

## **Appraisal of Drinking Water Quality of Jaipur Suburb Railway Stations**

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### **ABSTRACT**

Water is very important molecule for the sustaining and growth of life on earth. Clean drinking water is required by human beings and other living organisms. For the present study the water samples were collected and analysed for physico-chemical parameters namely pH, EC, TDS, Calcium and Magnesium Hardness, Total Alkalinity, Chlorides, Sulphates, Nitrates etc. with special reference to chloride and nitrate deliberation for drinking water of Sanganer; Baisgodam and Kanakpura railway stations. These railway stations are located quite near to the industrial areas of Jaipur city. The source of drinking water at every station is groundwater. The analysed values were compared with the standard values of Bureau of Indian Standards (BIS) and World Health Organisation (WHO). The analysis shows that the chloride and nitrate concentrations are in higher range of prescribed limits in the drinking water samples of Sanganer; Baisgodam and Kanakpura railway stations. High values of chloride and nitrate were found at Sanganer station with values 400 mg/l and 1.2 mg/l respectively. High chloride concentration cause salty taste of water. High nitrate concentrations above 100 mg/l in water can cause Methemoglobinemia in infants including birth defects and several other gastric problems in adults. Hence the study suggests the purification of drinking water in the study area to prevent any kind of diseases in human beings and work personnel at these stations.

**Kew Words:** *Railway stations, Drinking water quality, Chloride, Nitrate, Methemoglobinemia*

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### **I. Introduction**

Water is one of the most important molecule on earth. It is the main source of life. Clean drinking water is required by human beings and other organisms. Ground water contributes very small part of the total water resources on the earth and is the major source of drinking and agriculture water in rural and urban areas. Chemical composition of the water is the major criteria for its suitability in drinking purposes especially in India where water purifying techniques are minimal. Chloride (Cl<sup>-</sup>) occurs in almost all waters from trace to high concentrations (Graciri and Davies 1993). Bhatnagar (1999) revealed that the hardness of water was due to presence of high dissolved minerals usually calcium and magnesium which are mainly salts of chlorides. Presence of nitrates is quite harmful to the human beings. High nitrate contents may cause Methemoglobinemia, gastric problem and birth defects (Mirvish 1985). Recommendations of ICMR show that a concentration of 20 mg/l can be used for drinking while a level above 100 mg/l is completely harmful. Drinking water at railway stations is mainly supplied from borewells. Most of the railway stations in India rarely have the much needed purifying technology. Chloride and nitrate content in the water of railway stations may be harmful to the people and railway personal.

The Jaipur as the capital of Rajasthan and its thickly populated city has one main station and six suburb railway stations. Three stations are located near industrial areas namely Sanganer, Bais Godam and Kanakpura. The water supply to these stations is mainly ground water. In the present study drinking water samples from all these three stations were collected and analysed for the physico – chemical parameters for the monsoon period.

### **II. Material and Methods**

Three water samples were collected from suburb railway station namely Sanganer, Baisgodam, Kanakpura which are located nearby industrial areas of Jaipur city. Autoclaved plastic bottles were used for sample collection. A total of 17 physico – chemical parameters were analysed including pH, EC, TDS, chloride, nitrate, fluoride, total hardness, calcium and magnesium hardness, sulphates, phosphate, turbidity, sodium, potassium, alkalinity, and COD. Temperature was taken at the time of sampling of water samples with help of thermometer. Chloride and nitrate contents were determined titrimetrically (APHA 2005).

### III. Results and Discussion

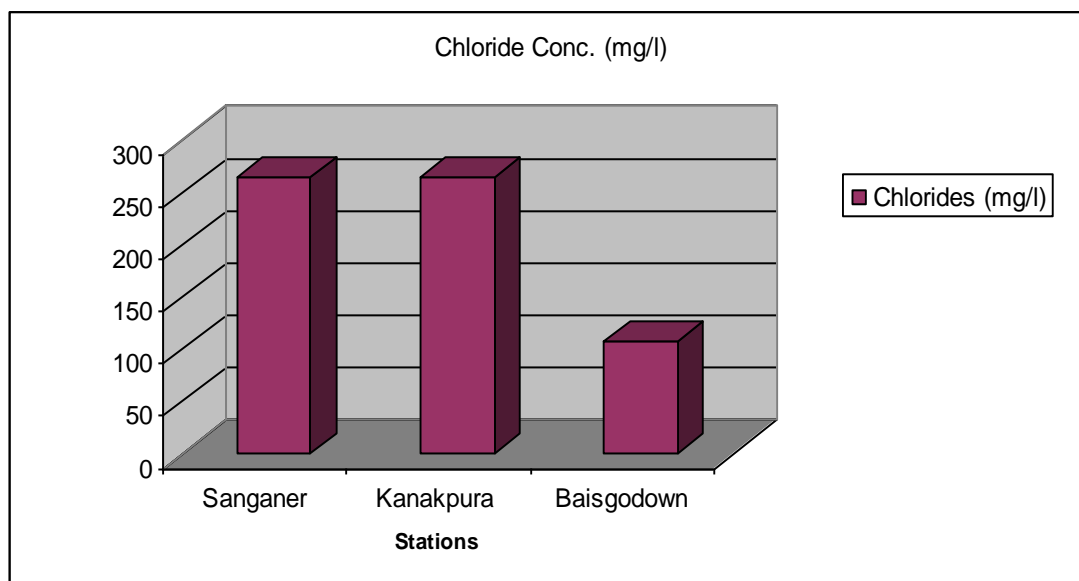
Observations reveal that (Table – 1) pH values were in the range of 7.26 to 7.32. TDS varied with minimum value 359.6 mg/l (baisgodown) to maximum of 870.4 mg/l (sanganer) indicating samples have tolerable concentrations of soluble salts as per WHO, ICMR and BIS norms. EC was in the range of 0.56 to 1.36 milli siemens. No prescribed standard are suggested by WHO, ICMR and BIS for electrical conductance of drinking water. Total hardness ranged from 180 to 400 mg/l, calcium and magnesium hardness ranged from 100 to 200 mg/l. Sulphates were in the range from 55 to 106 mg/l. Phosphates are not traceable in all the samples. Nitrates ranged from 0.6 to 1.2 mg/l (Graph 2). Potassium and sodium ions ranged from 8 to 73 mg/l. Total alkalinity ranged from 70 to 110 mg/l. COD ranged from 1.3 to 2.5 mg/l. All the values of above parameters are in the permissible range of WHO, ICMR and BIS. The fluoride values are in the range from 1.8 to 3.2 mg/l. All samples have higher fluoride content than the prescribed limits of WHO, ICMR and BIS.

The result interpretation shows that most of the samples were fit for drinking except a few where the values were on higher side of desirable limits. The pH and EC for Sanganer water sample are quite high showing the presence of dissolved salts in greater quantity. Similarly sodium content is higher in sanganer and kanakpura samples. Chloride content is maximum in sanganer water sample, nearly equal to kanakpura sample. Least value was obtained at Baisgodown station (Graph 1). When the concentration of chloride exceeds more than 250 mg/l it associated with sodium exerts salty taste (Sahni and Gautam, 2009). The nitrate value is low (0.1 – 1.5 mg/l) and in the acceptable range (40 mg/l). The high concentration of nitrate i.e. more than 45mg/l may cause disease “Methemoglobinemia” in infants and other health problems in adults. The study reveals the water quality at these stations to be within the prescribed limits of various organisations but on higher side of the range. Hence purification of such water is recommended for safe drinking purposes. This will be helpful in prevention of many diseases.

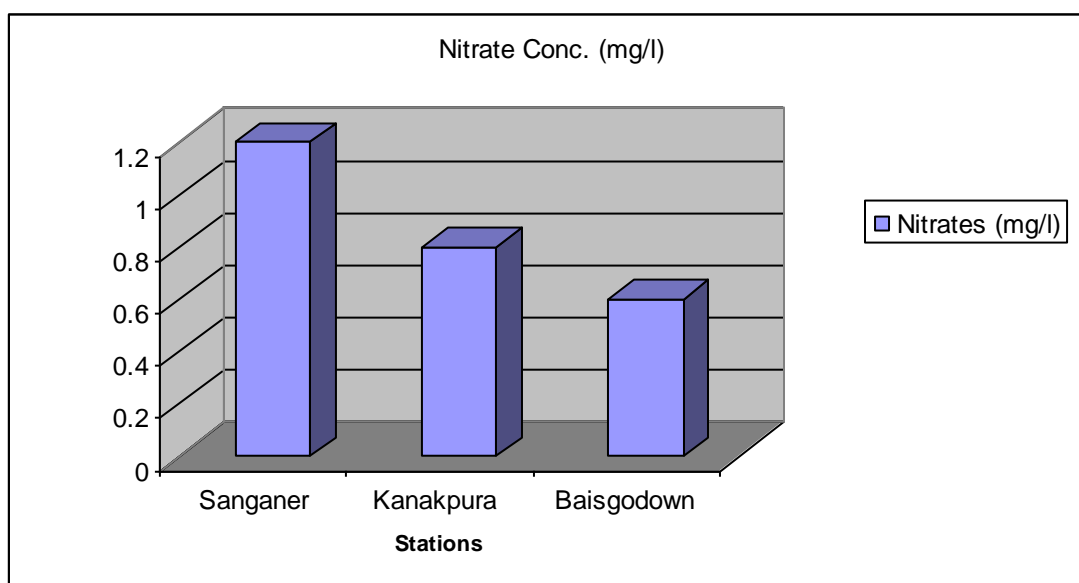
**Table 1:** Physico-chemical analysis of drinking water samples of various railway stations of Jaipur

S. No	Parameters	Sanganer	Kanakpura	Baisgodown
1	Temperature	26	25	26
2	pH	7.3	7.26	7.32
3	Electrical conductivity (ms)	1.36	0.88	0.56
4	Total dissolved solids mg/l	870.4	560	359.6
5	Chlorides (mg/l)	266	265	108.5
6	Total hardness (mg/l)	400	300	180
7	Calcium Hardness as Ca ( mg/l)	200	180	100
8	Magnesium Hardness as Mg (mg/l)	200	120	80
9	Sulphates (mg/l)	106	84	55
10	Phosphates (mg/l)	NT	NT	NT
11	Nitrates (mg/l)	1.2	0.8	0.6
12	Turbidity	2	2	1
13	Sodium as Na (mg/l)	73	68	49
14	Potassium as K (mg/l)	8	7	3
15	Total alkalinity (mg/l)	110	88	70
16	COD (mg/l)	2.5	2.2	1.3
17	Fluoride (mg/l)	3.2	2.1	1.8

Graph 1: Concentration of Chlorides at various railway stations



Graph 2: Concentration of Nitrates at various railway stations



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