

BAB IV

SPESIFIKASI BANGUNAN PENGOLAHAN AIR BUANGAN

4.1 Karakteristik Limbah dan Baku Mutu

Dari data air limbah buangan indsutri tekstil yang didapat, perlu adanya pengolahan agar air limbah yang akan di buang ke badan air sesuai dengan baku mutu yang telah diterapkan oleh Peraturan Kementerian Lingkungan Hidup Nomor 5 Tahun 2014. Berdasarkan karakteristik air limbah, maka diagram alir proses pengolahan limbah adalah sebagai berikut.

Tabel 4.1 Tabel Data Karakteristik Parameter Limbah serta Standar Baku Mutu Air Limbah Susu

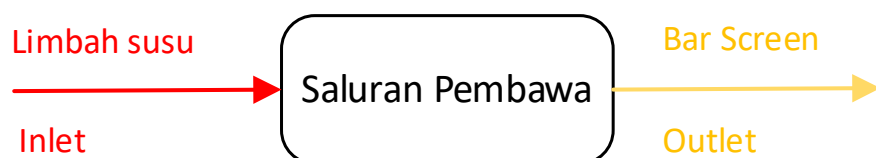
Parameter	Kadar Pencemar	Standard Baku Mutu
BOD ₅	1080	40
COD	2040	100
TSS	530	50
Minyak dan Lemak	50	10
NH ₃ – N	25	10
pH	6 – 8	6 – 8

Keterangan sumber:

- Kadar Pencemar = Data Perencanaan Tugas Perancangan
- Standard Baku Mutu = PERMEN LH Nomor 5 Tahun 2014
Tentang Baku Mutu Air Limbah Bagi Industri Susu (mg/l)

4.2 Neraca Massa

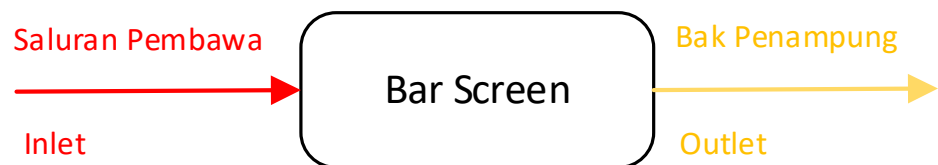
4.2.1 Saluran Pembawa



Tabel 4.2 Neraca Massa Saluran Pembawa

Saluran Pembawa						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	0.00%	0	1080	40
COD	mg/l	2040	0.00%	0	2040	100
TSS	mg/l	530	0.00%	0	530	50
Minyak dan lemak	mg/l	50	0.00%	0	50	10
Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

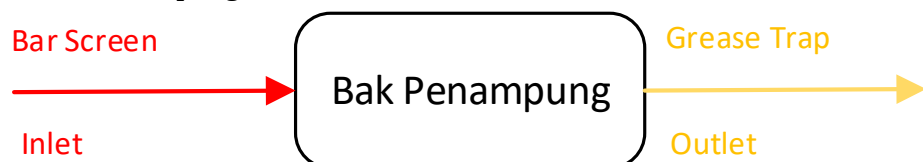
4.2.2 Bar Screen



Tabel 4.3 Neraca Massa Bar Screen

Bar Screen						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	0.00%	0	1080	40
COD	mg/l	2040	0.00%	0	2040	100
TSS	mg/l	530	0.00%	0	530	50
Minyak dan lemak	mg/l	50	0.00%	0	50	10
Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

4.2.3 Bak Penampung



Tabel 4.4 Neraca Massa Bak Penampung

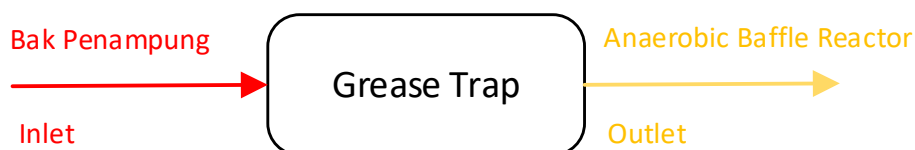
Bak Penampung						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	0.00%	0	1080	40
COD	mg/l	2040	0.00%	0	2040	100
TSS	mg/l	530	0.00%	0	530	50
Minyak dan lemak	mg/l	50	0.00%	0	50	10
Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

4.2.4 Grease Trap

% Penyisihan:

- Minyak dan lemak = 80%

(Kementerian PUPR. (2017). Buku A Panduan Perencanaan Teknik Terinci Bangunan Pengolahan. Jakarta)

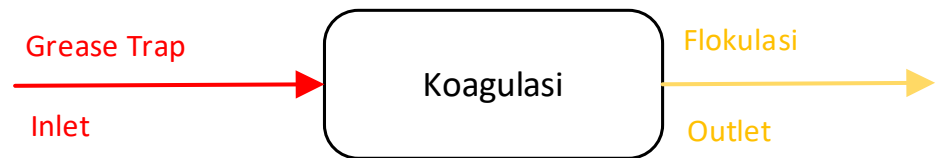


Tabel 4.5 Neraca Massa Grease Trap

Grease Trap						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	0.00%	0	1080	40
COD	mg/l	2040	0.00%	0	2040	100
TSS	mg/l	530	0.00%	0	530	50
Minyak dan lemak	mg/l	50	80.00%	40	10	10

Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

4.2.5 Koagulasi



Tabel 4.6 Neraca Massa Koagulasi

Koagulasi						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	0.00%	0	1080	40
COD	mg/l	2040	0.00%	0	2040	100
TSS	mg/l	530	0.00%	0	530	50
Minyak dan lemak	mg/l	10	0.00%	0	10	10
Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

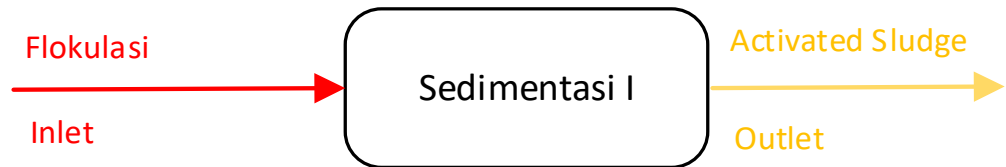
4.2.6 Flokulasi



Tabel 4.7 Neraca Massa Flokulasi

Flokulasi						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	0.00%	0	1080	40
COD	mg/l	2040	0.00%	0	2040	100
TSS	mg/l	530	0.00%	0	530	50
Minyak dan lemak	mg/l	10	0.00%	0	10	10
Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

4.2.7 Bak pengendap



% Penyisihan:

- BOD = 50% - 80% (Asumsi = 15%)
- TSS = 80% - 90% (Asumsi = 40%)

(Sumber: Reynold/Richard, Unit Operations and Process in Environmental Engineering, 2nd edition, hal 497)

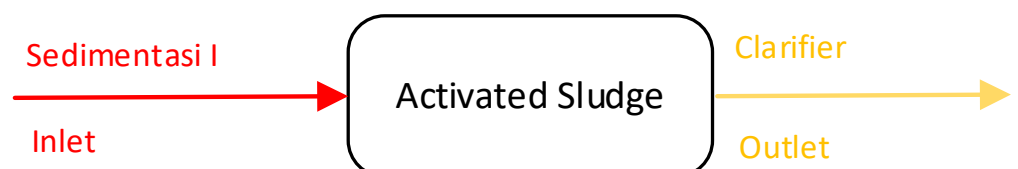
- COD = 41,5 %

Sumber: Song, Z., Williams, C. J. M., & Edyvean, R. G. J. (2000). Technical Note Sedimentation of Tannery Wastewater. 34(7), 2171 – 2176.

Tabel 4.8 Neraca Massa Sedimentasi

Sedimentasi I						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	1080	80.00%	864	216	40
COD	mg/l	2040	41.50%	846.6	1193.4	100
TSS	mg/l	530	80.00%	424	106	50
Minyak dan lemak	mg/l	10	0.00%	0	10	10
Nitrogen	mg/l	25	0.00%	0	25	10
pH	mg/l	8	0.00%	0	8	6-9

4.2.8 Activated Sludge



% Penyisihan

- Ammonia – Nitrogen = 50% – 90%

- COD = 70% – 95%

(Sumiyati, Sri & Sitinjak, Ronauli. (2020) Removal of Ammonia Nitrogen by Activated Sludge Process Using Simultaneous Nitrification Denitrification Method E3S Web of Conferences 202: ICENIS 2020, Semarang)

- BOD = 39% – 85%
- TSS = 71% – 91%

(Sukumara et al. (2015), Performance Evaluation of Prevailing Biological Wastewater Treatment Systems in West Bengal, India. India. Science and Education Publishing)

Tabel 4. 9 Neraca Massa Activated Sludge

Activated Sludge						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	216	80.00%	172.8	43.2	40
COD	mg/l	1193.4	92.00%	1097.928	95.472	100
TSS	mg/l	106	80.00%	84.8	21.2	50
Minyak dan lemak	mg/l	10	0.00%	0	10	10
Nitrogen	mg/l	25	80.00%	20	5	10
pH	mg/l	8	0.00%	0	8	6-9

4.2.9 Clarifier

% Penyisihan



- TSS = 25% – 40%
- BOD = 25% – 75%

(Sumber: Metcalf & Eddy, 2003, Wastewater Engineering Treatment & Reuse, Fourth Edition. Halaman 316)

- COD = 40% – 60%

(Sumber: Spellman, Frank r. 2003, Handbook of Water and Wastewater Treatment Plant Operation. Halaman 147)

Tabel 4.10 Neraca Massa Clarifier

Clarifier						
Parameter	satuan	Influent	% Removal	Removed	Effluent	Baku mutu
BOD	mg/l	43.2	40.00%	17.28	25.92	40
COD	mg/l	95.472	40.00%	38.1888	57.2832	100
TSS	mg/l	21.2	70.00%	14.84	6.36	50
Minyak dan lemak	mg/l	10	0.00%	0	10	10
Nitrogen	mg/l	5	0.00%	0	5	10
pH	mg/l	8	0.00%	0	8	6-9