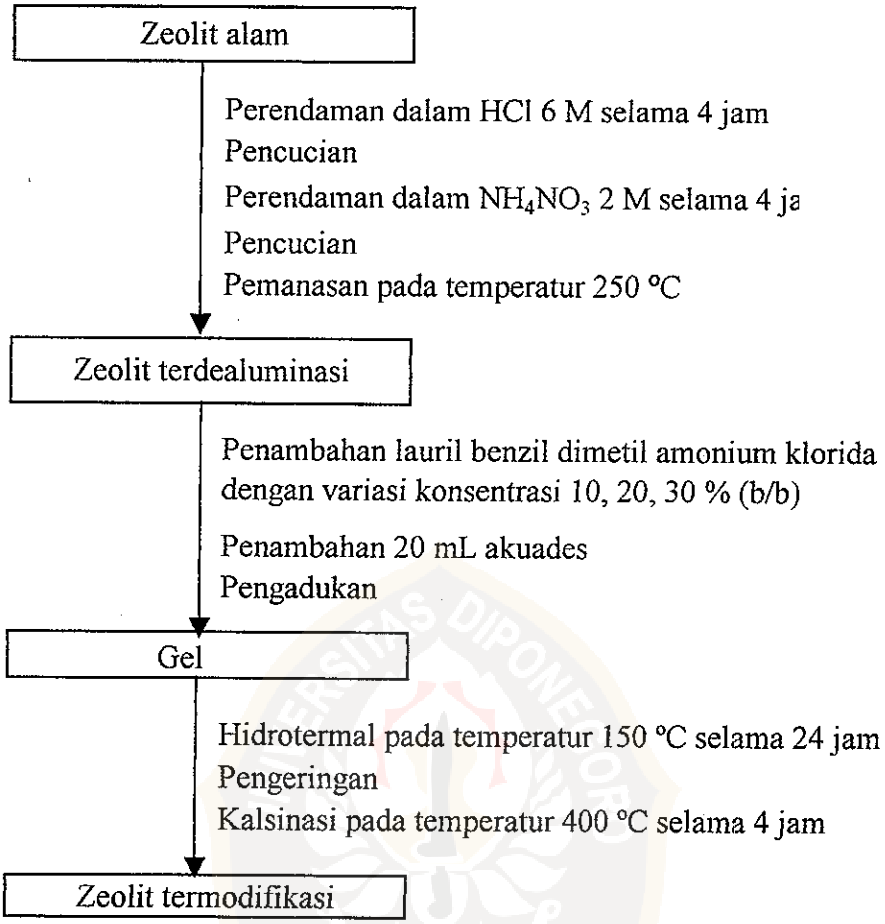
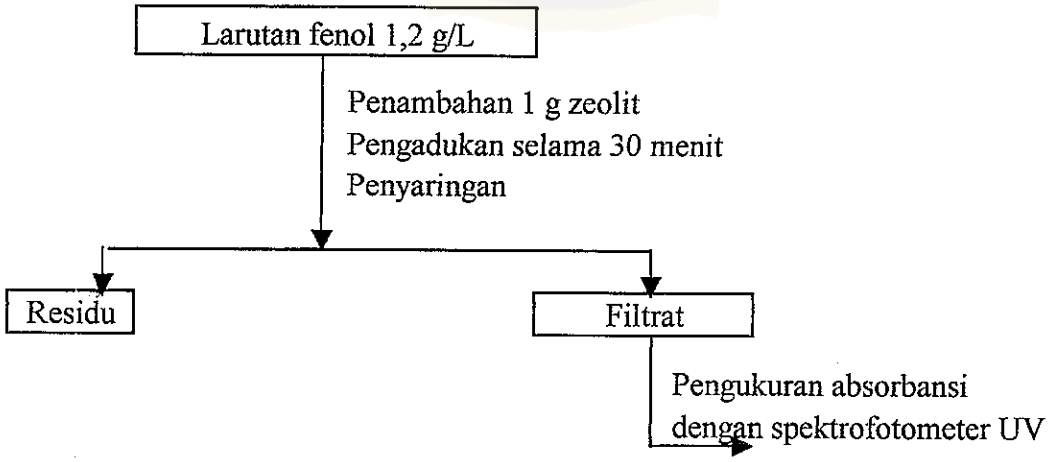
Lampiran 1. Skema Kerja

Modifikasi Zeolit Alam

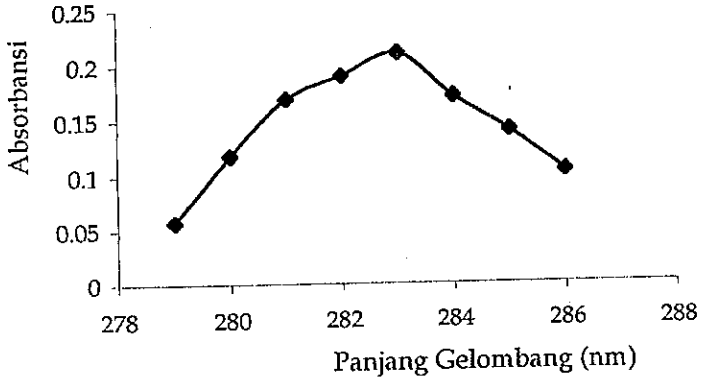


Uji adsorpsi

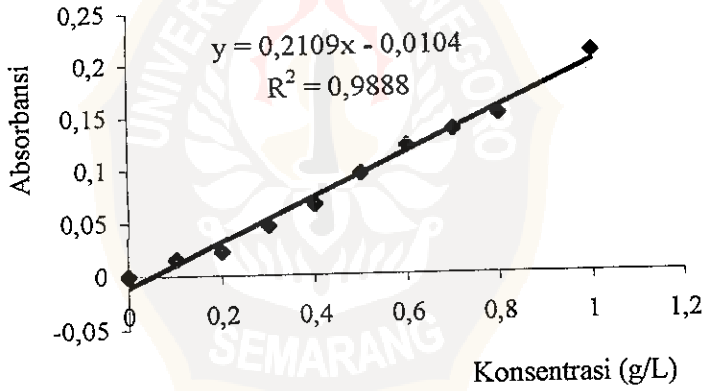


Lampiran 2. Penentuan Konsentrasi Adsorbat

1. Penentuan panjang gelombang optimum



2. Pembuatan kurva standar larutan fenol pada λ : 283 nm



3. Tabel hasil perhitungan

Adsorben	Absorbansi	Konsentrasi fenol awal (g/L)	Konsentrasi fenol akhir (g/L)	Konsentrasi fenol teradsorpsi (g/L)
AZ	0,253	1,20	1,25	-
MZ-1	0,171	1,20	0,86	0,34
MZ-2	0,142	1,20	0,72	0,48
MZ-3	0,159	1,20	0,80	0,40

Lampiran 4. Data print out luas permukaan dan ukuran pori NZ

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = f.dat

User ID	=	User Setup	= 3
Sample ID	= F	Sample Cell Number	= 2
Sample Weight	= 0.1453 g	Sample Volume	= 0.1553 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 749.71 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Wed Mar 12 13:09:23 2003	Analysis End Time	= Wed Mar 12 14:12:59 2003

Multi BET (Adsorption)

P/Po	BET Transform (1/{W[Po/P - 1]})
0.094311	12.811575
0.146357	18.655964
0.198638	25.196825
0.249343	31.989679
0.296186	38.994054

Slope	=	129.512325
Intercept	=	0.019969
Correlation Coefficient	=	0.998589
BET C	=	6486.744331
Surface Area	=	3.905146 sq m
Specific Surface Area	=	26.885315 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = f.dat

User ID	=	User Setup	= 3
Sample ID	= F	Sample Cell Number	= 2
Sample Weight	= 0.1453 g	Sample Volume	= 0.1553 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 749.71 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Wed Mar 12 13:09:23 2003	Analysis End Time	= Wed Mar 12 14:12:59 2003

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
651.097579	0.041957	0.001366
188.122280	1.112502	0.010464
113.332775	4.612666	0.026138
79.405124	12.580726	0.049949
62.830737	18.447173	0.057952
52.796817	35.757195	0.094393
44.067449	49.958148	0.110076
39.452501	62.854089	0.123988
35.511087	59.308570	0.105306
31.664749	129.547408	0.205104
28.550869	183.648251	0.262166
25.996813	267.521201	0.347735
23.812357	345.170081	0.410966
21.860492	438.770225	0.479587
19.965333	547.946974	0.546997
18.563840	683.472891	0.634394
17.480726	758.114762	0.662620
16.290898	858.456911	0.699252
15.187413	1028.976827	0.781375

Total Pore Volume is 24.514343 e-03 cc/g for all pores less than 1031.887345 Angstrom.

Average pore radius is 18.236232 Angstrom.

Lampiran 5. Data print out luas permukaan dan ukuran pori AZ

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = e.dat

User ID	=	User Setup	= 3
Sample ID	= E	Sample Cell Number	= 4
Sample Weight	= 0.1815 g	Sample Volume	= 0.1915 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 749.91 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Mon Mar 17 13:05:51 2003	Analysis End Time	= Mon Mar 17 14:08:28 2003

Multi BET (Adsorption)

P/Po	BET Transform (1/{W[Po/P - 1]})
0.091491	26.531117
0.149089	39.091168
0.201053	50.652880
0.251459	62.583878
0.301605	75.167714

Slope	=	230.914254
Intercept	=	4.867422
Correlation Coefficient	=	0.999557
BET C	=	48.440774
Surface Area	=	2.680240 sq m
Specific Surface Area	=	14.770090 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = e.dat

User ID	=	User Setup	= 3
Sample ID	= E	Sample Cell Number	= 4
Sample Weight	= 0.1815 g	Sample Volume	= 0.1915 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 749.91 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Mon Mar 17 13:05:51 2003	Analysis End Time	= Mon Mar 17 14:08:28 2003

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
395.569675	0.029362	0.000581
181.325667	0.344075	0.003119
107.346890	1.267154	0.006801
81.491960	3.678489	0.014988
63.333155	6.352627	0.020117
52.920259	11.193578	0.029618
44.064798	21.470417	0.047304
38.582034	32.882554	0.063434
34.956286	43.066851	0.075273
31.784903	57.217488	0.090933
28.114071	81.984143	0.115245
25.645931	95.120825	0.121973
23.522736	140.268956	0.164975
21.603088	6.310209	0.006816
20.030398	22.150178	0.022184
18.599271	410.118451	0.381395
17.312448	530.839103	0.459506
16.115710	668.203039	0.538428
15.036253	759.004765	0.570629

Total Pore Volume is 11.098458 e-03 cc/g for all pores less than 525.062313 Angstrom.

Average pore radius is 15.028287 Angstrom.

Lampiran 6. Data print out luas permukaan dan ukuran pori MZ-1

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = a.dat

User ID	=	User Setup	= 3
Sample ID	= A	Sample Cell Number	= 4
Sample Weight	= 0.1554 g	Sample Volume	= 0.1654 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 751.88 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Thu Mar 13 10:07:32 2003	Analysis End Time	= Thu Mar 13 11:05:59 2003

Multi BET (Adsorption)

P/Po	BET Transform (1/{W[Po/P - 1]})
0.103551	23.124604
0.152030	32.788523
0.201777	42.958884
0.251498	53.325598
0.301539	64.474862

Slope	=	208.395617
Intercept	=	1.222105
Correlation Coefficient	=	0.999775
BET C	=	171.521859
Surface Area	=	2.581081 sq m
Specific Surface Area	=	16.613655 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = a.dat

User ID	=	User Setup	= 3
Sample ID	= A	Sample Cell Number	= 4
Sample Weight	= 0.1554 g	Sample Volume	= 0.1654 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User		
Adsorbate	= N2	Po	= 751.88 mm Hg
		Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Thu Mar 13 10:07:32 2003	Analysis End Time	= Thu Mar 13 11:05:59 2003

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
667.805497	0.037207	0.001242
161.195532	1.290197	0.010399
108.627868	3.767360	0.020462
79.519599	8.407632	0.033429
64.404137	15.764518	0.050765
52.852472	25.668377	0.067832
45.357863	38.759042	0.087901
39.088908	59.940938	0.117151
34.724457	83.204638	0.144462
30.917906	108.873777	0.168307
28.037283	140.577420	0.197070
25.604944	182.902271	0.234160
23.541629	202.177220	0.237979

Total Pore Volume is 16.187251 e-03 cc/g for all pores less than 1114.799235 Angstrom.

Average pore radius is 19.486682 Angstrom.

Lampiran 7. Data print out luas permukaan dan ukuran pori MZ-2

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = b.dat

User ID	=	User Setup	= 3
Sample ID	= B		
Sample Weight	= 0.1620 g	Sample Cell Number	= 2
Sample Density	= 1.0000 g/cc	Sample Volume	= 0.1820 cc
Po Type	= User		
Adsorbate	= N2	Po	= 751.68 mm Hg
		Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Fri Mar 14 10:54:57 2003	Analysis End Time	= Fri Mar 14 11:53:06 2003

Multi BET (Adsorption)

P/Po	BET Transform (1/{W[Po/P - 1]})
0.095437	68.979595
0.149471	99.780653
0.200527	133.573759
0.250849	173.247227
Slope =	669.244253
Intercept =	2.399232
Correlation Coefficient =	0.997312
BET C =	279.941021
Surface Area =	0.840074 sq m
Specific Surface Area =	5.185067 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = b.dat

User ID	=	User Setup	= 3
Sample ID	= B	Sample Cell Number	= 2
Sample Weight	= 0.1620 g	Sample Volume	= 0.1820 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 751.68 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Fri Mar 14 10:54:57 2003	Analysis End Time	= Fri Mar 14 11:53:06 2003

DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
703.542166	0.012569	0.000442
162.116738	0.408808	0.003314
110.708948	1.491823	0.008258
79.874304	3.660397	0.014619
63.967315	7.344083	0.023489
52.362535	8.028740	0.021020
45.600348	11.072607	0.025246
39.825081	19.394237	0.038619

Total Pore Volume is 7.730579 e-03 cc/g for all pores less than 1186.809001 Angstrom.

Average pore radius is 29.818625 Angstrom.

Lampiran 8. Data print out luas permukaan dan ukuran pori MZ-3

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = c.dat

User ID	=	User Setup	= 3
Sample ID	= C	Sample Cell Number	= 4
Sample Weight	= 0.2110 g	Sample Volume	= 0.2210 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 749.91 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Fri Mar 14 12:57:24 2003	Analysis End Time	= Fri Mar 14 13:49:36 2003

Multi BET (Adsorption)

P/Po		BET Transform (1/(W[Po/P - 1]))
0.093965		76.548883
0.150871		106.024586
0.202124		132.478212
0.252608		160.017309
0.302001		187.234171
Slope	=	531.589564
Intercept	=	25.975942
Correlation Coefficient	=	0.999876
BET C	=	21.464689
Surface Area	=	1.317892 sq m
Specific Surface Area	=	6.245933 sq m/g

Quantachrome Corporation
NOVA Data Analysis Package Ver. 2.00
File Name = c.dat

User ID	=	User Setup	= 3
Sample ID	= C	Sample Cell Number	= 4
Sample Weight	= 0.2110 g	Sample Volume	= 0.2210 cc
Sample Density	= 1.0000 g/cc		
Po Type	= User	Po	= 749.91 mm Hg
Adsorbate	= N2	Bath Temperature	= 77.40 deg K
Adsorption Tolerance	= 0.1000 mm Hg	Desorption Tolerance	= 0.0000 mm Hg
Adsorption Equil Time	= 60 sec	Desorption Equil Time	= 0 sec
Adsorption Dwell Time	= 180 sec	Desorption Dwell Time	= 0 sec
Analysis Start Time	= Fri Mar 14 12:57:24 2003	Analysis End Time	= Fri Mar 14 13:49:36 2003

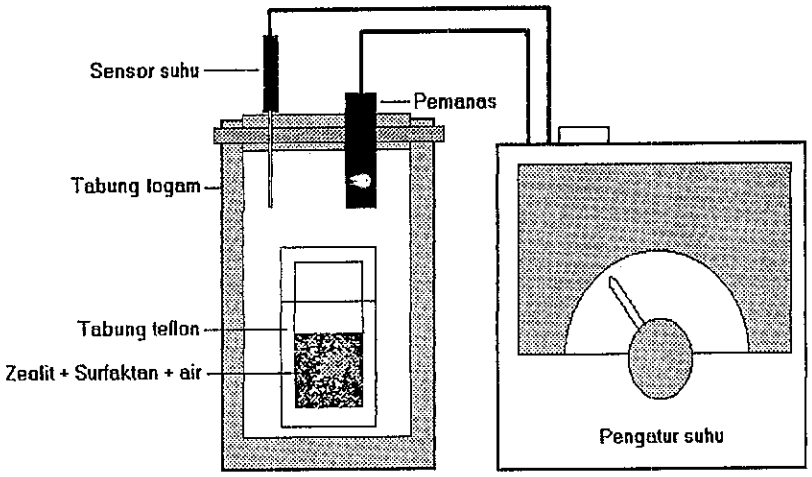
DVR (Adsorption)

Pore Radius (Ang)	Pore Area (sq m/Å/g e-03)	Pore Volume (cc/Å/g e-03)
1036.019872	0.002482	0.000129
167.080035	0.205807	0.001719
111.010585	0.688669	0.003822
77.102494	2.110142	0.008135
63.775421	1.958148	0.006244
53.231581	6.506146	0.017317
44.313793	10.593937	0.023473
38.728237	14.275228	0.027643
35.064207	7.960831	0.013957
31.914057	23.870022	0.038089
28.241609	39.884789	0.056321
25.723401	25.482363	0.032775
23.576292	62.211700	0.073336
21.672528	96.718818	0.104807

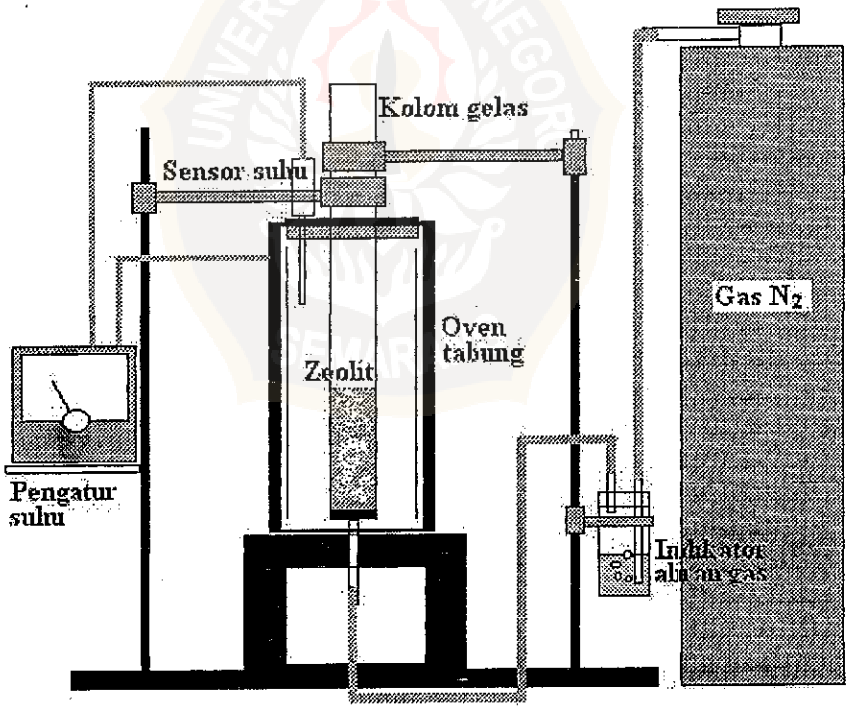
Total Pore Volume is 4.775191 e-03 cc/g for all pores less than 1839.212969 Angstrom.

Average pore radius is 15.290561 Angstrom.

Lampiran 4. Gambar Alat



Alat Hidrotermal



Tungku Kalsinasi