

Study of BOD and COD of the Sone river and pond water at Dehri-on-Sone

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Abstract : The Seasonal values of biological oxygen Demand (BOD) and chemical oxygen Demand (COD) varied significantly whereas the spatial variations of them were not found upto mark. Both BOD and COD were observed in higher values in the sone river than in the pond due to highly enriched water with organic matter. The main contribution to BOD and COD in both were phosphogenuous compounds rather than nitrogenuous and carbonaceous compounds.

(Keywords: BOD, COD, Sone river, pond)

Introduction

BOD test measures the oxygen required for the biodegradation of the organic matter. Temperature is the main abiotic factor which affects drastically the seasonal values of BOD and COD directly or indirectly. Dissolved oxygen is another important factor whose measures can indicate the strength of BOD and COD in the water and also direct towards the quantity of biodegradable and chemodegradable organic matters. In the present study the seasonal and spatial variations in the values of BOD and COD have been considered to evaluate the organic pollution in the sone river and pond. The comparative study of water throws light on the factors which affect the values of BOD and COD in the water.

Experimental

Material and methods

The water samples were collected from the surface and bottom of both river and pond.

Temperature and pH were recorded. Hardness and Chloride were analysed following the EDTA titration. Dissolve oxygen was estimated using modified winkler's Iodide- Azide method. Total nitrogen, total phosphorus and soluble carbohydrates were analysed with the help of spectrophotometer. COD was estimated using the open Reflux method. For the analysis of the BOD, water samples were incubated in 300ml. BOD bottles in BOD incubator for 5 days at 20°C. The DO was estimated before and after the incubation of samples. Then, BOD was calculated.

Results and Discussion

Seasonal values of BOD ranged from 3.0 to 7.3 mg/L in the Sone river and from 1.0 to 3.0mg/L in pond. The values of COD varied between 3.13 mg/L and 16.73 mg/l in Sone river and between 2.79 mg/L and 6.43 mg/L in pond. Seasonal mean values of COD were found minimum and maximum during winter and summer seasons respectively in Sone river and in pond. BOD was minimum during rainy season whereas the maximum value was recorded during winter. In both the lowest and highest values of COD were observed during winter the summer seasons respectively. (Table - 1)

The minimum value of BOD in the Sone river and minimum values of COD in both river and pond during winter season could be attributed to the declined decomposition of organic matter and rather low biological activities at low

temperature. Maximum BOD in the Sone river and maximum values of COD in both during summer season might be due to the increased biological activities at high temperature, high density of bacteria and saprobites and comparatively low water level. Maximum BOD was observed during winter in the pond water. During winter season the water level was lower than measured during rainy season because of evaporation and leaching out the water being the sandy bed of river. Nitrogenous components were high during winter.

In both river and pond COD was positively correlated with total phosphorus while with total nitrogen and soluble carbohydrates COD and did not show any significant correlation. The correlations indicate that in both the high COD was mainly dependent on phosphogenuous compounds but a small quantity was also

contributed by the nitrogenous and carbonaceous compounds. It is clear that BOD was also mainly due to phosphogenuous compounds in sone river and pond.

The positive correlation of pH with BOD and COD in Sone river and negative correlations in Pond, negative correlations of them with hardness in the Sone river and positive correlations in pond also throw light that sone river water is highly enriched with BOD and COD representative organic matters compared to the pond.

Thus it can be concluded that both chemodegradable and biodegradable organic matters were higher in quantity in the Sone river than in pond. Both BOD and COD in the water were mainly due to phosphogenuous compounds, however a little quantity was also due to the presence of nitrogenous and carbonaceous compounds.

Table - 1
Seasonal mean values of BOD and COD in sone river and pond

Factors	Place	Profiles	Sone river			Pond		
			Winter	Summer	Rainy	Winter	Summer	Rainy
BOD	A	Surface	3.90	4.95	3.30	3.0	1.6	1.7
		Bottom	3.0	3.85	3.13	1.9	1.6	1.3
	B	Surface	5.05	7.0	4.0	2.5	1.9	1.3
		Bottom	3.6	6.95	3.78	1.6	1.6	1.2
	C	Surface	5.3	7.35	4.33	2.2	1.3	1.4
		Bottom	4.25	6.35	3.45	1.9	1.4	1.1
	D	Surface	5.15	6.85	5.9	1.8	1.9	1.1
		Bottom	3.45	5.25	3.7	1.5	1.3	1.0
COD	A	Surface	4.70	13.6	7.0	2.79	6.36	3.83
		Bottom	4.64	14.4	8.2	2.86	5.88	3.78
	B	Surface	3.56	13.76	7.24	2.85	6.38	3.74
		Bottom	4.49	14.33	6.66	3.15	6.39	3.48
	C	Surface	3.71	16.72	6.57	2.81	6.43	4.13
		Bottom	3.46	11.11	7.10	3.15	6.35	4.31
	D	Surface	3.13	15.01	7.49	2.98	5.7	3.84
		Bottom	3.97	14.9	7.81	2.76	6.25	3.72

Table - 1
Seasonal range of the value of physico-chemical characteristics
of water in sone river and pond

Physico-Chemical factors	Seasons	Sone River	Pond
Temperature (°C)	Winter	18.28–19.58	17.38–18.50
	Summer	24.63–26.05	23.45–24.75
	Rainy	25.83–26.78	26.68–27.38
pH	Winter	8.67-8.92	8.92-8.67
	Summer	9.29-9.67	8.51-8.55
	Rainy	8.22-8.33	8.68-8.71
Hardness	Winter	181.5-194.5	226.5-237.0
	Summer	134.0-158.5	246.0-258.0
	Rainy	177.5-180.0	164.5-171.0
Cl	Winter	46.5-50.0	18.0-18.75
	Summer	70.5-75.25	31.5-33.0
	Rainy	55.0-57.0	14.75-16.0
DO	Winter	6.8-10.0	8.5-10.3
	Summer	3.7-8.6	4.9-6.0
	Rainy	4.4-5.7	5.2-5.8
Total Nitrogen	Winter	9.36-12.23	7.2-11.38
	Summer	7.1-15.81	6.39-10.28
	Rainy	7.34-10.89	5.19-9.17
Total phosphorus	Winter	0.468-0.794	0.314-0.386
	Summer	0.818-1.175	0.512-0.847
	Rainy	0.495-0.715	0.480-0.596
Soluble Carbohydrates	Winter	0.025-0.083	0.033-0.086
	Summer	0.029-0.078	0.053-0.087
	Rainy	0.032-0.075	0.041-0.070

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