

Analysis of Water Quality of Ramganjmandi Tehsil of District Kota and their Statistical Interpretation

Dr. K.M. Sharma¹, Mohd. Umar Farooq²

¹Professor Chemistry, Department of Chemistry, Career Point University, Alaniya, Kota, Rajasthan, India

²Research Scholar, Mohd. Umar Farooq, department of Chemistry, Career point University, Kota (Rajasthan) India

Abstract: *Ramganjmandi Tehsil of district Kota is an industrial hub famous for its Kota stone industries. In the present study, we analyzed ground water for various domestic and industrial point of view and check various parameters such as hardness, TDS (Total dissolved solid) and few other parameters reached to alarming level, so proper treatment is necessary before using for drinking & industrial purpose. Fluoride is also higher in comparison of other part of district although still it is under permissible limit. In the present research paper we analyzed water samples and give statistical interpretation for them.*

Keywords: Water quality, ground water SAR (Sodium absorption ratio), PI (Permeability index), Kota, Ramganjmandi

1. Introduction

Kota district is situated in South East part of Rajasthan between 24°25' and 25°51' North latitude and 75°17' and 76°00' East longitude. Total geographical area of district is 5198 sq. km. Average maximum temperature is 45°C and minimum 9°C.

In the present study we study & analyze various ground water sample Ramganjmandi Tehsil and give their statistical interpretation.

2. Experimental

In the Present study we took 10 samples of ground water collected from tube well and kept in PVC bottles and analyzed for various physico-chemical parameters using standard method as recommended by APHA (American public health association) Total hardness and calcium hardness were determined by complexometric method by EDTA titration using eriochrome black-T (EBT) and murexide indicator respectively. Total alkalinity (TA), carbonate, bicarbonate were estimated by titrimetric method using phenolphthalein and methyl-orange indicator.

For chloride determination we use $K_2Cr_2O_7$ and argentometric method.

Fluoride, nitrate, sulphate concentration determined by UV-VIS spectrophotometer (systronic – 2201) using Zirconyl SPANDAS dye, brucine and turbidimetric methods respectively. Sodium, Potassium and Calcium were carried out by Flame photometric method (Systronic -128, Compressor-126).

3. Result and Discussion

Result obtained are given in Table1.

- 1) **pH:** It is an important parameter for various biological and chemical process. If pH value is very high result will be difficulties in chlorination and incrustation and sedimentation.
- 2) **TDS:** Maximum allowed limit for TDS in drinking water is 1500 mg/L (ICMP).
- 3) **Electrical Conductivity:** It explains total ionic substance in water sample. It can be controlled by electro dialysis, reverse osmosis and desalination.
- 4) **Total hardness:** It's main parameter of water mainly drinking & industrial purpose.
- 5) **Calcium:** In all elements present in ground water samples, it's the most important .It comes mainly by limestone rocks but very high concentration of it affect the absorption of other essential minerals in the body.
- 6) **Magnesium:** It comes in ground water mainly by minerals such as dolomite, magnesite, some time it gives undesirable tastes to water samples.
- 7) **Sodium:** High concentration of it causes high blood pressure (hypertension) and heart disease.
- 8) **Potassium:** It's mainly found in ground water sample by percolation of dissolved fertilizers with rain water. Responsible for kidney problem coronary artery disease. Also responsible for adrenal problem and diabetes.
- 9) **Chloride:** It's the main reason behind corrosion of steel and aluminium and comes in water mainly by inorganic fertilizers and irrigation drainage & rocks.
- 10) **Sulphate:** It comes in ground water body by dissolution of gypsum and industrial discharge.
- 11) **Nitrate:** It comes in ground water mainly by fertilizers, sewage discharge High amount of it is responsible for blue baby syndrome and ability of blood to transport oxygen is reduced.
- 12) **Phosphate:** Same sources as of nitrate but majority of ground water samples show very low phosphate because it do not easily percolate and transport to ground water.

Table 1: Physico-chemical analysis of ground water of Ramganjmandi tehsil of district kota

S.No.	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-30
pH	8.35	8.14	8.26	8.31	8.35	7.96	7.9	8.14	8.59	8.21
TDS (mg/lit)	970	912	896	856	1008	762	819	674	924	1006
EC	480	612	494	523	478	604	574	490	376	402
CO ₃ ⁻²	36	38	41	44	40	32	33	33	58	41
HCO ₃ ⁻	168	165	186	192	171	152	159	153	203	186
TH	275	299	374	306	301	224	291	256	345	372
TA	490	476	456	512	524	504	424	541	514	476
Ca ⁺²	52	48	56	51	52	48	61	50	52	37
Mg ⁺²	28	32	31	22	23	27	34	44	29	26
Na ⁺	29	24	23	20	29	26	32	27	23	20
K ⁺	3.9	3.6	3.9	4.1	3.7	4.6	3.5	3.5	3.7	4
Cl ⁻	28	26	27	32	26	25	24	26	29	32
SO ₄ ⁻²	22	20	24	23	25	29	20	22	30	23
NO ₃ ⁻	35	37	41	31	29	37	35	44	30	32
PO ₄ ⁻³	0.26	0.3	0.24	0.25	0.26	0.31	0.34	0.19	0.2	0.24
F ⁻	0.94	0.87	1.1	0.76	0.92	0.69	1.2	1	1.1	0.94

Table 2: Statistical analysis of various water samples

	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10
SAR	4.59	3.8	3.48	3.31	4.73	4.25	4.64	3.94	3.61	3.57
PI	38.49	35.43	33.31	25.66	40.46	37.95	35.13	32.53	35.82	40.53
CAI	-0.18	-0.06	0.004	0.25	-0.34	-0.22	-0.48	-0.17	0.08	0.25
%Na	29.14	25.65	23.62	24.82	30.36	28.98	27.2	24.5	24.79	27.59
LSI	0.77	0.51	0.68	0.74	0.79	0.36	0.33	0.6	1.03	0.47

Richard explain (SAR) sodium absorption ratio of water which determine alkalinity in ground water used for irrigation purpose.

$$SAR = \frac{Na^+}{\sqrt{\frac{(Ca^{+2} + Mg^{+2})}{2}}}$$

Where: Ca²⁺, Mg²⁺ and Na⁺ ions are expressed in meq/L.

Do need gives Permeability index (PI) to measure the Soil permeability to check suitability of water for irrigation purpose.

$$PI = \frac{Na^+ + \sqrt{HCO_3^-}}{(Ca^{+2} + Mg^{+2} + Na^{+1})} \times 100$$

Schoeller calculate chloroalkaline indices (CAI) to calculate exchange between ground water and surroundings.

Chloro-alkaline indices 1;

$$CAI1 = [Cl - (Na + K)] / Cl$$

Here (-Ve) value of CAI indicates that there is exchange between (Na + K+) in water with (Ca+2 + Mg+2) in the rocks by a base exchange reaction.

Whereas positive value of CAI represents the absence of base exchange reaction and existence of cation-anion exchange types of reactions.

Calcium: In this paper we analyzed 10 samples for various factors to check whether they are under permissible range or not. Different statistical parameters also check which shows mild conditioning agent required before use of water.

4. Future Scope

In this paper we studied and analyzed various ground water samples of Tehsil Ramganjmandi which is for its stone industry. In future we are also working to develop techniques so that water can recycled economically and waste water can be reused so that water demand can be decreased.

References

- [1] A.Sreenivason, F.A.O., Fish rep, 44(3), 101, 1967.
- [2] 2. Prasad B. Guru, Environ and Poll Technol, 2(3), 273-276, 203.
- [3] Ravikumar P., Somashekhar R.K. and Angami M. Environ Monito Asses 173(1-4), 459-487, 2011.
- [4] JothivenKatacharlam, Nithyat and Chandra Mohan S. Rasayan J. Chem 3(4), 649-654, 2010.
- [5] Richard L.A., Diagnosis and improvement of Saline and alkali soils, agric handbook 60, USDA, Washington D.C., PP160. 1954.
- [6] Kumaresan M. and Riyazuddin P. Major ion Chemistry of environmental samples around sub urban of Chennai city current Science 91(12), 1668-1677 2006.
- [7] Doneen L.D. Notes on water quality in agriculture published as a water science and engineering paper, Department of water Science and Engineering, University of California 4001, 1964.
- [8] Schoeller H, Geochemistry of ground water An international guide for research and practice, UNESCO, 150, 1-18, 1967.
- [9] Raju N. Janaradhana, Hydrogeo Chemical parameters for assessment of ground water quality in the upper Gunjanaeru Environment Geology, 52, 1067-1074 2007.

Author Profile

Dr. K. M. Sharma did M.Sc. and Ph.D. Presently serving as Professor in Department of Chemistry, Career Point University, Alaniya, Kota, Rajasthan, India. He has 11 years of experience. He has published 12 research papers. He is also Dean Research. Three students are working as research scholar for fulfilling their doctoral degree. CPU is a place where student learn beyond classroom. Students are engage in research even during in their graduation level. Dual degree concept is beneficial for students for their growth in professional world. Personal focus given through mentor mentee system.

Mohd Umar Farooq did M.Sc. and Research Scholar of PhD /Chemistry, Career Point University, Alaniya, Kota. Presently serving as a lecturer in Modern school, Kota. He has 17 years of experience. He has published 2 research papers.