

**ORIGINAL ARTICLE****Assessment of BOD and COD in Chambal River in Relation to Pollution at Dholpur District****Pratap Singh Tiwari<sup>1</sup> and Mahendra Lodha<sup>2</sup>**<sup>1</sup>Department of Zoology, Kamla P.G. College, Dholpur<sup>2</sup>Department of Zoology, Govt. College, Dholpur

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Received: 16<sup>th</sup> June 2017, Revised: 25<sup>th</sup> September 2017, Accepted: 26<sup>th</sup> September 2017**ABSTRACT**

*The improper disposal of industrial effluents from water off along with raw sewage, create environmental problems altering the chemical composition of the aquatic resources and this cause heavy damage of the faunal and floral compositions of aquatic habitat, industries like foundries, sugar mill-paper mill, cement factory, Rubber industry, Plastic, petroleum are situated in various cities of M.P. from where Chambal River run away, over the years, Chambal has been in discriminately polluted and misused. In the preset study BOD and COD have been measured to ensure status of pollution in this River.*

**Key words:** Assessment, C.O.D., B.O.D., Organic pollution

**INTRODUCTION**

The socio-economic activities have severely damaged the quality of Chambal River so Chambal has now become danger for human as well as aquatic life. Gandhi sagar project, Rana pratap sagar project, Jawahar sagar project and Kota dam project are main project on the coastal region of Chambal River which are useful for irrigation and electricity production. The intensity of irrigation in the Chambal basin is very high, practically the entire dry weather flow is diverted to the upper Chambal act Kota and whatever flow regretted between Kota & Dholpur has a heavy flow of population. In this stretch the BOD in Chambal continuously rise from 10-20 gm/litre against a permissible limit of 3 gm/litre according to a rough movement at present about 500 MLD municipal waste is being discharged in Chambal River from the like Dhar, Ujjain, Ratlam Monsore, Bundi, Kota as a result of this Chambal is going to highly polluted.

**BOD (BIOCHEMICAL OXYGEN DEMAND)**

It is the amount of O<sub>2</sub> utilized by micro-organism in stabilizing the organic matter. The demand of O<sub>2</sub> of an average is proposol to the amount organic waste to be degraded arobically. The complete degradation of the organic matter may take as for as 20+30 days. Simple organic compounds like Glucose completely oxidized in 5 days. The 20-30 days period is of less significance in practice, therefore BOD test has been developed for 5 days at 20°C.

**PROCESS:**

Aerated the 1 litre distilled water in a container by bubbling compressed air for 1-2 hrs. At attained DO saturation and maintained the temperature at 20 degree centigrade. The add 1 ml each of phosphate buffer, magnesium Sulphate, calcium-chloride and ferric chloride solutions then add 2 ml seeds of microbial population.

**DILUTION OF SAMPLE:**

Neturalized the sample to pH around 7-0 using alkali or acid (NaOH or H<sub>2</sub>SO<sub>4</sub>). Two dilution samples were made in the range of 40% to 70%. It is recommended to have lower dilution to give 70%. Taken the diluted water in BOD bottles by siphon and stoppered immediately. Keep one bottle for the determination of the initial (zero day) DO and other two bottles incubated in BOD incubator at 20 degree centigrade for 5 days. Prepared two blanks by siphoning out only the dilution water in to the determine initial (zero day) and the other is incubated at 20 degree centigrade for 5 days. Determine D. O. in the sample and in the blank on initial (zero day) after 5 day.

**CALCULATION:**

$$\begin{aligned} \text{B. O. D. (mg/litre)} &= \\ (D_1 - D_2) &= \frac{(B_1 - B_2) \times 100}{\% \text{sample}} \end{aligned}$$

Where,

D<sub>1</sub> = D. O. of diluted sample on zeroday

D<sub>2</sub> = D. O. of diluted sample on 5<sup>th</sup> day

B<sub>1</sub> = D. O. of sample on zero day

B<sub>2</sub> = D. O. of diluted sample on 5<sup>th</sup> day

**C.O.D. (CHEMICAL OXYGEN DEMAND)**

C. O. D. is the oxygen requirement by the organic substances to oxidized them by a strong oxydent. The determination of C. O. D. is of great importance where BOD values cannot be determined accurately due to the presence toxins and other such unfavourable conditions for growth of microbes.

**PROCESS:**

Taken 50 ml. sample in round bottom flask then add 25 ml. standard 0.25 N (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) potassium dichromated solution them add 75 ml. C. O. D., acid (dissolved 25 g Ag<sub>2</sub>SO<sub>4</sub> in 2.5 litres of concentrate H<sub>2</sub>SO<sub>4</sub>). The connect the flask to condenser and reflex for 2 hr. at 102 degree centigrade then cool and wash down the condenser with distilled water. Disconnect the flask and add 150 ml. distilled water. Cool and titrated against 0.1 N ferrous ammonium sulphate, use ferrain indicator, sharply colour changes from blue green to wine red refluxed and titrated in the same manner a blank containing the agents and a volume of distilled water equal to that of sample.

**CALCULATION:**

$$\text{C.O.D. (mg/l)} = \frac{(A - B)N \times 8000}{\text{ml of sample}}$$

Where,

A = titrant used for blank

B = titrant used for sample

N = normality of titrant

**RESULTS AND DISCUSSION**

**B.O.D. (BIO CHEMICAL OXYGEN DEMAND):**

In the Chambal water there was significant variations in the Bio-chemical Oxygen Demand at different four sampling station. However, the B.O.D. of Chambal water varies significantly after each three month interval.

**Table 1:** Average B.O.D.

Month	B.O.D. (mg/l)			
	Site A	Site B	Site C	Site D
Oct-04	9.0	10.8	7.1	12.0
Jan-05	10.2	12.4	7.3	14.0
April-05	12.0	14.0	8.5	9.5
July-05	13.6	15.2	10.5	11.3

Site A= High way, Site B= Shamshan Ghat, Site C= Shergarh Fort, Site D= Near railway bridge

**C.O.D. (CHEMICAL OXYGEN DEMAND)**

There was significant variations in the C.O.D. of Chambal water at different four sampling station. However, the C.O.D. of chambal water varies significantly after each three months intervals.

**Table 2:** Average C.O.D.

Month	C.O.D. (mg/l)			
	Site A	Site B	Site C	Site D
Oct-04	24.0	30.0	33.0	37.0
Jan-05	28.0	36.0	38.0	42.0
April-05	30.0	38.0	48.0	52.0
July-05	36.0	40.0	57.0	60.0

Site A= High way, Site B= Shamshan Ghat, Site C= Shergarh Fort, Site D= Near railway bridge

**B.O.D. AND C.O.D.**

B.O.D is the oxygen demand of any system, required for stabilization under biological condition. So it is clear that an index of organic content of the system can utilized by microbes in the process of stabilization. Observations of the present work show that the value of B.O.D and C.O.D significantly increase in the month of July 2005, may be correlated with more water in River Chambal, because of rains. Further a significant increase in B.O.D. and C.O.D. value have been observed from oct. 2004 to April 2005 at down stream site D as compared to up stream site A. The probable reason for this increase B.O.D. and C.O.D. at down stream site D may be due to influx of washing, printing of cloths from washing ghat and the enhancement in B.O.D. and C.O.D. could be due to the entry of effluents of domestic sewage of the city. B.O.D. and C.O.D. values of the Chambal River are towards higher side in the winter compared to monsoon probably due to aquatic flora during winter. Such observations indicate the adverse effect of untreated sewage water on the water quality of River, which has further been revealed by high B.O.D. and C.O.D. values of almost sewage, domestic as well as effluents of some small scale industries. According second opinion the increased value of B.O.D. is probably due to polluted water that mixed up at down stream site D. The values of D.O. decrease and B.O.D. increase, the decreasing of D.O. is an index of increased organic pollution which is mainly due to the addition of wastes at down stream site D. These organic matters undergo degradation by microbial activities in the presence of D.O., which may be due to the exogenous addition of organic matter in the water. B.O.D. is an indicator of total amount of Biodegradable organic matter in the River. The B.O.D. increased probably due to presence of high organic matter in the water. C.O.D. is rapid measurable parameter of biodegradable and non biodegradable organic matter in the water. Both B.O.D. and C.O.D. values indicate the presence of high organic matter load in Chambal River. In the same way high values of B.O.D. and C.O.D. indicate the presence of large concentration of organic matter. B.O.D. and C.O.D. values are significantly increased in summer month April 2005 to July 2005. Sewage, domestic as well as small scale industrial waste and other kinds of effluents are also responsible for increase B.O.D. and C.O.D. values in Chambal River. The present observations indicate that the pollution is going to increase in Chambal River.

In the present findings the Author is of the opinion that the B.O.D. and C.O.D. values in Chambal River going to exceed due to addition of sewage, small scale industries waste as well as due to rich amount of microbes which discharging their toxic effluents. B.O.D. and C.O.D. datas indicate the presence of high organic matter load in River Chambal. The present observations clearly indicate that down stream site D heavily polluted as compared to up stream site A. the studies have revealed that the disposal sewage, domestic and small scale industries effluents would be harmful for aquatic fauna and flora as well as human beings if it is directly used for irrigation of or other purposes.

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