

V_{Awal} (ml)	V_{Akhir} (ml)	V_{Total} (ml)	$V_{Rata-rata}$ (ml)
0	12,4	12,4	12,4
12	24,14	12,4	

$$\begin{aligned}
 N_1 \cdot V_1 &= N_2 \cdot V_2 \\
 0,097 \text{ N} \cdot 10 \text{ ml} &= N_2 \cdot 12,4 \text{ ml} \\
 N_2 &= 0,078 \text{ N} \\
 \text{Meq}_{Awal} &= 0,098 \times 100 \\
 &= 9,8 \\
 \text{Meq}_{Akhir} &= 0,078 \times 100 \\
 &= 7,8 \\
 \text{KTK} &= \Delta \text{ Meq} \times 100 / 1 \\
 &= 2 \times 100 / 1 \\
 &= 200 \text{ meq/100 g}
 \end{aligned}$$

- Zeolit Aktivasi HCl

• HCl 1,8%

V_{Awal} (ml)	V_{Akhir} (ml)	V_{Total} (ml)	$V_{Rata-rata}$ (ml)
0	12,5	12,5	12,5
12	24,5	12,5	

$$\begin{aligned}
 N_1 \cdot V_1 &= N_2 \cdot V_2 \\
 0,097 \text{ N} \cdot 10 \text{ ml} &= N_2 \cdot 12,5 \text{ ml} \\
 N_2 &= 0,0776 \text{ N} \\
 \text{Meq}_{Awal} &= 0,098 \times 100 \\
 &= 9,8 \\
 \text{Meq}_{Akhir} &= 0,0776 \times 100 \\
 &= 7,76 \\
 \text{KTK} &= \Delta \text{ Meq} \times 100 / 1 \\
 &= 2,04 \times 100 / 1 \\
 &= 204 \text{ meq/100 g}
 \end{aligned}$$

LAMPIRAN B
KAPASITAS TUKAR KATION

KTK ZEOLIT (meq/100 g)			
Variasi	HCl	NaCl	NaOH
1	204	197	137
2	197	136	117
3	192	100	197
4	102	90	190
5	90	80	150

KTK ZEOLIT NaOH(meq/100 g)			
Variasi	Sebelum Aktivasi	Setelah Aktivasi	Kenaikan
1	70	137	67
2	70	117	47
3	70	197	127
4	70	190	120
5	70	150	80

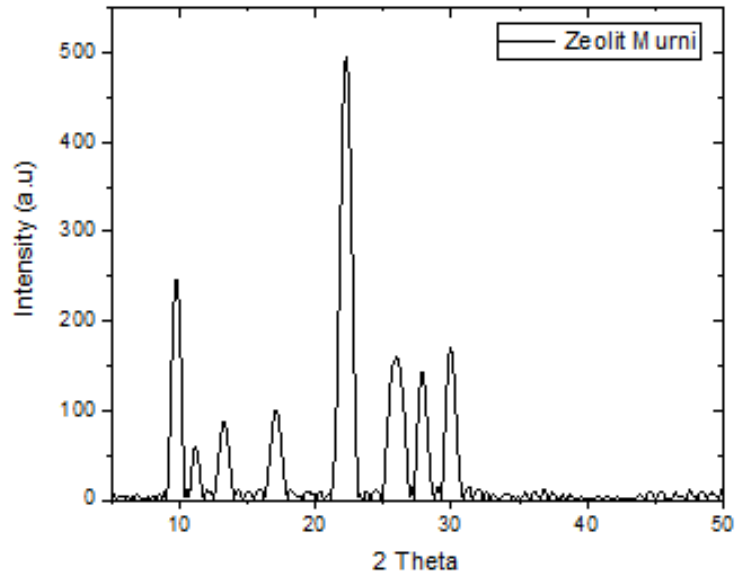
KTK ZEOLIT NaCl(meq/100 g)			
Variasi	Sebelum Aktivasi	Setelah Aktivasi	Kenaikan
1	70	197	127
2	70	136	66
3	70	100	30
4	70	90	20
5	70	80	10

KTK ZEOLIT HCl (meq/100 g)			
Variasi	Sebelum Aktivasi	Setelah Aktivasi	Kenaikan
1	70	204	134
2	70	197	127
3	70	192	122
4	70	102	32
5	70	90	20

LAMPIRAN C

HASIL KARAKTERISASI DAN PENGOLAHAN DATA XRD

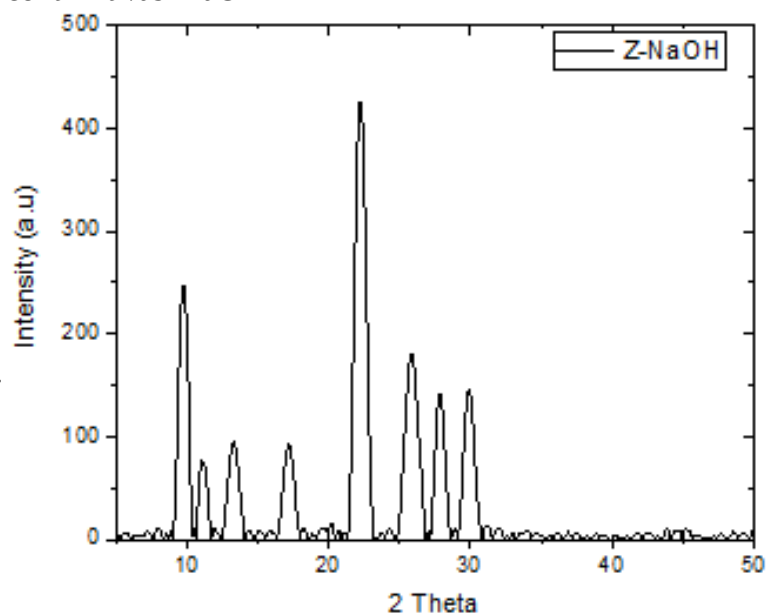
1. XRD Zeolit Murni Klinoptilolit



- Data Difraktogram XRD Zeolit Murni (Klinoptilolit)

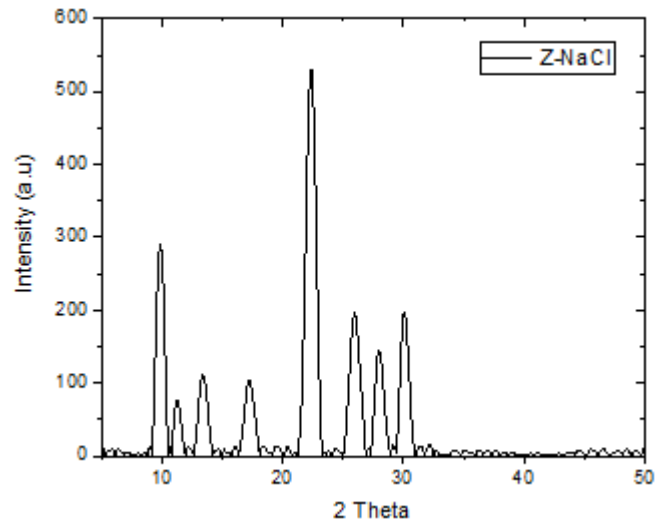
Peak	2 Theta	FWHM	D (nm)	d-spacing [Å]
1	9,8993	0,288	27,69	8,92788
2	11,0725	0,576	13,86	7,98440
3	13,2173	0,864	9,26	6,69318
4	17,2625	1,008	7,97	5,13277
5	19,6522	0,432	18,66	4,51369
6	22,4591	0,648	12,5	3,95552
7	25,6453	0,576	14,14	3,47084
8	26,4996	0,252	32,39	3,36086
9	27,8541	0,288	28,42	3,20042
10	30,0138	0,648	12,69	2,97487
11	31,8584	0,432	19,12	2,80670
12	35,5658	0,864	9,66	2,52217
13	37,9803	0,09	93,35	2,36720
14	41,4618	0,09	94,38	2,17611
15	42,4972	0,09	94,71	2,12546
16	44,7436	0,72	11,93	2,02383
17	46,5369	1,152	7,51	1,94993
18	48,6514	0,864	10,09	1,87001

2. XRD Zeolit Aktivasi NaOH



Peak	2 Theta	FWHM	D (nm)	d-spacing [Å]
1	9,5551	0,288	27,68	9,24871
2	11,0603	0,432	18,48	7,99318
3	13,283	1,008	7,93	6,66021
4	17,1771	0,648	12,4	5,15811
5	19,6546	0,432	18,66	4,51314
6	20,7473	0,288	28,04	4,27785
7	22,0999	0,288	28,11	4,01899
8	22,4291	0,288	28,12	3,96075
9	25,6922	0,432	18,86	3,46462
10	27,7183	0,72	11,36	3,21580
11	29,7897	0,72	11,42	2,99673
12	31,8325	0,432	19,12	2,80893
13	33,3252	0,495	16,75	2,68644
14	42,6171	0,864	9,87	2,11976
15	44,5569	0,576	14,9	2,03187

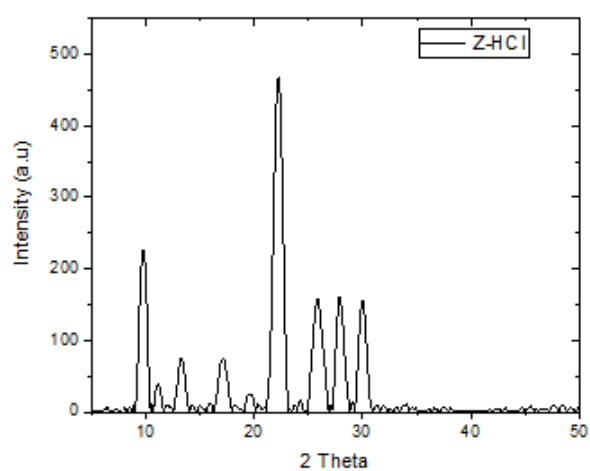
3. XRD Zeolit Aktivasi NaCl



- **Data Difraktogram XRD Zeolit-NaCl**

Peak	2 Theta	FWHM	D (nm)	d-spacing [Å]
1	9,721	0,252	31,64	9,09118
2	11,2333	0,72	11,09	7,87044
3	13,3896	0,864	9,26	6,60744
4	17,3838	1,152	6,98	5,09722
5	19,2155	0,648	12,43	4,61528
6	19,8134	0,504	16	4,47734
7	22,3102	0,36	22,49	3,98158
8	25,8234	0,432	18,87	3,44732
9	27,7054	0,504	16,23	3,21727
10	30,2264	0,504	16,33	2,95443
11	31,9947	0,576	14,35	2,79506
12	35,9487	0,864	9,67	2,49618
13	44,8453	1,152	7,46	2,01947
14	46,3481	1,152	7,5	1,95743

4. XRD Zeolit Aktivasi HCl



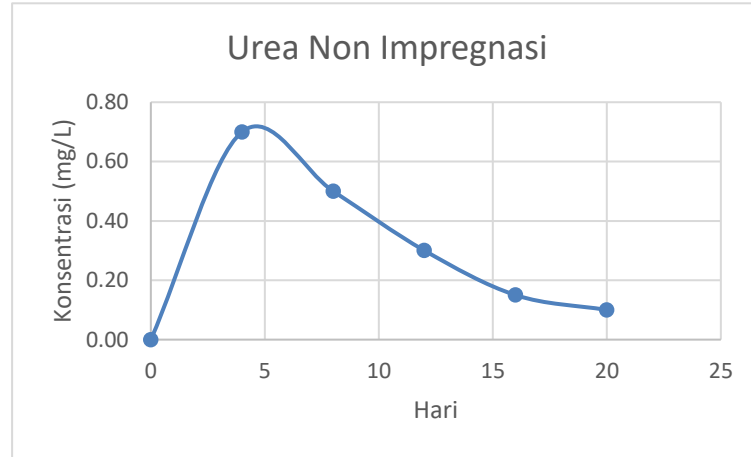
- Data Difraktogram XRD Zeolit-HCl

Peak	2Theta	FWHM	D (nm)	d-spacing [Å]
1	9,6502	0,324	24,61	9,15778
2	11,1632	0,576	13,86	7,91974
3	13,2866	0,864	9,26	6,65840
4	17,2825	1,152	6,98	5,12688
5	19,6916	0,36	22,4	4,50476
6	22,4074	0,72	11,25	3,96452
7	25,715	0,504	16,17	3,46160
8	27,8186	0,504	16,24	3,20443
9	30,068	0,72	11,42	2,96963
10	31,8697	0,432	19,12	2,80574

LAMPIRAN D

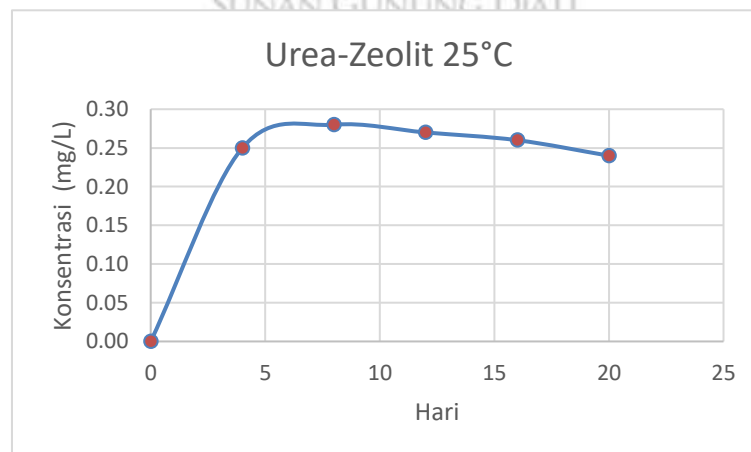
DATA HASIL ANALISIS SPEKTROFOTOMETER UV-VIS

1. Data Spektrofotometer UV-Vis Urea Non Impregnasi



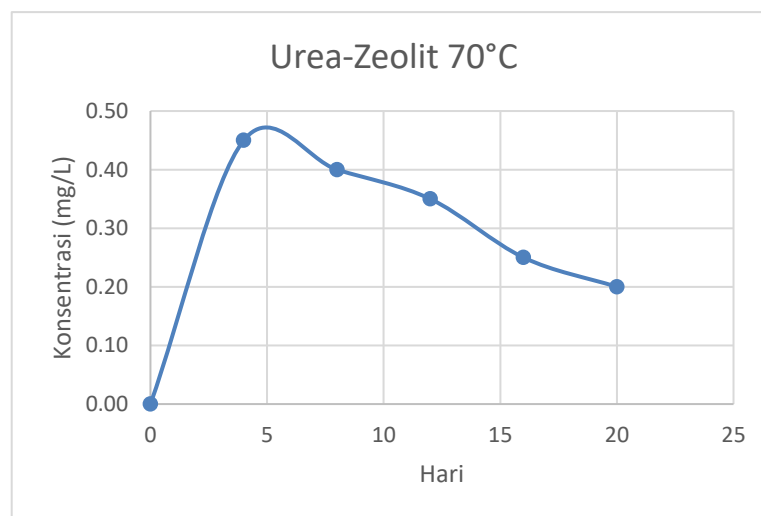
Urea Non Impregnasi		
Hari	Absorbansi	Konsentrasi (mg/L)
0	0,000	0,00
4	0,351	0,70
8	0,251	0,50
12	0,150	0,30
16	0,075	0,15
20	0,025	0,05

2. Data Spektrofotometer UV-Vis Urea-Zeolit 25



Urea-Zeolit 25°C		
Hari	Absorbansi	Konsentrasi (mg/L)
0	0,000	0,00
4	0,125	0,25
8	0,140	0,28
12	0,135	0,27
16	0,125	0,25
20	0,115	0,23

3. Data Spektrofotometer UV-Vis Urea-Zeolit 70



Urea-Zeolit 70°C		
Hari	Absorbansi	Konsentrasi (mg/L)
0	0,000	0,00
4	0,225	0,45
8	0,200	0,40
12	0,175	0,35
16	0,125	0,25
20	0,075	0,15

LAMPIRAN E DOKUMENTASI



Preparasi Zeolit



Penimbangan Zeolit



Penyaringan



Standarisasi NaOH



Standarisasi HCl



Titrasi KTK



Sebelum Titrasi



Hasil Aktivasi Zeolit



Impregnasi Zeolit + Pupuk