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## Branded Bottled Water as Evidence of Product Tampering

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### **Abstract:**

*The increasing trend of using the bottled water in the consumers is due to people's perception of purity, safety, better taste and convenience. The positive effect of this trend has given a substitute for safe drinking water but has left few drawbacks as well. The lack of awareness in the consumers regarding destroying of water bottles after use has lead to severe accidents. Under 272 & 273 IPC, Central Forensic Science Laboratory in Chandigarh received case of branded bottled water bottles as an evidence of product tampering. The problem arose due to the lack of awareness in consumer who do not crush used bottled water bottles and also due to the ignorance of the locals who reuse these water bottles. Herein, this case, the branded water bottle was reused for keeping acid which led to a serious accident for another consumer who used the same bottle under the perception of bottled water without checking the seal of the cap. Keeping in view the statement of the problem, the article is focused to examine the bottled water and to bring awareness in the readers about the tampering of the bottled water bottles.*

**Keywords:** Bottled water, product tampering, acid, consumer awareness

### **1. Introduction**

Reports suggest different reasons including taste, convenience, poor tap water quality, safety concerns and health concerns as a substitute for sugary drinks as the cause for increasing trend of bottled water usage in recent years. [1, 2] The positive effect of this trend has given a substitute for safe drinking water but has left few drawbacks as well. The water origin, environmental impact, container safety, role of the bottled water industry, tampering of the quality of product and seals of the bottles continue to be areas of concern. The study volunteers that on a global scale, markets for bottled water in poorer developing countries like Mexico, China and India are growing steeply due to increased fears of contaminated tap water, inadequate municipal water systems, and increased marketing on the part of bottled water companies. [3] Even in the United States, bottled water is the second most popular commercial beverage with about half the domestic consumption as soft drinks. [4] Most bottled water containers are made from recyclable PET plastic, and about 25% of these bottles end up in the waste stream in landfills and other 75% are reused. Therefore, the major concern for the use of bottled water is the consumer awareness. It is important that consumers visually inspect the container for anything suspicious such as a broken tampered evident seal of the bottle, any unusual appearances or odors when consuming the product. To the effect, the consumers should take a special care of destroying the plastic bottles after use so that they cannot be reused by the local people.

#### *1.1. Case History*

Central Forensic Science Laboratory in Chandigarh received case of branded bottled water bottles under 272 & 273 IPC. The case history indicated that a family went to a restaurant for a dinner and asked for branded bottled mineral water. The waiter of the restaurant served the same. The female member of the family took few sips of that water and severe burning started in her throat instantaneously. The victim was immediately shifted to the hospital in very critical condition. Investigating officer visited the site and collected the exhibits (Total seven exhibits) such as used water bottle on the serving table (Exhibit-1), one full bottle from the cartons of branded water bottles from which served bottle was taken (Exhibit-2) and five other water bottles from the bottle cartons (Exhibit-3 to exhibit-7). Keeping in view the statement of the problem, the article is focused to the forensic analysis of seized bottled water and to bring awareness in the readers about the tampering of the bottled water bottles.

## 2. Methods and Materials

### 2.1. Chemicals and Reagents

The chemicals methanol, ethyl acetate, alcohol, hydrochloric acid, sulphuric acid, ferric chloride, ferrous sulphate, silver nitrate, sodium bicarbonate, barium chloride, sodium hydroxide and phenolphthalein used were of analytical grade. Acetic Acid (glacial) and distilled water procured from Merck were used as control sample.

### 2.2. Experimental

All the exhibits were physically examined. followed by estimation of pH and chemical tests. The detailed observations are given as below:

#### 2.2.1. Physical Examination

Sr no	Parameter	Exh-1	Exh-2	Exh-3	Exh-4	Exh-5	Exh-6	Exh-7
1	Contents/water in bottles	half	Full	Full	Full	Full	Full	Full
2	Bottle caps	unsealed	unsealed	sealed	sealed	sealed	sealed	sealed
3	Bottle condition	Distorted	Puffed	Normal	Normal	Normal	Normal	Normal
4	Marking on bottles	Not visible	Not visible	visible	visible	visible	visible	visible
5	Bottle design	Not visible	Not visible	visible	visible	visible	visible	visible
6	Condition of liquid	Liquid with solid particulate matter	Viscous liquid with particulate matter	Clear free flowing liquid	Clear free flowing liquid	Clear free flowing liquid	Clear free flowing liquid	Clear free flowing liquid
7	odor	characteristic odor observed	characteristic odor observed	odorless	odorless	odorless	odorless	odorless
8	pH	2.5	2.5	5.8	5.8	5.9	5.8	5.8

Table 1

#### 2.2.2. Chemical Tests for Qualitative Analysis

Chemical tests were done to detect various anions like sulphate, nitrate, nitrite, chloride and acetate in all the exhibits such as Barium chloride test for sulphate ion, silver nitrate test for chloride ion and ferrous sulphate ion for nitrate ions along with control samples and controlled drinkable bottled water of various reputed brands along with standard questioned brand, which indicated the absence of these ions. Further the exhibits were tested for the presence of acetate ion. Ferric chloride test, ethylacetate odour test and sodium bicarbonate test were done with control acetic acid sample present in lab. Exhibit-1 and exhibit-2 gave positive tests for the presence of acetate anion. All the tests were done using control samples of acetic acid, distilled water and bottled waters or questioned brand along with other brands of reputed.

#### 2.2.3. Quantitative Analysis

Further, the quantitative estimation was done to check the strength of the acid in exhibit-1 & exhibit-2. The neutralization titration of the content was done against 2M NaOH solution with few drops of phenolphthalein indicator. The Molarity calculated for exhibit -1 and exhibit-2 were 17.4M which was the same as the control acetic acid sample (17.4M).

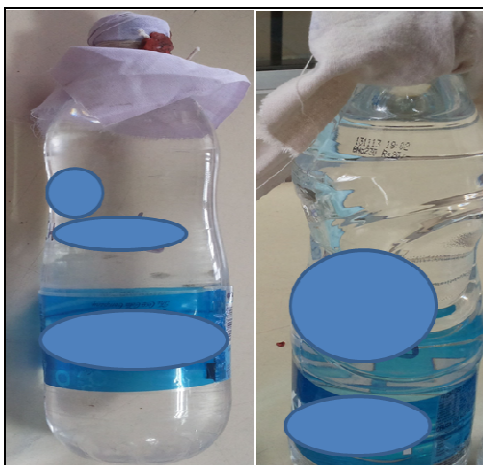


Figure 1: The first bottle is puffed and unsealed (exhibit-2) whereas the second bottle is sealed bottled water (Exhibit-3)

### 3. Results and Discussion

The Forensic analysis of all the exhibits indicated the presence of acetic acid with Molarity of 17.4M in Exhibit-1 and Exhibit-2. Acetic acid (glacial) is a colourless, viscous liquid with characteristic odour which has pH of 2.5. The Molarity of the acid in questioned bottles is same as standard acetic acid (glacial). Exhibit-3 to exhibit-5 are normal drinking water as per specifications. The lack of consumer awareness regarding the destruction of used water bottles is leading to various careless mishaps. Herein, the used bottled water bottle was not destroyed but reused to store acetic acid by the restaurant people. The bottle was unsealed, puffed and tampered. The same was kept along with fresh and sealed bottled water which was served to consumer and led to mishap. The consumer used the acid bottle without checking the seal and crimps which led to severe accident in this case. The first consumer showed ignorance in dumping the used bottle without crushing whereas the second consumer showed ignorance in consuming the product without checking the seal and physical state of the bottle.

### 4. Conclusion

This report detected the presence of acetic acid (glacial) in bottled water as the evidence of product tempering. This would highlight the importance of consumer awareness while using the bottled water which is becoming the need of the day.

### 5. Note of Caution

The plastic drinking bottles are polycarbonate bottles. Harvard School of Public Health (HSPH) researchers observed that drinking water from plastic bottles caused two-third times more excretion of a chemical Bisphenol (BPA). It interferes with the reproductive system of animals. More excretion is linked with diabetes and cardiac disorders in humans.

### 6. Acknowledgement

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### 7. References

- i. Commercially Bottled Water (<http://www.cdc.gov/healthywater/drinking/bottled/>).Center for Disease Control and Prevention. Retrieved 6 October 2014.
- ii. Mahmoud A. Saleh, Fawzia H. Abdel-Rahman, Brooke B. Woodard, Shavon Clark, Cecil Wallace, Adetoun Aboaba, Wenluo Zhang and James H. Nance (2008), Chemical, microbial and physical evaluation of commercial bottled waters in greater Houston area of Texas Journal of Environmental Science and Health Part A, 43, 335–347
- iii. Gleick, Peter H. (2014) Another Cost of Bottled Water: Environmental Injustice and Inequity. The Huffington Post. TheHuffingtonPost.com, 09 June 2011. Web. 20 Mar.2014
- iv. Bottled Water Market" (<http://www.bottledwater.org/economics/bottledwatermarket>) International Bottled Water Association. Retrieved 12 July 2014].