



PHYSICO-CHEMICAL PARAMETERS ASSESSTMENT OF CHILAR DAM WATER IN DIFFERENT SITES OF SHAJAPUR TOWN, M.P., INDIA

Bodane Arun Kumar *¹

*¹ Department of Chemistry, B.S.N. Govt. P.G. College, Shajapur- 465001, M.P. INDIA

*Correspondence Author: bodane2009@gmail.com

Abstract:

The present investigation reveals the quality of Dam water for public consumption to determine the Dam water of Shajapur town. Physico-chemical parameters of Dam water were monitored during the study period. The parameters investigated were pH, TDS, Alkalinity, Total Hardness, Chlorides, Magnesium, Fluoride, Nitrates, Dissolve Oxygen and COD. Results obtained from the study revealed that quality of Dam water during study season is well within the permissible limit and the Dam water is safe for drinking or fit for human consumption.

Keywords:

Dam water, Physico-chemical parameters, Drinking water, human consumption, Shajapur town.

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1. INTRODUCTION

Water in its pure form occurs rarely in nature. Comprising over 70 % of the Earth's surface, water is the most precious natural resource on our planet¹. Very small amount of water i.e. less than 1% is fit for human consumption which signifies the importance of this essential commodity on the earth. The most widely spread danger associated with drinking water is the direct or indirect contamination by human and animal feacal matter, chemical, municipal, domestic and industrial liquid discharge etc. Availability of clean water is going to be the greatest constraint for human health. Keeping this into consideration an attempt was made to evaluate the Physicochemical Characteristics of Dam water of the town to determine whether the water is fit for human consumption or not. Water is a basic and primary need of all vital processes and it is now well established that the life first arose in aquatic environment. The population of Shajapur Census 2011 is 1512353 and people depending upon this Dam for their domestic needs like cloth washing, domestic animal drinking and washing purpose.

2. EXPERIMENTAL

The study was conducted for a period of one year from Jan 2013 to Feb 2014. Dam water samples from Chilar Dam were collected in clear pre-sterilized polythene bottles. During field



investigation physical parameter like pH and temperature were measured. Proper sampling and preservation techniques for collecting water samples for DO, COD etc. The physico-chemical parameters such as pH, Conductivity, Alkalinity, Calcium, Magnesium, Chloride, Total Hardness, Fluoride, Nitrite, Do and COD were determined using standard method²⁻⁵. The method used for estimation of various nutrients and parameters are shown in Table-2. Reagent used for the present investigation was A.R. Grade and double distilled water was used for preparing various solutions. Methods used for estimation of various nutrients and parameters are shown in Table-2.

Table 1:

S.No.	Sampling Point	Place
01	S1E	East side of Chilar dam
02	S2W	West side of Chilar dam
03	S3N	North side of Chilar dam
04	S4S	South side of Chilar dam

Table 2:

S.No.	Parameters	Method
01	pH	pH Metrically
02	Conductivity (μ S)	Conductometrically
03	Alkalinity (mg/l)	Titration Method
04	Calcium	Titration Method
05	Magnesium	EDTA Titration Method
06	Chloride (mg/l)	Precipitation Titration
07	Total Hardness (ppm)	Titration Method
08	Fluoride (mg/l)	Spectrophotometrically
09	Nitrite (ppm)	Spectrophotometrically
10	Dissolved Oxygen	Winkler Method
11	COD	Titration Method



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Figure 1: Madhya Pradesh Map



Figure 2: Shajapur Map

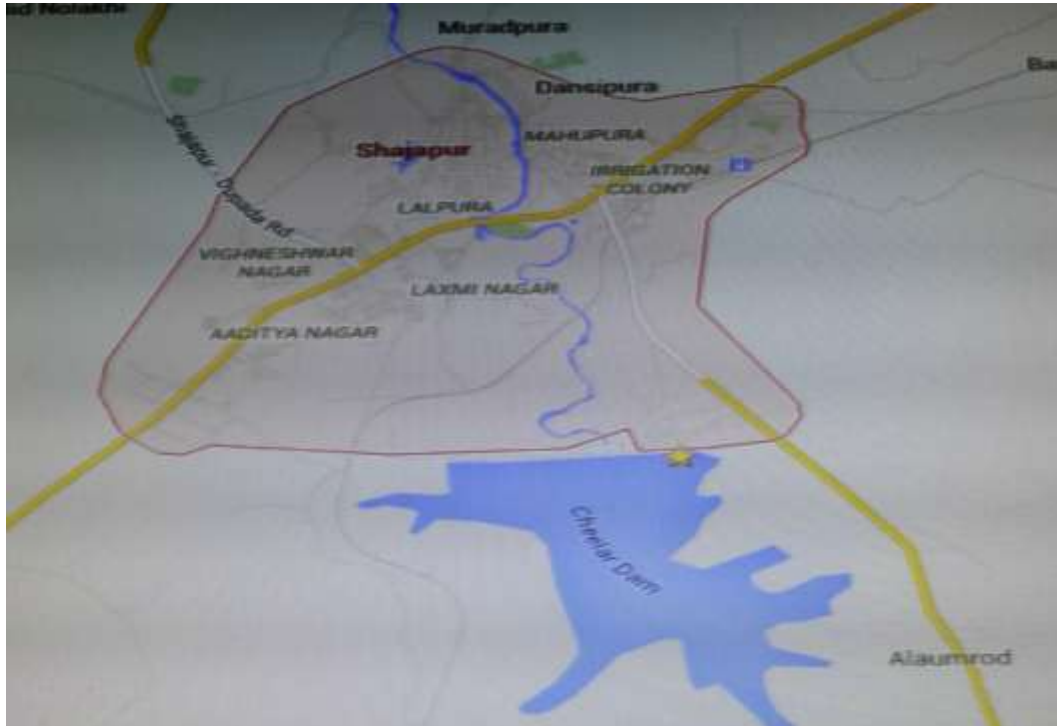


Figure 3: Shajapur and Chilar Dam on Google Map



Figure 3: Real Photo of Chilar Dam



3. RESULTS AND DISCUSSION

Physico-chemical parameters of water sample were determined in Jan 2013 to Feb 2014. The temperature of the sample was noted at the sample spot during collection. Other parameters like pH, Conductivity, Alkalinity, Calcium, Magnesium, Chloride, Total Hardness, Fluoride, Nitrite, Do and COD were measured within few hours from sampling. The parameters were analyzed by prescribed standard method⁶. The variation in various parameters of different samples is shown in Table-3.

pH

The pH value of natural water changes due to biological activity and industrial contamination. pH has no adverse effects on health. The average pH values of this investigation are too low and well within the standard permissible limits⁷.

CONDUCTIVITY

Conductivity is Chilar Dam where it is 0.4×10^{-3} to 0.6×10^{-3}

ALKALINITY

The main source for alkalinity is due to weathering of rocks. Higher alkalinity value contributes sour and saline taste to water. Although, alkalinity is not harmful to human beings yet the water supplied with less than 100 mg/l is desirable.

CALCIUM

The water above Calcium values 25 mg/l are classified as 'Calcium rich'. The present investigation shows that the concentration of calcium of the Chilar Dam water is 13 to 15 mg/l.

MAGNESIUM

The observed value of Magnesium in dam water is maximum 4.46 mg/l. The present investigations shows that the Magnesium content in majority of samples does not exceed the limit as prescribed by ISI as well as WHO.

CHLORIDE

The suitability of water resource for the irrigational use in agricultural is depends on its salt concentrations, especially Chloride contents. In the present investigation Chloride concentration is in the range of 37.70 to 40.60 in Dam water.



TOTAL HARDNESS

Total hardness of water is caused by the presence of Calcium and, Magnesium salts. Hardness has no known adverse effect on health. However, maximum permissible level has been prescribed for drinking water is 500mg/l, by WHO. According some classifications water having Hardness up to 75 mg/l is classified as soft, 76 to 150 mg/l is moderately soft, 151-300 mg/l as hard and more 300 mg/l as very hard. In present investigation Hardness of samples of dam water is in the range of 111.05 to 117.90 mg/l. the result shows that, this water is moderately soft⁸⁻¹⁰.

FLUORIDE

Fluoride is essential for human being as trace element and higher concentrations of this element causes toxic effects. The permissible limit of Fluoride for potable water is 0.6 to 1 mg/l. in the present study concentration of fluoride varies in between 0.335to 0.356 mg/l in dam water. Consumption of such water having fluoride more than 1.5 mg/l may cause degeneration of bones and dental mottling especially in pregnant women and children. It is suggested that defluoridation of the drinking water should be done at these stations.

NITRITE

Nitrate values are used to assess the self purification property of the water source. The main source of nitrate in water body is decaying plant and animal materials. The nitrate values of this investigation are well within the standard permissible limit⁷. The prescribed limit of NO₃ - by WHO is 50 mg/l for domestic water. The concentration of different forms of Nitrogen gives a useful indications of the level of micronutrients in water and hence their ability to support for plant growth¹¹⁻¹³.

DISSOLVED OXYGEN

During the study, the concentration of DO recorded is 2.09 to 2.13 mg/l for Chilar dam water.

COD

C.O.D. is the major of oxygen consumed during the oxidation of oxydisable organic matter present in the water. C.O.D. of dam water is in the range 3.7 to 4.3 mg/l COD of dam water is nearly same and below the permissible limit.

**Table 3:**

Sr.No.	Parameters	Chilar Dam			
		S1E	S2W	S3N	S4S
01	pH	7.20	7.25	7.19	7.17
02	Conductivity	0.6×10^{-3}	0.5×10^{-3}	0.6×10^{-3}	0.4×10^{-3}
03	Alkalinity	335	345	300	325
04	Calcium	14.40	15.20	14.32	13.82
05	Magnesium	4.46	4.01	4.22	3.30
06	Chloride	37.70	40.60	38.92	39.47
07	Total Hardness	111.05	117.90	114.75	115.89
08	Fluoride	0.335	0.356	0.341	0.348
09	Nitrite	0.00005	0.00007	0.00010	0.00012
10	Dissolved Oxygen	2.11	2.10	2.09	2.13
11	COD	4.2	4.3	3.9	3.7

4. CONCLUSION

The results obtained from this study clearly indicate usability of Chilar dam water for drinking and other domestic purposes. It is also helpful for a common man to understand the drinking water quality.

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