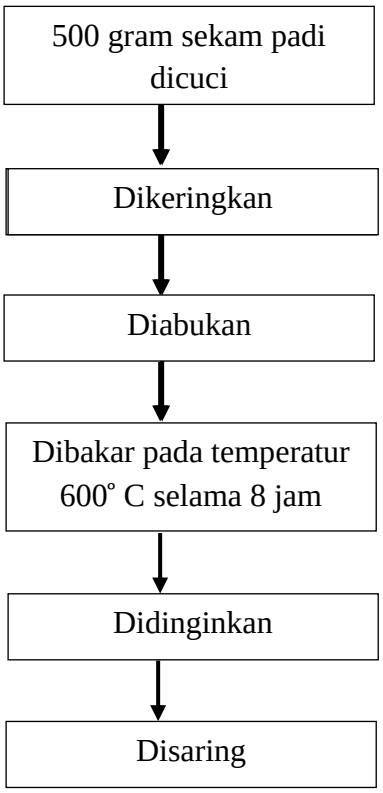
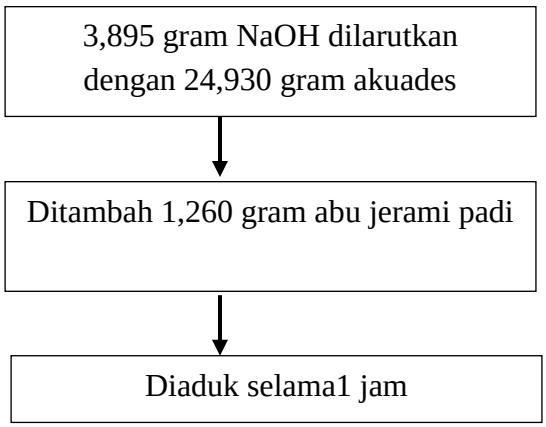
LAMPIRAN 1
Skema Prosedur Kerja

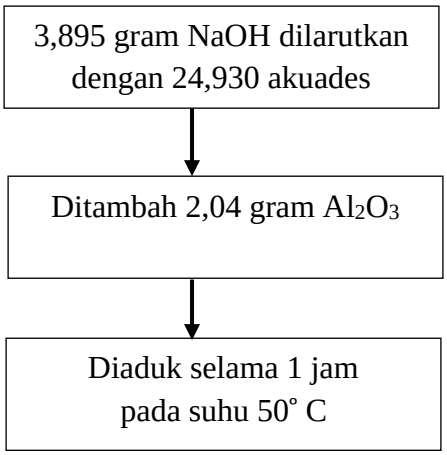
A. Pembuatan Abu Jerami Padi



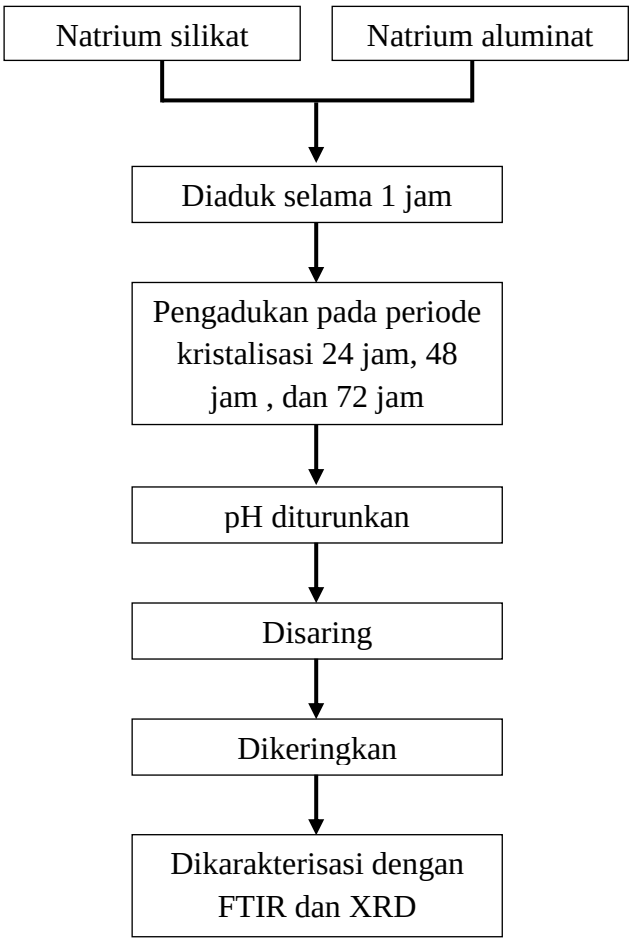
B. Pembuatan Natrium Silikat



C. Pembuatan Natrium Aluminat



D. Sintesis Zeolit Dari Abu Jerami Padi Dengan Variabel Bebas Waktu Aging

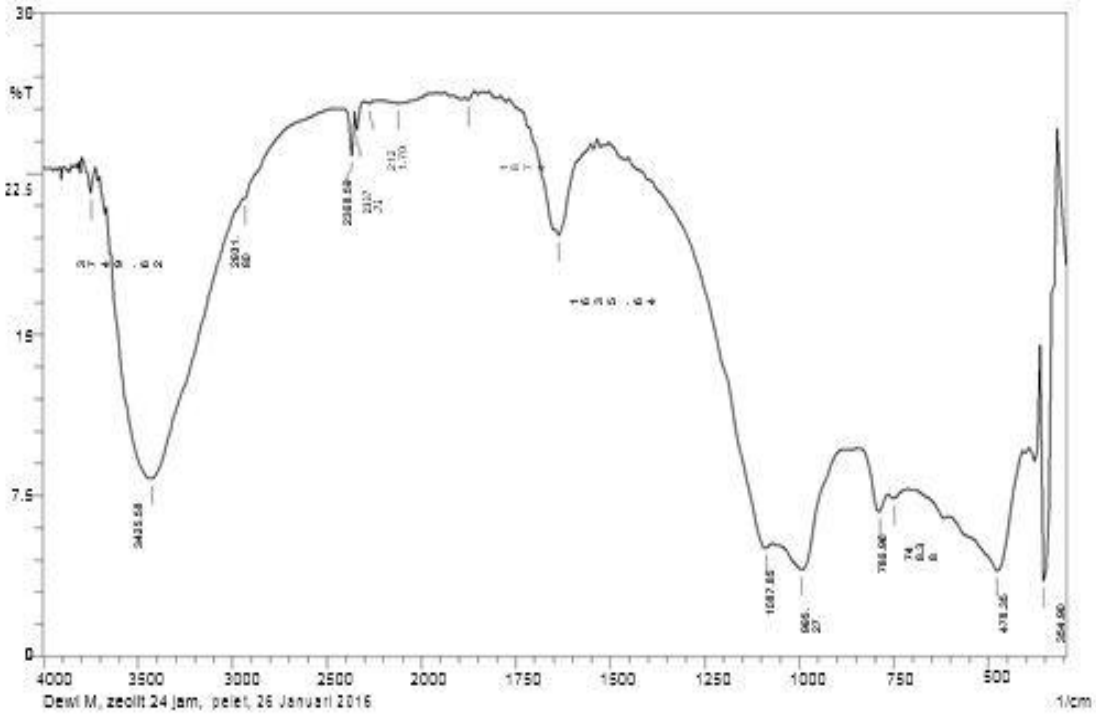


Data Spektrum FTIR

Spektrum FTIR Waktu Aging 24 Jam

Lab. Kimia Organik FMIPA - UGM

SHIMADZU

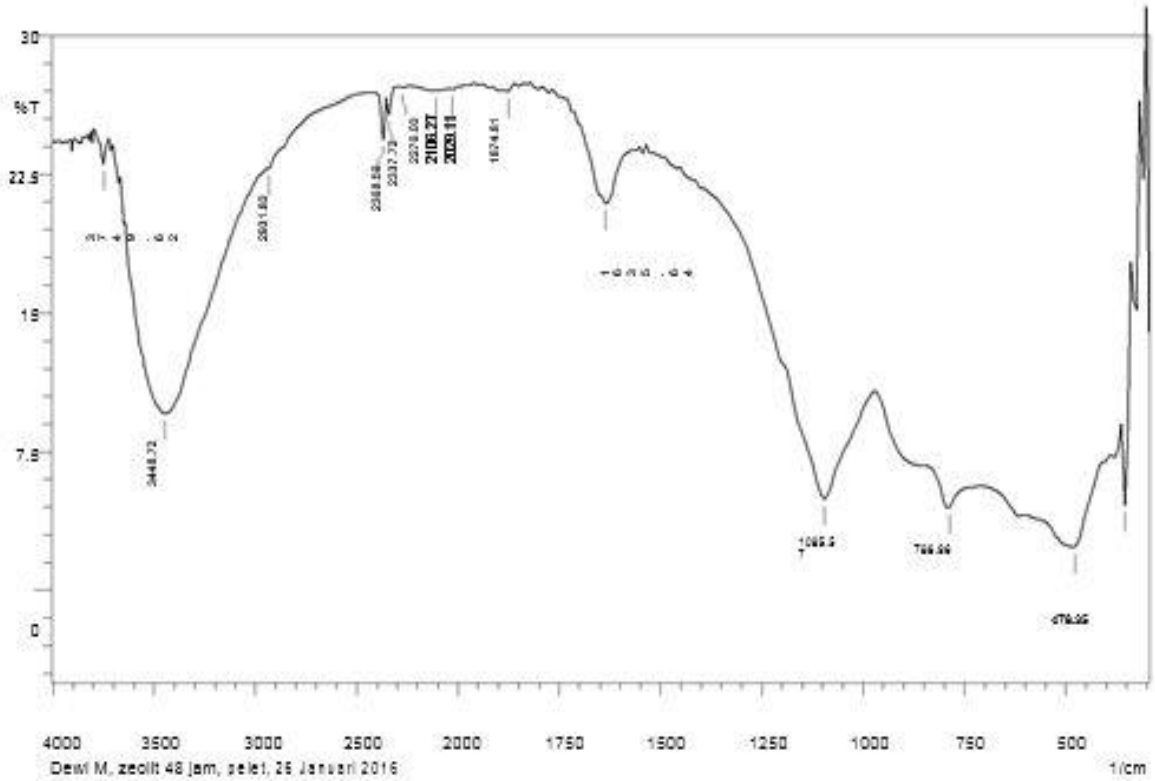


	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	354.9	3.504	12.66	362.62	316.33	47.552	14.914
2	478.35	3.978	4.435	601.79	393.48	256.31	28.058
3	748.38	7.335	0.303	763.81	717.52	51.939	0.377
4	786.96	6.759	1.203	840.96	771.53	76.376	1.909
5	995.27	4.052	2.692	1064.71	887.26	216.394	13.767
6	1087.85	5.073	0.906	1450.47	1072.42	320.535	1.267
7	1635.64	19.606	4.858	1759.08	1558.48	129.363	7.348
8	1874.81	25.917	0.235	1913.39	1867.09	27.079	0.114
9	2121.7	25.77	0.249	2214.28	1962.62	135.884	0.694
10	2276	25.767	0.092	2299.15	2229.71	40.808	0.039
11	2337.72	24.518	1.007	2353.16	2306.86	27.674	0.315
12	2368.59	23.325	2.084	2399.45	2353.16	28.275	0.739
13	2931.8	21.33	0.066	2939.52	2453.45	299.262	0.01
14	3425.58	8.266	12.797	3664.75	2947.23	629.712	145.296
15	3749.62	21.564	1.115	3768.19	3734.19	35.225	0.497

Spektrum FTIR Waktu Aging 48 Jam

Lab. Kimia Organik FMIPA - UGM

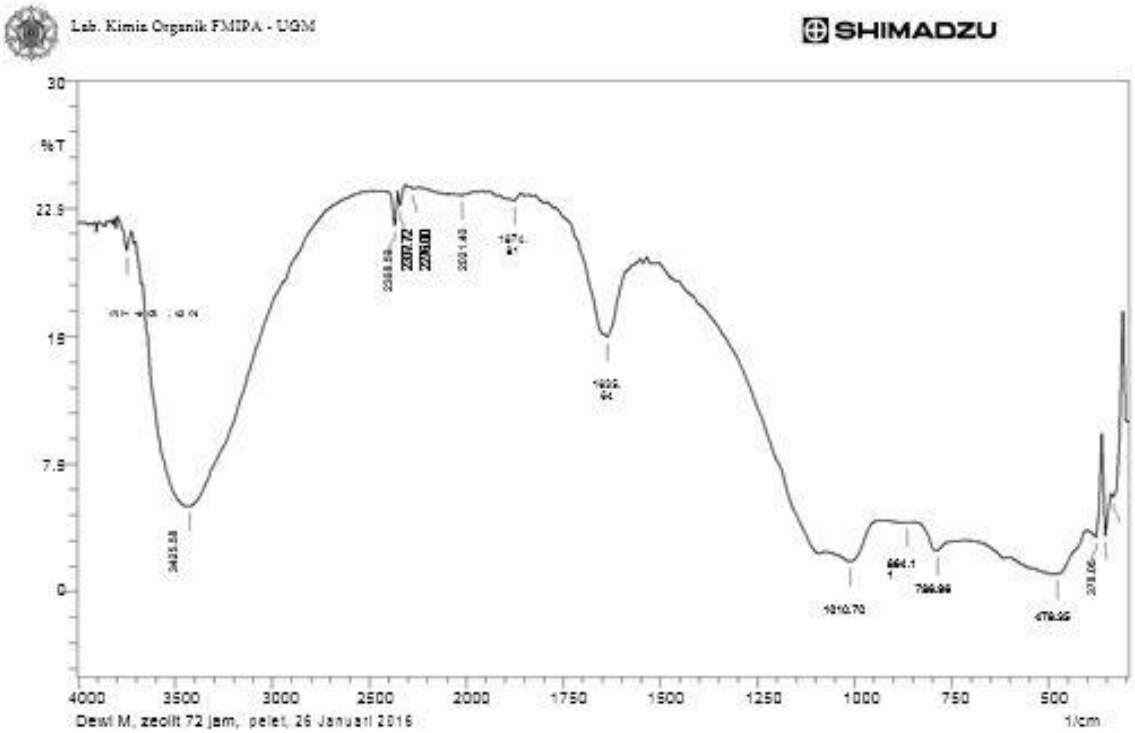
SHIMADZU



Dewi M, zeolit 48 jam, pelet, 26 Januari 2016

	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	354.9	4.584	7.307	362.62	339.47	24.368	4.695
2	478.35	2.322	3.577	594.08	393.48	284.868	31.992
3	786.96	4.483	2.679	964.41	709.8	304.049	20.293
4	1095.57	4.919	8.98	1450.47	972.12	432.966	50.471
5	1635.64	20.903	3.902	1759.08	1573.91	115.785	5.028
6	1874.61	26.946	0.271	1913.39	1867.09	26.288	0.128
7	2029.11	27.08	0.05	2036.83	1982.82	30.55	0.045
8	2106.27	27.008	0.115	2229.71	2059.98	96.286	0.208
9	2276	27.158	0.076	2291.43	2245.14	26.166	0.026
10	2337.72	25.673	1.117	2353.16	2299.15	31.044	0.325
11	2368.59	24.368	2.332	2399.45	2353.16	27.314	0.782
12	2931.8	22.799	0.144	2947.23	2453.45	293.38	0.045
13	3448.72	9.542	12.938	3664.75	2947.23	592.626	128.874
14	3749.62	23.044	1.529	3788.19	3726.47	38.318	0.716

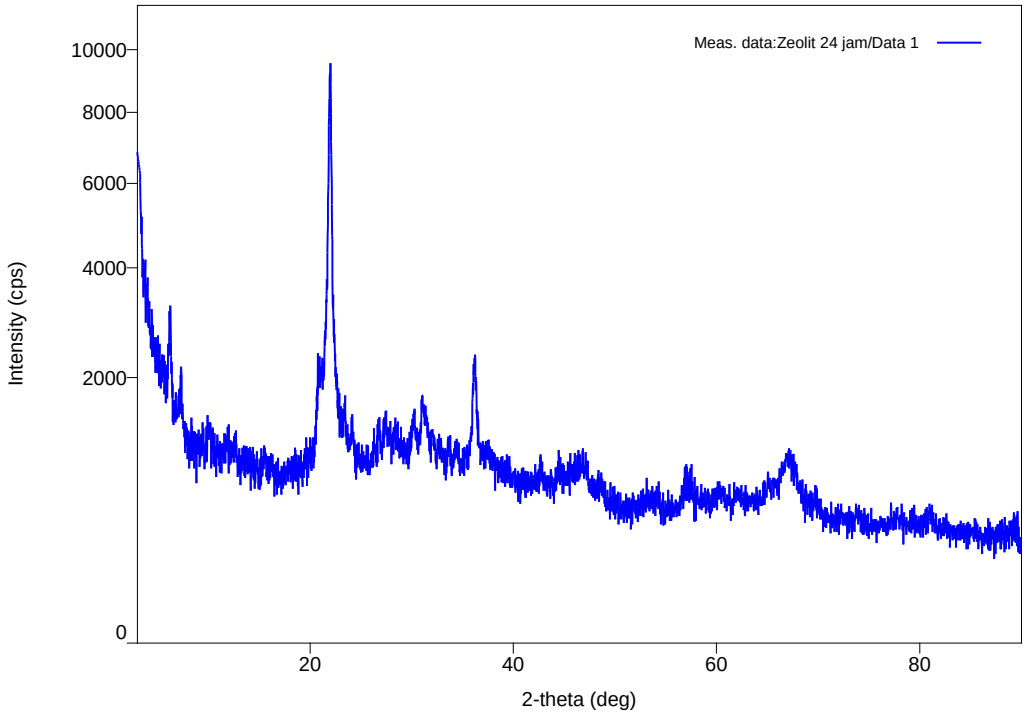
Spektrum FTIR Waktu Aging 72 Jam



	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	331.76	5.521	2.903	339.47	308.61	33.331	3.852
2	354.9	3.283	4.82	362.62	339.47	31.27	4.173
3	378.05	3.193	1.144	393.48	370.33	33.105	1.472
4	478.35	1.014	1.969	601.79	401.19	360.017	46.526
5	786.96	2.387	1.224	840.96	717.52	188.203	8.034
6	864.11	4.048	0.041	910.4	848.68	85.83	0.247
7	1010.7	1.769	1.472	1072.42	948.96	199.381	14.396
8	1635.64	14.929	5.573	1789.94	1558.48	168.03	10.975
9	1874.61	22.95	0.271	1936.53	1867.09	44.153	0.242
10	2021.4	23.256	0.126	2052.26	1982.82	43.693	0.093
11	2276	23.662	0.094	2306.86	2252.86	33.755	0.043
12	2337.72	22.641	0.997	2353.16	2314.58	24.459	0.34
13	2368.59	21.469	2.033	2399.45	2353.16	29.904	0.79
14	3425.58	4.989	16.739	3726.47	2507.46	1076.591	282.125
15	3749.62	20.025	1.126	3788.19	3734.19	36.801	0.505

LAMPIRAN 3
Difraktogram XRD

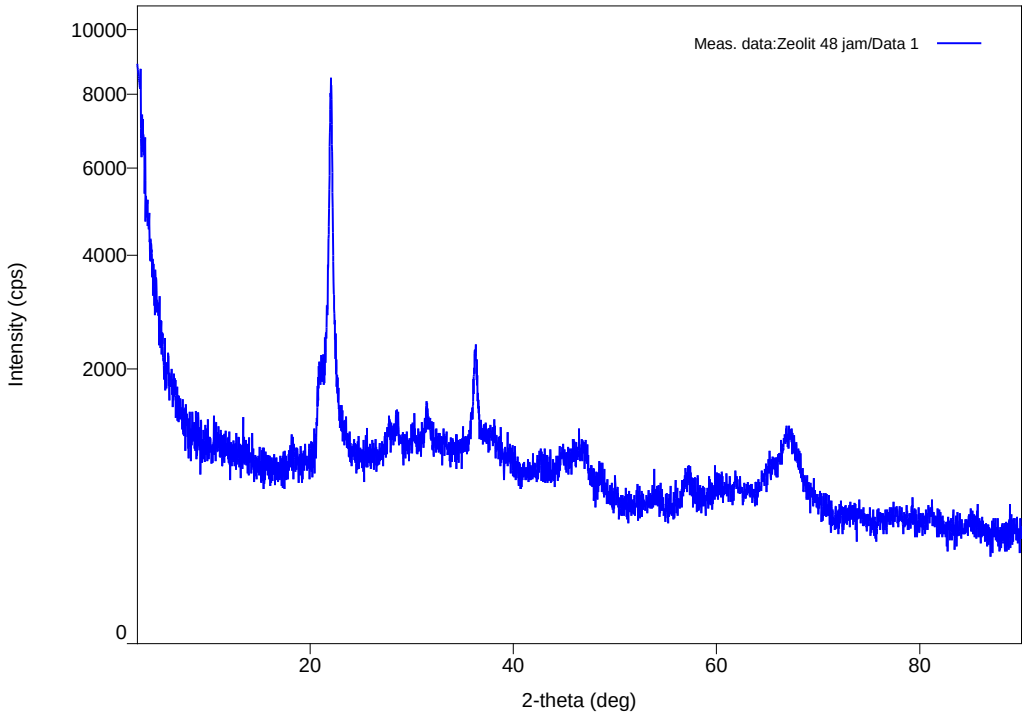
Difraktogram XRD Waktu Aging 24 Jam



Peak list

No.	2-theta (deg)	d(ang.)	Height (cps)	FWHM (deg)	Int. I(cps deg)	Int. W(deg)	Asym. factor
1	1.64(5)	53.9(17)	17236(379)	4.9(6)	127586(84207)	7(5)	5(6062136)
2	20.88(2)	4.251(4)	701(76)	1.45(11)	1673(91)	2.4(4)	0.20(5)
3	21.979(9)	4.0408(16)	5273(210)	0.370(10)	2889(78)	0.55(4)	1.44(18)
4	27.24(6)	3.271(7)	217(42)	3.7(3)	1545(74)	7.1(17)	0.22(5)
5	31.34(4)	2.852(4)	287(49)	1.24(10)	481(32)	1.7(4)	2.7(12)
6	36.11(4)	2.485(2)	923(88)	0.44(5)	710(22)	0.77(10)	0.5(2)
7	46.36(9)	1.957(3)	125(32)	2.0(2)	314(39)	2.5(10)	1.0(6)
8	66.89(6)	1.3977(11)	284(49)	2.29(8)	992(31)	3.5(7)	0.78(7)

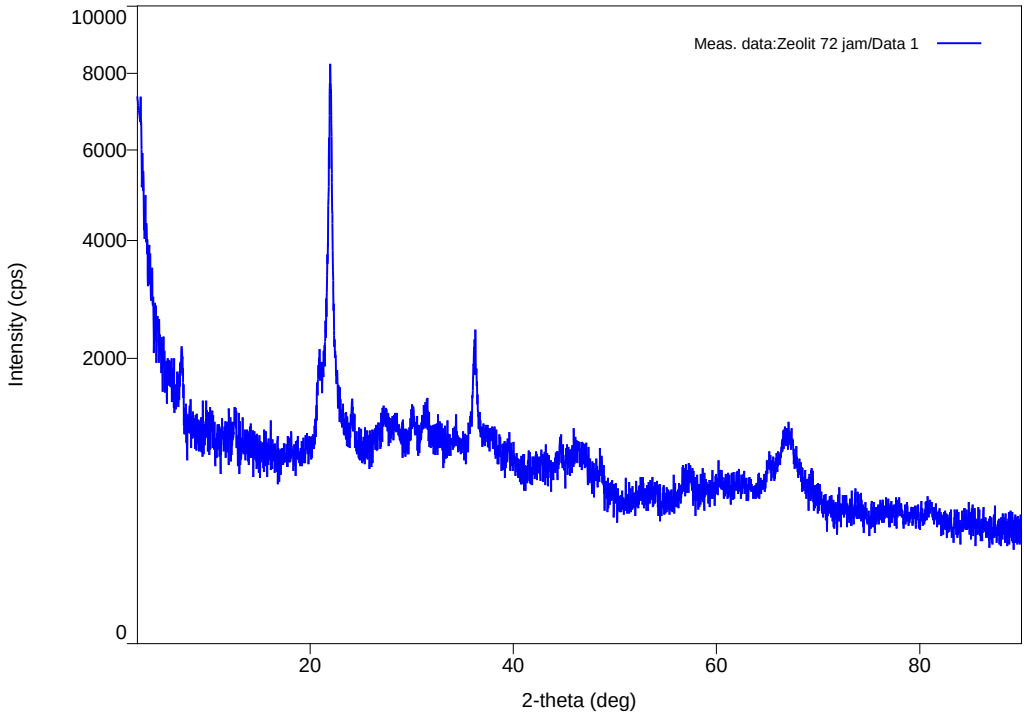
Difraktogram XRD Waktu Aging 48 Jam



Peak list

No.	2-theta (deg)	d(ang.)	Height (cps)	FWHM (deg)	Int. I(cps deg)	Int. W(deg)	Asym. factor
1	20.934(15)	4.240(3)	692(76)	1.27(7)	1501(67)	2.2(3)	0.22(4)
2	22.068(8)	4.0248(14)	4726(198)	0.380(9)	2761(57)	0.58(4)	1.45(14)
3	28.43(13)	3.136(14)	163(37)	1.16(12)	201(28)	1.2(5)	2.3(12)
4	31.45(3)	2.843(2)	238(45)	0.42(7)	132(19)	0.55(18)	0.4(5)
5	36.31(3)	2.4724(19)	766(80)	0.46(3)	435(47)	0.57(12)	1.9(6)
6	38.09(8)	2.360(5)	106(30)	1.5(5)	190(44)	1.8(9)	4(3)
7	46.88(4)	1.9364(15)	207(42)	2.52(13)	574(40)	2.8(7)	3.7(12)
8	67.14(8)	1.3930(15)	313(51)	2.20(7)	734(32)	2.3(5)	1.3(2)

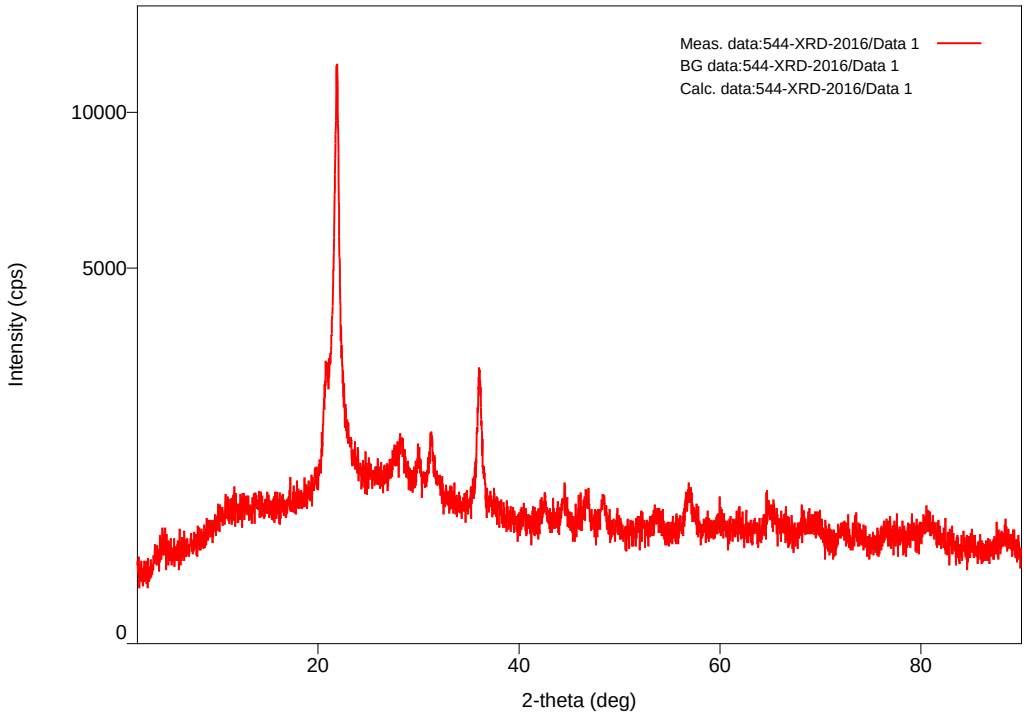
Difraktogram XRD Waktu Aging 72 Jam



Peak list

No.	2-theta(deg)	d(ang.)	Height (cps)	FWHM (deg)	Int. I (cps deg)	Int. W (deg)	Asym. factor
1	20.874(13)	4.252(3)	505(65)	0.34(5)	279(31)	0.55(13)	0.61(19)
2	21.998(10)	4.0374(18)	4693(198)	0.383(12)	2941(40)	0.63(3)	1.23(16)
3	46.15(11)	1.965(4)	139(34)	2.6(3)	404(60)	2.9(11)	1.1(6)
4	66.93(4)	1.3970(7)	311(51)	2.52(11)	1068(35)	3.4(7)	1.1(2)

Difraktogram XRD Abu Jerami Padi



Peak list

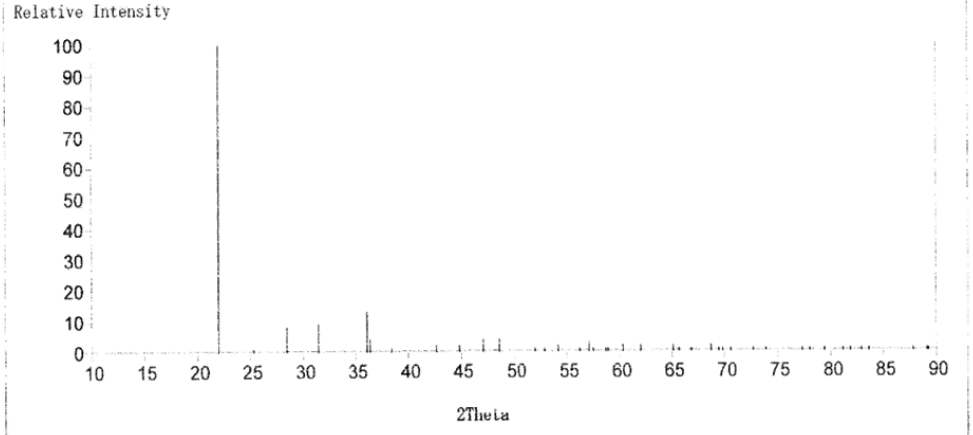
No.	2-theta (deg)	d(ang.)	Height (cps)	FWHM (deg)	Int. I (cps deg)	Int. W (deg)	Asym. factor
1	4.66(15)	18.9(6)	79(26)	1.17(14)	104(15)	1.3(6)	1.6(10)
2	20.72(2)	4.283(5)	866(85)	0.74(8)	1059(124)	1.2(3)	0.31(6)
3	21.879(9)	4.0591(16)	7040(242)	0.459(10)	5167(119)	0.73(4)	1.34(12)
4	31.17(2)	2.8668(18)	334(53)	0.52(6)	216(22)	0.65(17)	0.4(3)
5	36.02(2)	2.4916(16)	1401(108)	0.41(2)	913(19)	0.65(6)	0.9(2)
6	46.49(8)	1.952(3)	75(25)	1.7(3)	135(30)	1.8(10)	0.2(2)
7	56.84(8)	1.619(2)	206(41)	0.84(7)	192(19)	0.9(3)	0.8(3)
8	64.83(16)	1.437(3)	114(31)	0.79(14)	106(20)	0.9(4)	0.6(5)
9	80.61(6)	1.1909(7)	88(27)	1.13(17)	113(19)	1.3(6)	0.7(6)

LAMPIRAN 4
Standar JCPDS

PDF Card No.: 00-039-1425 Quality:S

Sub-File Name:	Inorganic, Mineral, Alloy&Metal, Cement&Hydration Product, Common Phase, Educational P...
Formula:	Si 02
Name:	Cristobalite, syn I/Ic (RIR)= ---
Crystal System:	Tetragonal Space Group: P41212(92) Dmeas:
Cell Parameters:	a= 4.9732 b= 4.9732 c= 6.9236
	Alpha= 90.000 Beta= 90.000 Gamma= 90.000
	Volume= 171.239 Z= 4
Reference:	Wong-Ng, W., McMurdie, H., Paretzkin, B., Hubbard, C., Dragoo, A., NBS, Gaithersburg, ...
Radiation:	CuKalpha1 Wavelength= 1.54060
2Theta range:	21.98 - 89.28

Database comments: Additional Patterns: See PDF 01-082-1404, 01-082-1410, 01-075-0923, 01-076-0935, 01-076-0936, 01-076-0937, 01-077-1315, 01-077-1316 and 01-077-1317. To replace 00-011-0695 and validated by calculated pattern. Color: Colorless. Polymorphism/Phase Transition: There are a number of other forms of ''Si 02''. Sample Preparation: Cristobalite was prepared by the Trans Tech Company using Berkeley 5 micron MIN-U-SIL(R). A two kilogram sample was heated at 1600 C for eight hours. The sample was



No.	2Theta	d-Value	Intensity	h	k	l	No.	2Theta	d-Value	Intensity	h	k	l
1	21.98	4.040	100.0	1	0	1	21	62.02	1.495	2.0	3	0	2
2	25.32	3.515	1.0	1	1	0	22	65.10	1.432	2.0	3	1	2
3	28.44	3.136	8.0	1	1	1	23	65.65	1.421	1.0	2	0	4
4	31.46	2.841	9.0	1	0	2	24	66.81	1.399	1.0	2	2	3
5	36.08	2.487	13.0	2	0	0	25	68.68	1.366	2.0	2	1	4
6	36.38	2.467	4.0	1	1	2	26	69.42	1.353	1.0	3	2	1
7	38.41	2.342	1.0	2	0	1	27	69.79	1.347	1.0	3	0	3
8	42.66	2.118	2.0	2	1	1	28	70.54	1.334	1.0	1	0	5
9	44.84	2.020	2.0	2	0	2	29	72.69	1.300	1.0	3	1	3
10	47.06	1.929	4.0	1	1	3	30	73.91	1.281	1.0	3	2	2
11	48.61	1.871	4.0	2	1	2	31	77.31	1.233	1.0	2	2	4
12	51.94	1.759	1.0	2	2	0	32	78.02	1.224	1.0	4	0	1
13	52.87	1.730	1.0	0	0	4	33	79.39	1.206	1.0	4	1	0
14	54.16	1.692	2.0	2	0	3	34	81.15	1.184	1.0	3	2	3
15	56.22	1.635	1.0	1	0	4	35	81.96	1.176	1.0	2	1	5
16	57.08	1.612	3.0	3	0	1	36	82.88	1.164	1.0	3	1	4
17	57.51	1.601	1.0	2	1	3	37	83.62	1.155	1.0	3	3	1
18	58.68	1.572	1.0	3	1	0	38	87.84	1.110	1.0	3	3	2
19	58.87	1.567	1.0	2	2	2	39	89.12	1.098	1.0	4	2	1
20	60.30	1.534	2.0	3	1	1	40	89.28	1.096	1.0	1	1	6

Note: 2theta are calculated with wavelength = 1.54059

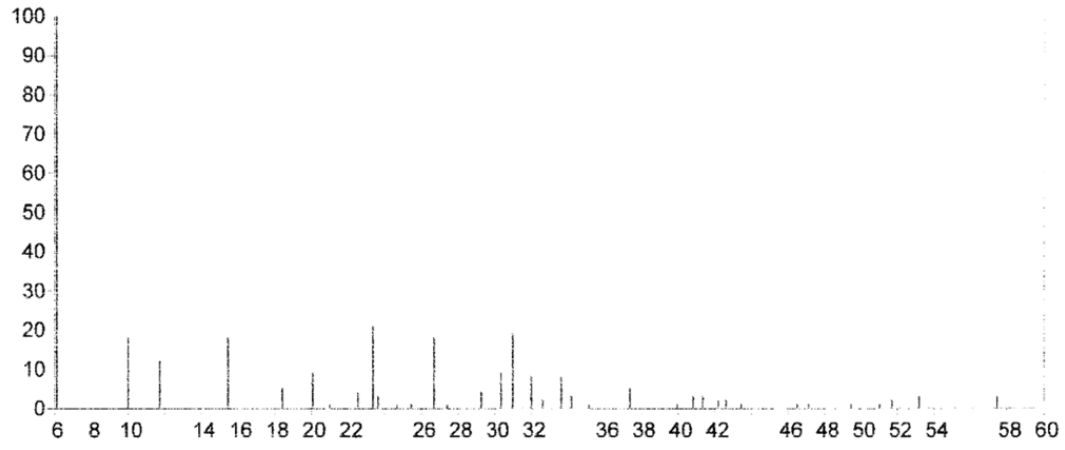
2016-Feb-25 12:33:59 Page-1/1

PDF Card No.: 00-038-0237 Quality:S

Sub-File Name:	Inorganic, Mineral, Zeolite						
Formula:	Na2 Al2 Si2.5 O9 · 6.2 H2 O						
Name:	Zeolite X, (Na)					I/Ic (RIR)= ---	
Crystal System:	Cubic	Space Group: F(0)			Dmeas: 1.930		
Cell Parameters:	a=	24.9900	b=	24.9900	c=	24.9900	
	Alpha=	90.000	Beta=	90.000	Gamma=	90.000	
	Volume=	15606.257	Z=	---			
Reference:	Milton, R., 2,882,244. U.S. Patent(1959).						
Radiation:	CuKalpha	Wavelength= 1.54180					
2Theta range:	6.10 - 57.44						

Database comments: General Comments: ''Na2 O'' = 0.9+/-0.2, ''Si O2'' = 2.5+/-0.2.

Relative Intensity



No.	2Theta	d-Value	Intensity	h	k	l	No.	2Theta	d-Value	Intensity	h	k	l
1	6.10	14.470	100.0	1	1	1	21	34.20	2.620	3.0	9	3	1
2	9.99	8.850	18.0	2	2	0	22	35.16	2.550	1.0	8	4	4
3	11.73	7.540	12.0	3	1	1	23	37.38	2.404	5.0	10	2	2
4	15.45	5.730	18.0	3	3	1	24	39.97	2.254	1.0	11	1	1
5	18.43	4.810	5.0	5	1	1	25	40.82	2.209	3.0	8	8	0
6	20.07	4.420	9.0	4	4	0	26	41.34	2.182	3.0	9	7	1
7	20.98	4.230	1.0	5	3	1	27	42.17	2.141	2.0	10	6	0
8	22.51	3.946	4.0	6	2	0	28	42.61	2.120	2.0	9	7	3
9	23.34	3.808	21.0	5	3	3	29	43.41	2.083	1.0	12	0	0
10	23.61	3.765	3.0	6	2	2	30	46.48	1.952	1.0	10	8	0
11	24.65	3.609	1.0	4	4	4	31	47.10	1.928	1.0	10	8	2
12	25.43	3.500	1.0	7	1	1	32	49.44	1.842	1.0	12	6	2
13	26.68	3.338	18.0	6	4	2	33	51.01	1.789	1.0	13	5	1
14	27.39	3.253	1.0	7	3	1	34	51.69	1.767	2.0	14	2	0
15	29.25	3.051	4.0	7	3	3	35	53.18	1.721	3.0	11	9	3
16	30.34	2.944	9.0	6	6	0	36	57.44	1.603	3.0	11	11	1
17	30.97	2.885	19.0	7	5	1							
18	32.01	2.794	8.0	8	4	0							
19	32.62	2.743	2.0	9	1	1							
20	33.63	2.663	8.0	6	6	4							

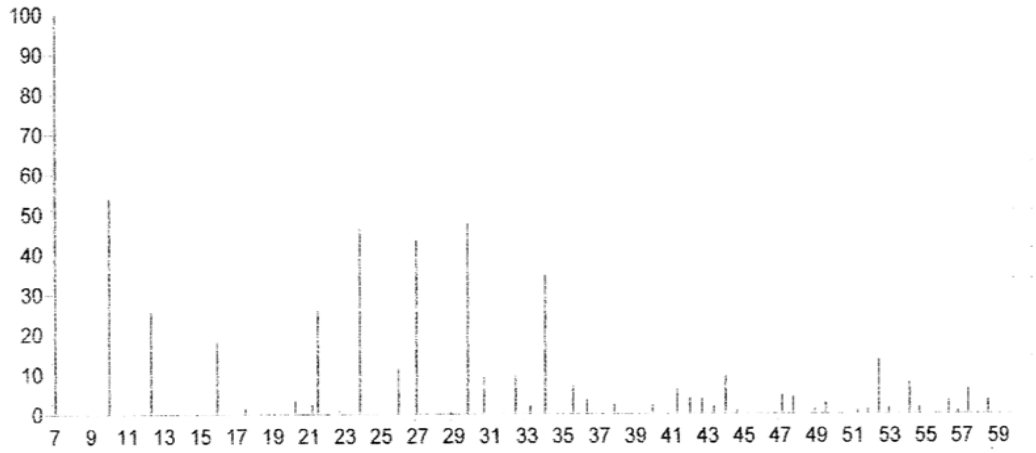
Note: 2theta are calculated with wavelength = 1.54059

2016-Feb-25 12:55:09 Page-1/1

PDF Card No.: 00-039-0222 Quality:C

Sub-File Name:	Inorganic, Mineral, Zeolite
Formula:	Na96 Al96 Si96 O384 · 216 H2 O
Name:	Zeolite A, (Na) I/Ic (RIR)= ---
Crystal System:	Cubic Space Group: Fm-3c(226) Dmeas:
Cell Parameters:	a= 24.6100 b= 24.6100 c= 24.6100
	Alpha= 90.000 Beta= 90.000 Gamma= 90.000
	Volume= 14905.099 Z= ---
Reference:	von Ballmoos, R. Collection of Simulated XRD Powder Patterns For Zeolites(1984).
Radiation:	CuKalpha Wavelength= 1.54180
2Theta range:	7.18 58.56
Database comments:	

Relative Intensity



No.	2Theta	d-Value	Intensity	h	k	l	No.	2Theta	d-Value	Intensity	h	k	l
1	7.18	12.305	100.0	2	0	0	21	37.97	2.368	2.3	10	2	2
2	10.16	8.701	54.1	2	2	0	22	40.10	2.247	2.1	10	4	2
3	12.45	7.104	25.4	2	2	2	23	41.48	2.175	6.1	8	8	0
4	16.09	5.503	17.8	4	2	0	24	42.15	2.142	3.9	10	4	4
5	17.61	5.023	1.3	4	2	2	25	42.82	2.110	3.6	10	6	0
6	20.40	4.350	3.3	4	4	0	26	43.47	2.080	1.8	10	6	2
7	21.34	4.160	2.3	5	3	1	27	44.12	2.051	9.4	12	0	0
8	21.65	4.102	26.1	6	0	0	28	44.76	2.023	0.7	12	2	0
9	22.84	3.891	0.7	6	2	0	29	47.25	1.922	4.5	10	8	0
10	23.97	3.710	46.3	6	2	2	30	47.86	1.899	4.1	10	8	2
11	26.09	3.413	11.3	6	4	0	31	49.07	1.855	1.2	12	4	4
12	27.09	3.289	43.3	6	4	2	32	49.67	1.834	2.6	10	8	4
13	29.00	3.076	0.5	8	0	0	33	51.41	1.776	0.7	8	8	8
14	29.92	2.984	47.6	6	4	4	34	51.97	1.758	1.1	12	6	4
15	30.81	2.900	9.6	6	6	0	35	52.55	1.740	13.4	10	10	0
16	32.52	2.751	9.4	8	4	0	36	53.11	1.723	1.4	14	2	2
17	33.34	2.685	1.9	8	4	2	37	54.23	1.690	7.7	12	8	2
18	34.16	2.623	34.6	6	6	4	38	54.79	1.674	1.6	14	4	2
19	35.71	2.512	6.9	8	4	4	39	56.40	1.630	3.2	10	8	8
20	36.48	2.461	3.4	10	0	0	40	56.94	1.616	0.7	14	6	0

Note: 2theta are calculated with wavelength = 1.54059

2016-Feb-25 12:32:39 Page-1/2

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No.	2Theta	d-Value	Intensity	h	k	l	No.	2Theta	d-Value	Intensity	h	k	l
41	57.48	1.602	6.7	10	10	6							
42	58.56	1.575	3.4	12	10	0							

Note: 2theta are calculated with wavelength = 1.54059

2016-Feb-25 12:32:39 Page-2/2

LAMPIRAN 5
Interpretasi Spektrum Inframerah Zeolit Sintesis

Frekuensi Daerah Serapan (cm^{-1})	Tipe Vibrasi
3650-3200	Gugus -OH
3500-3200	Vibrasi rentang -OH bebas
3436,9	Vibrasi rentang dsn tekuk dsri molekul H_2O
3448,5	Pita renggangan -OH
3448,5	Serapan rentangan asimetri -NH
3440,8	Serapan rentangan ikatan O-H
2923,9	Serapan vibrasi ulur simetri -CH-
2120-2230	Vibrasi ikatan -Osi-H
2235-2285	Vibrasi rentang Si-H untuk subtitusi trihalida
1639,4	Serapan rentangan -NH
2550-1560	Vibrasi rentangan S-H, Gugus aril -SH
1624	Vibrasi rentang dan tekuk dari molekul H_2O
1300-1475	Lentur $(CH)_3$-CH
1100-980	Regangan asimetri Al dalam situs tetrahedral
1250-950	Regangan asimetri tetrahedral luar
920-914	Gugus Al-O dalam silika alumina
900-700	Gugus S-O, Vibrasi S-O
750,3	Serapan vibrasi rentang simetri TO4 (T= Si atau Al)
1000-650	Lentur Ar-H , C=C-H (luar bidang)
720-650	Symetric stretch
570-500	Serapan rentangan asimetri TO4
-560	Serapan vibrasi cincin ganda
650-500	Struktur dengan dua cincin
580	Vibrasi tetrahedral dia cincin lingkar luar dalam struktur framework
434	Adanya ikatan Si-O
445	Serapan vibrasi tekuk T-O
470,6	Serapan vibrasi tekuk ikatan Si-O dari lapisan silika
420-500	Ikatan T-O tetrahedral luar
300-420	Pembukaan pori

(Sumber: Kurniawan,2010)