

" A P P E N D I X "

T A B U L A R S T A T E M E N T S

TABLE - 1

PHYSICO-CHEMICAL VARIABLES (AND ALGAL BIOMASS) USING NOSTOC PYRIFORMIS

T e s t s	Detention period in days									
	Control (Raw sewage)					Raw sewage + Nostoc				
	0	2	4	6	0	2	4	6	0	6
A. PHYSICAL :										
Water Temp. (°C)	29.7	29.7	29.8	29.8	29.7	29.8	29.8	29.9	29.8	29.9
Colour	Brown	Brown	Brown	Brown	Brown	Bluish green	Bluish green	Bluish green	Bluish green	Bluish green
pH	7.3	7.4	7.2	7.4	7.3	8.5	8.9	9.8	8.9	9.8
B. CHEMICAL (mg/l)										
Phenol alkalinity	28	36	40	42	28	65	78	90	78	90
Am-N	36.4	35.0	34.0	32.9	36.4	9.9	5.4	3.0	5.4	3.0
NO ₂ -N	0.18	0.20	0.28	0.18	0.24	0.16	0.14	0.18	0.14	0.18
NO ₃ -N	0.26	0.24	0.30	0.26	0.28	0.32	0.36	0.40	0.36	0.40
PO ₄	19.5	17.8	18.4	20.0	19.5	7.4	6.0	5.7	6.0	5.7
BOD ₅ at 20°C #	197	114	102	61	197	56	44	26	44	26
COD #	315	230	164	97	315	90	69	42	69	42
C. BIOLOGICAL (mg/l)										
Algal biomass dry Wt.	-	-	-	-	-	206	212	218	212	218

TABLE - 2

PHYSICOCHEMICAL VARIABLES (AND ALGAL BIOMASS) USING ANABAENA CYLINDRICA

T e s t s	Detention period in days									
	Control (Raw sewage)					Raw sewage + Anabaena				
	0	2	4	6	0	2	4	6		
A. PHYSICAL :										
Water Temp. (°C)	28.9	28.9	29.0	29.0	28.9	28.9	29.1	29.1		
Colour	Brown	Brown	Brown	Brown	Bluish green	Bluish green	Bluish green	Bluish green		
pH	7.2	7.4	7.4	7.3	7.2	8.4	8.9	9.8		
B. CHEMICAL (mg/l)										
Phenol alkalinity	36	52	61	65	36	72	84	98		
Am-N	34.0	36.2	31.8	30.4	34.0	8.2	6.4	2.7		
NO ₂ -N	0.18	0.20	0.18	0.20	0.18	0.26	0.28	0.21		
NO ₃ -N	0.22	0.24	0.16	0.24	0.22	0.28	0.36	0.28		
PO ₄	16.0	14.3	12.8	14.0	16.0	5.3	1.4	1.0		
BOD ₅ at 20°C #	153	108	85	64	153	43	25	12		
COD #	240	180	125	100	240	68	39	18		
C. BIOLOGICAL (mg/l)										
Algal biomass dry wt.	-	-	-	-	-	199	201	205		

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TABLE - 3

PHYSICO-CHEMICAL VARIABLES (AND ALGAL BIOMASS) USING MIXED ALGAE

T e s t s	Detention period in days									
	Control (Raw sewage)					Raw sewage + Mixed algae				
	0	2	4	6		0	2	4	6	
A. PHYSICAL										
Water Temp. (°C)	28.4	28.4	28.6	28.6		28.4	28.5	28.6	28.6	
Colour	Brown	Brown	Brown	Brown		Brown	Green	Green	Green	
pH	7.5	7.6	7.6	7.8		7.5	8.8	9.4	10.0	
B. CHEMICAL (mg/l)										
Phenol alkalinity	26	35	40	45		26	81	92	106	
Am-N	36.0	26.8	26.4	21.4		36.0	8.0	5.9	2.2	
NO ₂ -N	0.20	0.24	0.20	0.19		0.20	0.24	0.36	0.48	
NO ₃ -N	0.16	0.17	0.24	0.26		0.16	0.20	0.30	0.28	
PO ₄	16.8	16.1	12.8	14.0		16.8	5.7	3.6	2.7	
BOD ₅ at 20°C #	160	104	78	65		160	68	26	21	
COD #	264	156	110	104		264	102	44	40	
C. BIOLOGICAL (mg/l)										
Algal biomass dry wt.	-	-	-	-		-	208	210	214	

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TABLE - 4
BIOCHEMICAL VARIABLES USING MIXED ALGAE (mg/l)

T e s t s	Detention period in days									
	Control (Raw sewage)					Raw sewage + Mixed algae				
	0	2	4	6	6	0	2	4	6	6
Protein	6.8	5.4	3.6	2.3	2.3	6.6	4.5	2.8	1.5	
Amino-N	5.7	4.7	3.5	1.1	1.1	5.6	4.5	2.3	0.7	
Total sugar	80.0	61.8	41.2	29.2	29.2	83.9	56.0	30.0	16.3	
Free sugar	28.2	25.0	17.2	6.6	6.6	28.2	18.0	11.2	2.9	
Volatile acids	46.8	32.5	13.2	8.4	8.4	51.6	29.0	8.2	3.1	

TABLE - 5

BIOLOGICAL CONDITIONS USING MIXED ALGAE

T e s t s	Detention period in days									
	Control (Raw sewage)			Raw sewage + Mixed algae						
	0	2	4	6	0	2	4	6		
i. Zoogloal growth	nil	rr	rr	r	nil	rr	rr	rr		
ii. Dark to light brown filament (Leptothrix ochracea)	nil	rr	rr	rr	nil	nil	nil	nil		
iii. Organic debris intermixed with algae	nil	nil	nil	nil	nil	r	C	C		
iv. Flocculent brown precipitate separately seen at bottom	nil	r	C	CC	nil	nil	nil	nil		
v. <u>Ciliophora (free swimming)</u>										
Paramaecium caudatum	nil	nil	rr	nil	nil	nil	nil	nil		
Spathidium spathula	nil	r	rr	nil	nil	r	nil	nil		
Aspidisca costata	nil	nil	nil	r	nil	rr	nil	nil		
vi. <u>Ciliophora (stalked)</u>										
Vorticella globosa	nil	nil	CCC	nil	nil	nil	nil	nil		
Vorticella spp.	nil	CC	nil	CCC	nil	nil	nil	nil		
vii. Rotifers										
Lecane spp.	nil	nil	nil	nil	nil	CCC	CCC	CC		
viii. Annelid worm	nil	nil	nil	nil	nil	rrr	nil	rrr		

C = common
 CC = more common
 CCC = most common
 r = less common
 rr = rare
 rrr = stray form

TABLE - 6

REMOVAL OF NUTRIENTS DURING ASSIMILATORY AND ENDOGENOUS PHASES OF ALGAL-BACTERIAL
SYMBIOSIS USING THE THREE ALGAE AND BARODA RAW SEWAGE

T e s t s	Nostoc pyriformis			Anabaena cylindrica			Mixed Algae		
	Assimila- tory phase 0 - 2	Endogenous phase 2 - 4	4 - 6	Assimi- latory phase 0 - 2	Endogenous phase 2 - 4	4 - 6	Assimi- latory phase 0 - 2	Endogenous phase 2 - 4	4 - 6
<u>Geo-chemical tests (mg/l)</u>									
Am-N	26.5	4.5	2.4	25.8	1.8	3.7	28.0	2.1	3.7
PO ₄	12.1	1.4	0.3	10.7	3.9	0.4	11.1	2.1	0.9
<u>Bio-chemical tests (mg/l)</u>									
BOD ₅	141.0	12.0	18.0	110.0	18.0	13.0	92.0	42.0	5.0
COD	225.0	21.0	27.0	172.0	29.0	21.0	162.0	58.0	4.0
Organic matter	187.5	17.5	22.5	143.3	24.2	17.5	135.0	48.3	3.3
Algae formed	206.0	6.0	6.0	199.0	2.0	4.0	208.0	2.0	4.0
Amino nitrogen	-	-	-	-	-	-	1.1	2.2	1.6
Protein	-	-	-	-	-	-	2.1	1.7	1.3
Total sugar	-	-	-	-	-	-	27.9	26.0	13.7
Free sugar	-	-	-	-	-	-	10.2	6.8	8.3
Organic acids	-	-	-	-	-	-	22.6	20.8	5.1

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TABLE - 7

RELATION BETWEEN CATALASE ACTIVITY AND PHYSICOCHEMICAL
PARAMETERS OF WASTE WATER

No. of obs.	Catalase activity (μ moles/ 100ml/hr.)	Turbidity (O.D.)	GOD (mg/l)	BOD ₅ (mg/l)
1.	339.3	0.190	328	126.6
2.	570.2	0.400	500	237.5
3.	434.8	0.370	472	204.1
4.	415.2	0.210	358	166.7
5.	362.1	0.210	336	233.3
6.	543.9	0.300	476	212.5
7.	569.1	0.290	456	187.5
8.	528.0	0.250	524	208.3
9.	643.5	0.360	556	358.4
10.	285.7	0.170	304	120.8
11.	504.1	0.320	456	229.1
12.	400.0	0.290	388	187.5
13.	381.3	0.190	316	158.3
14.	336.2	0.190	300	108.3
15.	508.8	0.270	364	200.0
16.	439.0	0.230	372	154.2
17.	512.0	0.230	348	187.5
18.	521.7	0.280	428	300.0
19.	232.1	0.130	268	114.2
20.	300.9	0.220	316	200.0
21.	339.1	0.200	320	179.1
22.	305.1	0.150	264	150.0
23.	318.9	0.160	288	91.7
24.	438.9	0.210	272	162.5
25.	414.6	0.200	324	141.7
26.	456.0	0.180	256	154.1
27.	452.2	0.230	416	275.0

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