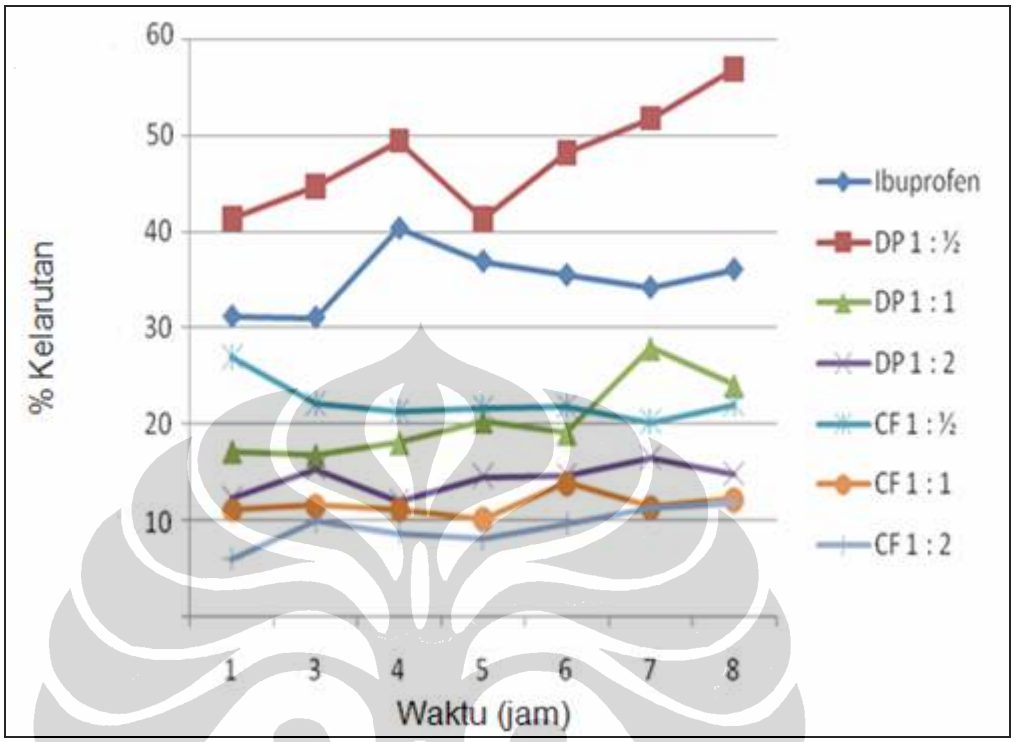
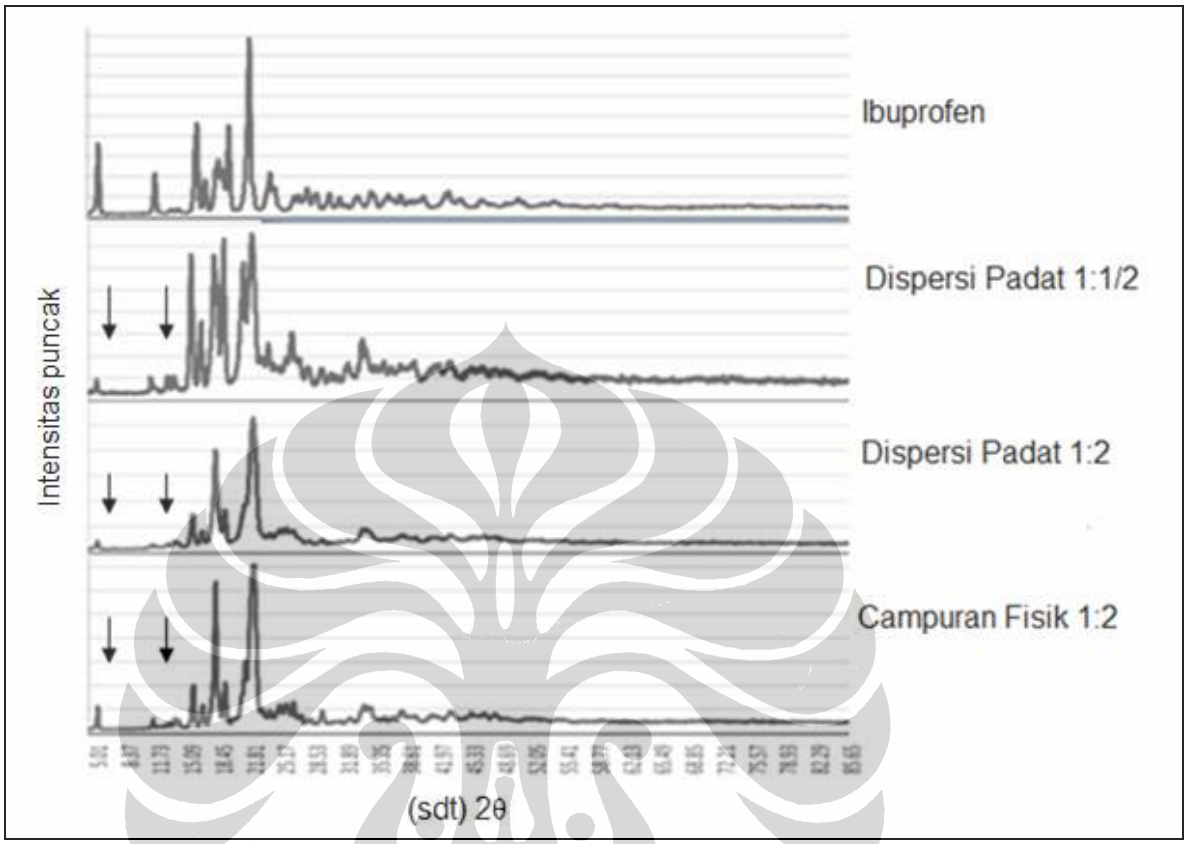
LAMPIRAN

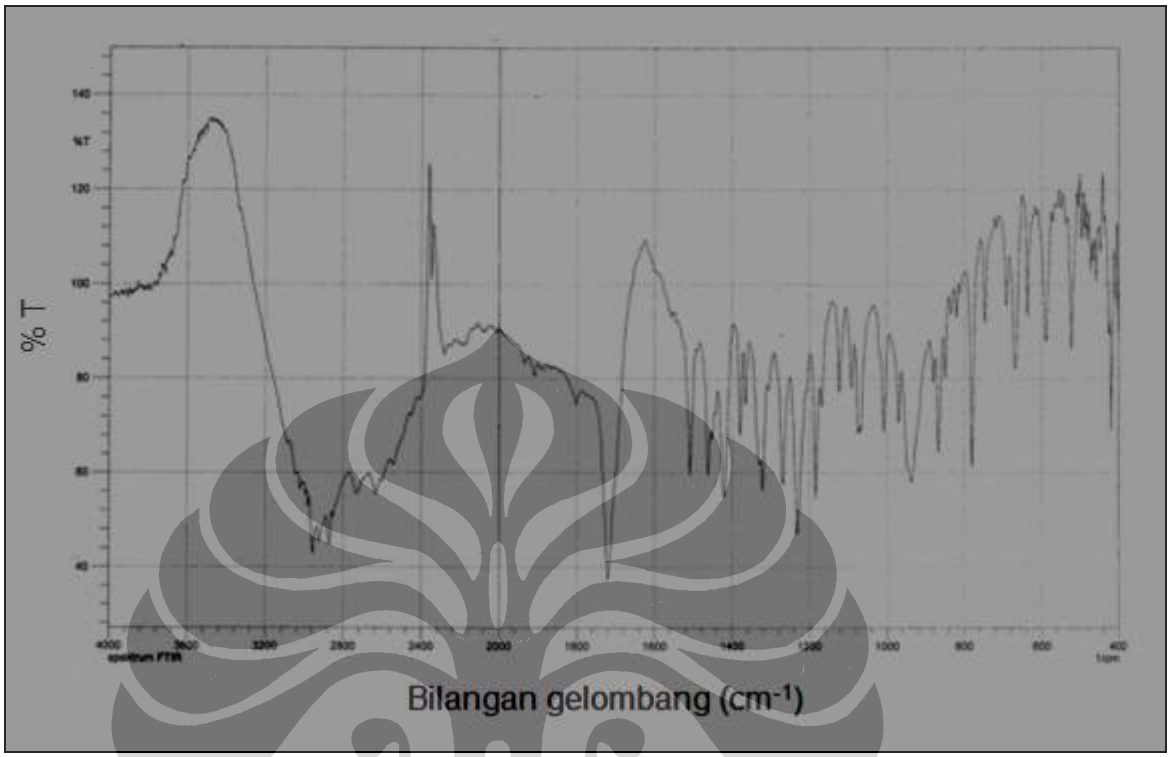
Gambar 1. Kurva Serapan Larutan Ibuprofen Baku dalam NaOH 0,1 N pada Panjang Gelombang 265 nm



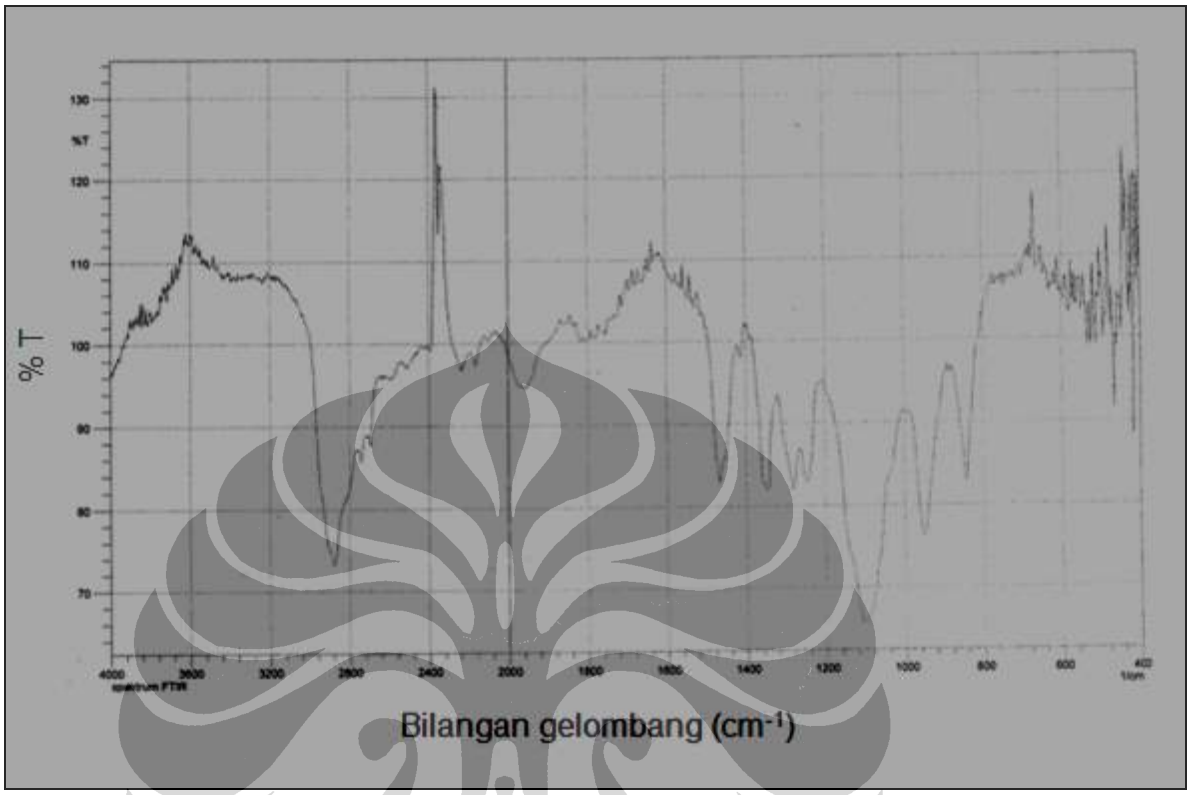
Gambar 2. Hasil Uji Kelarutan Serbuk Campuran dalam Perbandingan Masing-Masing Selama 8 jam



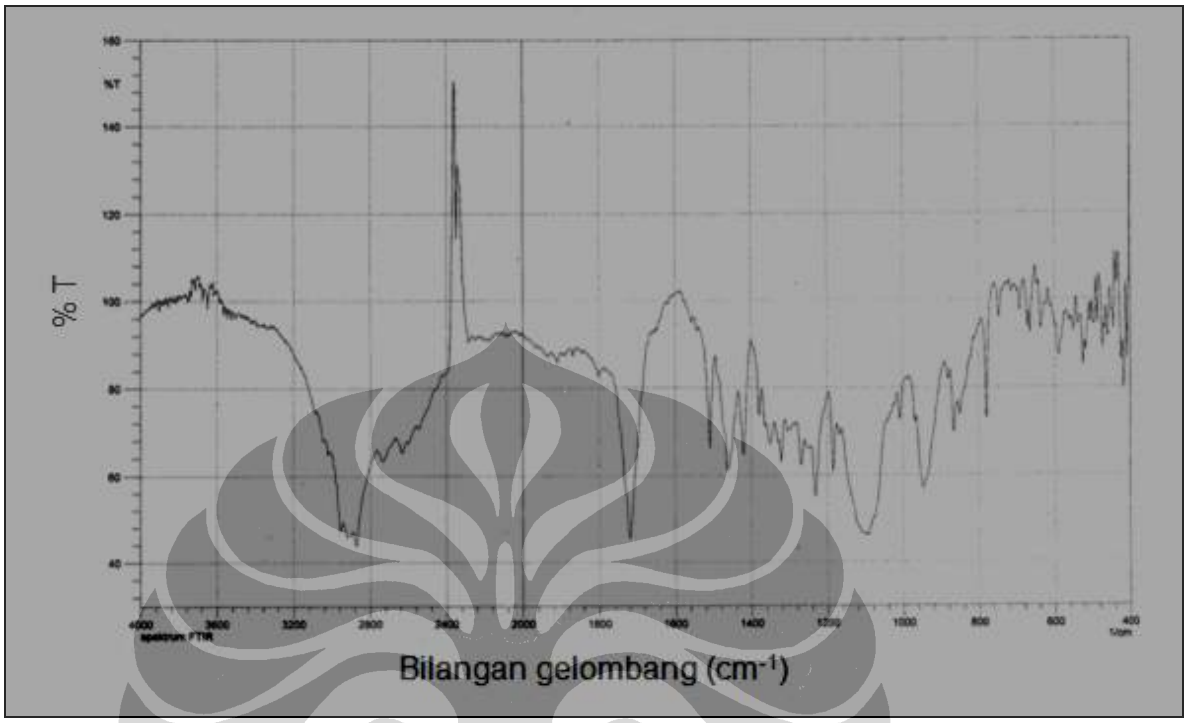
Gambar 3. Difraktogram Menggunakan Difraksi sinar-X dari serbuk Ibuprofen, Campuran Fisik dan Dispersi Padat



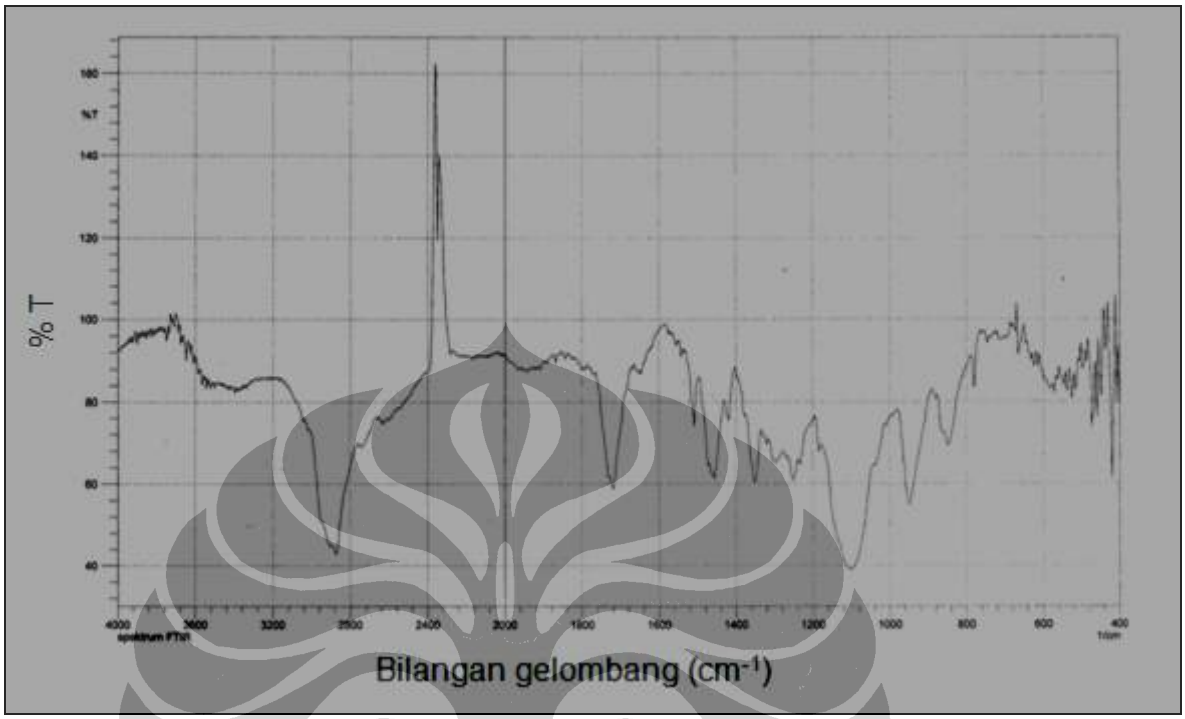
Gambar 4 . Spektrum FTIR Ibuprofen Baku dalam KBr



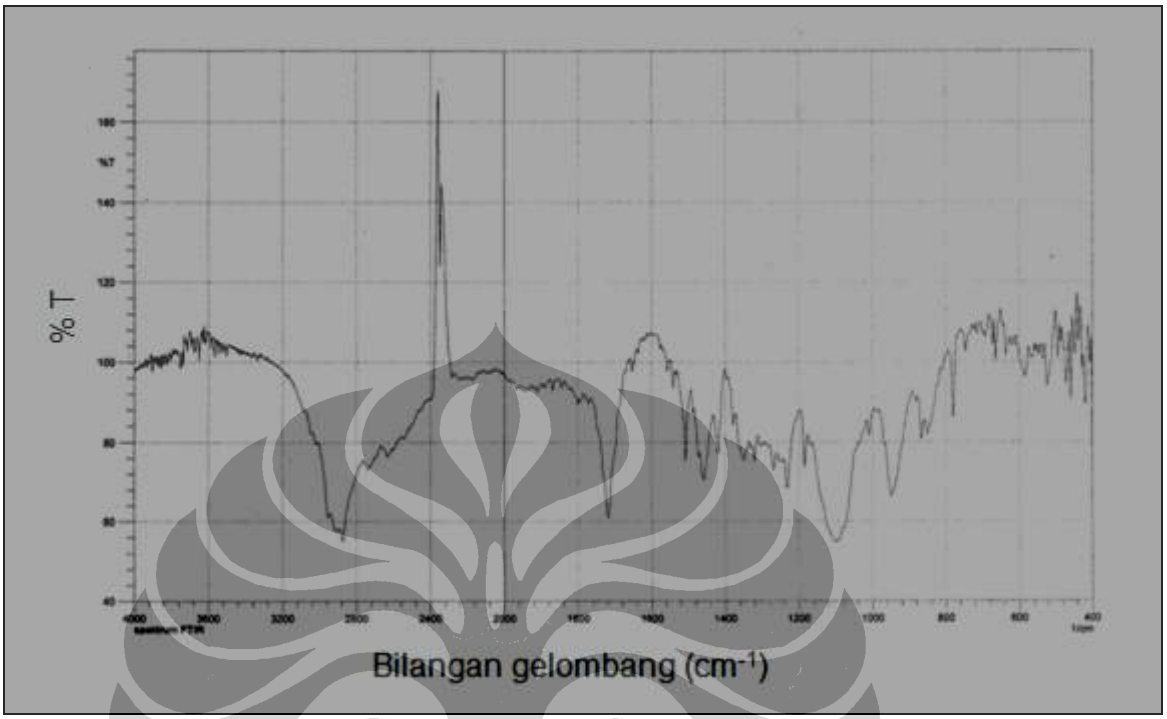
Gambar 5 . Spektrum FTIR PEG 6000



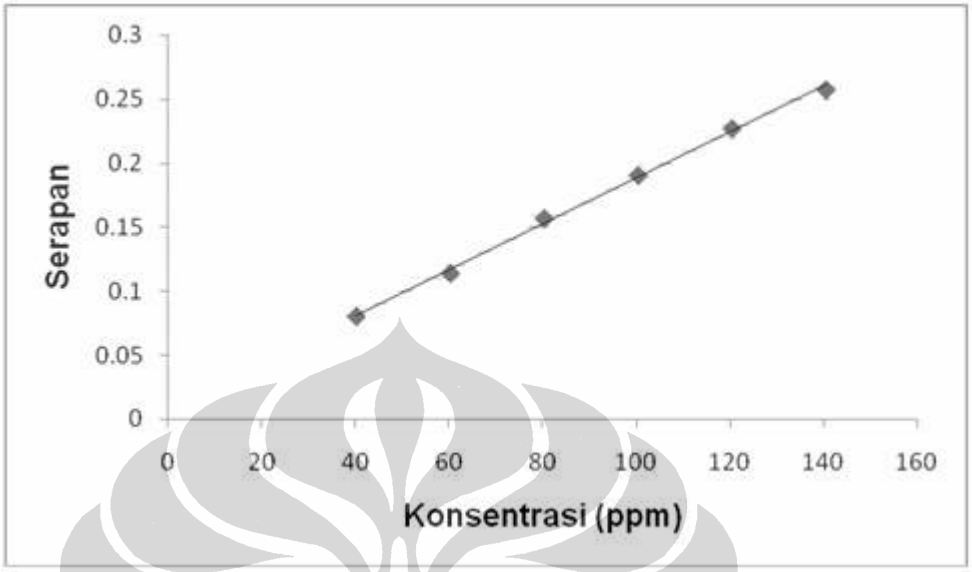
Gambar 6 . Spektrum FTIR Dispersi Padat 1:1/2



Gambar 7 . Spektrum FTIR Dispersi Padat 1:2



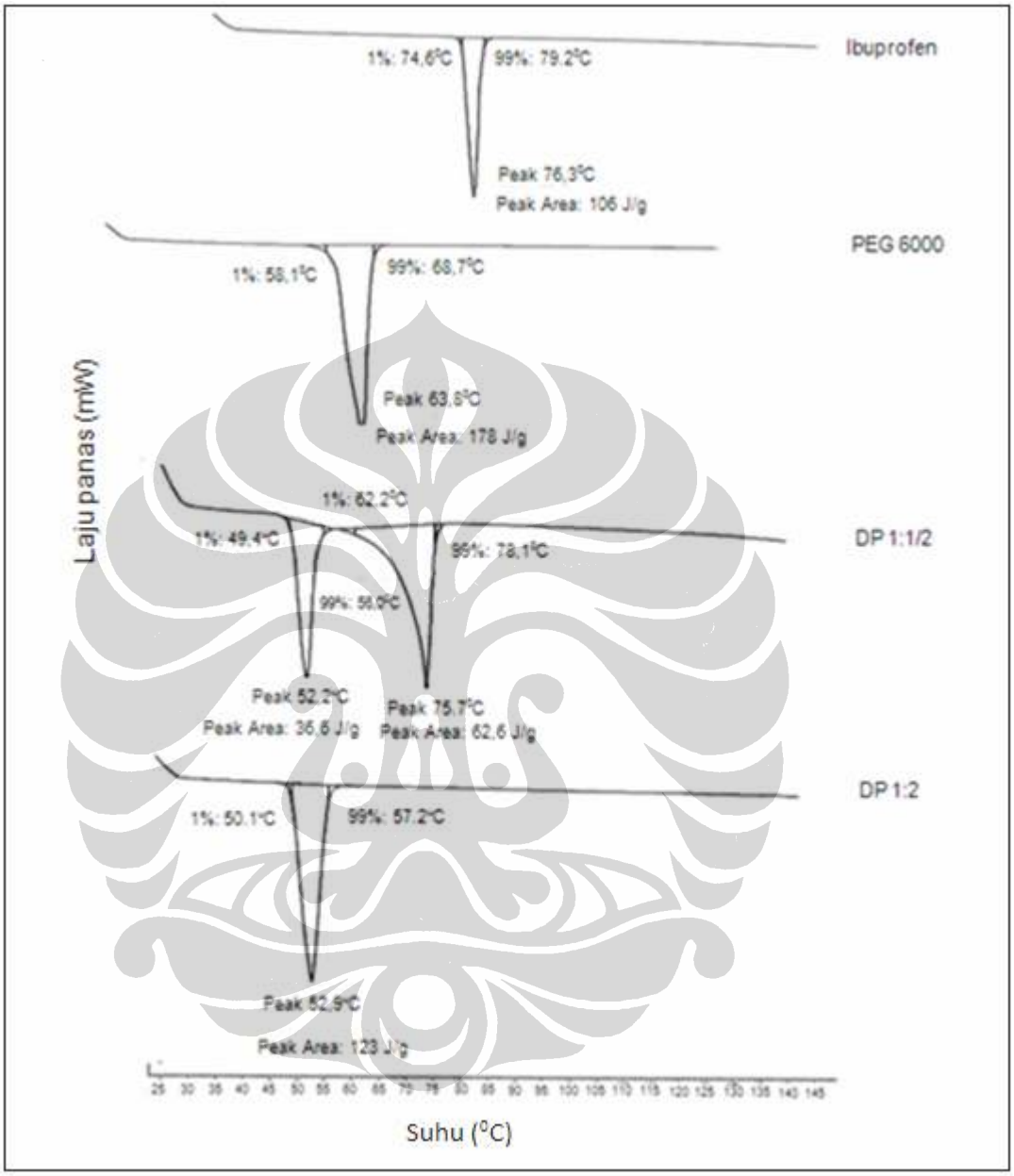
Gambar 8 . Spektrum FTIR Campuran Fisik 1:2



Gambar 9. Kurva Kalibrasi Larutan Ibuprofen Baku dalam NaOH 0,1 N pada Panjang Gelombang 265 nm

Persamaan : $y = 8{,}72476, 10^{-3} + 1{,}79624, 10^{-3} x$

Dengan nilai r = 0,999204



Gambar 10. Termogram DSC Serbuk Ibuprofen, PEG 6000 dan Dispersi Padat

TABEL

Tabel 1
Hasil Serapan Kurva Kalibrasi Ibuprofen

No	Konsentrasi (ppm)	Serapan
1	40,16	0,0801
2	60,24	0,1138
3	80,32	0,1567
4	100,4	0,1906
5	120,48	0,2273
6	140,56	0,2577

Dengan perhitungan regresi linear didapatkan:

Persamaan : $y = 8{,}72476, 10^{-3} + 1{,}79624, 10^{-3} x$

Dengan nilai r = 0,999204

Tabel 2
Hasil Uji Kelarutan dari Masing-Masing Perbandingan Selama 8 Jam

Jam	Kelarutan * Pada 8 Jam ± SD (mg/ml)						
	Ibuprofen	**DP 1 : ½**	**DP 1 : 1**	**DP 1 : 2**	**CF 1 : ½**	**CF 1 : 1**	**CF 1 : 2**
1	0,301 ± 0,052	0,295 ± 0,135	0,196 ± 0,022	0,118 ± 0,007	0,220 ± 0,064	0,148 ± 0,020	0,112 ± 0,036
3	0,236 ± 0,065	0,524 ± 0,070	0,165 ± 0,020	0,118 ± 0,035	0,220 ± 0,044	0,175 ± 0,015	0,086 ± 0,017
4	0,250 ± 0,184	0,540 ± 0,124	0,212 ± 0,035	0,121 ± 0,015	0,210 ± 0,035	0,170 ± 0,016	0,084 ± 0,040
5	0,316 ± 0,046	0,450 ± 0,032	0,255 ± 0,045	0,130 ± 0,016	0,220 ± 0,004	1,629 ± 0,030	1,696 ± 0,028
6	0,333 ± 0,034	0,462 ± 0,042	0,182 ± 0,009	0,120 ± 0,047	0,170 ± 0,041	1,535 ± 0,030	0,109 ± 0,042
7	0,340 ± 0,008	0,605 ± 0,076	0,328 ± 0,065	0,186 ± 0,020	0,210 ± 0,018	0,160 ± 0,004	0,044 ± 0,055
8	0,361 ± 0,004	0,877 ± 0,267	0,302 ± 0,060	0,121 ± 0,026	0,203 ± 0,015	0,104 ± 0,005	0,107 ± 0,074

Keterangan : * merupakan hasil dari tiga kali pengukuran (triplo)

Tabel 3
Hasil Data XRD Ibuprofen

Angle [° 20]	d-value A1 [Å]	d-value α2 [Å]	Peak width [° 20]	Peak int [counts]	Back. Int [counts]	Rel. Int [%]	Signif.
6,060	145,724	146,086	0,140	8317	282	100,0	7,37
6,195	142,552	142,906	0,080	7157	276	86,1	2,36
12,135	72,874	73,055	0,080	2391	177	28,7	2,72
12,290	71,959	72,137	0,100	1616	174	19,4	2,80
13,955	63,408	63,566	0,240	182	169	2,2	3,43
14,675	60,313	60,463	0,280	174	164	2,1	2,74
16,450	53,843	53,977	0,080	2798	159	33,6	1,27
16,710	53,011	53,143	0,140	3684	159	44,3	7,46
17,490	50,664	50,790	0,140	1218	159	14,6	4,23
17,665	50,166	50,291	0,120	1056	156	12,7	1,44
18,665	47,525	47,644	0,080	1640	156	19,7	0,87
19,085	46,464	46,580	0,080	1681	154	20,2	1,92
19,475	45,543	45,656	0,180	1560	154	18,8	6,21
20,100	44,140	44,250	0,120	3014	149	36,2	4,78
22,275	39,877	39,976	0,180	5640	151	67,8	13,50
22,425	39,614	39,712	0,080	3540	149	42,6	1,53
22,735	39,080	39,178	0,200	718	149	8,6	1,89
24,050	36,973	37,064	0,160	462	149	5,6	0,77
24,515	36,282	36,372	0,140	1149	149	13,8	3,99
25,100	35,449	35,537	0,060	655	149	7,9	1,58
27,050	32,936	33,018	0,060	396	144	4,8	0,77
27,590	32,304	32,384	0,080	404	144	4,9	0,81
28,425	31,374	31,452	0,100	571	144	6,9	0,86
28,600	31,186	31,263	0,140	471	144	5,7	1,78
29,175	30,584	30,660	0,200	535	144	4,2	1,97
29,550	30,204	30,279	0,240	400	144	4,8	4,97
30,955	28,865	28,936	0,100	342	142	4,1	0,91
31,920	28,014	28,083	0,280	269	144	3,2	5,77
32,545	27,490	27,558	0,200	123	142	1,5	1,13

Tabel 3 (lanjutan)

33,560	26,681	26,748	0,240	213	142	2,6	2,50
33,950	26,384	26,449	0,200	266	142	3,2	1,56
35,255	25,436	25,500	0,280	331	142	4,0	4,20
35,705	25,126	25,188	0,160	272	142	3,3	1,09
37,140	24,187	24,248	0,240	266	139	3,2	2,25
37,775	23,795	23,854	0,240	177	139	2,1	1,33
38,535	23,343	23,401	0,360	256	139	3,1	9,54
39,490	22,801	22,857	0,200	151	139	1,8	1,22
40,975	22,008	22,063	0,240	202	139	2,4	2,53
43,250	20,901	20,953	0,120	234	137	2,8	1,38
43,690	20,701	20,753	0,240	269	139	3,2	2,97
44,960	20,145	20,295	0,560	137	139	1,6	5,70
46,975	19,327	19,375	0,240	88	139	1,1	0,81
48,520	18,747	18,794	0,400	36	137	0,4	1,47
49,695	18,331	18,377	0,480	37	139	0,4	0,83
51,010	17,889	17,933	0,280	114	137	1,4	3,03
51,680	17,673	17,717	0,160	69	137	0,8	0,90
53,925	16,989	17,031	0,240	42	137	0,5	1,53
54,975	16,739	16,781	0,320	56	139	0,7	0,93
59,135	15,610	15,649	0,640	12	112	0,1	1,01
60,565	15,275	15,313	0,640	25	110	0,3	1,90
61,560	15,052	15,090	0,320	29	108	0,4	1,16
63,800	14,577	14,613	0,800	10	102	0,1	1,14
67,440	13,876	13,910	0,960	9	94	0,1	2,08
75,895	12,526	12,557	0,640	18	92	0,2	1,52
77,960	12,245	12,276	0,960	7	86	0,1	1,03
84,415	11,466	11,494	0,100	12	83	0,1	0,77

Tabel 4
Hasil Data XRD Dispersi Padat 1:1/2

Angle [° 20]	d-value A1 [Å]	d-value α2 [Å]	Peak width [° 20]	Peak int [counts]	Back. Int [counts]	Rel. Int [%]	Signif.
5,935	148,791	149,160	0,200	534	303	26,8	3,22
11,860	74,558	74,743	0,240	286	172	14,4	4,16
12,520	70,642	70,817	0,240	86	166	4,3	1,23
13,655	64,795	64,956	0,240	256	161	12,9	3,38
14,375	61,565	61,718	0,280	256	159	12,9	3,56
16,210	54,635	54,770	0,160	1980	151	99,6	6,50
17,365	51,026	51,153	0,160	973	146	48,9	4,00
18,730	47,337	47,454	0,100	1849	142	93,0	1,36
19,160	46,284	46,399	0,200	1204	142	60,5	2,52
19,745	44,926	45,037	0,080	1815	142	91,2	1,28
19,860	44,668	44,779	0,060	1989	139	100,0	3,47
21,975	40,415	40,515	0,100	1482	137	74,5	1,16
23,145	38,397	38,493	0,600	1475	135	74,1	36,79
24,745	35,950	36,039	0,240	454	132	22,8	2,80
26,630	33,446	33,529	0,240	272	130	13,7	1,55
27,325	32,611	32,692	0,280	511	130	25,7	5,76
28,185	31,635	31,714	0,160	253	128	12,7	1,07
29,160	30,599	30,675	0,440	137	128	6,9	5,25
30,540	29,247	29,320	0,280	137	125	6,9	1,91
31,620	28,273	28,343	0,320	92	123	4,6	1,65
33,205	26,958	27,025	0,560	130	125	6,5	5,85
34,885	25,698	25,761	0,120	269	123	13,5	0,93
35,495	25,270	25,333	0,320	234	123	11,8	1,08
36,445	24,633	24,694	0,240	125	121	6,3	0,87
37,440	24,001	24,060	0,120	146	121	7,4	1,22
38,135	23,579	23,638	0,320	102	121	5,1	0,86
39,175	23,034	23,034	0,320	112	121	5,6	1,11
40,760	22,174	22,174	0,160	123	121	6,2	0,88
42,940	21,097	21,097	0,480	86	119	4,3	1,16

Tabel 4 (lanjutan)

43,455	20,859	20,859	0,240	92	119	4,6	0,82
44,680	20,315	20,315	0,640	106	119	5,3	5,73
47,050	19,346	19,346	0,320	69	119	3,5	0,77
48,300	18,874	18,874	0,400	62	117	3,1	1,36
49,380	18,486	18,486	0,240	49	117	2,5	0,75
50,640	18,056	18,056	0,480	38	117	1,9	1,71
54,895	16,753	16,753	0,640	12	119	0,6	0,81
56,800	16,235	16,235	0,640	15	102	0,8	4,03
60,725	15,277	15,277	0,960	5	94	0,3	0,76
75,780	12,573	12,573	0,640	5	74	0,2	0,86

Tabel 5
Hasil Data XRD Dispersi Padat 1:2

Angle [° 20]	d-value α1 [Å]	d-value α2 [Å]	Peak width [° 20]	Peak int [counts]	Back. Int [counts]	Rel. Int [%]	Signif.
60,55	145,844	146,207	0,120	666	289	22,8	1,69
12,185	72,576	72,757	0,120	159	180	5,4	0,79
13,865	63,818	63,976	0,160	180	172	6,2	0,81
14,630	60,498	60,648	0,160	276	166	9,4	1,12
16,565	53,472	53,605	0,160	1109	164	38,0	4,46
17,645	50,222	50,347	0,080	506	161	17,4	0,82
18,990	46,695	46,811	0,100	2852	159	97,8	1,20
19,090	46,452	46,568	0,060	2714	159	93,1	1,43
20,015	44,326	44,436	0,100	1056	156	36,2	1,11
22,155	40,090	40,190	0,240	1056	154	36,2	1,98
22,970	38,686	38,782	0,160	2916	154	100,0	1,48
23,345	38,073	38,168	0,140	2746	151	94,2	1,33
24,965	35,638	35,726	0,200	262	149	9,0	1,02
26,105	34,107	34,192	0,480	339	146	11,6	2,34
26,840	33,189	33,272	0,240	335	149	11,5	0,78
27,725	32,150	32,229	0,200	282	146	9,7	0,79
29,530	30,224	30,299	0,140	58	144	2,0	0,90
30,740	29,062	29,134	0,320	88	144	3,0	1,56
33,490	26,735	26,802	0,320	61	144	2,1	1,25
35,210	25,468	25,531	0,400	231	142	7,9	2,60
36,065	24,883	24,945	0,400	169	142	5,8	0,95
37,685	23,850	23,909	0,480	62	142	2,1	1,50
39,530	22,778	22,835	0,240	117	139	4,0	1,14
41,050	21,969	22,024	0,560	62	142	2,1	2,26
42,940	21,045	21,097	0,960	56	139	1,9	2,40
44,750	20,235	20,285	0,640	83	139	2,8	4,77
47,110	19,275	19,323	0,640	45	137	1,5	1,60
48,515	18,749	18,796	0,480	48	137	1,6	1,74
49,755	18,310	18,356	0,240	48	139	1,6	1,02

Tabel 5 (lanjutan)

59,170	15,602	15,641	0,640	7	92	0,3	0,82
61,305	15,109	15,146	0,960	8	90	0,3	1,06

Tabel 6
Hasil Data XRD Campuran Fisik 1:2

Angle [° 20]	d-value α1 [Å]	d-value α2 [Å]	Peak width [° 20]	Peak int [counts]	Back. Int [counts]	Rel. Int [%]	Signif.
60,55	145,844	146,207	0,120	666	289	22,8	1,69
12,185	72,576	72,757	0,120	159	180	5,4	0,79
13,865	63,818	63,976	0,160	180	172	6,2	0,81
14,630	60,498	60,648	0,160	276	166	9,4	1,12
16,565	53,472	53,605	0,160	1109	164	38,0	4,46
17,645	50,222	50,347	0,080	506	161	17,4	0,82
18,990	46,695	46,811	0,100	2852	159	97,8	1,20
19,090	46,452	46,568	0,060	2714	159	93,1	1,43
20,015	44,326	44,436	0,100	1056	156	36,2	1,11
22,155	40,090	40,190	0,240	1056	154	36,2	1,98
22,970	38,686	38,782	0,160	2916	154	100,0	1,48
23,345	38,073	38,168	0,140	2746	151	94,2	1,33
24,965	35,638	35,726	0,200	262	149	9,0	1,02
26,105	34,107	34,192	0,480	339	146	11,6	2,34
26,840	33,189	33,272	0,240	335	149	11,5	0,78
27,725	32,150	32,229	0,200	282	146	9,7	0,79
29,530	30,224	30,299	0,140	58	144	2,0	0,90
30,740	29,062	29,134	0,320	88	144	3,0	1,56
33,490	26,735	26,802	0,320	61	144	2,1	1,25
35,210	25,468	25,531	0,400	231	142	7,9	2,60
36,065	24,883	24,945	0,400	169	142	5,8	0,95
37,685	23,850	23,909	0,480	62	142	2,1	1,50
39,530	22,778	22,835	0,240	117	139	4,0	1,14
41,050	21,969	22,024	0,560	62	142	2,1	2,26
42,940	21,045	21,097	0,960	56	139	1,9	2,40
44,750	20,235	20,285	0,640	83	139	2,8	4,77
47,110	19,275	19,323	0,640	45	137	1,5	1,60
48,515	18,749	18,796	0,480	48	137	1,6	1,74

Tabel 6 (lanjutan)

59,170	15,602	15,641	0,640	7	92	0,3	0,82
61,305	15,109	15,146	0,960	8	90	0,3	1,06

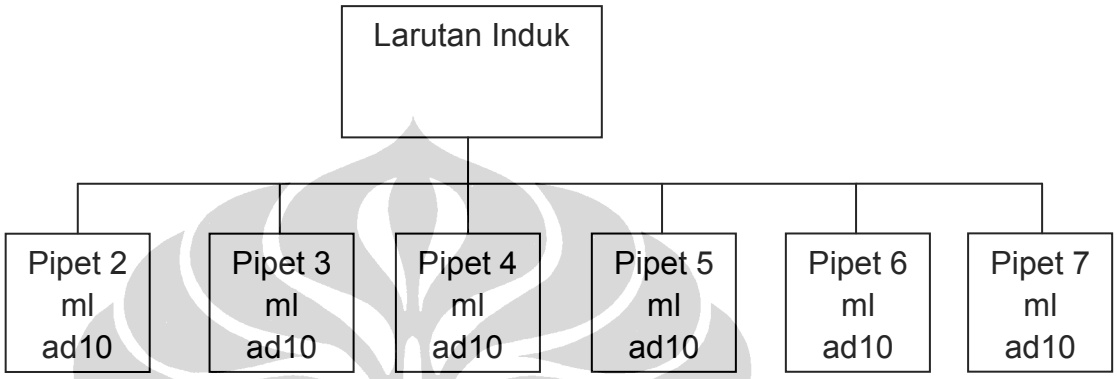
Tabel 7
Perubahan Spektra Serapan Hasil Uji Fourier-Transform Infra Merah

Gugus	Ibuprofen	Dispersi padat 1:1/2	Dispersi padat 1:2	Campuran fisik 1:2	PEG 6000
OH Karboksilat	2400-3200 cm^{-1}	2400-3000 cm^{-1}	2400-3000 cm^{-1}	2400-3060 cm^{-1}	2880 cm^{-1}
C=O Karboksilat	1721 cm^{-1}	1720 cm^{-1}	1720 cm^{-1}	1720 cm^{-1}	
CH_2	1470 cm^{-1}				1470 cm^{-1}
C=C Aromatis	1440 dan 1320 cm^{-1}				
CH_3	1230 cm^{-1}	1100 cm^{-1}	1100 cm^{-1}	1100 cm^{-1}	1100 cm^{-1}
Subtitusi Para Cincin Aromatis	870 dan 780 cm^{-1}	950 cm^{-1}	950 cm^{-1}	950 cm^{-1}	950 cm^{-1}

LAMPIRAN

Lampiran 1
Perhitungan Kurva Kalibrasi Larutan Standar Ibuprofen dengan Larutan NaOH 0,1 N

Skema pembuatan larutan standar ibuprofen:



Perhitungan kurva kalibrasi larutan standar ibuprofen

1. Konsentrasi untuk larutan induk
   - Ibuprofen : $\frac{50{,}2 \text{ mg}}{250 \text{ ml}} \times 1000 = 200{,}8$ ppm
2. Konsentrasi untuk kurva kalibrasi
   - Pipet 2 ml : $\frac{2 \text{ ml}}{10 \text{ ml}} \times 1000 \text{ ppm} = 40{,}16$ ppm
   - Pipet 3 ml : $\frac{3 \text{ ml}}{10 \text{ ml}} \times 1000 \text{ ppm} = 60{,}24$ ppm
   - Pipet 4 ml : $\frac{4 \text{ ml}}{10 \text{ ml}} \times 1000 \text{ ppm} = 80{,}32$ ppm
   - Pipet 5 ml : $\frac{5 \text{ ml}}{} \times 1000 \text{ ppm} = 100{,}4$ ppm

10 ml

- Pipet 6 ml : $\frac{6 \text{ ml}}{10 \text{ ml}} \times 1000 \text{ ppm} = 120{,}48 \text{ ppm}$

- Pipet 7 ml : $\frac{7 \text{ ml}}{10 \text{ ml}} \times 1000 \text{ ppm} = 140{,}56 \text{ ppm}$

Lampiran 2
Sertifikat Analisis Ibuprofen

湖北百科格莱制药有限公司
HUBEI GRANULES-BIOCAUSE PHARMACEUTICAL CO., LTD

Certificate of Analysis

No.:080536
Product: Ibuprofen(45Grade)
Batch No: C100-0804169M
Manufacturing Date: 2008.04.24
Expiry Date: 2013.04.23
Test Standard: USP29
Quantity: 1100kg
Testing Date: 2008.04.25

Items	Specifications	Results
Characteristics	White crystalline powder	Conforms
Solubility	Practically insoluble in water; very soluble in alcohol, in methanol, in acetone, and in chloroform; slightly soluble in ethyl acetate.	Conforms
Identification: A. IR B. UV C. HPLC	A. Sample IR spectrum corresponds to that of the standard	Conforms
	B. Sample UV spectrum does not differ from that of the standard by more than 3.0%	Conforms
	C. Retention time corresponds to that of the standard	Conforms
Water Content	Not more than 1.0%	0.14%
Heavy Metals	Not more than 0.002%	<0.002%
Residual on Ignition	Not more than 0.5%	0.02%
Chromatographic Purity	2-[3-(2-methylpropyl)phenyl]propanoic acid: not more than 0.15%	0.02%
	2-[4-(2-methylpropanoyl)phenyl] propanoic acid: not more than 0.15%	Not detected
	2-(4-methylphenyl)propanoic acid: not more than 0.15%	Not detected
	2-(4-ethylphenyl)propanoic acid: not more than 0.15%	0.01%
	2-(4-propylphenyl)propanoic acid: not more than 0.15%	0.01%
	2-(4-butylphenyl)propanoic acid: not more than 0.1%	Not detected
	Any unknown impurity: not more than 0.05%	0.02%
	Total impurities: not more than 0.6%	0.07%
4-Isobutylacetophenone	Not more than 0.1%	Not detected
Assay (Dry Basis)	97.0% - 103.0%	100.2%
ADDITIONAL TESTS		
Residual solvents (Petroleum ether)	Not more than 250ppm	28ppm
Bulk Density	0.20-0.50 g/ml	0.31g/ml
Tapped Density	0.40-0.70g/ml	0.52g/ml
Median Particle Size	30-60um	46.00um
Conclusion: The product meets USP29 specifications.		

Qc supervisor: 曹晓燕 Checked by: 胡士凤 Analyst(s): 张红霞 唐志芳 余金枝 钟琴

Lampiran 3
Sertifikat Analisis PEG 6000

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Up Margaret

HASIL PEMERIKSAAN

BRATACO CHEMIKA

Nama Bahan : P.E.G. 6000
Batch : J 0809/8 (612905)
Ex : Japan

Jenis pemeriksaan	*Syarat*	*Hasil*
Pemerian	serbuk atau flake putih, tidak berbau	flake
Kelarutan	Mudah larut dalam air, dalam etanol, dan dalam kloroform	sesuai
Titik Lebur	53-60 °C	58.0
Kadar air	<1,0%	0.3%
pH larutan 5% b/v	4.5-7.5	7.0

Kesimpulan : *Memenuhi syarat*

Cikarang, 5 Mei 2008

Pemeriksa

Nur Komarewati
Analis

PT. BRATACO CHEMIKA
Telp. 8934139
Fax. 8934659
JABABEKA
CIKARANG

Apoteker
S.I.K. 3836/B