

**PENGOLAHAN LINDI DENGAN KOAGULAN HASIL SINTESIS SAMPAH
ALUMINIUM DI TEMPAT PENGOLAHAN SAMPAH TERPADU (TPST)
JERUKLEGI, KABUPATEN CILACAP, JAWA TENGAH**

Oleh :
Alya Talitha Larasati
114210006

INTISARI

TPST Jeruklegi di Kabupaten Cilacap belum dilengkapi Instalasi Pengolah Lindi, sehingga berpotensi mencemari badan air sekitar. Di lain sisi, sampah perabotan aluminium dapat dimanfaatkan kembali untuk menghasilkan koagulan *Poly Aluminum Chloride* (PAC) melalui proses sintesis dengan pelarut HCl. Tujuan dari penelitian ini adalah untuk mengetahui kualitas lindi, sungai, dan saluran air di sekitar TPST Jeruklegi; mengetahui pengaruh variasi HCl terhadap karakteristik PAC; mengetahui efektivitas dan dosis optimal koagulan PAC; serta memberi rekomendasi arahan pengolahan lindi.

Metode untuk pengambilan sampel adalah *grab sampling* dan titik sampel ditentukan dengan *purposive sampling*. Metode perhitungan debit dilakukan dengan metode neraca Thornthwaite; volumetrik; dan pelampung. Metode matematis dan statistika dilakukan untuk mengetahui Indeks Pencemar, analisis *effluent*, efektivitas penurunan, regresi linear, dan perancangan desain. Metode laboratorium digunakan untuk mengetahui kualitas air yang diuji serta untuk sintesis aluminium dengan variasi HCl 30 mL, 35 mL, dan 40 mL. Selain itu, dilakukan *jar test* untuk mengetahui dosis PAC untuk menurunkan kadar TSS dan COD pada air lindi dengan variasi PAC 100 mg, 200 mg, 300 mg, 400 mg, 500 mg, dan 600 mg.

Berdasarkan hasil penelitian, diketahui bahwa nilai TSS dan COD pada lindi melebihi baku mutu dalam Permen LHK Nomor 59 Tahun 2016 dengan nilai TSS 436 mg/L dan nilai COD 416 mg/L. Status mutu air pada saluran air dan air sungai di sekitar daerah penelitian termasuk tercemar sedang dengan nilai indeks pencemar 7,328 pada saluran air 1; 7,284 pada saluran air 2; dan 5,203 pada Kali Plered. Variasi pelarut HCl terbaik adalah 35 mL dengan pH PAC sebesar 4,07 dan kadar Al_2O_3 sebesar 10,544% yang sudah sesuai dengan SNI 3822:2018. Dosis optimum untuk penurunan kadar TSS dan COD adalah dosis 600 mg atau 1200 mg/L yang mampu menurunkan 99,54% TSS dan 65,14% COD. Rekomendasi pengolahan lindi yaitu menggunakan bak ekualisasi, bak pembubuh PAC, bak koagulasi dan flokulasi, serta bak sedimentasi.

Kata Kunci : Lindi, *Poly Aluminum Chloride* (PAC), *Jar Test*, Koagulasi, Flokulasi, Pengolahan Lindi

***Leachate Treatment Using Coagulant Synthesized From Aluminium Waste at
The Integrated Waste Processing Site Jeruklegi, Cilacap Regency, Central Java***

By :

Alya Talitha Larasati

114210006

ABSTRACT

TPST Jeruklegi in Cilacap Regency, is currently not equipped with a wastewater treatment plant, posing a potential risk of contaminating nearby water. On the other hand, household aluminum waste holds the potential to be repurposed to produce Poly Aluminum Chloride (PAC) through a synthesis process using HCl as a solvent. The goals of this study are to determine the quality of leachate, river water, and drainage channels; determine the effect of HCl variations on PAC characteristics; evaluate the effectiveness and optimal dosage of PAC coagulant; and provide recommendations for leachate treatment.

The used sampling method is grab sampling, with sampling points determined through the purposive sampling method. The discharge calculation method involves the Thornthwaite water balance method; the volumetric; and the float. Mathematical and statistical methods were employed to determine the Pollution Index, effluent analysis, reduction effectiveness, linear regression, and design planning. Laboratory methods were used to determine water quality and to synthesize aluminum with HCl variations of 30 mL, 35 mL, and 40 mL. Jar test was conducted to determine the optimal PAC dosage for reducing TSS and COD levels with variations of 100 mg, 200 mg, 300 mg, 400 mg, 500 mg, and 600 mg.

Based on the research results, it was found that the TSS and COD levels in the leachate exceeded the quality standards set by the Indonesian Ministry of Environment and Forestry Regulation No. 59 of 2016, with TSS measured at 436 mg/L and COD at 416 mg/L. The water quality status of drainage and river water was classified as moderately polluted with Pollution Index (PI) values of 7.328 for Drainage 1, 7.284 for Drainage 2, and 5.203 for the Plered River. The best HCl solvent variation was 35 mL, with a PAC pH of 4.07 and an Al_2O_3 content of 10.544%, which complies with SNI 3822:2018. The optimal dosage for reducing TSS and COD levels was 600 mg or 1200 mg/L, capable of reducing TSS by 99.54% and COD by 65.14%. The recommended leachate treatment involves using an equalization tank, PAC dosing tank, coagulation and flocculation tank, and sedimentation tank.

Keywords : Leachate, Poly Aluminum Chloride (PAC), Jar Test, Coagulation, Flocculation, Leachate Treatment

LAMPIRAN VII

PERHITUNGAN KADAR Al_2O_3 PADA PAC SESUAI SNI 3822:2018

A. Konsentrasi Zn pada Standardisasi larutan ZnCl_2 0,02 M

Tabel 10. Hasil Percobaan untuk mengetahui Konsentrasi Zn

No.	Volume ZnCl_2 sebagai titran (mL)	C Zn
1.	12,8	
2.	12,4	
3.	13,8	
Rata-Rata	13	0.015

$$\begin{aligned}
 C_{\text{zn}} &= \frac{10 \times 0,02}{V_{\text{ZnCl}_2}} \\
 &= \frac{10 \times 0,02}{13} \\
 &= 0,015
 \end{aligned}$$

B. Kadar Al_2O_3

Tabel 11. Hasil Percobaan untuk mengetahui Kadar Al_2O_3

No	Variasi HCL	Contoh Uji		Faktor Pengenceran	Volume Blanko (V_1)	Volume Titran (V_2)	Kadar Al_2O_3
		Bobot	Volume				
1	30 mL	2,5 gr	2 mL	50	56,75 mL	41,667 mL	9.483%
2	35 mL		2,5 mL	40		43,333 mL	10.544%
3	40 mL		2,6 mL	38,9.462		44,767 mL	9.794%

- Variasi 30 mL

$$\begin{aligned}
 \text{Al}_2\text{O}_3 \% &= \frac{50,98 \times (V_2 - V_1) \times C_{\text{zn}}}{m \times \text{fp}} \times 100\% \\
 &= \frac{50,98 \times (56,75 - 41,667) \times 0,015}{2,5 \times 50} \times 100\% \\
 &= 9,483\%
 \end{aligned}$$

- Variasi 35 mL

$$\begin{aligned}
 \text{Al}_2\text{O}_3 \% &= \frac{50,98 \times (V_2 - V_1) \times C_{\text{zn}}}{m \times \text{fp}} \times 100\% \\
 &= \frac{50,98 \times (56,75 - 43,333) \times 0,015}{2,5 \times 40} \times 100\% \\
 &= 10,544\%
 \end{aligned}$$

- Variasi 40 mL

$$\begin{aligned}
 \text{Al}_2\text{O}_3 \% &= \frac{50,98 \times (V_2 - V_1) \times C_{\text{zn}}}{m \times \text{fp}} \times 100\% \\
 &= \frac{50,98 \times (56,75 - 44,767) \times 0,015}{2,5 \times 38,462} \times 100\% \\
 &= 9,483\%
 \end{aligned}$$