

Paper Wastewater Operating Cost Calculator

Blue block is the design datameter ; be filled in
 Brown: calculate process data
 Red : last result for your process

I. Basic data:

Designed Water Quantity	35000.00	m3/d							
Project	COD(mg/l)	BOD(mg/l)	ammonia nitrogen(mg/l)	SS(mg/l)	total phosphorus(mg/l)				
Inlet water quality	1000.00	500.00	100.00	500.00	50.00	20.00			
Effluent water quality	50.00	10.00	5.00	10.00					

II. Calculations:

1. Calculation of labor costs

Total number of people	10.00	people	payroll	2000.00	Yuan/month	Cost of tonnes of water	0.019	Yuan/Ton
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2. Calculation of electricity costs

Running power	1273.00	KW	Unit electricity costs	0.50	Yuan/KW h	Cost of tonnes of water	0.436	Yuan/Ton
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3.Pre-treatment chemicals cost

PAC addition amount	100.00	ppm	unit cost	1350.00	Yuan/Ton	Cost of tonnes of water	0.135	Yuan/Ton
Amount of PAM added	12.00	ppm	unit cost	15500.00	Yuan/Ton	Cost of tonnes of water	0.186	Yuan/Ton

4. Biochemical treatment chemicals

Design Data								
Oxidation-ditch influent BOD	600.00	mg/l	ammonia nitrogen	1.00	mg/l	total phosphorus	1.000	mg/l
Required carbon, nitrogen and phosphorus ratio	100.00				5.00	1.000		
Actual amount of nutrients needed			nitrogen source	33.50	mg/l	quantity of phosphorus source	5.900	mg/l
When phosphorus source is (NH ₄) ₂ HPO ₄			Nitrogen content	0.22	phosphorus content	0.24		
(NH ₄) ₂ HPO ₄ addition amount	24.58	mg/l	unit cost	2300.00	Yuan/Ton	Cost of tonnes of water	0.067	Yuan/Ton
When nitrogen source is CO(NH ₂) ₂			Nitrogen content	0.43				
CO(NH ₂) ₂ addition amount	65.63	mg/l	unit cost	1660.00	Yuan/Ton	Cost of tonnes of water	0.169	Yuan/Ton
When the phosphorus source is Na ₃ PO ₄			Purity	0.98	phosphorus content	0.08		
Amount of Na ₃ PO ₄ added	75.26	mg/l	unit cost	2990.00	Yuan/Ton	Cost of tonnes of water	0.225	Yuan/Ton
Amount of CO(NH ₂) ₂	78.27	mg/l	unit cost	1660.00	Yuan/Ton	Cost of tonnes of water	0.130	Yuan/Ton

5. Cost of deep treatment chemicals

PAC additive amount	360.00	mg/l	unit cost	1350.00	Yuan/Ton	Cost of tonnes of water	0.486	Yuan/Ton
Amount of PAM added	2.00	mg/l	unit cost	15500.00	Yuan/Ton	Cost of tonnes of water	0.031	Yuan/Ton
Addition of ferrous chemicals	600.00	mg/l	unit cost	400.00	Yuan/Ton	Cost of tonnes of water	0.240	Yuan/Ton
Additive amount of oxidizer	400.00	mg/l	unit cost	1000.00	Yuan/Ton	Cost of tonnes of water	0.400	Yuan/Ton
Amount of sulfuric acid added	0.00	mg/l	unit cost	800.00	Yuan/Ton	Cost of tonnes of water	0.000	Yuan/Ton
NaOH additive	0.00	mg/l	unit cost	1850.00	Yuan/Ton	Cost of tonnes of water	0.000	Yuan/Ton

6. Sludge dewatering chemicals

I. Calculation of sludge volume of primary sedimentation tank									
Calculation formula: W1= Q*(SS removal)-1000-1000 (SS removal mainly refers to the difference between the SS in and out of the primary sedimentation tank)									
Primary/dual influent SS	1000.00	mg/l	Final Dual Out of Water SS	500.00	mg/l	sludge quantity	17.500	tonne/day	
II Calculation of biochemical sludge volume									
Calculation formula: W2 = Q * (BOD removal) * 0.3 + 1000 - 1000 (BOD removal mainly refers to the difference between the BOD into the oxidation ditch and the BOD out of the secondary sedimentation tank)									
Biochemical tank influent BOD	1000.00	mg/l	二沉出水BOD	500.00	mg/l	sludge quantity	5.250	tonne/day	
III The amount of air flotation sludge calculation									
Calculation formula: W3=Q*(COD*Q*0.6-ΔSS*Q+PAC*Q*0.48+PAM*Q)									
Inlet water for air flotation COD	0.00	mg/l	Air Flotation Effluent COD	0.00	mg/l				
Air flotation feed water SS	0.00	mg/l	Air flotation effluent SS	0.00	mg/l				
Addition of PAC	0.00	mg/l	Addition of PAM	0.00	mg/l	sludge quantity	0.000	tonne/day	
IV. Calculation of chemical sludge volume									
Calculation						Chemical sludge volume=Q*10000- (4000-7000)	Sludge volume	17.500	tonne/day
When Fenton						Chemical sludge volume=Q*10000+6000	Sludge volume	21.000	tonne/day
When is catalytic oxidation						Chemical sludge volume=Q*10000+6000+(0.3-0.4)	Sludge Volume	6.300	tonne/day
V. Total amount of sludge									
PAC addition amount	10.00	kg/per ton of sludge	unit cost	1350.00	tonne/day	Total sludge volume	67.500	tonne/day	
Amount of PAM added	3.00	kg/per ton of sludge	unit cost	1350.00	tonne/day	Cost per ton of water	0.028	tonne/day	
						Cost of ton of water	0.008	tonne/day	

7. Water charges

Total PAC	18.10	tonne/day	Configuration Concentration	10.00%	Water consumption	181.000	tonne/day	
Total amount of PAM	0.49	tonne/day	Configuration Concentration	0.10%	Water consumption	493.000	tonne/day	
Total amount of oxidizer	14.00	tonne/day	Configuration Concentration	30.00%	Water consumption	46.667	tonne/day	
(NH ₄) ₂ HPO ₄ addition amount	0.86	tonne/day	Configuration Concentration	50.00%	Water Consumption	1.721	tonne/day	
Amount of Na ₃ PO ₄ added	2.03	tonne/day	Configuration Concentration	50.00%	Water Consumption	5.268	tonne/day	
Amount of area added when the phosphorus source is (NH ₄) ₂ HPO ₄	2.33	tonne/day	Configuration Concentration	50.00%	Water Consumption	4.584	tonne/day	
Amount of area added when the phosphorus source is Na ₃ PO ₄	2.74	tonne/day	Configuration Concentration	50.00%	Water Consumption	5.479	tonne/day	
Total water volume when phosphorus source is (NH ₄) ₂ HPO ₄	36.33	tonne/day	Price of tons of water	3.87	Yuan/per ton of water	Cost of tons of water	0.064	Yuan/ton of water
Total water volume when phosphorus source is Na ₃ PO ₄	38.03	tonne/day	Price of tons of water	3.87	Yuan/per ton of water	Cost of ton of water	0.064	Yuan/ton of water

8. Anaerobic treatment chemicals

Design Data								
Anaerobic influent BOD	5000.00	mg/l	Ammonia Nitrogen	50.00	mg/l	Total Phosphorus	1.000	mg/l
Required Carbon, Nitrogen and Phosphorus Ratio	300.00				5.00	1.000		
Actual amount of nutrients needed			Nitrogen source	33.33	mg/l	Phosphorus Source Volume	15.667	mg/l
When the phosphorus source is (NH ₄) ₂ HPO ₄			Nitrogen content	0.22	phosphorus content	0.24		
(NH ₄) ₂ HPO ₄ additive quantity	65.26	mg/l	unit cost	2300.00	Yuan/Ton	Cost per ton of water	0.150	Yuan/ton of water
When the nitrogen source is CO(NH ₂) ₂			Nitrogen content	0.43				
CO(NH ₂) ₂ additive quantity	44.33	mg/l	unit cost	1660.00	Yuan/Ton	Ton of water cost	0.074	Yuan/ton of water
When the phosphorus source is Na ₃ PO ₄			Purity	0.98	phosphorus content	0.08		
Na ₃ PO ₄ additive quantity	199.03	mg/l	unit cost	2990.00	Yuan/Ton	Ton of water cost	0.597	Yuan/ton of water
CO(NH ₂) ₂ additive quantity	77.89	mg/l	unit cost	1660.00	Yuan/Ton	Ton of water cost	0.129	Yuan/ton of water
Backwash air volume strength								
Filter flushing strength								

		Indicators of water consumption per ton		Daily consumption		Cost (Yuan/tonne of water)	
labor cost	10.00	human	666.67	Yuan	0.019		

		0.07	kwh	31652.00	kwh	0.406	
Consumption of pre-treatment chemicals	PAC	0.10	kg	3500.00	kg	0.135	
	PAM	0.01	kg	420.00	kg	0.186	
Anaerobic nutrient salt consumption	(NH ₄) ₂ HPO ₄	0.07	kg	2384.72	kg	0.150	
	CO(NH ₂) ₂	0.04	kg	1551.47	kg	0.074	
	Na ₃ PO ₄	0.20	kg	6994.05	kg	0.597	
	CO(NH ₂) ₂	0.08	kg	2755.86	kg	0.129	
	(NH ₄) ₂ HPO ₄	0.02	kg	860.42	kg	0.067	
	CO(NH ₂) ₂	0.07	kg	2297.22	kg	0.109	
Oxidation ditch nutrient salt consumption	(NH ₄) ₂ HPO ₄	0.08	kg	2633.93	kg	0.225	
	CO(NH ₂) ₂	0.08	kg	2739.49	kg	0.130	
	Na ₃ PO ₄	0.36	kg	12606.00	kg	0.486	
	PAM	0.00	kg	70.00	kg	0.031	
Deep treatment drug consumption	hydrogen peroxide (H ₂ O ₂)	0.40	kg	14000.00	kg	0.400	
	Ferrous salts	0.60	kg	21000.00	kg	0.240	

Sludge Dewatering PAM Consumption		3-5	kg/ton dry sludge	3.00	kg	0.008	
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Sludge dewatering PAC consumption		10-15	kg/ton dry sludge	10.00	kg	0.026	
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