Advance Physics Letter

Surfactant assemblies and their application in the determination of Water quality of bore well water in Durg District, Chhatisgarh.

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Abstract : The present work is aimed to study the water quality for the bore well samples collected form district in the presence of surfactant. This has been determined by collecting bore well water samples and subjecting the samples to a physicochemical analysis by standard method in the presence of surfactant. The surfactant selected for the analysis is anionic surfactant. For calculating the water quality, the following 10 parameters have been considered: pH, EC, TDS, TH, DO, COD, BOD, Ca, Mg, Ni, Cu and Zn .The water quality for these samples ranged between standard and desirable limits. The results of the analysis showed that the bore well water of the area needs some treatment methods before consumption, and it also needs to check the level of contamination caused by leachate.

Key words: Surfactant, Physicochemical Parameters, Water Quality, Leachate.

I. INTRODUCTION:

The safe portable water is absolutely essential for healthy living. Bore well water is ultimate and most suitable fresh water resource for human consumption in both urban as well as rural areas. The importance of bore well water for existence of human society cannot be overemphasized. There are several states in India where more than 90% population are dependent on groundwater for drinking and other purpose [1]. Ground water is also frequently using as the alternative source for agricultural and industrial sector.

In India, there are over 20 million private wells in addition to the government tube wells[2]. The wells are generally considered as the worst type of ground water sources in the term of physio-chemical contamination due to the lack of concrete plinth and surrounding drainage system[3]. Over burden of the population pressure, unplanned urbanization, unrestricted exploration and dumping of the polluted water at inappropriate place enhance the infiltration of harmful compounds to the ground water [4].There are various ways by which the bore well water gets contaminated .some may be direct or indirect .bore well water is contaminated indirectly by use of fertilizer in farming [5], seepage from effluent bearing water body[6].Location of the wells and borewells are also responsible for the contamination. Most of the industries discharge their effluent without proper treatment into nearby open pits or pass them through unlined channels, resulting in the contamination of ground water [7]. The incidence of ground water pollution is highest in urban areas where large volumes of waste are concentrated and discharge into relatively small areas[8]. The hydro-geochemical conditions are also responsible for causing significant variations in ground water quality [9]. The paper makes an attempt to carry out qualitative analysis of some physico-chemical parameters of bore well water in study area.

Materials and method

Study area…

The study area selected is durg district of Chhatisgarh state. Durg is part of Chhatisgarh situated at 13o4' N and 80o5'latitude with surplus water ecosystem lying on the middle. Underground water and pond water is the only source of water for the Rural areas

of Durg district. The water quality of durg is continuously degrading due to Domestic activities. Therefore, bore well water analysis is done so, that some remedies for the improvement could be possible.Fig.1 and 2 shows the study area and sampling locations.

Fig .1

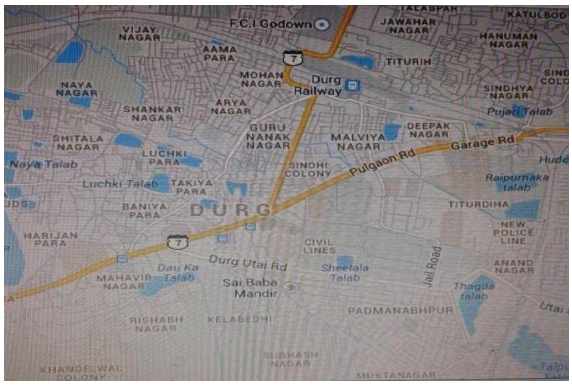

Fig 2

TABLE NO .1 SAMPLING SITES

S. No	SAMPLING SITE NAME	SITE NO (BW)
1	KELABADI	BW1
2	SANTRA BADI	BW2
3	LUCHKI PARA	BW3
4	SHANKER NAGAR	BW4
5	MOHAN NAGAR	BW5
6	HANUMAN NAGAR	BW6
7	SINDHYA NAGAR	BW7
8	TITURDIH	BW8
9	ANAND NAGAR	BW9

TABLE NO. 2 DATA TABLE

PARAMETERS	**METHOD**
Temperature	Thermometer
PH	pH meter
Total Hardness	EDTA Titration
Total Dissolved Solids	Conductivity +online calculation
Conductivity D.O	Conductivity Meter & water analysis kit
Ca, Mg, Ni, Cu and Zn	Complexometric titration

TABLE 3 PROPERTIES OF EDTA AND SLS

Product	EDTA	SLS
Type	chelating agent	anionic surfactant
Molecular formula	Na2C10H14O 8N2·2H2O	C12H 25 OSO 3 Na
Molecular weight	372.24	288.38
CMC		8.20 [10]

Sample Collection

Water samples were collected from nine different locations of Durg town. Borosilicate glassware, distilled water and AR grade reagents were used throughout the testing. Samples were collected in sterilized screw-capped polyethylene bottles of one litre capacity and analyzed in laboratory for their physicochemical parameters. Samples collected from study sites were properly labelled and a record was prepared (Table 1).

The various physiochemical parameters were analyzed (Table 2). The pH, conductivity of the water sample was measured using pH meter and conductometry method. The total hardness of the water samples was determined by Complex metric titration with EDTA using Erichromebalck-T as an indicator.[11,12], other parameters were determined according to Standard methods[12,13].

Aliquot Preparation: Two sets of sample were prepared, one for standard reading (without surfactant) and with Surfactant. The surfactant used was Sodium laurel sulphate (SLS).

II. RESULT AND DISSCUSION:

The pH values of all the water were alkaline. However, the buffering capacity of soil tends

to bring homeostasis and lower the pH of the effluents applied according to pH of the soil [14].

According to [15] the optimum pH of irrigation water ranges from 6.5 to 8.5, while the permissible limit is 9. On addition of anionic surfactant the pH was found to increase which is evident from graphs.

Conductivity also showed enhancement on addition of surfactant. As without the surfactant the water sample gives the conductance of total dissolved solids and after the addition of surfactant the anionic surfactant gets dissociated into ions and thus the conductivity increases. **In case of metal analysis** there was reduction in data which shows that the metal was entrapped by the surfactant and formed the micelles.

III. CONCLUSION:

The work presented here is only to study the physiochemical parameters and water quality of the bore well water, with the help of surfactant. The anionic surfactant used is sodium lauryl sulphate. Surfactant is added to the polluted aqueous solution containing metal ions and/or organic solutes. The surfactant forms micelles which are charged spherical aggregates containing 50 to 150 surfactant molecules at a concentration higher than its critical micelle concentration (cmc). The metal ions are adsorbed on the surface of the oppositely charged micelles by electrostatic attraction. Surfactants above their critical micelle concentration starts to form micelles and they trap the metal ions form the water sample, adsorbs and help in mobilization of ions and this process is cross checked by Complexometric titration. Metal analysis can be done by surfactants and this method can be used for the metal extraction. This method has the following advantages: simple operation; environmentally safer; low-energy requirement; high removal efficiency; easy to recover metal ions; less expensive; separation can be carried out at room temperature. [16]

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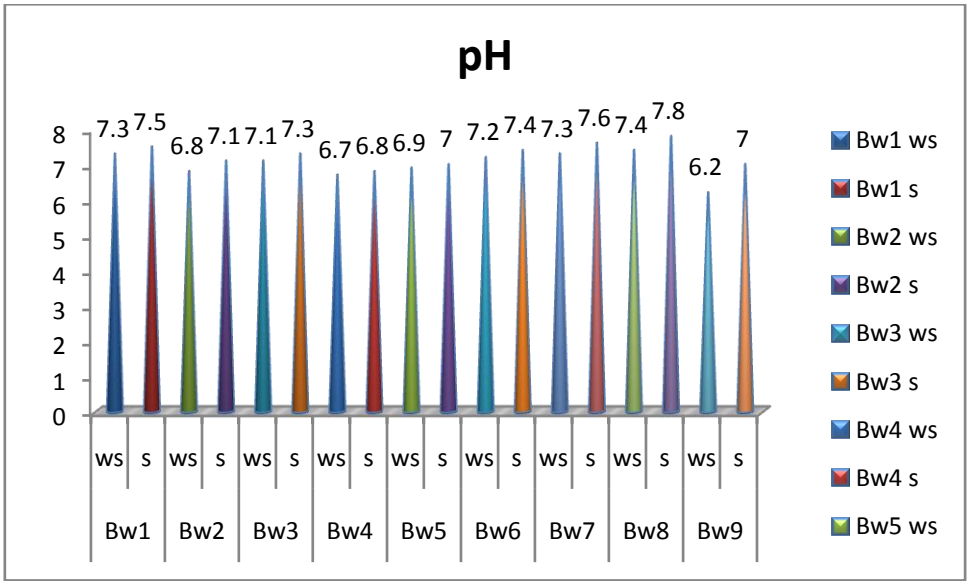
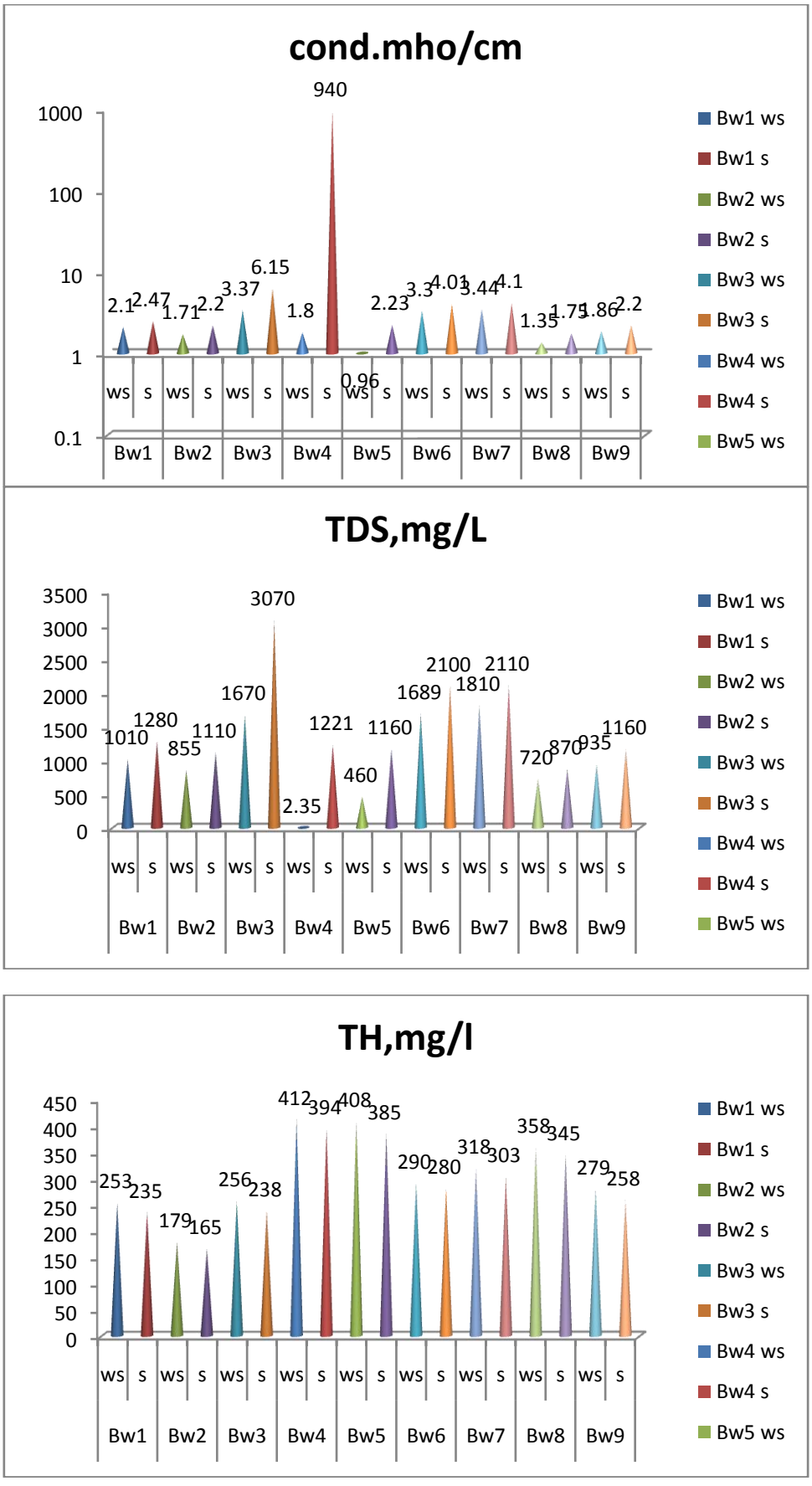
Fig.3 Graphs

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TDS,mg/L
3500
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3070
2100
2110
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1689
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870
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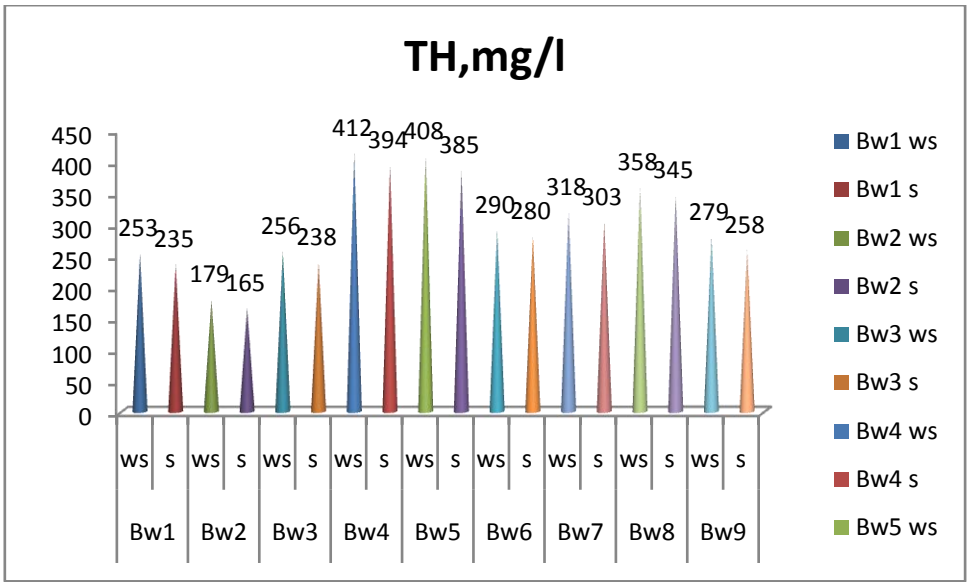
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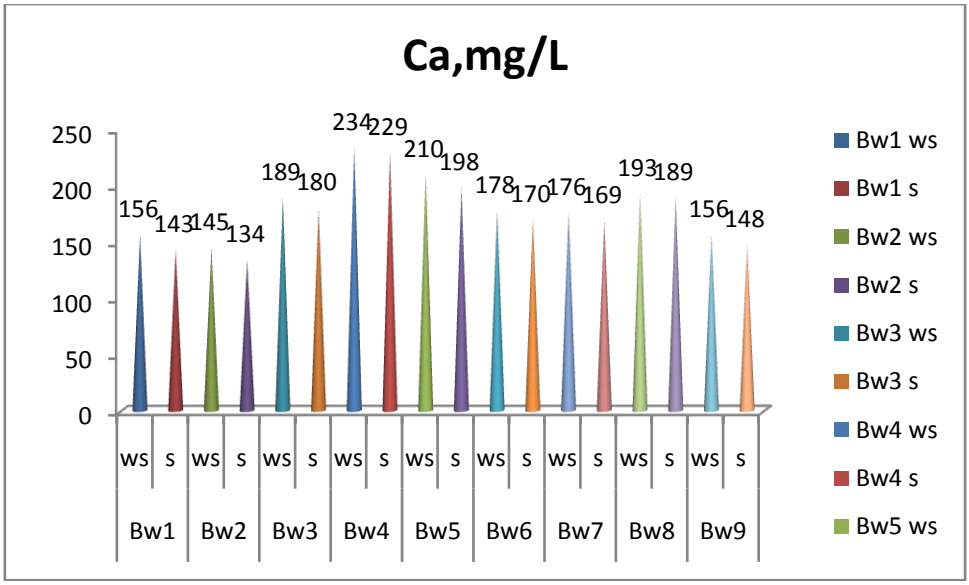
Ca,mg/L
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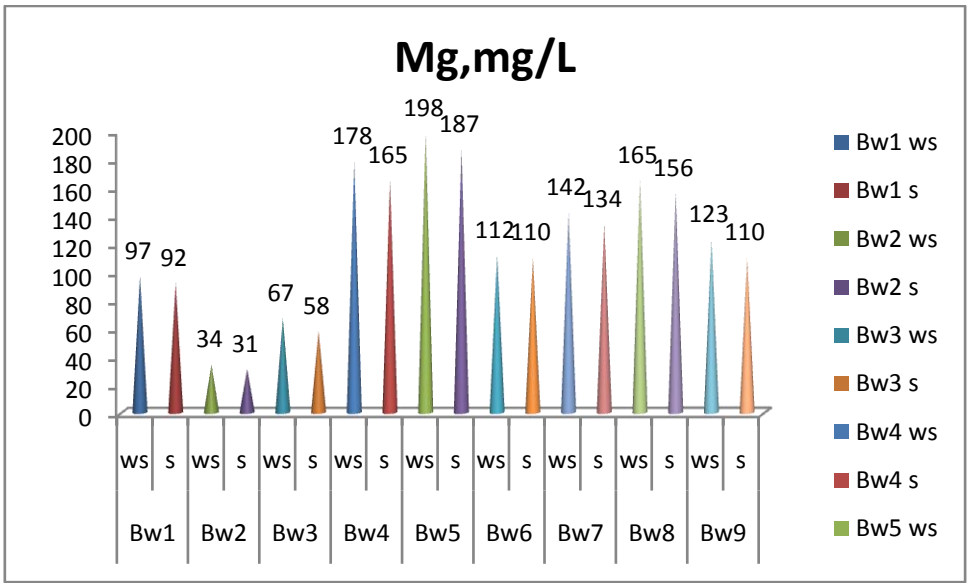
Mg,mg/L
200
180
160
140
120
100
80
60
40
20
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97 92 34 31 67 58 178 165 198 187 112 110 142 134 165 156 123 110
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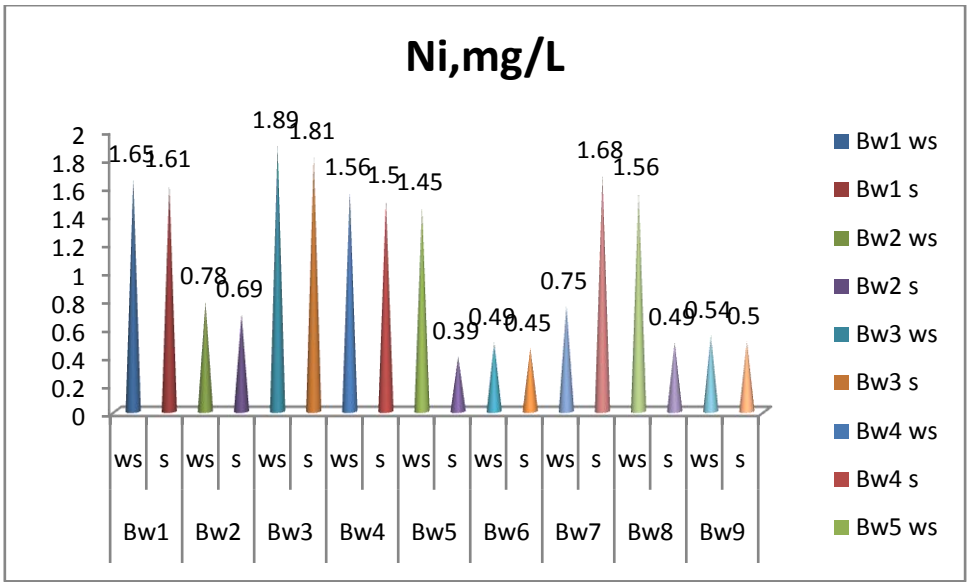
Ni,mg/L
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1.4
1.2
1
0.8
0.6
0.4
0.2
0
1.65
1.61
0.78
0.69
1.89
1.81
1.56
1.5
1.45
0.39
0.49
0.45
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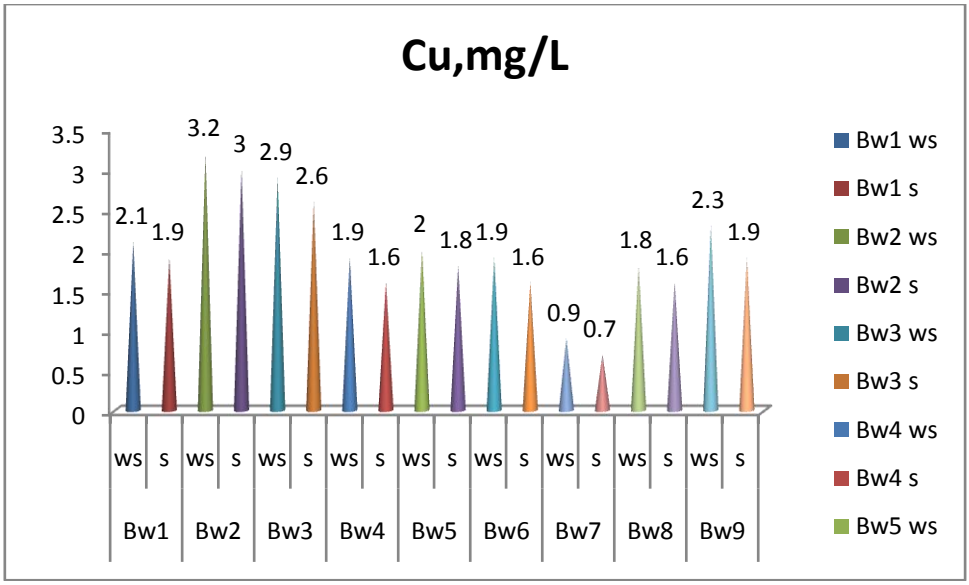
Cu,mg/L
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2.5
2
1.5
1
0.5
0
2.1
1.9
3.2
3
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