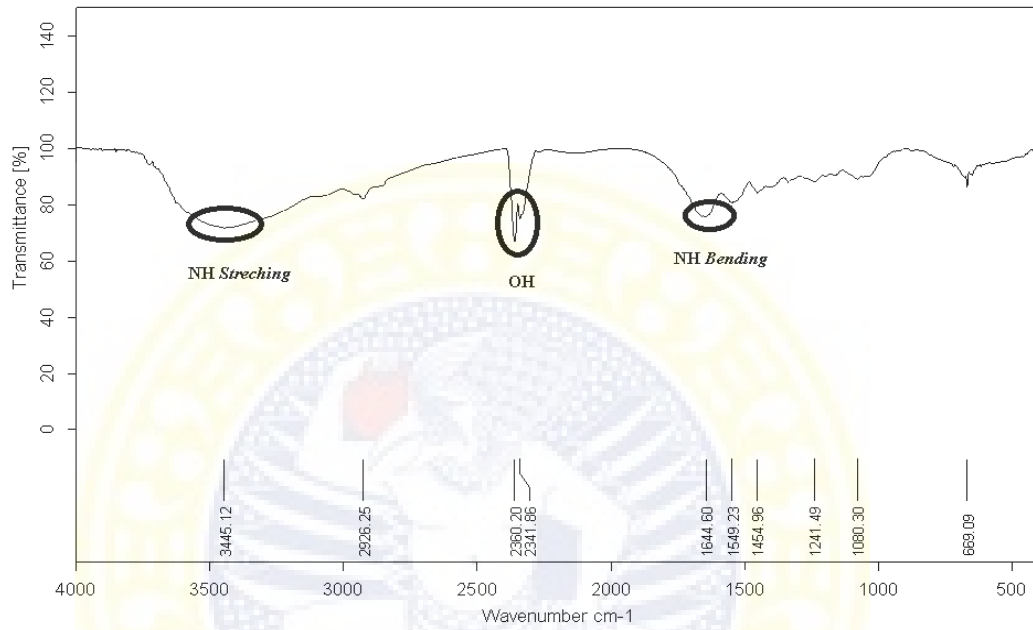
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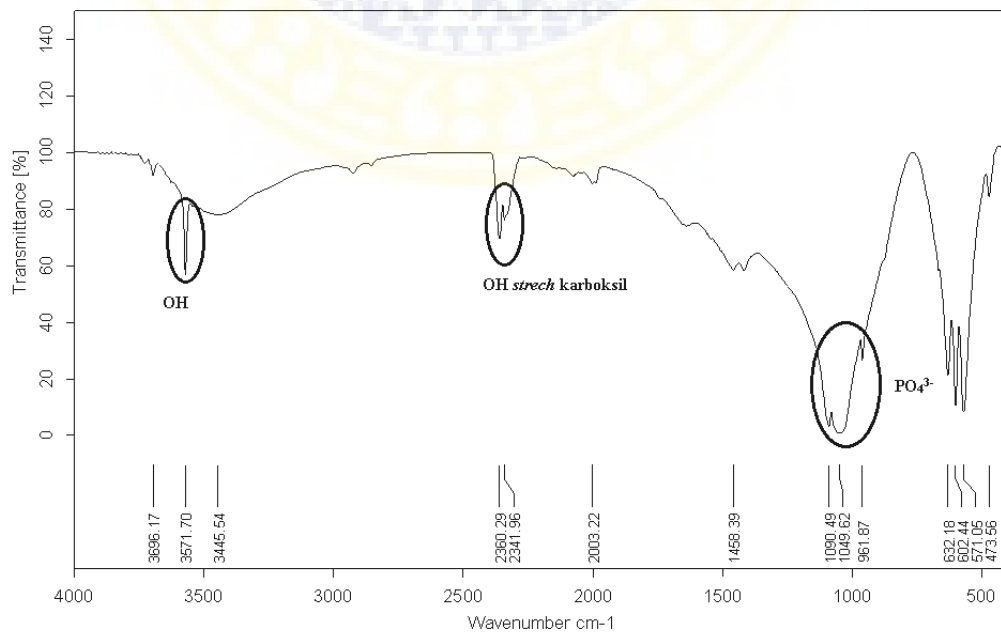


LAMPIRAN

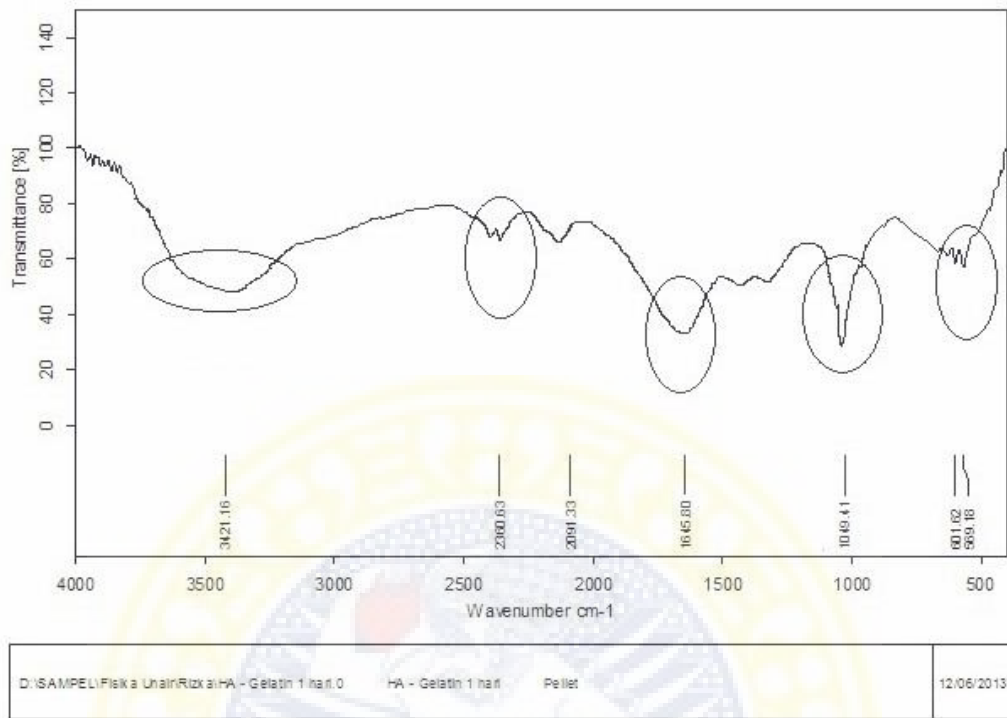
Lampiran 1. Hasil Pengujian FTIR Sampel Gelatin



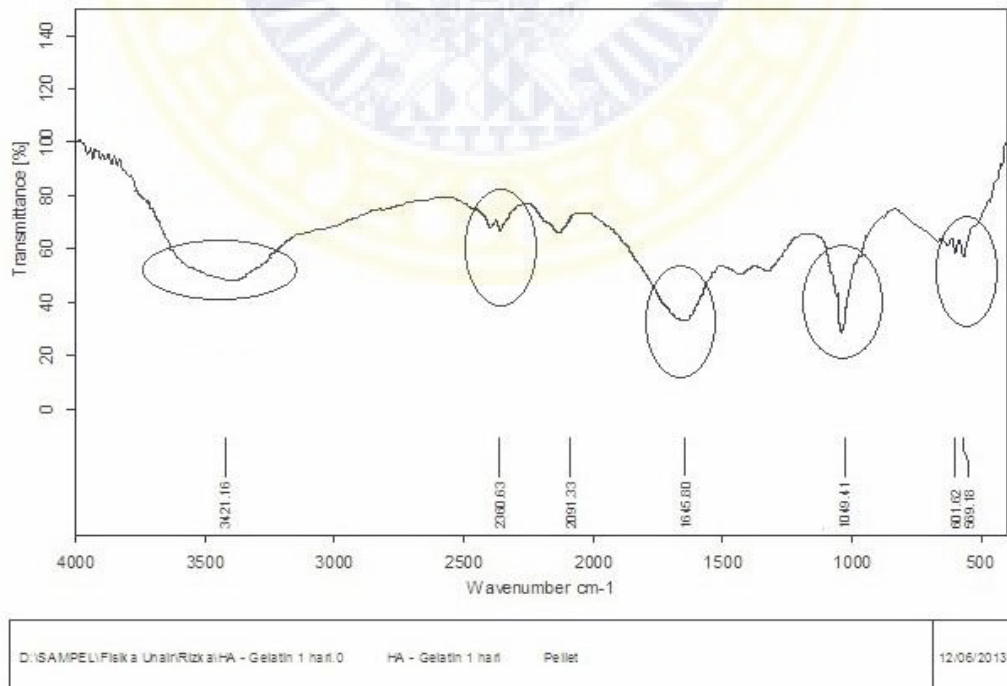
Lampiran 2. Hasil Pengujian FTIR Hidroksiapatit



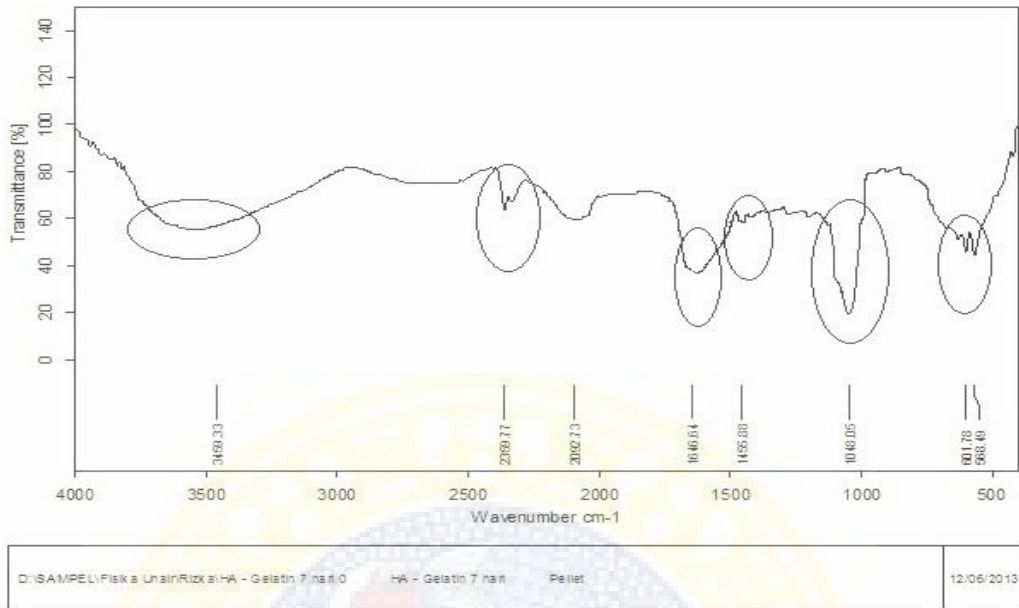
Lampiran 3. Hasil Pengujian FTIR Komposit Hidroksiapatit-gelatin sebelum perendaman



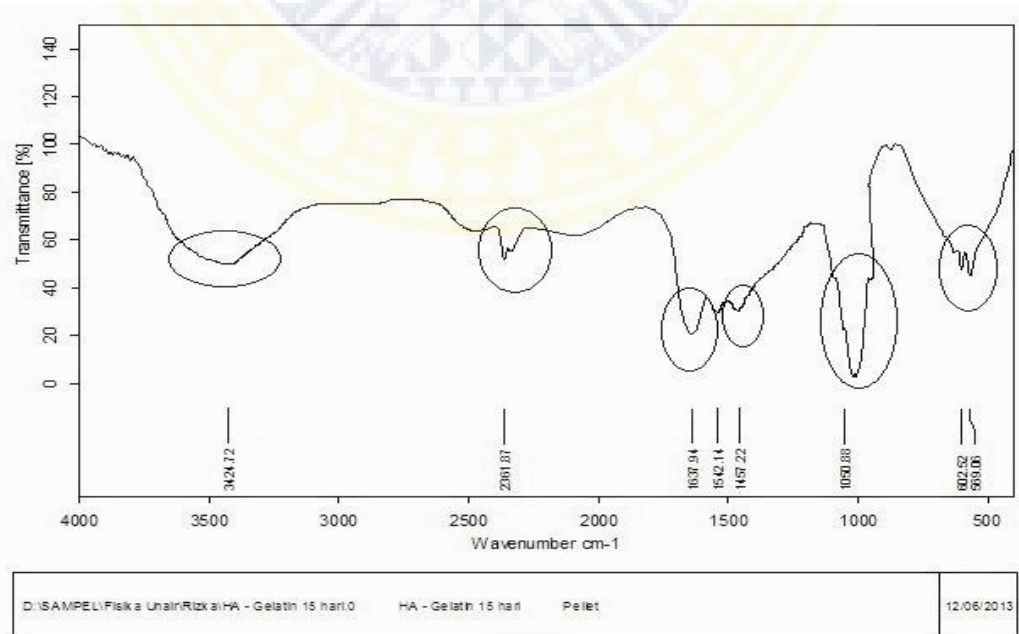
Lampiran 4. Hasil Pengujian FTIR Komposit Hidroksiapatit-gelatin perendaman 1 hari



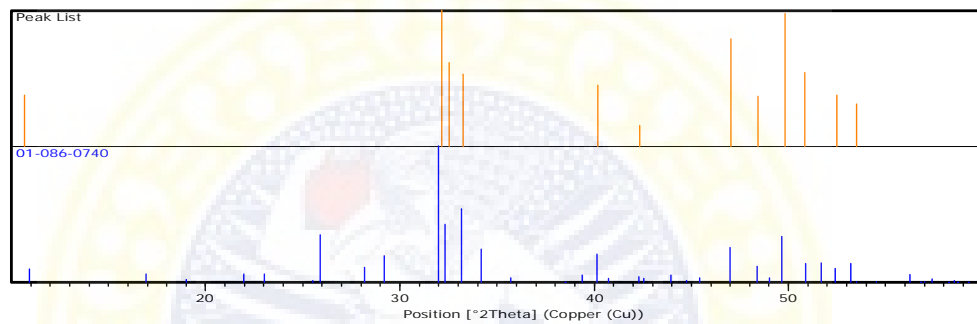
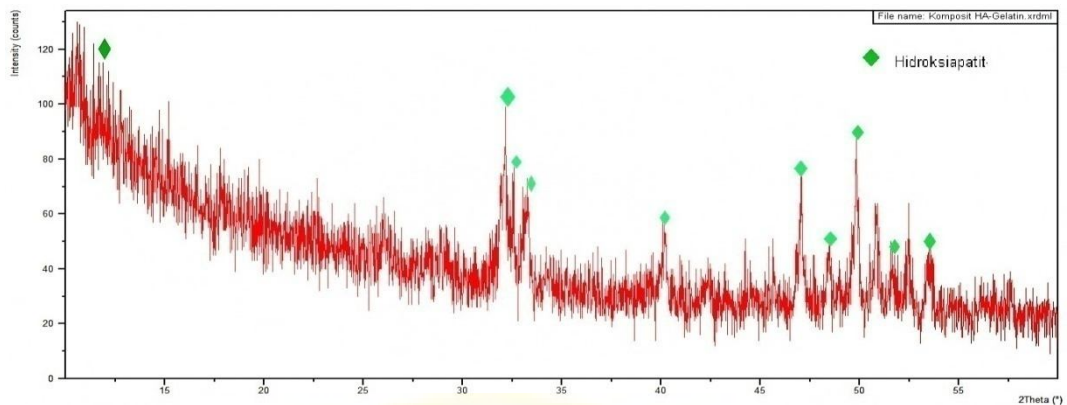
Lampiran 5. Hasil Pengujian FTIR Komposit Hidroksiapatit-gelatin perendaman 7 hari



Lampiran 6. Hasil Pengujian FTIR Komposit Hidroksiapatit-gelatin perendaman 15 hari

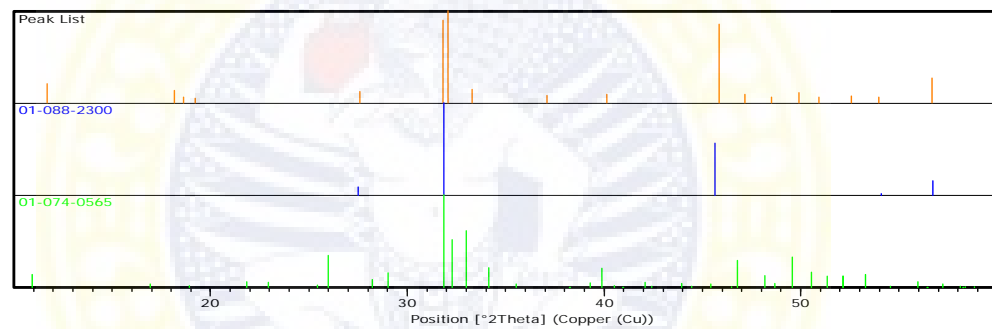
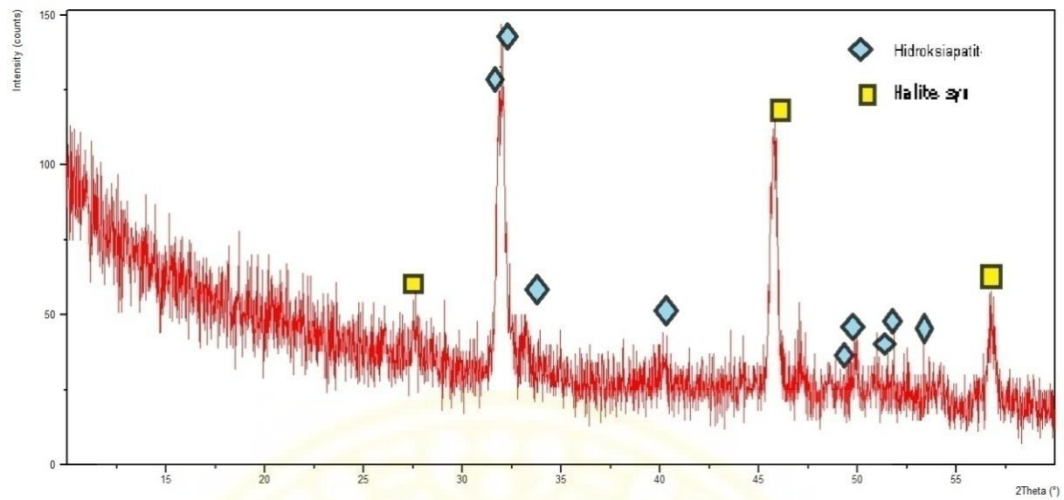


Lampiran 7. Hasil Search Match Hidroksiapatit Sampel Komposit Hidroksiapatit-Gelatin sebelum direndam



Pos. [°2Th.]	Height [cts]	FWHM Left [°2Th.]	d-spacing [Å]	Rel. Int. [%]
10.6965	20.25	0.4015	8.27103	37.65
32.1493	53.78	0.1004	2.78428	100.00
32.5555	33.11	0.1004	2.75046	61.56
33.2536	28.47	0.4015	2.69430	52.93
40.1823	24.03	0.2007	2.24426	44.68
42.3270	8.32	0.4015	2.13538	15.47
47.0530	42.28	0.1004	1.93134	78.61
48.4304	19.85	0.2007	1.87958	36.90
49.8193	52.38	0.1673	1.83038	97.39
50.8472	29.19	0.2007	1.79577	54.28
52.4722	20.26	0.2676	1.74392	37.67
53.5100	16.69	0.3346	1.71252	31.03

Lampiran 8. Hasil Search Match Hidroksiapatit Sampel Komposit Hidroksiapatit-Gelatin etelah direndam selama 1 hari

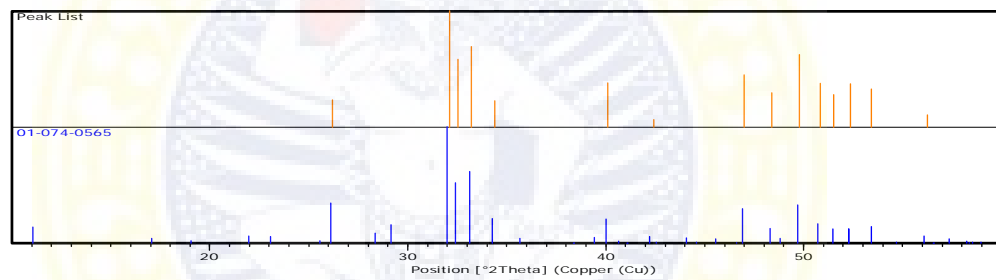
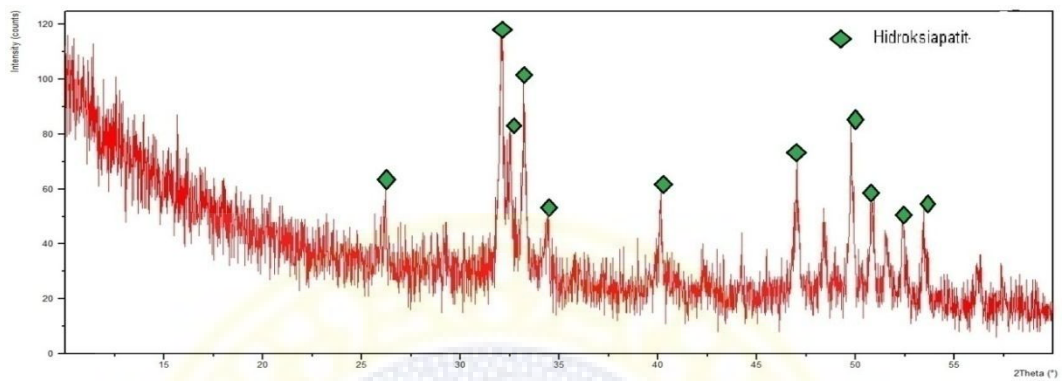


Peak List

Pos.[°2Th.]	Height [cts]	FWHMLeft[°2Th.]	d-spacing [Å]	Rel. Int. [%]
11.7105	19.70	0.0502	7.55707	21.11
18.1666	12.86	0.0669	4.88335	13.78
18.6447	5.94	0.1338	4.75921	6.36
19.2246	4.81	0.2676	4.61693	5.15
27.5759	11.43	0.2007	3.23476	12.25
31.8030	83.42	0.2007	2.81380	89.40
32.0643	93.31	0.0836	2.79146	100.00
33.2784	13.69	0.1673	2.69235	14.67
37.1052	7.48	0.0669	2.42300	8.02
40.1585	8.51	0.4015	2.24554	9.12
45.8336	79.74	0.2676	1.97984	85.46
47.1424	8.90	0.4015	1.92788	9.54
48.5082	5.82	0.4015	1.87675	6.24
49.9099	10.70	0.1673	1.82727	11.46
50.9395	6.05	0.3346	1.79273	6.48

52.5735	7.09	0.4015	1.74080	7.60
53.9718	6.15	0.5353	1.69896	6.59
56.6670	25.11	0.4015	1.62438	26.91

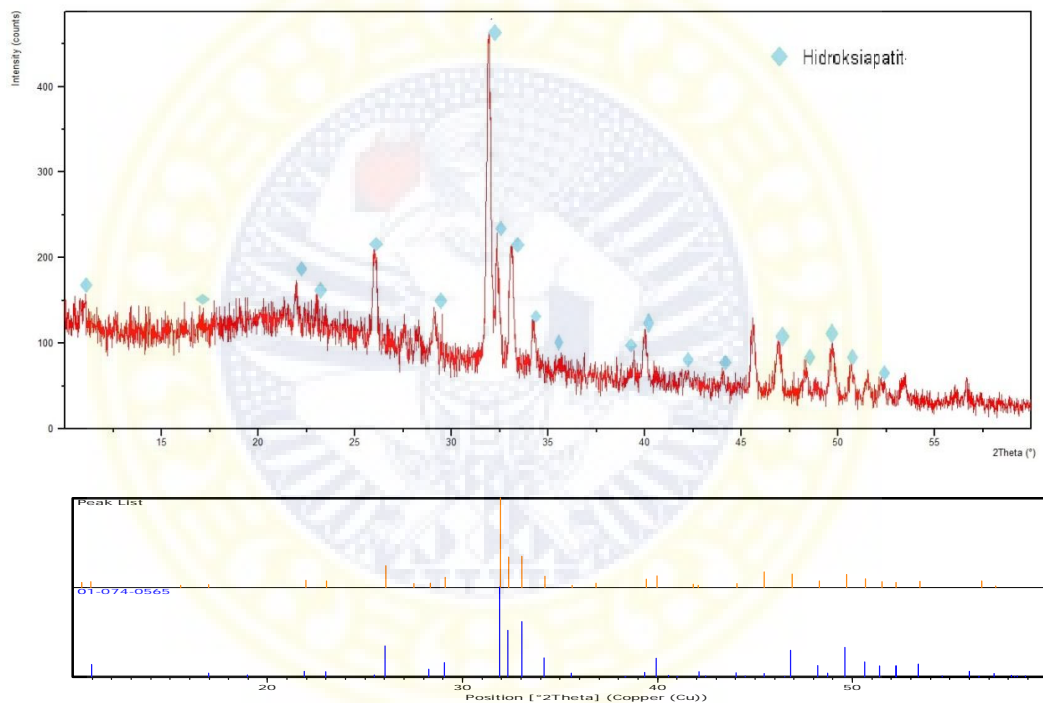
Lampiran 9. Hasil Search Match Hidroksiapatit Sampel Komposit Hidroksiapatit-Gelatin Setelah direndam selama 7 hari



Pos. [°2Th.]	Height [cts]	FWHM Left [°2Th.]	d-spacing [Å]	Rel. Int. [%]
26.1881	19.76	0.1004	3.40295	23.31
32.1190	84.78	0.1338	2.78683	100.00
32.5308	49.16	0.1004	2.75249	57.99
33.2249	58.48	0.1171	2.69656	68.97
34.3779	19.21	0.2007	2.60871	22.66
40.1213	32.30	0.1338	2.24753	38.10
42.4302	5.39	0.8029	2.13043	6.36
47.0078	38.18	0.2342	1.93309	45.03
48.3782	24.83	0.1673	1.88148	29.29

49.7637	52.73	0.1673	1.83230	62.20
50.8315	31.96	0.2007	1.79629	37.69
51.5233	23.58	0.1673	1.77378	27.81
52.3815	31.40	0.1004	1.74673	37.04
53.4114	27.59	0.1338	1.71545	32.54
56.2343	8.74	0.2676	1.63585	10.31

Lampiran 10. Hasil Search Match Hidroksiapatit Sampel Komposit Hidroksiapatit-Gelatin setelah direndam selama 15 hari



Peak List

Pos. [°2Th.]	Height [cts]	FWHMLeft [°2Th.]	d-spacing [Å]	Rel. Int. [%]
10.4882	21.76	0.1004	8.43485	5.53
10.9428	25.60	0.2676	8.08546	6.51
15.5580	9.07	0.1004	5.69576	2.30
16.9867	11.96	0.1004	5.21981	3.04
21.9633	31.14	0.1338	4.04702	7.91
23.0280	29.01	0.0669	3.86227	7.37
26.0679	94.76	0.2007	3.41836	24.08
27.5235	18.08	0.2007	3.24079	4.59
28.3453	19.57	0.1338	3.14868	4.97
29.0929	44.92	0.1338	3.06944	11.41
31.9349	393.57	0.1338	2.80248	100.00
32.3569	133.96	0.0836	2.76689	34.04

33.0515	136.70	0.1004	2.71031	34.73
34.2101	49.61	0.1673	2.62113	12.61
35.6062	9.52	0.4015	2.52149	2.42
36.8607	18.83	0.1004	2.43850	4.78
39.4371	36.57	0.0836	2.28493	9.29
39.9676	51.49	0.1673	2.25582	13.08
41.8506	14.27	0.1004	2.15858	3.63
42.0937	9.90	0.4015	2.14667	2.52
44.0842	16.80	0.2342	2.05425	4.27
45.4912	68.02	0.0612	1.99229	17.28
46.9241	58.23	0.1004	1.93634	14.80
48.3217	28.71	0.2007	1.88355	7.30
49.7095	57.79	0.2676	1.83417	14.68
50.6637	37.64	0.1338	1.80184	9.56
51.5126	25.66	0.1673	1.77413	6.52
52.2303	22.33	0.2007	1.75143	5.67
53.4578	27.07	0.1004	1.71407	6.88
56.6381	28.79	0.0816	1.62380	7.32
57.3348	5.93	0.2007	1.60704	1.51

Lampiran 11. Perhitungan Derajat Kristalinitas

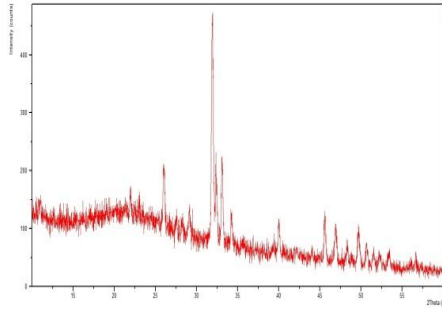
$$\text{Kristalinitas} = \frac{\text{Fraksi luas kristalin}}{\text{Fraksi luas kristalin} + \text{fraksi luas amorf}} \times 100\%$$

Keterangan :

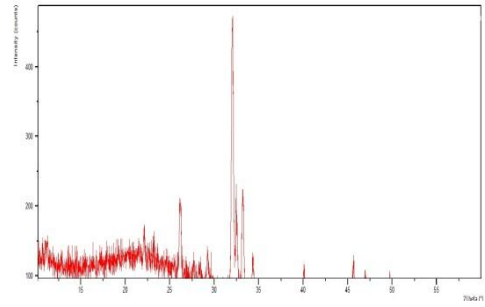
$$\text{Fraksi Luas Amorf} = \beta_{\text{amorf}} \times \text{Intensitas}$$

$$\text{Fraksi Luas Kristal} = \beta_{\text{kristal}} \times \text{Intensitas}$$

$$\beta = \frac{1}{2} \times (2\theta_2 - 2\theta_1)$$



(A) Background Amorf

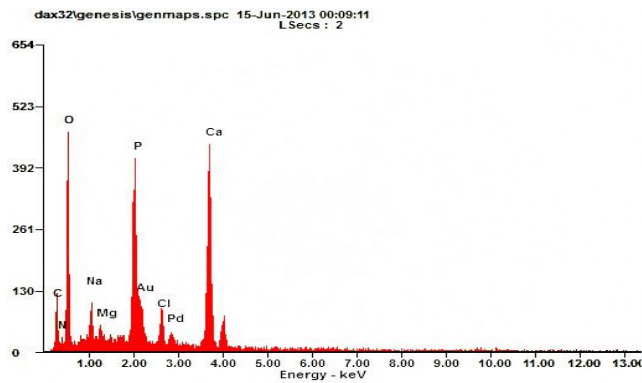


(B) Background Kristal

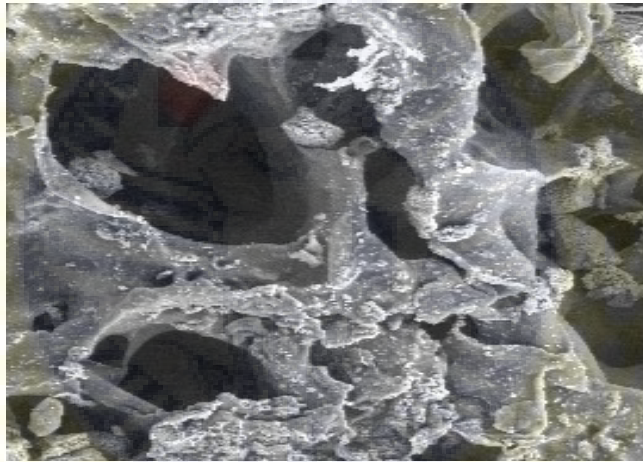
Penghilangan Background Amorf

Waktu Perendaman	Fraksi Luas Amorf	Fraksi Luas Kristal	Fraksi Luas Keseluruhan	Derajat Kristalinitas
0 hari	45,03	73,50	118,53	62,02%
1 hari	43,38	67,5	110,89	64,28%
7 hari	37,50	75,01	112,51	66,67%
15 hari	19,98	175,00	194,98	89,75%

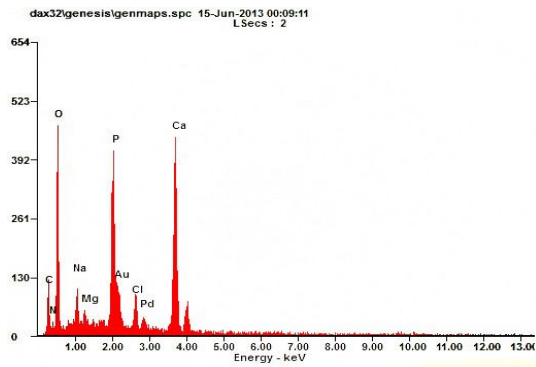
LAMPIRAN 13. Hasil SEM EDX sampel Hidroksiapatit-gelatin sebelum perendaman



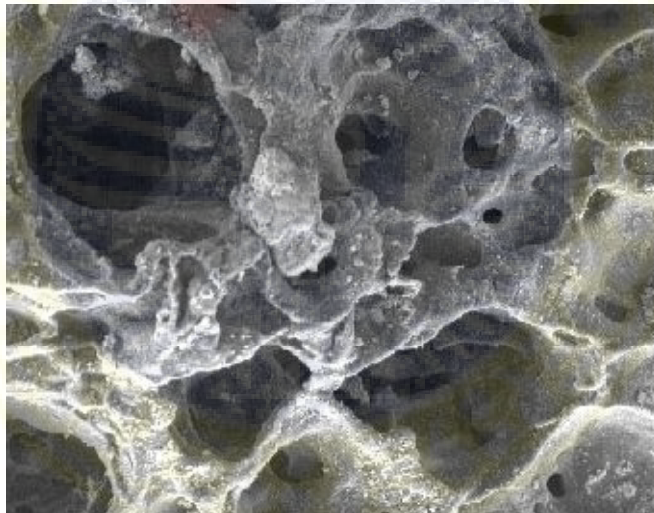
<i>Element</i>	<i>Wt%</i>
<i>CK</i>	14.92
<i>NK</i>	03.71
<i>OK</i>	42.40
<i>NaK</i>	03.95
<i>MgK</i>	01.17
<i>PK</i>	11.15
<i>AuM</i>	05.24
<i>ClK</i>	01.76
<i>PdL</i>	01.34
<i>CaK</i>	14.35
<i>Matrix</i>	Correction



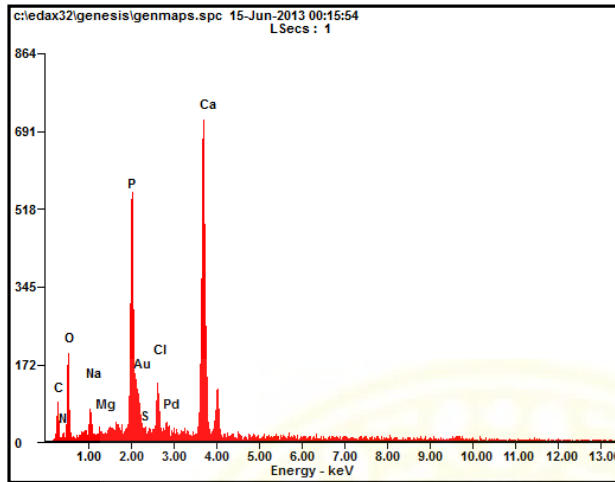
LAMPIRAN 13. Hasil SEM EDX sampel Hidroksiapatit-gelatin setelah perendaman selama 1 hari



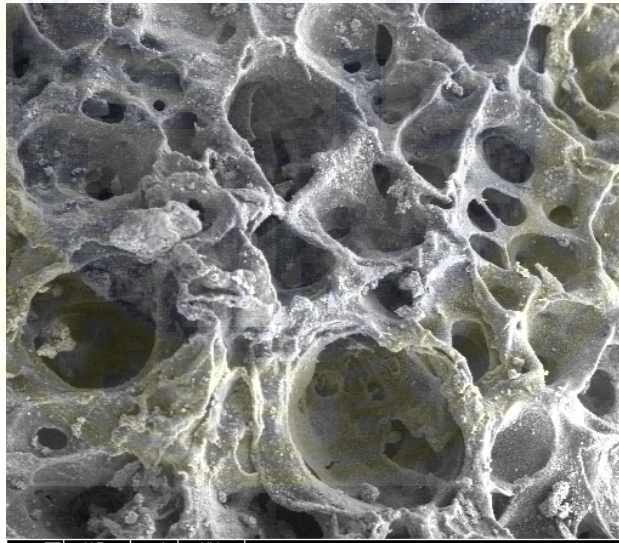
<i>Element</i>	<i>Wt%</i>
<i>CK</i>	24.67
<i>NK</i>	05.73
<i>OK</i>	37.04
<i>NaK</i>	04.52
<i>MgK</i>	00.22
<i>PK</i>	08.93
<i>SK</i>	00.38
<i>ClK</i>	03.55
<i>PdL</i>	01.68
<i>CaK</i>	13.28
<i>Matrix</i>	Correction



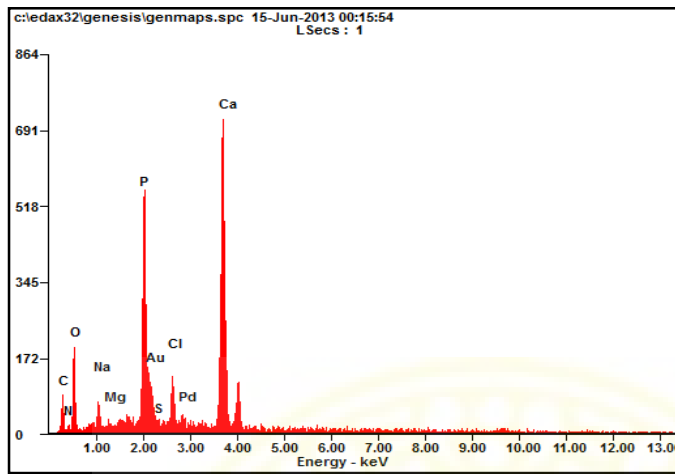
LAMPIRAN 14. Hasil SEM EDX sampel Hidroksiapatit-gelatin setelah perendaman selama 7 hari



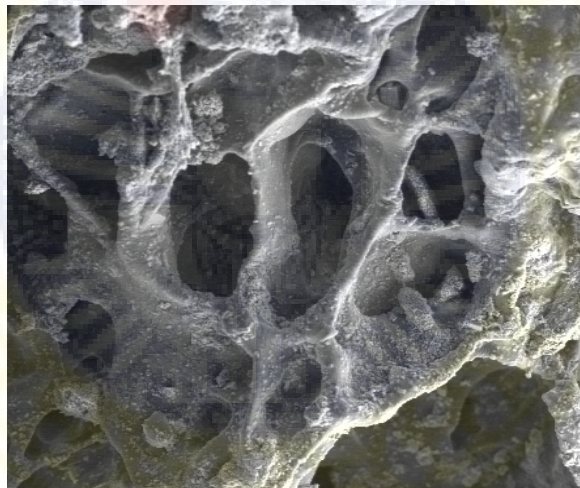
<i>Element</i>	<i>Wt%</i>
<i>CK</i>	14.42
<i>NK</i>	04.42
<i>OK</i>	26.04
<i>NaK</i>	03.05
<i>MgK</i>	00.34
<i>PK</i>	16,77
<i>AuM</i>	03.68
<i>SK</i>	00.30
<i>ClK</i>	03.27
<i>PdL</i>	02.05
<i>CaK</i>	25.66
<i>Matrix</i>	Correction



LAMPIRAN 15. Hasil SEM EDX sampel Hidroksiapatit-gelatin setelah perendaman selama 15 hari



<i>Element</i>	<i>Wt%</i>
<i>CK</i>	14.38
<i>NK</i>	04.43
<i>OK</i>	26.98
<i>NaK</i>	03.06
<i>MgK</i>	00.34
<i>PK</i>	13.00
<i>AuM</i>	06.72
<i>ClK</i>	03.28
<i>PdL</i>	02.05
<i>CaK</i>	25.75
<i>Matrix</i>	Correction



Lampiran 16. Hasil uji MTT Assay

Tabel Lampiran. Viabilitas sel dari uji MTT Assay

	OD kontrol		OD Perlakuan			
	Sel	Media	S0	S2	S3	S4
	0,323	0,137	0,281	0,218	0,245	0,35
	0,259	0,123	0,222	0,109	0,300	0,261
	0,330	0,149	0,280	0,297	0,310	0,30
	0,327	0,154	0,342	0,363	0,325	0,311
Rata-rata OD	0,309	0,140	0,281	0,246	0,295	0,305
Viabilitas Sel (%)			93,76%	86,14%	96,88%	99,10%

Rata-rata nilai absorbansi dihitung dengan :

$$\langle OD \rangle = \frac{\sum OD_i}{n}$$

$$\langle OD \rangle = \frac{OD_1 + OD_2 + \dots + OD_n}{n}$$

Viabilitas sel dihitung dengan :

$$\text{Viabilitas Sel (\% dari kontrol)} = \frac{\text{Nilai absorbansi kelompok perlakuan}}{\text{Nilai absorbansi kelompok kontrol}}$$

$$\text{Viabilitas Sel (\% dari kontrol)} = \frac{OD \text{ Perlakuan} + OD \text{ Kontrol Media}}{OD \text{ Kontrol sel} + OD \text{ Kontrol Media}}$$

