



# **POTABLE WATER QUALITY WITH RESPECT TO TOTAL DISSOLVED SOLIDS AND TOTAL HARDNESS OF BHARATPUR DISTRICT OF RAJASTHAN**

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## **ABSTRACT**

The ground water is the major resource for drinking water. The ground water resources include tube-wells, hand pumps and open wells. The availability of fresh, safe ground water is very scarce and restricted due to peculiar hydrological, geological, geomorphic and demographic features. The physicochemical assessment of water quality is required to protect the water for further deterioration. A variety of chemical substances such as fluoride, nitrate, chloride, total dissolved solids and total hardness are dominant in the ground water contamination. A study has been carried out for the determination of chemical parameters such as total hardness and total dissolved solids in ground water resources used for drinking purposes in Bharatpur district of Rajasthan. There is a huge variation in concentration of total hardness and total dissolved solids.

**Key words:** Drinking water, Bharatpur district, Total dissolved solids, Total hardness.

## **INTRODUCITON**

### **Study area**

Bharatpur District is situated in the eastern part of Rajasthan State between North latitude 26°22' and 27°83' and longitude between 76°53' and 78°17'. It is situated at the foothills of Aravali Mountain series.

### **Geology, geomorphology, mineral sources of the study area**

The rock-type exposed are grouped under Alwar and Ajabgarh groups belonging to Delhi Super group. The rocks of Delhi Super group are succeeded by sand stone of Bhandar

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group. The major parts of the district are occupied quaternary alluvium and blow sand, which conceals the hard rock geology. The area has been divided in two river basin mainly Barah river basin towards north and Banganga towards south.

The people and animals of Bharatpur district are dependent on ground water for drinking agriculture and allied purposes. The ground water of this district has been affected by modernization, urbanization, irregular-inadequate rainfall and agricultural discharges like fertilizers and pesticides.

The quality of water is assessed on the basis of certain physical, chemical and biological parameters<sup>2</sup>. The standard permissible value of total dissolved solids and total hardness according to international standards, Indian standard, Ministry of Urban Development and WHO are given in Table 1.

**Table 1: Limits of ions concentration (mg/L)**

Chemical parameters	International <sup>4</sup> standard		Indian <sup>5</sup> standard		Ministry of Urban development <sup>3</sup>		WHO <sup>1</sup>	
	Max. allow. conc.	Min. acc. conc.	Max. allow. conc.	Min. acc. conc.	Max. allow. conc.	Min. acc. conc.	Max. allow. conc.	Min. acc. conc.
T.D.S.	500	1500	500	1500	500	1500	500	1500
T.H	100	500	200	600	200	600	100	500

Max. allow, conc. = Maximum allowable concentration

Min. acc. conc. = Minimum acceptable concentration

Following Table 2 shows the probable relationship between ion concentration in drinking water and its effect.

**Table 2: Concentration of ion in drinking water and its effect**

Parameters in maximum allowable limit	Undesirable effect that may be produced
Total dissolved solids	Turbidity, gastrointestinal-irritation
Total hardness	Excessive scales.

## EXPERIMENTAL

In present study, the water samples have been collected from hand-pumps and tube-wells of villages of seven tehsil head-quarters. The samples were collected in borosil glass bottles without adding preservatives. Samples were collected with necessary precautions. All chemicals used in the analysis were of analytical grade. The total hardness was determined by complexometric titration with EDTA using Eriochromeblack-T as an indicator. Total dissolved solids was estimated by digital TDS meter systronics 308.

## RESULTS AND DISCUSSION

For the assessment of quality of under ground drinking water in Bharatpur district, 48 water samples were collected from the villages of seven tehsil. The drinking water has total dissolved solid ranges from 754 to 11687 mg/L and total hardness ranges from 80 to 4460 mg/L.

**Table 3: Chemical parameters of the water sample collected**

Village/Town and source location	Source	T.H.	T.D.S.	Village/Town and source location	Source	T.H.	T.D.S.
Pidyani (Achnera Road)	T.W.	520	1791	Bharatpur (Jaghina Gate)	T.W.	200	1281
Mallah	T.W.	460	1922	Rarah	T.W.	600	1319
Gunsara (near Pokhar)	H.P.	2800	7163	Bhusawar	T.W.	1830	4524
Ajan (Primary School)	H.P.	790	2111	Baroli	T.W.	760	1847
Ubar (Jaloshari Pokhar)	H.P.	1450	3430	Ramaspur	T.W.	140	1131
Bharatpur (Chauburja)	H.P.	2100	4524	Amoli (Near old bus stand)	T.W.	240	1168
Peepla (PHED Office)	T.W.	980	2563	Bhagwanpura	T.W.	490	1357

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Village/Town and source location	Source	T.H.	T.D.S.	Village/Town and source location	Source	T.H.	T.D.S.
Helak (Near Dev Mandi)	H.P.	340	1017	Nadbai (Katara Booster)	T.W.	1090	2375
Jiroli (PHED Office)	T.W.	750	1998	Karili	T.W.	2100	7540
Gazipur	TW	2370	5556	Bharatpur (Jaghina Gate)	T.W.	200	1281
Onch (Jatav Basti)	H.P.	650	1696	Rarah	T.W.	600	1319
Binaua (UP School)	H.P.	170	942	Bhusawar	T.W.	1830	4524
Uchain	T.W.	2130	5278	Baroli	T.W.	760	1847
Rupbas	H.P.	50	754	Ramaspur	T.W.	140	1131
Peepal Khera	H.P.	140	1583	Amoli (Near old bus stand)	T.W.	240	1168
Kutakpura (Near Road)	H.P.	2200	5278	Bhagwanpura	T.W.	490	1357
Abar (Primary School)	H.P.	3450	11687	Nadbai (Katara Booster)	T.W.	1090	2375
Sitara (Pr. School)	H.P.	1240	6032	Karili	T.W.	2100	7540
Bilawati (School)	H.P.	3280	10179	Gudawali	HP	1780	4524
Kumher (Chainpura)	H.P.	4320	11310	Sainth	HP	3100	9425
Sikrori (Near Pokhar)	H.P.	630	5278	Poonth	HP	1840	7540
Sheopura (School)	H.P.	870	3355	Naswada (Near Pokhar)	HP	970	5278
Deeg (Kama Gate)	H.P.	1940	9048	Garauli (Near School)	HP	510	2865

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Village/Town and source location	Source	T.H.	T.D.S.	Village/Town and source location	Source	T.H.	T.D.S.
Nawgaun	T.W.	310	867	Didawali (Near School)	HP	40	1847
Ahalwadi (Near pond)	H.P.	2900	6787	Bayana (Girls School)	HP	660	2601
Satpada	H.P.	760	1809	Bodi Dhokla	TW	870	3619
Milakpur	H.P.	1170	3694	Kumher (Main market)	HP	4460	9429

The percentage of samples occurring minimum acceptable concentration, maximum allowable concentration and more than allowable concentration of T.D.S. and T.H. are shown in the Table 4.

**Table 4: T. D. S. and T. H. with concentration of samples (%)**

Parameters	% of samples occurring Min. acceptable conc.	% of samples occurring max. allowable conc.	% of samples occurring more than max allowable conc.
T.D.S.	Nil	17.39%	82.61%
T.H.	4.3%	19.56%	76.14%

## CONCLUSION

From the above analysis, a large number of underground water sources possess high concentration of total dissolved solids and total hardness in Bharatpur district. A large number of people may have gastrointestinal disorder.

## REFERENCES

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