Physico-Chemical Assessment of Kham River at Aurangabad, (Maharashtra)

S. S. Patil	I. B. Ghorade
Department of Environmental Science Dr. Babasaheb Ambedkar Marathwada University, Aurangabad	Department of Environmental Science Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

ABSTRACT *A laboratory study was conducted to monitor the physicochemical characteristics of water samples of Kham River for a period of ten months during July 2010 to April 2011.The analysis was done for the parameters like (Temperature, pH, TDS, Conductivity, Turbidity, DO, BOD,COD, Sodium, Potassium.) The observed values of various physicochemical parameters of water samples were compared with standard values. This research work shows that the water quality of Kham River is deteoriated possibly due to increased human activities and improper release of industrial effluents.*

Introduction:-

Aurangabad is the headquarters of the district as well as the division – Marathwada. It is situated on the Kham River. Its geographical location is latitude 19° 53 ' north and longitude 75° 20' east. Kham River flows through Aurangabad city. This river flows with freshwater in monsoon only. Rest of the year it receives wastewater from the city. The Kham River receives sewage from the nallas flowing through densely populated areas. Near the Holy Cross School, the river crosses the city boundary and receives a nalla coming from the Station area MIDC. The Government of India is determined to rectify this situation and, consequently, supplying safe drinking water to rural and urban populations has been identified as one of the "Technology Missions" to be pursued by the nation1. Water is essential to all forms of life and makes up 50-97% of the weight of all plants and animals and about 70% of human body (Buchholz, 1998). Water is also a vital resource for agriculture, manufacturing, transportation and many other human activities. Despite its importance, water is the most poorly managed resource in the world (Fakayode, 2005).The quality of water may be described according to its physico-chemical and micro-biological characteristics (. N. S. Bhandari and Kapil Nayal, 2008) The river water quality has been greatly influenced by the discharge of domestic, industrial waste waters besides agricultural runoff. Introduction of different wastewaters into the river in large quantities not only alters the environment but also influence the aquatic communities. The studies on physico-chemical parameters of various water bodies have been performed in different countries (Habib et al., 1997).

Material and Methods

The water samples were collected for physico-chemical analysis from Kham River and analysed at regular intervals of one month for a period of ten months from July 2010 to April 2011. The samples were well mixed and stored in 1.5 liter plastic cans for the analysis work. Sample collection was usually completed during morning hours between 6.00 am to 9.00 am every for further analysis. The Water temperature, Water transparency, Dissolved Oxygen and Hydrogen ion concentration (PH) were estimated on the spot at the time of sampling while other parameters were estimated in the laboratory. Standard methods as prescribed APHA (1998) were followed for examination of various physical and chemical parameters of water. Water transparency was measured by Secchi disc having a diameter of 20 cm and divided into black and white quadrants. The depth at which the Secchi disc was visible was determined.

Results and Discussion:-

Table- 1. Average Physico-Chemical Analysis of Water Sample at Kham River (2010-11)

Parameters	Temp.	pH	TDS	Conductivity	Turbidity	DO	BOD	COD	Sodium	Potassium
July	24	7.05	369	253.5	98	7.3	3.4	8.7	19	2.5
Aug.	25.5	7.35	310	272	95	8.1	3.5	7.9	15.5	1.9
Sept	25.5	8.3	299.5	289.7	65	8.0	3.4	8.5	12.5	1.9
Oct	25	8.0	255.5	255	87	7.9	2.9	7.9	17.5	2.5
Nov.	26	8.9	248	295	49	8.6	3.5	7.8	19	0.9
Dec.	26.5	8.9	289	240	35	8.4	4.0	8.5	20.5	1.8
Jan.	26	8.6	295	288	89	8.1	3.5	7.6	16.5	2.0
Feb.	26.5	7.4	310	245	83	8.0	3.5	8.0	14.5	2.9
Mar.	29	8.2	355	278	77	7.5	4.6	8.5	20.5	2.5
Apr.	28.5	8.9	329	283	101	7.6	3.8	9.0	19.5	3.6
Average	26.25	8.16	306	269.92	77.9	7.95	3.61	8.24	17.5	2.25
SD	1.514	0.695	38.438	19.990	21.871	0.398	0.448	0.458	2.698	0.728

The analytical results for the various parameters have been shown with their Mean in the Table No.1.

Temperature

In the present investigation the range of temperature of water was found average 26.25.00c at the sampling station. At higher temperature solubility of oxygen and other gases decreases and water becomes tasteless while metabolic activity of organism increases. Tamlurkar et. al. (2006) recorded maximum temperature of water at Nanded in Maharashtra. Lowest temperature 26.0° c was observed during winter season while highest temperature 31.2° c was observed during summer season. Temperature had an appreciable effect on dissolved oxygen and biochemical oxygen demand and the aquatic organism in water (Kasthuri and et. al. 2005).

pH

The analytical results for the various parameters have been shown in the result table. The pH range was recorded in the range 8.16 at the Sampling station. pH is a term used universally to express the intensity of the acid or alkaline condition of a solution. Most of the waters are slightly alkaline due to presence of carbonates and bicarbonates. pH of water is important for the biotic compound because most of the plant and animal species can survive a narrow of pH from slightly acidic to slightly alkaline condition.

TDS

Total dissolved solids were recorded in the range of 306 mg/l at sampling station. The TDS values were below the drinking water standards prescribed by WHO. Similar results were also observed by Dhembare and Pondhe [1997]. TDS conductivity and Turbidity are positively related with each other. TDS conductivity and Turbidity are positively related with each other [Tamlurkar and Ambore 2006].

Conductivity

It is ranged average 269 µmhocm-1, showing large measure of soluble ions which is confirmed by the presence of other metals and chlorides as well as other parameters. However, the average conductivity is low. Electrical conductivity is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salt.

Turbidity

In the present investigation the range of turbidity was 77.9 NTU at sampling station. Turbidity is an important parameter for characterizing water quality. It is an expression of optical property of a sample (water and wastewater) containing insoluble substance which causes light to be scattered rather than transmitted in straight lines. The amount and angular distributions of this scattered light is governed not only by the quantity of the insoluble substances but also by their size, shape and refractive index.

DO

In the present investigation the range of DO was 7.95 ppm. The concentration of DO regulates the distribution of flora and fauna. Seasonally the concentration of DO was more during monsoon and least during summer [Yogendra et.al. 2008]. DO play an important role in water quality determination. The introduction of oxygen demanding materials, either organic or inorganic, in to water causes depletion of the dissolved oxygen in the water. This poses a threat to fish and other higher forms of aquatic life if the concentration of oxygen falls below critical point [Ramana et.al. 2008]. The DO levels recorded in the study area varied according to the rate of respiration and decomposition of the organic materials in the water (Bankar, et .al., 2005).

B.O.D

In the present investigation the range of BOD was 3.61. Biochemical Oxygen Demand (BOD) is the measure of the degradable organic material present in a water sample and can be defined as the amount of Oxygen required by the Micro Organisms in stabilizing the Biologically Degradable Organic matter under aerobic conditions. The principle of the method involves, measuring the difference of the Oxygen concentration between the sample and after incubating it for five days at 20°C.

C.O.D

During the period of present investigation, the average value of COD at sampling station 3.61 ppm. COD is the oxygen required by organic substances in water to oxidize them by a strong chemical oxidant. (Trivedy and Goel, 1986).Chemical oxygen demand is a method to determine the organic load of water body i.e. susceptible to oxidation.(Jadhavar, et al., 2010The level of chemical oxygen demand seems to be the appropriate indices for assessing the pollution level of water bodies (Jakher, 2003). The high COD values are found mainly in water, which may be due to the mixing of domestic and industrial waste (Murugesan et al., 2007).

Sodium (Na)

During the period of present study, the value of Na was found 17.5. It is also one of the important cation occurring naturally. Its concentration in natural fresh water is lower than calcium and magnesium. In natural waters, the major source of sodium is weathering of various rocks (Trivedy and Goel, 1986).

Potassium (K)

During the period of present study, the value of Potassium was found 2.25. Potassium is less common and mobile cation apart from an involvement in metabolic processes. These ions participate in nerve impulse in conductive via the brain.

Conclusion:-

To summarize the base line result of a present investigation, it clearly indicated that River water of this area is not highly contaminated but there is indication of increase in pollution and it may be due to the discharge of industrial effluents into the river bed and other land sites which may get percolated into the ground water and finally affected the river water. Hence prevention of river water pollution due to any cause is very important. Therefore constant monitoring of water is required to present the health hazards in the area for safe water supply and hygienic waste disposal should receive priority into these areas. The study indicated that water sample showed that the water with more Dissolve Oxygen & more turbidity, so that water is not potable. Therefore it is necessary to control the incoming Industrial waste by redesigning the infrastructure to protect the river and surroundings. The present situation has been the outcome of human activity.

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