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Graphical representation and classification of surface water in the lower alluvial plains of Narmada valley, between Khalghat and Harinphal

V.K.PARASHAR

Department of Geology, Govt. Motilal Vigyan Mahavidyalaya, Bhopal (India)

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ABSTRACT

The present study mainly concerns the classification and graphical representation of surface water in the lower alluvial plains of Narmada Valley between Khalghat and Harinphal in Madhya Pradesh. In all 18 (Eighteen) surface water samples have been collected from the ferry points and analysed by using the methods proposed by APHA (1985). The chemical analysis data have been graphically represented in Piper's trilinear diagram, Modified Trilinear diagram and Wilcox diagram. On the basis of diagrams the surface water is dominated by Calcium-Bicarbonate type and does not have any Bicarbonate Hazard.

Key words: Water quality, graphical representation, bicarbonate hazard.

INTRODUCTION

Water is essential for all living for their existence. Water is needed not only for domestic use but also for the growing needs of any nation for its better agricultural growth. On the surface of the earth, the largest available sources of fresh water are lakes, streams and groundwater. In India, specially in Madhya Pradesh the farmers mostly depend on rainwater and surface water for irrigational purpose. In M.P. lower alluvial plains of Narmada Valley is the most important amongst the upland valleys form the point of view of agriculture. The area of present study lies between Latitude 22° 15'20' and 20°'2'30" North and Longitude 75°27'15" and 74° 41'21" East, extending stretch of about 84 Km. from Khalghat to Harinphal. The study area falls in the top sheets Nos. 46 N/4, 46N/8, 46J/12 and 46J/16.

EXPERIMENTAL

In the present study 18 (Eighteen) surface water samples were collected from the ferry points of Narmada river. The collected water sample were analysed by using standard procedures as suggested by APHA (1985). A variety of graphical representation methods are used to classify water into Modified Triliner types. In the present study Piper's Trilinear diagram and Modified Trilinear diagram after Piper's (1944) and Romani (1981). Have been used to classify the surface water. The concentration of major cation and anions have been converted into me/1 and percent reacting values of each ion have been computed and presented in Table-1. These percent reacting values of surface water have been plotted in Piper's Trillinear diagram and Modified Trilinear diagram. Plotting in various diagram are shown in Fig. 1,2,3.

RESULTS AND DISCUSSION

It is observed form the Table 1 that the pH of surface water varies between 7.6 to 7.9 suggesting midly alkaline in nature while the specific electrical conductance varies between 205

Table -1: Chemical Characters and Percentage Reacting Value of Surface water in the study area

Well No.	Topo Sheet	Name of the village	Chemical Characters					Percentage Reacting Values					
			Temp. °C	pH (field)	Lab. pH at 25°C	ECX10^6 at 25°	TDS	$Na+K^+$	Ca^{++}	Mg^{++}	HCO_3^-	$Cl+NO_3^-$	SO_4^{--}
1.	46N/8	Khalaghat	19.00	7.6	7.8	480	307	20	61	19	69	20	11
2.	46N/8	Nimbola	20.00	7.5	7.7	440	282	17	59	24	69	19	12
3.	46N/8	Kathora	18.00	7.7	7.9	380	243	25	62	13	66	20	14
4.	46N/8	Brahmangaon	20.00	7.5	7.6	410	262	23	60	17	67	20	13
5.	46N/8	Chichli	18.00	7.6	7.7	380	243	22	59	19	69	20	11
6.	46N/8	Nalway	20.00	7.6	7.8	390	250	19	60	21	69	22	09
7.	46N/8	Logara	20.00	7.5	7.7	340	218	19	60	21	72	19	09
8.	46N/8	Barabarda	12.00	7.6	7.7	360	230	18	65	17	70	15	15
9.	46N/8	Mohipura	20.00	7.7	7.8	380	243	16	62	22	74	17	09
10.	46N/8	Chhotabarda	21.00	7.5	7.7	350	224	21	58	21	70	21	09
11.	46N/8	Aunli	19.00	7.7	7.7	390	250	16	62	22	69	17	14
12.	46J/16	Piplod	20.00	7.5	7.7	340	218	16	60	24	62	22	16
13.	46J/16	Kasrawad	21.00	7.5	7.6	320	205	20	61	19	67	20	13
14.	46J/16	Rajgaht	21.00	7.6	7.8	320	205	17	63	20	73	17	10
15.	46J/16	Sondul	20.00	7.5	7.7	360	230	20	64	16	63	20	17
16.	46J/16	Jangarwa	22.00	7.6	7.8	410	262	21	67	12	64	23	13
17.	46J/16	Bijasan	22.00	7.7	7.9	430	275	18	65	17	69	18	13
18.	46J/16	Mortakka	22.00	7.7	7.9	390	250	24	55	21	75	14	11

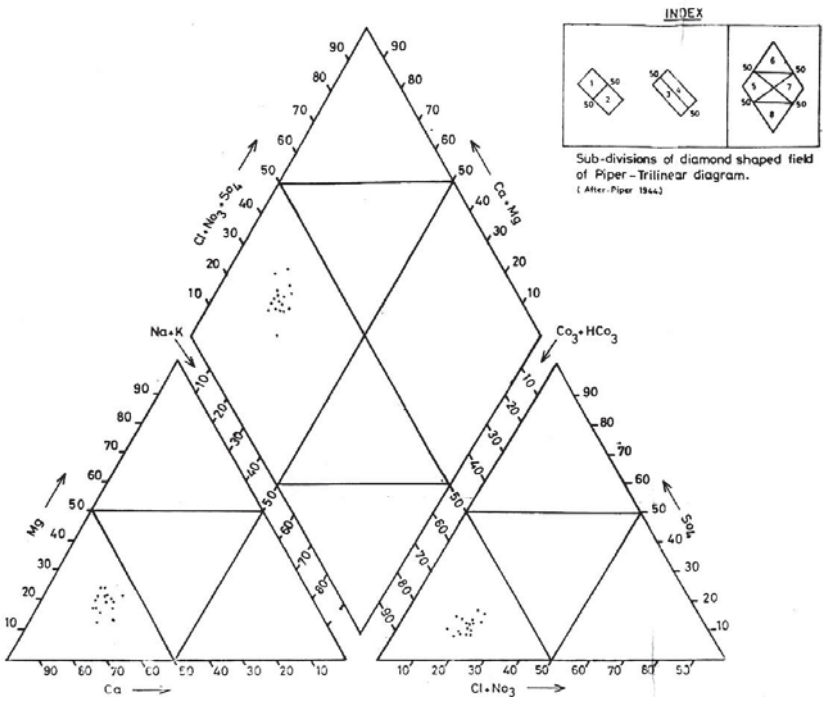

Fig. - 1: Trilinear diagram representing chemical characters of surface water

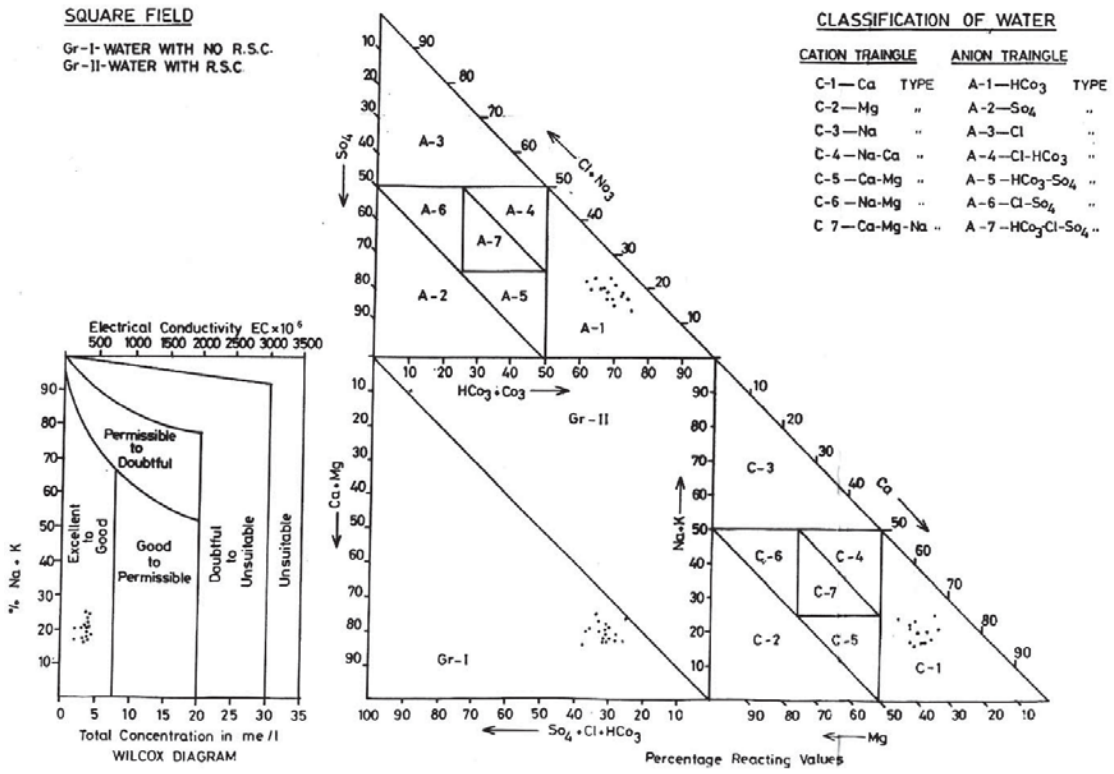

Fig. - 2: Plot of surface water analysis data in modified trilinear diagram

to 307 mmohs/cm at 25°C, indicating that the surface water of the area has low concentration of salts in solution.

It is seen form the Piper's Trillinear diagram that all the surface water samples fall in field No. 1 3 5 and thus the hydrochemistry of surface water is dominated by alkaline earth, weak acids and carbonate hardness exceeding 50%; which is of temporary nature (Fig. -1). The chemical analysis plotted in Modified Trilinear diagram after Romani (1981) reveal that the surface water samples of the study area falls in field C-1 and A-1, which shows that the surface water belongs to Calcium-bicarbontate type. Surface water samples fall in Gr.I of central square field which indicates that the surface water are not associated with any bicarbonate hazards. When the central field plotting extended in Wilcox diagram, it is noticed that all the surface water fall in excellent to good range of irrigational water (Fig. -2).

Conclusion

On the basis of chemical characters and graphical representation of hydrochemistry of surface water in Pipers Trilinear diagram and Modified Trilinear diagram, it can be concluded that the surface water of the study area is dominated by calcium-bicarbonate type and it does not have any bicarbonate hazards. As per Wilcox diagram it belongs to excellent to good range. Hence the surface water can be applied fruitfully for irrigational purpose for all types of crops.

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