

Evaluation of Physicochemical Characteristics in Packaged Drinking Water: A Case Study

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Abstract - This study evaluates the physicochemical characteristics of packaged drinking water brands available in Karnataka, India. Different bottled water brands such as Bisleri, Kinley, Aquafina, Bindu, Tata Copper+, and Nandini were analyzed for parameters including pH, Total Dissolved Solids (TDS), hardness, alkalinity, turbidity, and dissolved oxygen. The obtained results were compared with Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards. The analysis revealed that most brands complied with acceptable limits, although slight variations were observed due to differences in purification techniques and mineral composition. Graphical analysis was used to compare the physicochemical properties of the selected bottled water brands. The study highlights the importance of regular monitoring and quality control in the packaged drinking water industry.

Key Words: Packaged Drinking Water, Physicochemical Properties, BIS Standards, TDS, pH, Hardness, Water Quality

1. INTRODUCTION

Safe drinking water is essential for human health and sustainable development. Due to increasing urbanization and contamination of natural water sources, the demand for packaged drinking water has increased significantly. Bottled water is widely consumed because of its convenience, portability, and perceived safety. However, variations in water treatment methods and mineral composition can affect the quality of bottled water. This study focuses on evaluating the physicochemical properties of commonly available packaged drinking water brands and comparing the results with BIS and WHO standards.

The history of bottled drinking water dates back to ancient times when clay, leather, and glass containers were used to carry spring water. Modern bottled water began in 1622 at Holy Well, England, due to the belief in medicinal mineral water. By the 18th and 19th centuries, bottled water became popular in Europe and the United States. The industry expanded rapidly after the introduction of plastic (PET) bottles in the 1970s. In India, bottled water gained importance during the 1990s with brands like Bisleri. Today, bottled water is a major global industry emphasizing convenience, purity, and portable safe drinking water.

2. Objectives

- To analyze and compare the physicochemical properties of different bottled water brands.
- To determine compliance with WHO/ISI/BIS drinking water standards.

3. Methodology

Samples of packaged drinking water were collected from different brands available in local markets. Laboratory testing was carried out to determine pH, TDS, hardness, alkalinity, and turbidity using standard procedures and instruments such as pH meter, TDS meter, turbidity meter, burette, and conical flask.

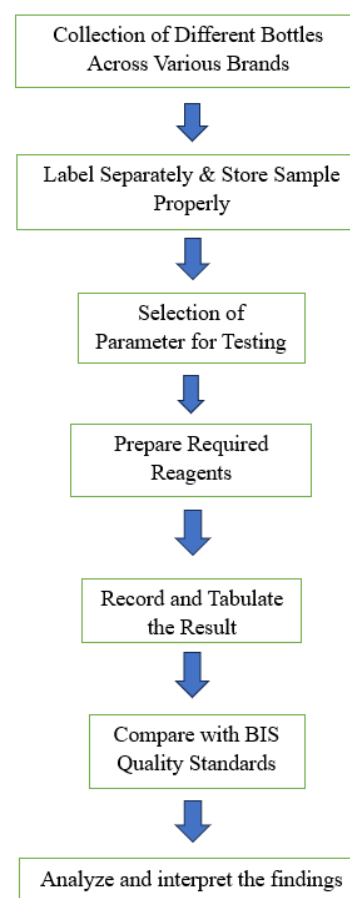


Fig 3.1 Methodology

4. RESULT

Comparative Analysis of Physico-Chemical Parameters of Packaged Drinking Water Brands

Sl. No	Water Brand	pH	Turbidity (NTU)	DO (mg/L)	TDS (mg/L)	Alkalinity (mg/L)	Acidity (mg/L)	Hardness (mg/L)
1	Evian	7.0	0.1	4.0	180	110	18	95
2	Aquafina	6.2	0.1	8.2	120	85	15	70
3	Bisleri	6.8	0.0	7.5	145	100	16	82
4	Kinley	7.0	0.1	7.5	135	92	14	76
5	Bindu	6.0	0.1	6.8	160	105	20	90
6	Tata Copper+	7.0	0.1	7.4	150	98	17	84
7	Nandini	6.0	0.1	5.5	170	108	19	92
8	Petrio	6.0	0.7	6.5	93	95	35	60
9	Bislie	6.0	0.1	7.3	7	28	10	45

Fig 4.1 Comparative analysis

Graphical Analysis

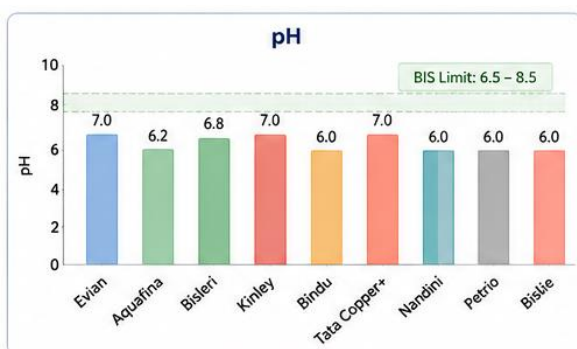


Fig 4.2 - pH Analysis

The pH values of all packaged drinking water brands were within acceptable limits, indicating safe and balanced drinking water quality.

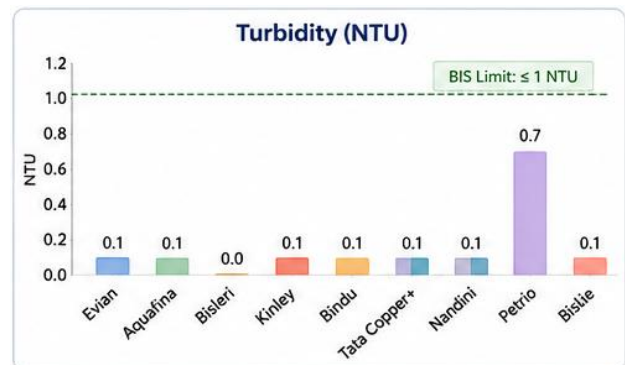


Fig 4.3 - Turbidity Analysis

All brands exhibited very low turbidity, indicating effective filtration and clear water quality.

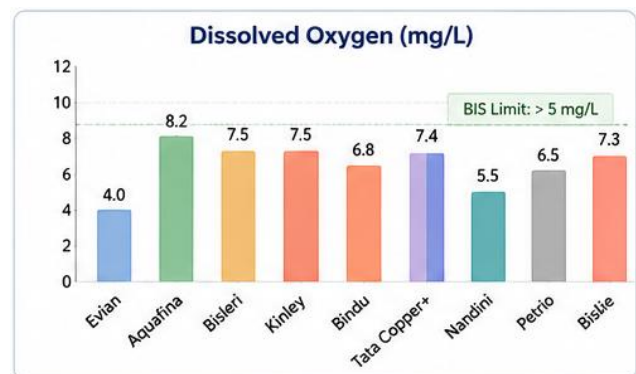


Fig 4.4 - Dissolved Oxygen Analysis

Most samples had satisfactory dissolved oxygen levels, reflecting good freshness and low organic contamination.

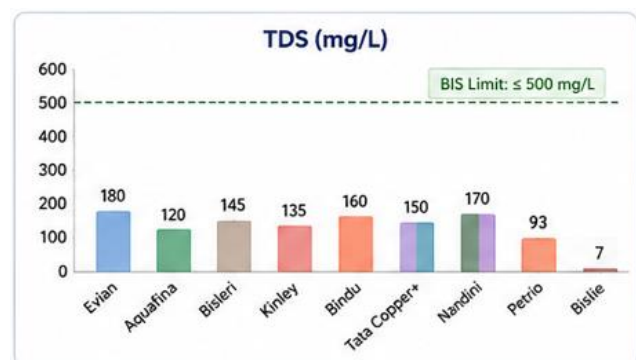


Fig 4.5 - TDS Analysis

TDS values varied among brands due to differences in mineral composition and water source, but remained within limits.

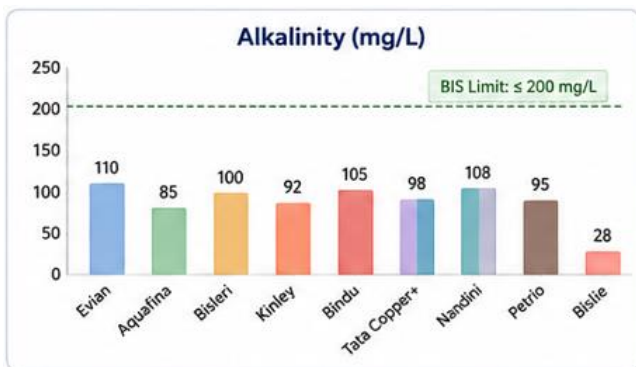


Fig 4.6 – Alkalinity Analysis

All brands showed acceptable alkalinity values, indicating balanced buffering capacity and chemical stability of water.

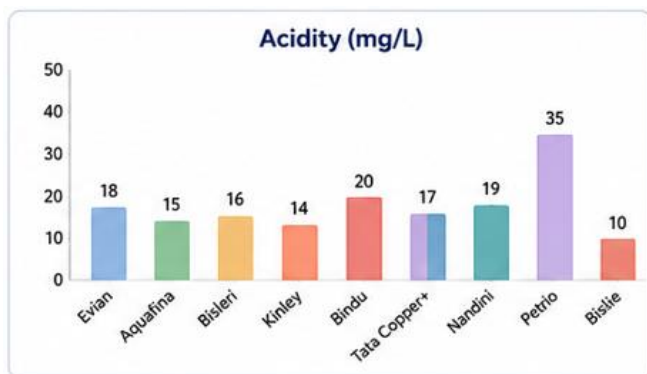


Fig 4.7 – Acidity Analysis

Acidity levels were moderate in most brands, while Petrio showed comparatively higher acidity values.

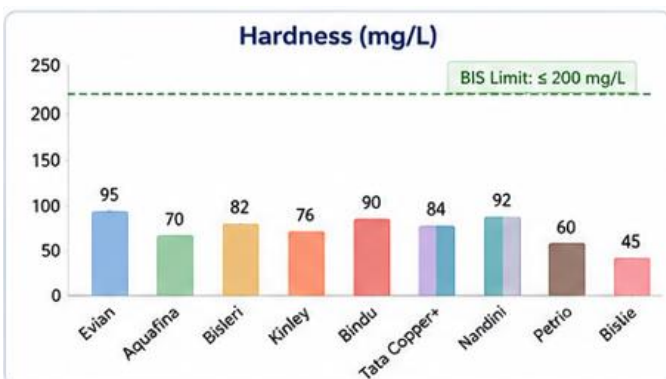


Fig 4.8 – Hardness Analysis

Hardness values were within BIS limits, indicating moderate mineral content suitable for drinking purposes.

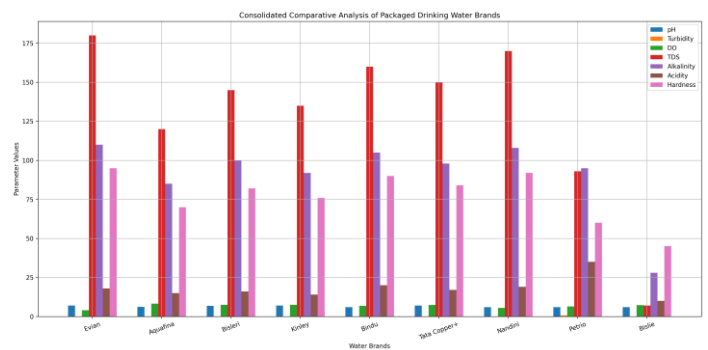


Fig 4.9 – Overall Analysis

All tested packaged drinking water brands were found generally safe and acceptable as per BIS standards.

CONCLUSION

The study evaluated the physicochemical characteristics of packaged drinking water brands such as Bislie, Bisleri, Nandini, Evian, Kinley, Aquafina, and Tata Copper by analyzing pH, turbidity, TDS, hardness, acidity, alkalinity, and dissolved oxygen. Results showed that most samples satisfied BIS and WHO drinking water standards. Low turbidity indicated effective purification, while variations in TDS and hardness were due to differences in source water and mineral composition. Evian showed higher mineral content, whereas Bislie had lower TDS and hardness values. Tata Copper exhibited comparatively higher hardness and alkalinity. Overall, all tested brands were found safe for drinking purposes, highlighting the importance of continuous quality monitoring and regular assessment of packaged drinking water.

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