



Packaged Water Everywhere

Not All Brands Fit To Drink

Why is it that an element that is most necessary for our survival and is available in abundance – constitutes over 70 per cent of Earth – needs to be bought? Who came up with the idea of packing it in bottles and ‘selling’ it like a rare commodity? Shouldn’t access to clean drinking water be the right of every individual?

Answers to these questions can be given at various levels of complexities and are debateable at best. However, if the packaged ‘drinking water’ – the one that you and I buy at a price in the belief that it is the safest – isn’t clean enough, then there cannot be two opinions. In that case, the seller is not only breaching the consumer’s trust but is also putting their health at risk.

In an effort to single out unhealthy packaged drinking water brands in the Indian market, *Consumer Voice* tested a dozen top brands – on the basis of their market share – in an NABL-accredited laboratory. While most

brands passed all tests and met the BIS requirement, the samples of a few failed in crucial microbiological tests. Is your bottled water brand one of them? Here’s a complete report for you to find that out.

CV Recommendation

Bisleri

(followed by Foster's, Icelings, Kinley, Bonaqua, Railneer and Aquafina)

Brands to Avoid

Bailley | Kingfisher | McDowell's
| Crystal+ | Royal Blue

- *Bailley contains maximum amount of TPC, coliform and yeast and mould – followed by Kingfisher, Royal Blue, McDowell's and Crystal+, violating the maximum permissible limit as per the national standard requirement.*

What is 'packaged' drinking water?

It is water derived from varied sources including surface, ground or sea and subjected to treatment like decantation, filtration (including aeration filtration with membrane filter, cartridge filter, activated carbon filtration), demineralization, mineralization and reverse osmosis. The packaged water is also disinfected before being packed so that it does not get contaminated until consumed within a specific time.

The packaged drinking water shall be filled in sealed containers of various capacities that are suitable for direct consumption without further treatment. In case demineralization is a part of the treatment process, the material used for packaging shall be food-grade quality (as the product is in direct contact with the packaging material) and conform to the requirements of Food Safety and Standards Authority of India and rules framed there under.

Best in Sensory Tests

Kinley

How and Where We Tested the Waters?

The test programme for packaged drinking water is based on IS: 14543: 2004 with the latest amendments. Test parameters were mainly based on IS in order to judge the overall quality as also on the requirements of FSS Rules, 2011, which cover the product requirements.

The comparative testing was conducted in an NABL-accredited lab capable of testing and analyzing packaged drinking water as per the mentioned standards.

BRANDS TESTED





Rank	Brand	Manufactured/Marketed By
1	Bisleri	Bisleri Industries
2	Foster's	SAB Miller India
3	Icelings	Sarthak Aqua India
4	Kinley	Coca-Cola
5	Bonaqua	HindustanCoca-Cola Beverages
5	Rail Neer	Indian Railways (IRCTC)
5	Aquafina	PepsiCo
6	Bailley*	Parle Agro
7	Kingfisher*	United Spirits
8	McDowell's*	United Spirits
9	Crystal+*	Parasaram Mineral Aqua
10	Royal Blue*	SG Beverages

*Downgraded as not complying with microbiological requirement



Comparative Test









COMPARATIVE PERFORMANCE RATING

Brands→ Parameters↓	Weightage (%)	Bisleri 	Foster's 	Icelings 	Kinley 
MRP (Rs)/Volume (litre)		18/1	20/1	15/1	18/1
1. General					
1.1 Packaging	3	2.55	2.17	2.05	2.85
1.2 Marking	4	4	4	4	4
2. Physical Parameters					
2.1 Colour	1	1	1	1	1
2.2 Turbidity	3	2.82	2.82	2.82	2.83
2.3TDS	15	9.10	8.06	7.31	4.67
2.4 pH	3	2.25	2.78	2.08	2.4
3. Parameters Concerning Undesirable Substances	21	19.42	19.52	20.41	19.88
4. Parameters Concerning Toxic/ Heavy Metals	10	10	10	10	10
5. Toxic Substances	8	8	8	8	8
6. Microbiological Testing	20	20	20	19.08	20
7. Radioactivity	5	5	5	5	5
8. Sensory Panel Test#	7	6.43	6.42	5.96	6.73
Percentage Score (Rounded off)	100	91	90	88	87

Rating: >90: very good*****, 71-90: good****, 51-70: fair***, 31-50: average**, up to 30: poor*

#Sensory panel test includes visual defects, taste and odour

OF PACKAGED DRINKING WATER

	Bonaqua	Rail Neer	Aquafina	Bailley	Kingfisher	McDowell's	Crystal+	Royal Blue	
									
	18/1	15/1	18/1	15/1	18/1	18/1	15/1	20/1	
	2.43	2.32	2.55	2.43	2.32	2.25	2.17	1.75	
	4	4	4	4	4	4	4	4	
	1	1	1	1	1	1	1	1	
	2.83	2.83	2.83	2.82	2.82	2.82	2.82	2.83	
	4.07	3.95	3.75	10.32	9.20	8.92	5.01	3.92	
	2.4	2.89	2.79	2.49	2.90	2.97	2.42	2.30	
	19.85	19.88	19.87	19.4	19.47	19.62	19.7	19.84	
	10	10	10	10	10	10	10	10	
	8	8	8	8	8	8	8	8	
	20	20	19.67	5	5	5	5	5	
	5	5	5	5	5	5	5	5	
	6.45	5.99	6.14	2.45	2.61	2.51	2.56	2.45	
	86	86	86	Downgraded to poor as not complying with microbiological requirement					

Comparative Test

MICROBIOLOGICAL

Brands → Parameters ↓	Requirement as per IS	Bisleri	Foster's	Icelings	Kinley	
E. coli/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Coliform/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Total plate count at 22 0C (cfu/ml)	<100	ND	ND	33	ND	
Total plate count at 37 0C (cfu/ml)	<20	ND	ND	ND	ND	
S. aureus/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Faecal streptococci/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Salmonella/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Shigella/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Yeast and mould/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Vibrio cholera/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Vibrio parahaemolyticus/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Sulphite-reducing anaerobes/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Pseudomonas aeruginosa/250ml	Ab.	Ab.	Ab.	Ab.	Ab.	
Score out of 20	Ab.	20	20	19.08	20	

Ab.: absent | ND: not detected | TNTC: too numeral to count | *Downgraded since not complying with the microbiological requirement



MICROBIOLOGICAL TEST

Microbiological contamination of water has long been a concern of the public. Many infectious microorganisms found in the environment – including shigella, escherichia coli, vibrio, salmonella, coliform, s. aureus, faecal streptococci, yeast and mould, vibrio cholera, vibrio parahaemolyticus and pseudomonas aeruginosa – can cause symptoms such as nausea, vomiting, diarrhoea and stomach cramps. In healthy adults, these illnesses are usually mild and do not last long. In infants, children, the elderly and persons with weakened immune systems, these illnesses can be severe.

- *Bailley, McDowell's, Kingfisher, Royal Blue and Crystal+ did not comply with the IS requirement in the microbiological test and should be avoided.*

TEST RESULTS

	Bonaqua	Rail Neer	Aquafina	Bailley*	Kingfisher*	McDowell's*	Crystal+*	Royal Blue*
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	TNTC	Ab.	9	84	46
	ND	ND	6	13,000	6,200	2,200	900	4,200
	ND	ND	3	4700	220	230	110	670
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	TNTC	Ab.	18	36	14
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.	Ab.
	20	20	19.67	5	5	5	5	5



Comparative Test

TEST RESULTS PHYSICAL PARAMETERS

◆ *Total Dissolved Solids (TDS)*

Total dissolved solids are the amount of minerals, salts or metals dissolved in a given volume of water. TDS is directly related to the purity of potable water and the quality of water purification systems, and affects everything that consumes, lives in, or uses water, whether organic or inorganic, whether for better or for worse. The standard/regular practice of packaged drinking water in industry is to take the potable water from a regular source (for example, groundwater or as permitted by the Indian Standard) and demineralize the water through the RO system and in the required quantity to balance the TDS level as permitted in the national standard. It is because of this demineralization process that there is a low level of TDS in packaged drinking water (20.8 mg/l to 146.22 mg/l) as compared to packaged mineral water (permitted between 150 mg/l and 700 mg/l), which is filled directly at the source. Based on the IS limit of 0 mg/l–500 mg/l for packaged drinking water, we have rated the brands.

- *TDS in all water brands was lower than the maximum permissible limit.*
- *Within the permissible limit, Bailey was found to contain the highest quantity of TDS and hence given the highest score.*

Consumer Voice suggests that there be a lower-side limit for TDS – no TDS means there are no minerals as well. Water with extremely low concentrations of TDS may also be unacceptable because of its flat taste.

◆ *Turbidity*

Turbidity is a principal physical characteristic of water. It is caused by suspended matter or impurities that interfere with the clarity of the water. These impurities may include clay, silt, finely divided inorganic and organic matter, and soluble coloured organic compounds.

Turbidity in water should not be more than 2 nephelometric turbidity units (NTU).

- *All the brands were free of suspended matters and impurities, and found well below the maximum permissible limit for turbidity.*



◆ *The pH Level*

The pH level of your drinking water reflects how acidic it is. pH stands for ‘potential hydrogen’, referring to the amount of hydrogen mixed with the water. A measurement of seven is neutral, indicating there is no acid or alkalinity. A measurement below 7 indicates presence of acid and a measurement above 7 indicates alkalinity. The normal range for pH in packaged drinking water as per the national standard should be between 6.5 and 8.5.

- *All the brands of packaged drinking water were within the specified range for pH.*

◆ *Colour (in Hazen)*

Water, as per set standards, should be within 2 Hazen units.

- *All the brands were found with 1 Hazen unit and given full scores.*

SENSORY PANEL TEST

The sensory panel test was conducted in a reputed lab by qualified and experienced panel members who were capable of judging the sensory attributes of such products. Ratings were given on the five-point scale, where 1 meant very poor and 5 meant very good or excellent.

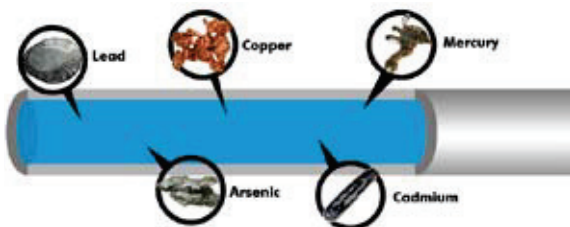
Bailley, McDowell's, Kingfisher, Royal Blue and Crystal+ were not included in the sensory test for taste as they had failed the microbiological test and could be unsafe to drink.

Kinley was the most liked brand by the panel.

Parameters→ Brands↓	Visual Defects	Odour	Taste	Score Out of 7
Kinley	4.75	4.62	4.93	6.73
Bonaqua	4.25	4.5	4.75	6.45
Bisleri	4.5	4.62	4.62	6.43
Foster's	4.12	4.5	4.75	6.42
Aquafina	4.25	4.5	4.37	6.14
Rail Neer	4.25	4.37	4.25	5.99
Icelings	3.87	4.25	4.37	5.96
Kingfisher	4.37	4.37	*	2.61/3
Crystal+	4.12	4.37	*	2.56/3
McDowell's	3.87	4.37	*	2.51/3
Bailley	4.25	4	*	2.45/3
Royal Blue	3.75	4.25	*	2.45/3

* Not included in the taste evaluation as not complying with the microbiological requirement

TOXIC/HEAVY METALS + TOXIC SUBSTANCES



As per the national standard, the toxic substances including mercury, cadmium, arsenic, cyanide, lead, chromium and nickel should not be present in drinking water. As for toxic substances, standards for polychlorinated biphenyl (PCB) and polynuclear aromatic hydrocarbons (PAH) too should have zero presence and residual pesticides are permitted up to 0.1µg/L.

- All the brands passed these tests as none of them had any of the said substances.

UNDESIRABLE SUBSTANCES

Apart from the toxic metals and substances, there are a few undesirable substances that can make drinking water unhealthy/unhygienic or hamper its taste. All these undesirable substances were tested as per the requirements of IS, and a handful of brands contained some of these in negligible quantities.

◆ Nitrate (as NO₃)

High nitrate levels in water can cause methemoglobinemia or blue baby syndrome, a condition found especially in infants less than six months old.

- Except for Bonaqua and McDowell's, all the brands contained some amount of nitrate, but were well within the maximum permissible limit.

◆ Fluoride (as F)

Fluoride is added in drinking water to promote dental health. Exposure to excessive consumption of fluoride over a lifetime may lead to increased likelihood of bone fractures in adults and might also result in effects on bone, leading to pain, tenderness and fluorosis on long intake of affected water. Children aged eight years and younger exposed to excessive amounts of fluoride have an increased chance of developing pits in the tooth enamel, along with a range of cosmetic effects on teeth. As per the national standard, the maximum amount of fluoride permissible in packaged drinking water is 1 mg/litre.

- Aquafina and Rail Neer had no fluoride, while others had acceptable minor traces.

◆ Silver (as Ag)

As silver ions are bacteria-static, silver is used as an emergency drinking water disinfectant and impregnated in some water filters to prevent

Comparative Test

microbial re-growth. Silver salts are used to maintain the bacteriological quality of drinking water. Levels of silver up to 0.1 mg/litre can be tolerated without risk to health.

- All the brands contained silver (Ag) well within the maximum permissible limit.

◆ Chloride (as Cl) and Sulphate (as SO₄)

Chloride in drinking water is generally not harmful to people until high concentrations are reached, although chloride may be injurious to some people suffering from diseases of the heart or kidneys. Sulphate is a naturally occurring substance that contains sulphur and oxygen. Sulphate is generally considered to be non-toxic. However, the consumption of drinking water containing high amounts of sulphate may result in intestinal discomfort, diarrhoea and consequently dehydration. Liquid chlorine is mixed into drinking water to destroy bacteria. The maximum permissible limit for chloride and sulphate as per IS is 200 mg/litre.

- All the brands were found well below the maximum permissible limit for chloride and sulphate.

◆ Alkalinity (as HCO₃)

Alkalinity is not considered to be detrimental to humans, but is generally associated with hardness, high pH values and excessive dissolved solids, all of which may be undesirable. HCO₃ should not exceed 200 milligrams per litre.

- All the brands were found well below the permissible limit for alkalinity.

◆ Calcium (as Ca) and Magnesium (as Mg)

Calcium in water and certain other minerals in water are healthy. Calcium-rich water has a higher pH and that is better than drinking acidic water. However, calcium and magnesium are components of permanent hardness, and thus are undesirable in drinking water. The amount of calcium should not exceed 75 milligrams per litre, while magnesium should not be more than 30 milligrams per litre.

- All the brands were found to contain very slight amounts of calcium and magnesium.

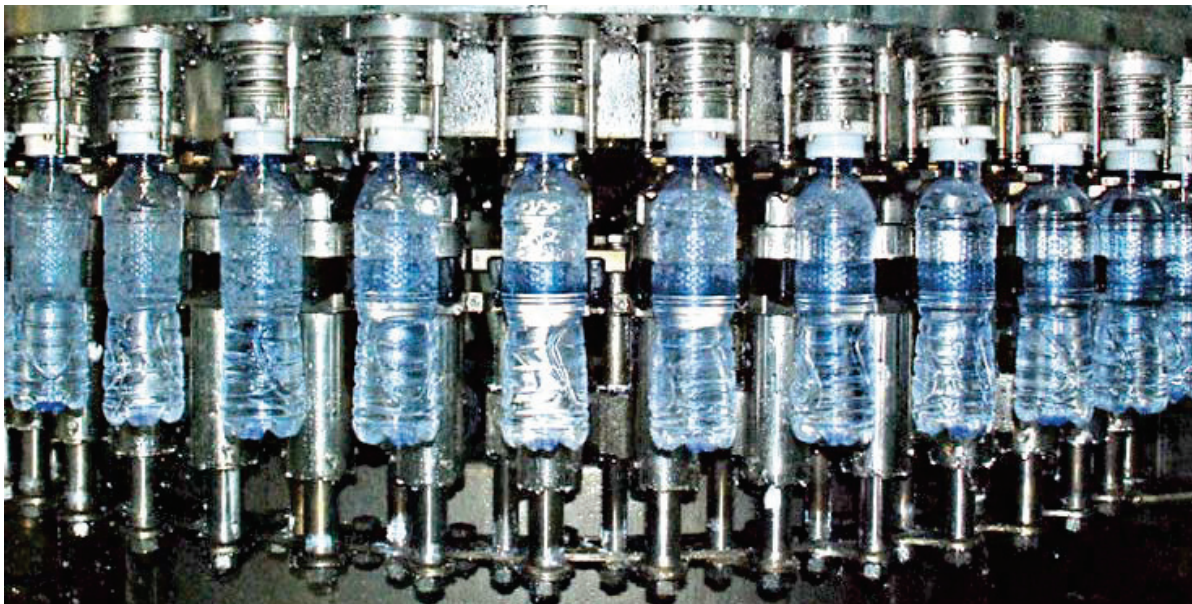
◆ Sodium (as Na)

Sodium is an essential mineral in our diet. It is commonly found in the form of sodium chloride (salt). Salt has no smell and it dissolves easily in water and gives water a salty taste at levels greater than 180 milligrams per litre.

- All the brands were found well within the maximum permissible limit for sodium as per the national standard.

PACKAGING

The packaging material of packaged drinking water should be of food-grade material and the cap of



the bottle must not have any colour migration on the product. Eight expert panellists judged the packaging based on ease of use, handling and other related parameters.

- All the brands were in pet bottle. Kinley was judged to have the most convenient and acceptable packaging, followed by Aquafina and Bisleri.

◆ Marking and labelling

As per the requirement of IS 14543:2004, the bottle of packaged drinking water should be legibly marked with the following:

- a) Name of the product; b) name and address of processor; c) brand name, if any; d) batch or code number; e) date of processing/packaging; f) treatment

of disinfection, if any; and g) 'best before' date; and h) mandatory ISI mark.

- All the brands were found with the marking/labelling requirements and hence were given full scores. All the brands marked their packaging with ISI mark.

RADIOACTIVITY

Radioactive minerals occur irregularly in the bedrock, similar to other minerals such as iron and arsenic. Radioactive alpha and beta emitters dissolve easily in water.

- All the brands passed the test as no radioactive emitters were found and were given full scores.



REACTION OF MANUFACTURERS

Brand, Manufacturer	Manufacturer's Comment	VOICE Society's Reply
Kinley and Bonaqua, Coca-Cola	Sensory test is not a parameter as per the national standard	The sensory evaluation is an important criterion for any food product's acceptability by users.
McDowell's, United Breweries	Submitted a lab report showing that it met the requirements	The report showed variations in results, mainly in microbiological test.
Kingfisher, United Breweries	Claimed to have done detailed investigations on mismatching results at their end and sent test reports on other batches indicating compliance; sought clarification on batch number mismatch	The test lab has confirmed our results.
Bisleri	Sought clarity on the unit of radioactivity test	We confirmed the same after consulting the test laboratory.