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## LAMPIRAN

### Lampiran 1. Dokumentasi Proses Penelitian

#### A. Preparasi sampel



Tulang sapi dibersihkan



Tulang sapi dihancurkan menjadi seroihan kecil



Tulang sapi direbus selama 1 jam



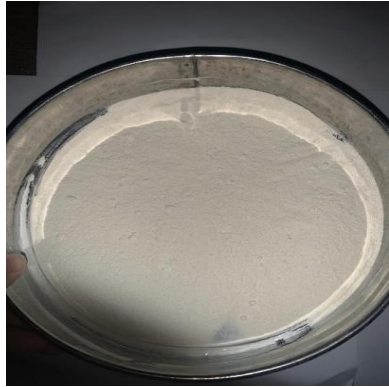
Tulang sapi direndam dengan aseton 1L selama 2 jam



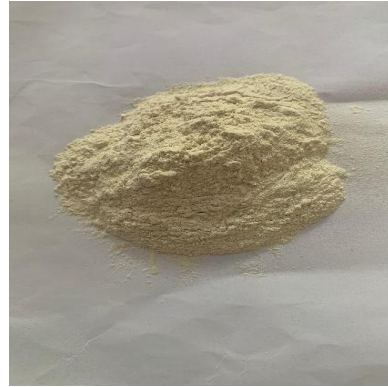
Tulang sapi dikeringkan dalam oven dengan suhu 120°



Tulang dihaluskan menggunakan blender



Serbuk tulang diayak menggunakan ayakan 200



$\text{CaCO}_3$



kalsinasi  $\text{CaCO}_3$  selama 4 jam dengan suhu  $900^\circ\text{C}$

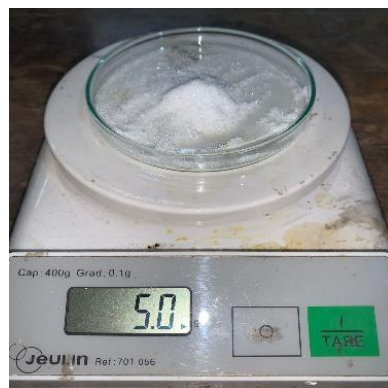


$\text{CaO}$

## B. Pembuatan Hidroksiapatit (HAp)



23.4 gr  $\text{CaO}$



5 gr  $(\text{NH}_4)_2\text{HPO}_4$





CaO + (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> di *Ball milling*  
Selama 3 jam



Kalsinasi suhu 700°C selama  
4 jam



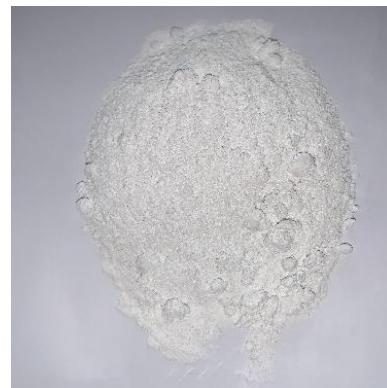
Kalsinasi suhu 800°C selama  
4 jam



Kalsinasi suhu 900°C selama  
4 jam



HAp digerus



Hidroksiapatit (HAp)

## Lampiran 2. Analisis Data X-Ray Diffraction (XRD)

**Tabel 1.** Analisis data XRD untuk kristal HAp tanpa sintering

<b>2θ (deg)</b>	<b>θ (deg)</b>	<b>θ (rad)</b>	<b>Cos θ</b>	<b>K</b>	<b>λ</b>	<b>FWHM (deg)</b>	<b>FWHM (rad)</b>	<b>D (nm)</b>
23.36	11.68	0.204	0.9793	0.9	0.15406	0.153	0.0027	53.0009
25.57	12.79	0.223	0.9752	0.9	0.15406	0.2211	0.0039	36.8301
28.75	14.38	0.251	0.9687	0.9	0.15406	0.1942	0.0034	42.214
31.47	15.74	0.275	0.9625	0.9	0.15406	0.2204	0.0038	37.4343
31.88	15.94	0.278	0.9615	0.9	0.15406	0.2093	0.0037	39.4596
32.6	16.3	0.285	0.9598	0.9	0.15406	0.2041	0.0036	40.5386
33.75	16.88	0.295	0.9569	0.9	0.15406	0.2029	0.0035	40.9005
39.51	19.76	0.345	0.9411	0.9	0.15406	0.2107	0.0037	40.0479
<b>Rata-rata</b>						<b>0.202</b>	<b>0.0035</b>	<b>41.3033</b>

**Tabel 2.** Analisis data XRD untuk kristal HAp pada suhu sintering 700°C

<b>2θ (deg)</b>	<b>θ (deg)</b>	<b>θ (rad)</b>	<b>Cos θ</b>	<b>K</b>	<b>λ</b>	<b>FWHM (deg)</b>	<b>FWHM (rad)</b>	<b>D (nm)</b>
25.8	12.9	0.225	0.9747	0.9	0.15406	0.44	0.0077	18.5156
26.67	13.34	0.233	0.973	0.9	0.15406	0.54	0.0094	15.1135
27.74	13.87	0.242	0.9708	0.9	0.15406	0.6333	0.0111	12.9161
28.83	14.42	0.252	0.9685	0.9	0.15406	0.4066	0.0071	20.1658
29.61	14.81	0.259	0.9668	0.9	0.15406	0.648	0.0113	12.6759
31.8	15.9	0.278	0.9617	0.9	0.15406	0.7833	0.0137	10.5416
32.72	16.36	0.286	0.9595	0.9	0.15406	0.53	0.0093	15.616
34.62	17.31	0.302	0.9547	0.9	0.15406	0.48	0.0084	17.3294
35.25	17.63	0.308	0.953	0.9	0.15406	0.45	0.0079	18.5168
39.73	19.87	0.347	0.9404	0.9	0.15406	0.5083	0.0089	16.6121
<b>Rata-rata</b>						<b>0.542</b>	<b>0.0095</b>	<b>15.8003</b>

**Tabel 3.** Analisis data XRD untuk kristal HAp pada suhu sintering 800°C

<b>2θ (deg)</b>	<b>θ (deg)</b>	<b>θ (rad)</b>	<b>Cos θ</b>	<b>K</b>	<b>λ</b>	<b>FWHM (deg)</b>	<b>FWHM (rad)</b>	<b>D (nm)</b>
25.8	12.9	0.225	0.9747	0.9	0.15406	0.305	0.0053	26.7111
26.67	13.34	0.233	0.973	0.9	0.15406	0.4547	0.0079	17.9488
27.76	13.88	0.242	0.9708	0.9	0.15406	0.3886	0.0068	21.0503
28.76	14.38	0.251	0.9686	0.9	0.15406	0.2511	0.0044	32.6489
29.41	14.71	0.257	0.9672	0.9	0.15406	0.3062	0.0053	26.8133
31.09	15.55	0.271	0.9634	0.9	0.15406	0.3096	0.0054	26.6242
31.63	15.82	0.276	0.9621	0.9	0.15406	0.2643	0.0046	31.2288

32.72	16.36	0.286	0.9595	0.9	0.15406	0.27	0.0047	30.6536
34.41	17.21	0.3	0.9552	0.9	0.15406	0.2805	0.0049	29.6378
35.25	17.63	0.308	0.953	0.9	0.15406	0.254	0.0044	32.8053
37.38	18.69	0.326	0.9472	0.9	0.15406	0.3	0.0052	27.9451
39.66	19.83	0.346	0.9407	0.9	0.15406	0.28	0.0049	30.1503
<b>Rata-rata</b>						<b>0.3053</b>	<b>0.0053</b>	<b>27.8515</b>

**Tabel 4.** Analisis data XRD untuk kristal HAp pada suhu sintering 900°C

2 $\theta$ (deg)	$\theta$ (deg)	$\theta$ (rad)	Cos $\theta$	K	$\lambda$	FWHM (deg)	FWHM (rad)	D (nm)
25.76	12.88	0.225	0.9748	0.9	0.15406	0.305	0.0053	26.7089
26.67	13.34	0.233	0.973	0.9	0.15406	0.4547	0.0079	17.9488
27.76	13.88	0.242	0.9708	0.9	0.15406	0.3886	0.0068	21.0503
28.81	14.41	0.252	0.9685	0.9	0.15406	0.2511	0.0044	32.6526
29.55	14.78	0.258	0.9669	0.9	0.15406	0.3062	0.0053	26.8219
31.09	15.55	0.271	0.9634	0.9	0.15406	0.3096	0.0054	26.6242
32.49	16.25	0.284	0.96	0.9	0.15406	0.2066	0.0036	40.0368
34.43	17.22	0.301	0.9552	0.9	0.15406	0.2805	0.0049	29.6394
35.25	17.63	0.308	0.953	0.9	0.15406	0.254	0.0044	32.8053
37.38	18.69	0.326	0.9472	0.9	0.15406	0.3	0.0052	27.9451
39.8	19.9	0.347	0.9402	0.9	0.15406	0.28	0.0049	30.1636
<b>Rata-rata</b>						<b>0.3033</b>	<b>0.0052</b>	<b>28.3997</b>

**Lampiran 3.** Gambar hasil spektrum FTIR

