

LAMPIRAN

LAMPIRAN A

Perhitungan Massa Bahan Dasar Untuk Sampel BPSCCO-2212/Ca=1,10.

Tabel 3. Berat molekul (BM) senyawa penyusun BPSCCO-2212.

Bahan	Berat Molekul (BM) (gram/mol)	Fraksi	Jumlah
Bi ₂ O ₃	465,9589	1,60	2
PbO	223,1894	0,40	1
SrCO ₃	147,6292	2,00	1
CaCO ₃	100,0872	1,10	1
CuO	79,5454	2,00	1

- Perhitungan BM-X total

$$\text{BM-X (Bi}_2\text{O}_3\text{)} = \text{BM} \times \left(\frac{1}{\text{jumlah atom}} \right) \times \text{fraksi}$$

$$= 465,9589 \times (1/2) \times 1,60$$

$$= 372,7671 \text{ gram/mol}$$

$$\text{BM-X (PbO)} = \text{BM} \times \left(\frac{1}{\text{jumlah atom}} \right) \times \text{fraksi}$$

$$= 223,1894 \times (1/1) \times 0,40$$

$$= 89,2758 \text{ gram/mol}$$

$$\text{BM-X (SrCO}_3\text{)} = \text{BM} \times \left(\frac{1}{\text{jumlah atom}} \right) \times \text{fraksi}$$

$$= 147,6292 \times (1/1) \times 2,00$$

$$= 295,2584 \text{ gram/mol}$$

$$\text{BM-X (CaCO}_3\text{)} = \text{BM} \times \left(\frac{1}{\text{jumlah atom}} \right) \times \text{fraksi}$$

$$= 100,0872 \times (1/1) \times 1,10$$

$$= 110,09959 \text{ gram/mol}$$

$$\text{BM-X (CuO)} = \text{BM} \times \left(\frac{1}{\text{jumlah atom}} \right) \times \text{fraksi}$$

$$= 79,5454 \times (1/1) \times 2,00$$

$$= 159,0908 \text{ gram/mol}$$

$$\begin{aligned}
 \text{BM-X Total} &= \text{BM-X (Bi}_2\text{O}_3) + \text{BM-X (PbO)} + \text{BM-X (SrCO}_3) + \text{BM-X} \\
 &\quad (\text{CaCO}_3) + \text{BM-X (CuO)} \\
 &= 372,7671 + 89,2758 + 295,2584 + 110,0996 + 159,0908 \\
 &= 1026.4917 \text{ gram/mol}
 \end{aligned}$$

- Perhitungan untuk membuat 3 gram sampel

$$\begin{aligned}
 \text{BB (Bi}_2\text{O}_3) &= \frac{\text{BM-X}}{\text{BM-X Total}} \times \Sigma \text{ berat sampel} \\
 &= \frac{372,7671}{1026,4917} \times \Sigma 3,000 \text{ gram} \\
 &= 1,0894 \text{ gram}
 \end{aligned}$$

$$\begin{aligned}
 \text{BB (PbO)} &= \frac{\text{BM-X}}{\text{BM-X Total}} \times \Sigma \text{ berat sampel} \\
 &= \frac{89,2758}{1026,4917} \times \Sigma 3,000 \text{ gram} \\
 &= 0,2609 \text{ gram}
 \end{aligned}$$

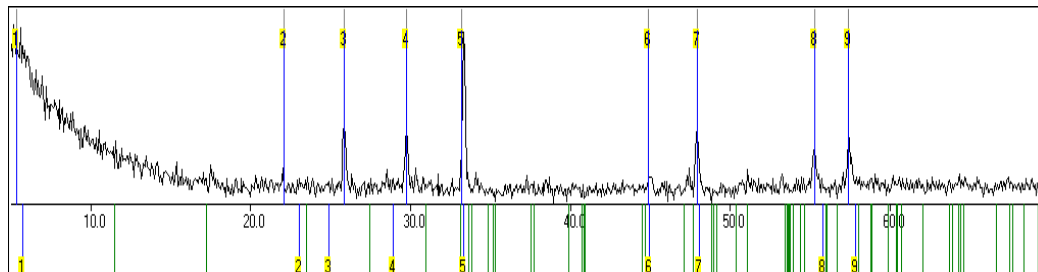
$$\begin{aligned}
 \text{BB (SrCO}_3) &= \frac{\text{BM-X}}{\text{BM-X Total}} \times \Sigma \text{ berat sampel} \\
 &= \frac{295,2584}{1026,4917} \times \Sigma 3,000 \text{ gram} \\
 &= 0,8629 \text{ gram}
 \end{aligned}$$

$$\begin{aligned}
 \text{BB (CaCO}_3) &= \frac{\text{BM-X}}{\text{BM-X Total}} \times \Sigma \text{ berat sampel} \\
 &= \frac{110,0996}{1026,4917} \times \Sigma 3,000 \text{ gram} \\
 &= 0,3218 \text{ gram}
 \end{aligned}$$

$$\begin{aligned}
 \text{BB (Bi}_2\text{O}_3) &= \frac{\text{BM-X}}{\text{BM-X Total}} \times \Sigma \text{ berat sampel} \\
 &= \frac{159,0908}{1026,4917} \times \Sigma 3,000 \text{ gram} \\
 &= 0,4650 \text{ gram}
 \end{aligned}$$

LAMPIRAN B

1. Hasil Analisis Sampel BPSCCO-2212/ Ts 815.



CELREF Version 3. 7/14/2013 10:32:41 AM

Final values : (Standard errors on 2nd line)

Zero	Lambda	a	b	c	alpha	beta	gamma	volume
0.0000	1.54180	5.4819	5.2078	30.9528	90.00	90.00	90.00	883.656
0.0000	0.00000	0.0518	0.1276	0.3917	0.000	0.000	0.000	

H	K	L	2Th(obs)	2Th_obs-shift	2Th(Calc)	diff.	Intensitas
0	0	2	5.3562	5.3562	5.7103	-0.3541	235
0	0	8	22.0512	22.0512	22.9857	-0.9345	47
1	1	3	25.8567	25.8567	25.1149	0.7418	144
0	0	10	29.7247	29.7247	28.8434	0.8813	143
0	2	0	33.2059	33.2059	33.2824	-0.0765	128
1	1	13	44.8751	44.8751	45.0116	0.1365	79
2	2	0	47.9043	47.9043	48.2029	-0.2986	109
3	1	5	55.3180	55.3180	55.3057	0.0123	98
3	1	7	57.3831	57.3831	57.3556	0.0275	122

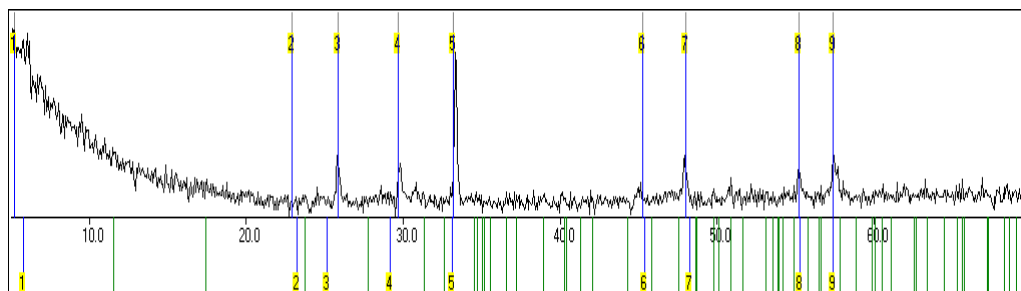
$\text{Sqrt}(\text{Sum}(2\text{Th O-C})^2 / (\text{Nref}-\text{Npar})) : 0.6373$

$\text{Sqrt}(\text{Sum}(2\text{Th O-C})^2 / \text{Nref}) : 0.5204$

Ket. Warna: **Merah** = Impuritas ber-hkl

Hasil Perhitungan Fase BPSCCO-2212						
Intens. Bi-2212	Intens. (001)	Intensi. Total	Fraksi Volum (%)	Impuritas		Derajat Orientasi (%)
				2223 (%)	Lain (%)	
800	425	1105	72.39	-	27.61	53.13

2. Hasil Analisis Sampel BPSCCO-2212/ Ts 820.



CELREF Version 3. 7/3/2013 06:53:25 AM

Final values : (Standard errors on 2nd line)

Zero	Lambda	a	b	c	alpha	beta	gamma	volume
0.0000	1.54180	5.4956	5.1902	30.6064	90.00	90.00	90.00	872.994
0.0000	0.00000	0.0459	0.0785	0.2704	0.000	0.000	0.000	

H	K	L	2Th(obs)	2Th_obs-shift	2Th(Calc)	diff.	Intensitas
0	0	2	5.2273	5.2273	5.7750	-0.5477	244
0	0	8	22.8912	22.8912	23.2494	-0.3582	44
1	1	3	25.8567	25.8567	25.1628	0.6939	84
0	0	10	29.6591	29.6591	29.1770	0.4821	73
2	0	2	33.2059	33.2059	33.1221	0.0838	102
1	1	13	45.2619	45.2619	45.4050	-0.1431	43
2	2	0	47.9698	47.9698	48.2338	-0.2640	92
3	1	5	55.1890	55.1890	55.2520	-0.0630	75
2	2	10	57.3831	57.3831	57.3702	0.0129	108

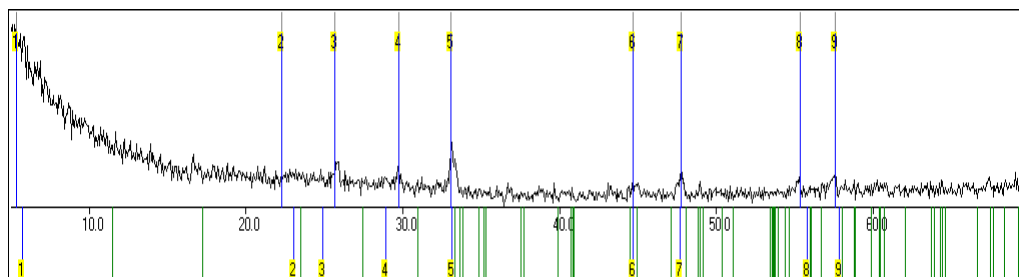
Sqrt(Sum(2Th O-C)**2)/(Nref-Npar) : 0.4553

Sqrt(Sum(2Th O-C)**2)/Nref : 0.3717

Ket. Warna: **Merah** = Impuritas ber-hkl

Hasil Perhitungan Fase BPSCCO-2212						
Intens.	Intens.	Intensi.	Fraksi	Impuritas		Derajat
Bi-2212	(001)	Total	Volum	2223	Lain (%)	Orientasi
			(%)	(%)		(%)
645	361	865	74.56	-	25.43	55.97

3. Hasil Analisis Sampel BPSCCO-2212/ Ts 825.



CELREF Version 3. 7/3/2013 07:19:55 AM

Final values : (Standard errors on 2nd line)

Zero	Lambda	a	b	c	alpha	beta	gamma	volume
0.0000	1.54180	5.4411	5.3349	30.8805	90.00	90.00	90.00	896.40
0.0000	0.00000	0.0427	0.0914	0.4447	0.000	0.000	0.000	

H	K	L	2Th(obs)	2Th_obs-shift	2Th(Calc)	diff.	Intensitas
0	0	2	5.3562	5.3562	5.7237	-0.3675	225
0	0	8	22.2465	22.2465	23.0402	-0.7937	42
1	1	3	25.6633	25.6633	24.9230	0.7403	54
0	0	10	29.7247	29.7247	28.9124	0.8123	77
2	0	0	33.0769	33.0769	32.9217	0.1552	85
0	2	10	44.6816	44.6816	44.9019	-0.2203	44
2	2	0	47.7109	47.7109	47.7497	-0.0388	41
3	1	5	55.3199	55.3199	55.5448	-0.2249	40
3	1	7	57.5765	57.5765	57.5985	-0.0220	56

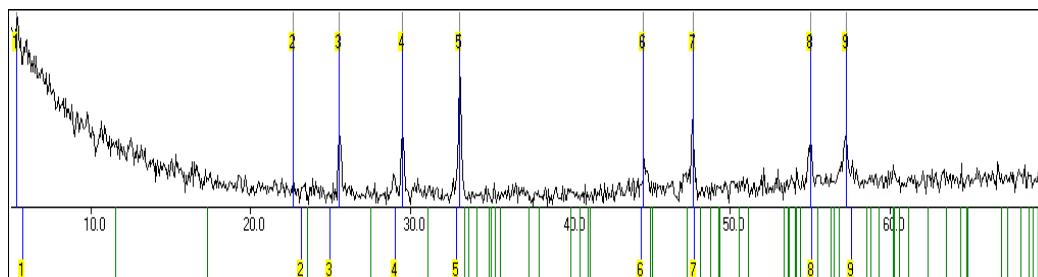
$\text{Sqrt}(\text{Sum}(2\text{Th O-C})^2 / (\text{Nref} - \text{Npar})) : 0.5914$

$\text{Sqrt}(\text{Sum}(2\text{Th O-C})^2 / \text{Nref}) : 0.4828$

Ket. Warna: **Merah** = Impuritas ber-hkl

Hasil Perhitungan Fase BPSCCO-2212						
Intens. Bi-2212	Intens. (001)	Intensi. Total	Fraksi Volum (%)	Impuritas		Derajat Orientasi (%)
				2223 (%)	Lain (%)	
580	344	664	87.34	-	12.65	59.31

4. Hasil Analisis Sampel BPSCCO-2212/ Ts 830.



CELREF Version 3. 7/3/2013 07:19:55 AM

Final values : (Standard errors on 2nd line)

Zero	Lambda	a	b	c	alpha	beta	gamma	volume
0.0000	1.54180	5.4498	5.3339	30.7417	90.00	90.00	90.00	893.632
0.0000	0.00000	0.0373	0.0408	0.3177	0.000	0.000	0.000	

H	K	L	2Th(obs)	2Th_obs-shift	2Th(Calc)	diff.	Intensitas
0	0	2	5.3562	5.3562	5.7496	-0.3934	246
0	0	8	22.6315	22.6315	23.1456	-0.5141	32
1	1	3	25.5343	25.5343	24.9215	0.6128	94
0	0	10	29.4668	29.4668	29.0458	0.4210	112
2	0	0	33.0769	33.0769	32.8676	0.2093	187
2	0	10	44.5527	44.5527	44.4257	0.1270	55
2	2	0	47.6464	47.6464	47.7149	-0.0685	108
1	3	3	54.9975	54.9975	55.0631	-0.0656	101
3	1	7	57.2520	57.2520	57.5589	-0.3069	85

$\text{Sqrt}(\text{Sum}(2\text{Th O-C})^2/(\text{Nref-Npar})) : 0.5914$

$\text{Sqrt}(\text{Sum}(2\text{Th O-C})^2/\text{Nref}) : 0.4828$

Ket. Warna: **Merah** = Impuritas ber-hkl

Hasil Perhitungan Fase BPSCCO-2212						
Intens. Bi-2212	Intens. (001)	Intensi. Total	Fraksi Volum (%)	Impuritas		Derajat Orientasi (%)
				2223 (%)	Lain (%)	
919	390	1020	90.10	-	9.90	42.43

LAMPIRAN C

1. Foto Sampel Superkonduktor Pra-Kalsinasi.



(a)



(b)



(c)



(d)

Gambar 26. Foto sampel pra-kalsinasi (a). BPSCCO-2212/Ts 815, (b). BPSCCO-2212/Ts 820, (c). BPSCCO-2212/Ts 825, dan (d) BPSCCO-2212/Ts 830.

2. Foto Sampel Superkonduktor Pasca-Kalsinasi.



(a)



(b)



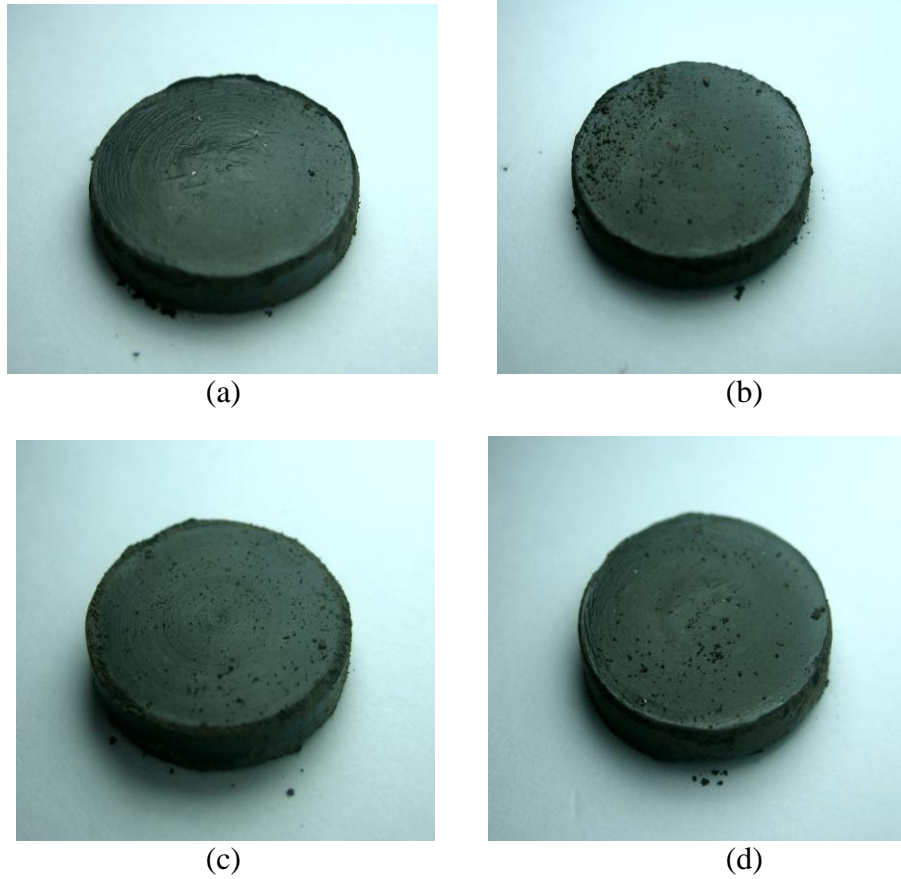
(c)



(d)

Gambar 27. Foto sampel pasca-kalsinasi (a). BPSCCO-2212/Ts 815, (b). BPSCCO-2212/Ts 820, (c). BPSCCO-2212/Ts 825, dan (d) BPSCCO-2212/Ts 830.

3. Foto Sampel Superkonduktor Pra-Sintering.



Gambar 28. Foto sampel pra-sintering (a). BPSCCO-2212/Ts 815, (b). BPSCCO-2212/Ts 820, (c). BPSCCO-2212/Ts 825, dan (d) BPSCCO-2212/Ts 830.

4. Foto Sampel Superkonduktor Pasca-Sintering.



(a)



(b)



(c)



(d)

Gambar 29. Foto sampel pasca-sintering (a). BPSCCO-2212/Ts 815, (b). BPSCCO-2212/Ts 820, (c). BPSCCO-2212/Ts 825, dan (d) BPSCCO-2212/Ts 830.

5. Foto Alat dan Bahan dalam Sintesis Sampel Superkonduktor.



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)

Gambar 30. Alat dan bahan yang digunakan dalam sintesis sampel superkonduktor (a) bahan dasar berupa karbonat dan oksida, (b) neraca *sartorius* digital, (c) spatula, (d) *pestle* dan *mortar*, (e) *die*/cetakan sampel, (f) *pressing*/pompa hidrolik, (g) *furnace*, (h) *crucible*, (i) alat SEM, dan (j) alat XRD