

LAMPIRAN

1. Persiapan Alat dan Bahan

A



B



C



D.



E.



F.



G.



H.



Keterangan A. Cetakan specimen, B. Serbuk Iron Powder, C. Serbuk Arang Batok Kelapa Carbon, D. Zinc Stearat, E.alat timbang digital F. Gelas wadah serbuk, G. sendok serbuk specimen, H. stop watch

2. Pembuatan Spesimen

A



B



C



D



E



F



G



Keterangan A. Menimbang serbuk Iron Powder, **B.** Menimbang serbuk Arang Batok Kelapa Carbon, **C.** Menimbang Zinc Stearat, **D.** Penuangan serbuk spesimen paduan, **E.** Proses penekanan kompaksi, **F.** proses kompaksi selesai spesimen dengan waktu tahan 10 menit, **G.** Penimbangan hasil spesimen setelah dikompaksi

3. Proses Sintering

A

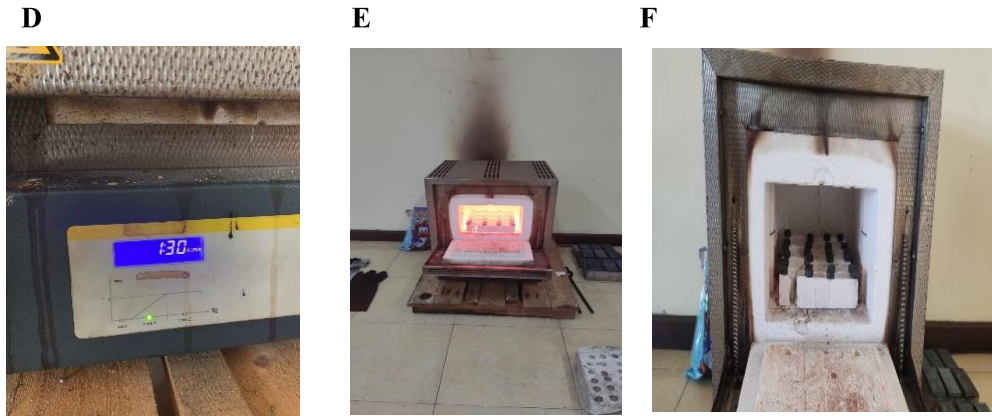


B



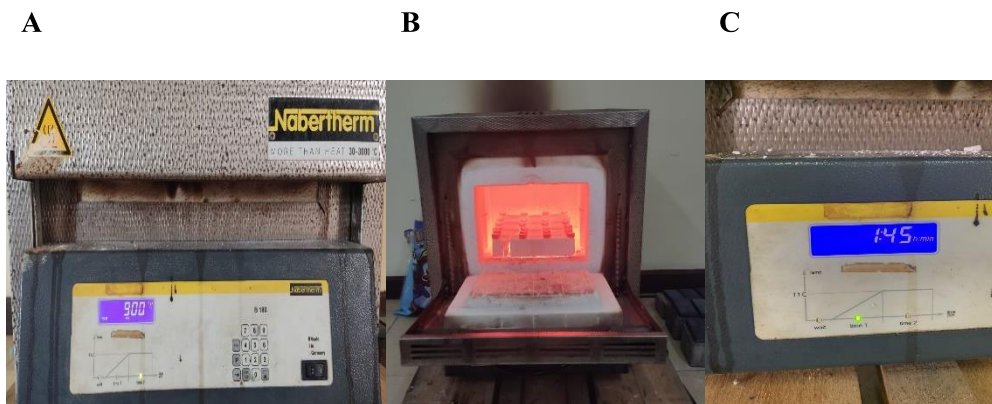
C





Keterangan A. Mesin furnace, **B.** Penataan spesimen untuk proses sintering, **C.** Mengatur temperature pada furnace, **D.** Waktu tahan temperature sinter, **E.** Spesimen setelah disinter, **F.** Proses pendinginan normalizing.

4. Proses Penuaan Spesimen



Keterangan **A.** Mengatur temperature untuk penuaan spesimen, **B.** Proses penuaan spesimen, **C.** Waktu tahan temperature sinter

5. Proses Pengujian Densitas

A



B



Keterangan A. Pengukuran ukuran spesimen serta pengambilan data tinggi spesimen, **B.** Penimbangan berat massa spesimen untuk pengambilan data

6. Proses pengujian Kekerasan Vickers

A



B



C



Keterangan A. Alat uji kekerasan vickers, **B.** Mengatur indenter load 100gf,menempatkan spesimen dan mendata uji kekerasan Vickers **C.** Hasil nilai data pada uji vickers.

1. Data hasil pengujian XRD Serbuk Besi (*Iron*)

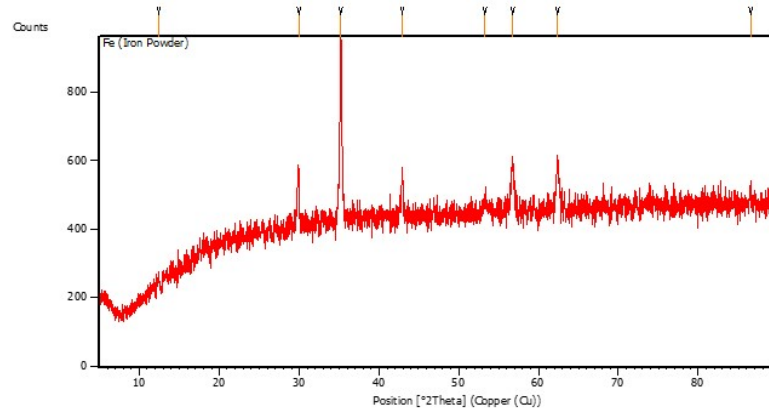
This is the simple example template containing only headers for each report item and the bookmarks. The invisible bookmarks are indicated by text between brackets. Modify it according to your own needs and standards.

Measurement Conditions: (Bookmark 1)

Dataset Name	Fe (Iron Powder)
File name	E:\DATA PENGUJIAN-XRD\Pengujian 2023\April\Nugraha\Fe (Iron Powder)\Fe (Iron Powder) rd
Comment	Configuration=Reflection-Transmission Sp Goniometer=PW3050/60 (Theta/Theta); Mini
Measurement Date / Time	4/25/2023 1:31:00 PM
Raw Data Origin	PHILIPS-binary (scan) (RD)
Scan Axis	Gonio
Start Position [°2Th.]	5.0084
End Position [°2Th.]	89.9744
Step Size [°2Th.]	0.0170
Scan Step Time [s]	10.1500
Scan Type	Continuous
Offset [°2Th.]	0.0000
Divergence Slit Type	Fixed
Divergence Slit Size [°]	1.0000
Specimen Length [mm]	10.00
Receiving Slit Size [mm]	12.7500
Measurement Temperature [°C]	-273.15
Anode Material	Cu
K-Alpha1 [Å]	1.54060
K-Alpha2 [Å]	1.54443
K-Beta [Å]	1.39225
K-A2 / K-A1 Ratio	0.50000
Generator Settings	30 mA, 40 kV
Diffractometer Type	XPert MPD
Diffractometer Number	1
Goniometer Radius [mm]	200.00
Dist. Focus-Diverg. Slit [mm]	91.00
Incident Beam Monochromator	No
Spinning	Yes

Main Graphics, Analyze View: (Bookmark 2)

Powder)

**Peak List:** (Bookmark 3)

Pos. [°2Th.]	Height [cts]	FWHM Left [°2Th.]	d-spacing [Å]	Rel. Int. [%]
12.4366	23.92	0.4015	7.11742	4.59
29.9155	169.82	0.2007	2.98690	32.57
35.1778	521.35	0.0669	2.55121	100.00
42.8568	131.09	0.1673	2.11020	25.14
53.3120	34.27	0.8029	1.71842	6.57
56.7229	142.44	0.2676	1.62292	27.32
62.3318	147.65	0.2007	1.48968	28.32
86.4731	53.10	0.2007	1.12544	10.19

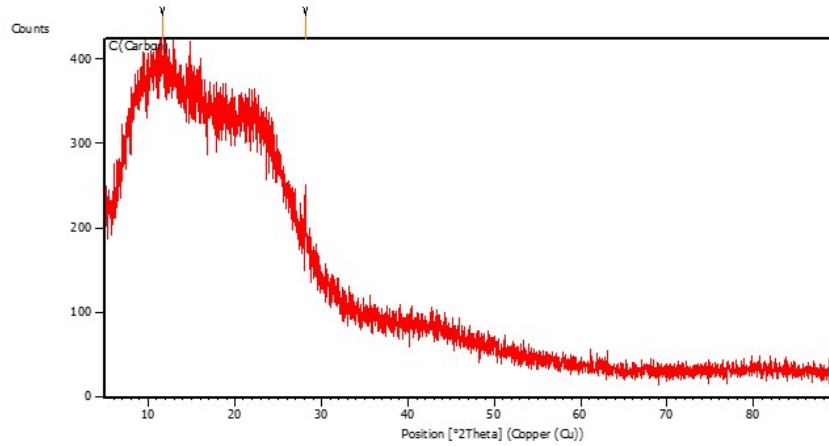
2. Data hasil pengujian XRD Serbuk Besi (*Iron Powder*)

This is the simple example template containing only headers for each report item and the bookmarks. The invisible bookmarks are indicated by text between brackets. Modify it according to your own needs and standards.

Measurement Conditions: (Bookmark 1)

Dataset Name	C (Carbon)
File name	E:\DATA PENGUJIAN-XRD\Pengujian 2023\April\Nugraha\C (Carbon)\C (Carbon).rd
Comment	Configuration=Reflection-Transmission Sp Goniometer=PW3050/60 (Theta/Theta); Mini
Measurement Date / Time	4/25/2023 1:40:00 PM
Raw Data Origin	PHILIPS-binary (scan) (RD)
Scan Axis	Gonio
Start Position [°2Th.]	5.0084
End Position [°2Th.]	89.9744
Step Size [°2Th.]	0.0170
Scan Step Time [s]	10.1500
Scan Type	Continuous
Offset [°2Th.]	0.0000
Divergence Slit Type	Fixed
Divergence Slit Size [°]	1.0000
Specimen Length [mm]	10.00
Receiving Slit Size [mm]	12.7500
Measurement Temperature [°C]	-273.15
Anode Material	Cu
K-Alpha1 [Å]	1.54060
K-Alpha2 [Å]	1.54443
K-Beta [Å]	1.39225
K-A2 / K-A1 Ratio	0.50000
Generator Settings	30 mA, 40 kV
Diffractometer Type	XPert MPD
Diffractometer Number	1
Goniometer Radius [mm]	200.00
Dist. Focus-Diverg. Slit [mm]	91.00
Incident Beam Monochromator	No
Spinning	Yes

Main Graphics, Analyze View: (Bookmark 2)

**Peak List:** (Bookmark 3)

Pos. [°2Th.]	Height [cts]	FWHM Left [°2Th.]	d-spacing [Å]	Rel. Int. [%]
11.6244	78.00	0.0900	7.60652	100.00
28.1410	64.84	0.1020	3.16844	83.13

3. Data Hasil Uji Densitas

Kompaksi	Komposisi	kodevikasi	massa (gr)	r ² (mm)	t (mm)	Densitas (gr/cm ³)		
7000	1%	A1	a	7,998	100	7,11	3,582	
			b	8,000	100	7,13	3,573	
			c	7,414	100	6,79	3,477	
				Hasil Rata – rata			3,544	
8000		1%	A2	a	7,998	100	7,10	3,588
				b	8,000	100	7,22	3,529
				c	8,000	100	7,23	3,524
					Hasil Rata – rata			3,547
9000			1%	A3	a	7,800	100	7,23
	b				7,850	100	7,12	3,511
	c				7,691	100	7,23	3,338
					Hasil Rata – rata			3,445
7000	2%			B1	a	8,000	100	7,56
		b			8,000	100	7,47	3,411
		c			8,000	100	7,58	3,361
					Hasil Rata – rata			3,381
8000		2%		B2	a	7,855	100	7,38
			b		7,998	100	7,52	3,387
			c		7,570	100	7,23	3,334
					Hasil Rata – rata			3,370
9000			2%	B3	a	8,000	100	7,57
	b				7,961	100	7,46	3,399
	c				7,125	100	6,79	3,342
					Hasil Rata – rata			3,369
7000	3%			C1	a	7,736	100	7,67
		b			7,886	100	7,79	3,224
		c			7,286	100	7,79	2,979
					Hasil Rata – rata			3,138
8000		3%		C2	a	7,712	100	7,7
			b		7,790	100	7,7	3,322
			c		7,808	100	7,73	3,217
					Hasil Rata – rata			3,209
9000			3%	C3	a	7,824	100	7,75
	b				7,733	100	7,65	3,219
	c				7,038	100	7,14	3,139
					Hasil Rata – rata			3,191

7000	100%	A4	a	7,990	100	6,46	3,939
			b	7,998	100	6,38	3,992
			c	8,000	100	6,42	3,868
Hasil Rata – rata						3,967	
8000		A5	a	8,000	100	6,36	4,006
			b	8,000	100	6,49	3,926
			c	8,000	100	6,39	3,987
Hasil Rata – rata						3,973	
9000		A6	a	8,000	100	6,35	4,012
	b		7,998	100	6,33	4,024	
	c		7,990	100	6,32	4,026	
Hasil Rata – rata						4,021	

4. DATA HASIL UJI KEKERASAN



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET, DAN TEKNOLOGI
POLITEKNIK NEGERI MALANG
JURUSAN TEKNIK MESIN
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Telp. (0341) 404424 – 404425, Fax (0341) 404430,
<http://www.polinema.ac.id>

SURAT KETERANGAN NOMOR : 25/LAB.TM/2023

Yang bertanda tangan dibawah ini :

Nama : Rafik Djoenaidi,ST
N I P : 19780125 200912 1 002
Jabatan : Prinsipal Laboratorium Pendidikan
Politeknik Negeri Malang

Menerangkan dengan sesungguhnya bahwa mahasiswa :

NO	Nama	NIM/NPM	Prodi	Instansi
1	Septian Fachrul Rozi	1421900051	S-1 Teknik Mesin	Universitas 17 Agustus 1945 Surabaya
2	Amoua	1421900025	S-1 Teknik Mesin	Universitas 17 Agustus 1945 Surabaya

Benar benar telah melaksanakan pengambilan data di Jurusan Teknik Mesin Politeknik Negeri Malang, guna keperluan penyusunan skripsi.

Demikian surat keterangan ini dibuat untuk dipergunakan sebagaimana mestinya.

Malang, 25 Mei 2023
Prinsipal Laboratorium Pendidikan
Politeknik Negeri Malang

Rafik Djoenaidi,ST
19780125 200912 1 002

TABEL NILAI UJI KEKERASAN MICRO VICKERS HARDNESS TESTER

Kompaksi (Pa)	Komposisi (%)	Waktu tahanan (menit)	Suhu (°C)	Spesimen	Nilai kekerasan (HVN)
7000	3%	90	1000	a	huncur
				b	471,1
				c	581,0
a				672,9	
b				361,3	
c				515,6	
a				824,2	
b				858,0	
c				800,2	
8000	2%	90	1000	a	881,4
				b	672,2
				c	577,8
9000	2%	90	1000	a	511,5
				b	548,6
				c	714,3
7000	3%	90	1000	a	787,5
				b	580,9
				c	698,3
8000	3%	90	1000	a	390,2
				b	329,5
				c	401,9
9000	3%	90	1000	a	398,2
				b	582,3
				c	763,5
7000	Fe-Murni	90	1000	a	872,0
				b	586,6
				c	521,7
8000	Fe-Murni	90	1000	a	490,9
				b	653,1
				c	573,9
9000	Fe-Murni	90	1000	a	651,2
				b	728,6
				c	651,0
7000	Fe-Murni	90	1000	a	582,3
				b	615,7
				c	698,1