# Physicochemical Analysis of Groundwater sample of Cheeplata Village of Neemkathana Block of Sikar India

### \*Suresh Kumar Verma **\*\*Santosh Kumar Verma**

Studies of Physico-chemical parameters of groundwater quality based on Physico-chemical parameters of Cheeptala village of Neemkathana block is taken to evaluate its suitability for domestics purpose. Groundwater samples were collected from the hand-pump for the assessment period from Jan-2016 to Dec-2016. Physico-chemical parameters pH, total hardness, total alkalinity, chloride, nitrate, sulphate, fluoride, and TDS are selected. Methods were used as suggested by BIS (IS 10500: 2012 estimation of acceptable limits and permissible limits for selected parameters. Nitrate and TDS both parameters were both found above the acceptable limit, as the value of any parameter is more or less than the selected standard then the sample is contaminated, so the groundwater of cheeplata village is found not suitable for human health for the assessment period.

Keywords: Groundwater, physio-chemical parameters, WHO, BIS, TDS

#### Introduction

Modern civilization, industrialization, urbanization, and an increase in population create a degradation of our groundwater quality. A primary concern of people is that of obtaining clean drinking water which is one of the most important natural resources on earth. In water, the presence of dissolved solids may affect its taste (Bruvold, 1969). Nagarajan et al,(2000) stated that use of fluoride contaminated water, air and agriculture produce causes dental, skeletal and non-skeletal fluorosis.4 Concentrations of TDS from natural sources have been found to vary from 30 mg/liter to 6000 mg/liter (WHO). High TDS levels (>500 mg/litre) result in large scaling in water pipes, water heaters, boilers, and home appliances such as kettles and steam irons (Tihansky, 1974). A limited epidemiological study in the former Soviet Union showed that the average number of "cases" of inflammation of the gallbladder and gallstones over a 5-year period increased with the mean level of dry residue in the groundwater (Popov, 1968).

#### **Study Area**

Geographical location Cheeplata village 27.5604° N, 75.8243° E. Neemkathana is the nearest town to Cheeplata village and distance between is 25 km away. Neemkathana block is over-exploited, and the

### Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India



# AIJRA Vol. II Issue III www.ijcms2015.co

hydrological formation of Cheeplata village is Quartzite. Open-cast mining in this area is very common for sand and stone. Due to unavailability of surface water people of 4235, are dependent on groundwater.

#### **Results and Discussions**

### Assessment of groundwater of Cheeplata village in Neemkathana block

Groundwater samples of Cheeplata village collected from the Month of Jan-2016 to Dec-2016 and tested for different physico-chemical parameters. The results of physico-chemical parameters shown in the table1.

Water testing of Cheeplata Village in Neemkathana								
Month	рН	Total Alkalinity, mg/L CaCO <sub>3</sub>	Total Hardness, mg/l	Chloride, mg/L	Sulphate, mg/L	Nitrate, mg/L	Fluoride, mg/L	TDS, mg/L
Jan-16	7.4	320	450	150	25	25	0.52	1055
Feb-16	7.1	280	410	100	45	20	0.71	980
Mar-16	7.5	300	405	135	40	23	0.39.	985
Apr-16	7.3	290	420	132	38	45	0.52	974
May-16	7.6	285	405	142	34	65	0.53	945
Jun-16	7.9	300	390	135	32	60	0.5	920
Jul-16	7.9	310	400	130	41	37	0.43	875
Aug-16	7.5	305	405	145	40	45	0.48	900
Sep-16	7.2	395	409	160	37	50	0.53	890
0ct-16	7.5	320	396	165	40	52	0.55	800
Nov-16	7.3	305	395	105	41	43	0.46	912
Dec-16	7.6	355	305	110	45	45	0.56	905

#### Table: 1 Water testing data of Cheeplata village in Neemkathana block

# Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India





Figure 1: pH of groundwater in Cheeplata village of Neemkathana block

Figure 1 shows that the pH of the groundwater of Cheeplata village found within (BIS IS 10500: 2012) acceptable limit of 6.5 – 8.5 for the assessment year from Jan-2016 to Dec-2016. A minimum of 7.1 was observed in the month of Feb-2016, and a maximum of 7.9 was observed in the month of July 2016.



Figure 2: Total alkalinity in groundwater of Cheeplata village in Neemkathana block

Figure 2 shows that the total alkalinity for the groundwater of Cheeplata village was found beyond

# Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India



the BIS (IS 10500: 2012) acceptable limit of 200 mg/L, but all the results are within the permissible limit of 600 mg/L, the results of the test indicate that the value is maximum 395 mg/L in the month of Sept-2016 while minimum 280 mg/L in the month of Feb- 2016.





Figure 3 shows the assessment of parameter total hardness for the assessment period and the results state that the maximum total hardness of 450 mg/L was found in the month of Jan- 2016 and the minimum total hardness of 305 mg/L is observed in the month of Dec- 2016.



Figure 4: Chloride in groundwater of Cheeplata village in Neemkathana block

### Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India



Figure 4 shows that maximum chloride 165 mg/L found in the month of Oct-2016 and the minimum chloride conentration100 mg/L is observed in the month of Feb-2016. The chloride concentration of groundwater in the Cheeplata village observed within the BIS (IS 10500: 2012) acceptable limit of 250 mg/L.



Figure 5: Sulphate in water of Cheeplata village of Neemkathana block

Figure 5 shows that the maximum sulphate 45 mg/L found in the month of Feb-2016 and the minimum 25 mg/L sulphate is found in the month of Jan- 2016. The sulphate concentration in groundwater of Cheeplata village is observed higher than the BIS (IS 10500: 2012) acceptable limit of 200 mg/L.



Figure 6: Nitrate in groundwater of CHEEPLATA village in Neemkathana block

# Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India



Figure 6 shows that maximum nitrate 65 mg/L found in the month of May 2016 and the minimum 20 mg/L nitrate is found in the month of Feb-2016. Test result reveals that the nitrate concentration of groundwater in the Cheeplata village observed are within the BIS (IS 10500: 2012) acceptable limit of 45 mg/L.



Figure 7: Fluoride in groundwater of Cheeplata village of Neemkathana block

Figure 7 shows that the fluoride concentration variation for the assessment period Aug-20 to Jul-21 is 0.43 mg/L -0.71mg/L. The maximum fluoride 0.71 mg/L found in the month of Feb-2016 and the minimum fluoride 0.43 mg/L is found in the month of July 2016.



Figure 8: TDS in groundwater of Cheeplata village of Neemkathana block

### Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India



### AIJRA Vol. II Issue III www.ijcms2015.co

Figure 8 shows that the Total Dissolved Solids (TDS) variation for the assessment period Jan 2016 to Dec-2016 is 800 mg/L-1055 mg/L. The maximum TDS 1055 mg/L found in the month of Jan-2016 and the minimum TDS 800 mg/L is found in the month of Oct-2016. Test result reveals that the total dissolved solid (TDS) in groundwater of the Cheeplata village observed higher than the BIS (IS 10500: 2012) acceptable limit of 500 mg/L.

### Conclusion

The study carried out in the Cheeplata village of Neemkathana block on groundwater samples conform that the pH level and chloride concentration of groundwater was within BIS standard limit. The total alkalinity , total hardness, sulphate concentration for the groundwater of Cheeplata village was found beyond the BIS (IS 10500: 2012) acceptable limit of 200 mg/L. Nitrate concentration for most of the water samples was found beyond the standard of BIS which is 45mg/L, as nitrate is a health hazard for infants. Test result found for the total dissolved solid (TDS) in groundwater were higher than the BIS (IS 10500: 2012) acceptable limit of 500 mg/L. Test results for the water samples of the village indicates that quality of water is overall not good for drinking purposes as nitrate is much more than the acceptance limit, so it is suggested from the study that a continuous monitoring of groundwater sources of the village is necessary to control the degradation of water quality.

\*S.K. Govt. College Sikar (Raj.) \*\* Kamla Modi Govt. Girls College Neemkathana, Sikar (Raj.)

#### References

- 1. Bruvold, W.H., Ongerth, H.J.(1969). Taste quality of mineralized water. Journal of the American Water Works Association, 61:170.
- 2. WHO/UNEP, GEMS. Global freshwater quality. Oxford, Alden Press, 1989.
- 3. Tihansky, D.P.( 1974). Economic damages from residential use of mineralized water supply. Water resources research, 10(2),145.
- 4. Popov, V.V.( 1968). On the question of a possible relationship between morbidity of the population with cholelithiasis and cholecystitis and the salt content and hardness of drinking water. Gigiena i sanitarija, 33(6):104-105.
- 5. Nagarajan, P., Kavitha, B., Jeyakar Chellaraj, D. A., & Raja, R. E. (2000). Analysis of fluoride in ground water and surface water and survey of dental fluorisis among children in Lalgudi taluk, Trichy. *Indian J. Environ Prot*, *21*(1), 51.

# Physicochemical Analysis of Groundwater Sample of Cheeplata Village of Neemkathana Block Sikar India

