

Zeroing in on Packaged Drinks-by Fuzzy Inferences

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Abstract: Soft drinks have become a factor of trend among the people of nowadays. This makes them feel that they are followers of modern fashion. But it is a pathetic fact that these people are not aware of the nature of these drinks. On its intake frequently, it will have undermining effects on the health of its consumer. Fuzzy Logic Inference method when worked upon on various cases reveals that these drinks have catastrophic effects on the entire clan of the Homo sapiens. Conclusions of the analyses made on Ph values of various soft drinks, convey us unanimously that they are acidic. They don't have any progressive impact on the human body and also lie to be one of the factors leading to electrolytic imbalance.

Key words: Soft drinks • Fuzzy logic inference method • Health hazards • Acidic nature • Ph value

INTRODUCTION

Potentially toxic effects of these drinks imparted towards the human health are not very common among the youth society where there prevails a conception that soft drinks are fashionable objects.

Every ingredient of a normal soft drink has acidic behavior in anyone of its aspects. This makes the whole product predominantly acidic. Logically, there are two motives for choosing acidic materials as build components of a soft drink. They are:

Sweetening agents are invincible for a soft drink. When meticulously examined, we find that most of the sweetening agents undergo neutralization reaction with alkalis. This is evident that they are acidic.

Moreover, acidic nature makes a soft drink refrained from being a safe haven for micro-organisms.

Scientific studies predict a possible sprout out of health deterring ailments such as tooth decay, obesity, renal failure and even heart and skin are feared to be affected by the consumption of these drinks [3, 4].

Food & Drug Administration [FDA] advocates avoidance of foods containing aspartame [a sweetening agent], as its presence in food may head towards migraine, dizziness and memory loss [4]. Ageing arises due to the deposition of unwanted slurry products

[contributed by soft drinks] on our human body. For the proper functioning of our human body, blood's pH should range somewhere between 7.35 & 7.45.

Angular Fuzzy Sets: Angular fuzzy sets are used in the quantitative description of linguistic variables known as truth values. Various soft drink samples are collected and subjected to pH tests to classify them across a gamut from absolutely acidic to neutral. The pH of a neutral solution is 7.0. Any solution whose pH value falls below 7.0 is termed acidic. The entire domain of acidity is further divided as Absolutely Acidic[AA], Very Acidic [VA], Acidic and Fairly Acidic[FA] (ie) graphically between $\theta = 0$ and $-\pi/2$. Most of the soft drinks never cross beyond the pH realm of Very Acidic[VA] category (considering pH of packaged drinking water is neutral (i.e) $\pi = 0$ or pH=7). [5, 7].

Fuzzy Inference: This, which otherwise called as Approximate Reasoning denotes computational procedures used in the evaluation of linguistic description [1, 2].

Two important inferring procedures are:

- Generalized Modus Ponens [GMP],

$$\begin{array}{l} \text{IF } x \text{ is } \tilde{A} \text{ THEN } y \text{ is } \tilde{B} \\ x \text{ is } \tilde{A} \\ \hline y \text{ is } \tilde{B}' \end{array}$$

- Generalized Modus Tollens[GMT].

$$\begin{array}{l} \text{IF } x \text{ is } \tilde{A} \text{ THEN } y \text{ is } \tilde{B} \\ y \text{ is } \tilde{B}' \\ \hline x \text{ is } \tilde{A}' \end{array}$$

A, B, A', B' are Fuzzy items. Each Fuzzy linguistic statement above the line is analytically known and what is below is analytically unknown.

MATERIALS AND METHODS

Four types of soft drinks classified based on their flavor are:

- Orange flavor,
- Lemon flavor,
- Clove & mango flavor.

These solutions were tested in the laboratory using pH metric meter. Three samples of packaged drinking water are tested for expected results [6] to avoid the faulty calibration of the pH metric meter. The observed pH values are tabulated as follows:

Table 1: Categories showing various pH levels

Category	Type		
	1	2	3
Orange Drink (OR)	3.81	3.54	-
Cloves Drink (CD)	2.93	3.01	4.89
Lemon Drink (LN)	3.40	3.28	-
Mango Drink (MD)	3.46	3.80	-
Packaged Water (PW)	7.00	7.00	7.00

The mean value is calculated from the observed records to determine the nature of the sample solutions.

Table 2: Categories showing mean pH value & property

Category	Mean pH Value	Property
Orange Drink (OR)	3.67	Acidic
Cloves Drink (CD)	3.61	Acidic
Lemon Drink (LN)	3.34	Acidic
Mango Drink (MD)	3.63	Acidic
Packaged Water (PW)	7.00	Neutral

Note:

Acidic[pH values from 0 to 7],

Neutral[pH value of exactly 7],

Basic[pH values from 7 to 14].

RESULT AND DISCUSSIONS

Angular Fuzzy Set: Angular Fuzzy Set Analysis is made for various samples of soft drinks. On studying the observed results, it is found that the pH values for all samples lie between absolutely acidic to Very acidic. The pH of the packaged drinking water samples were also confirmed neutral. The red color chart indicates Very Acidic zone.

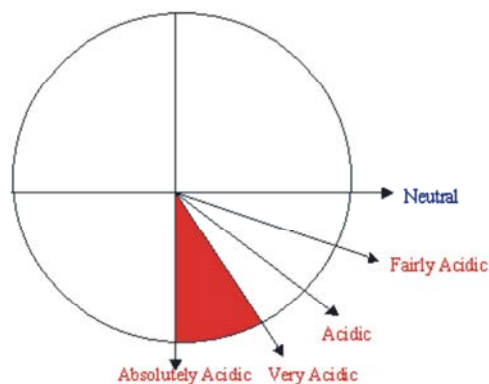


Fig. 1: Angular Fuzzy set for Soft drinks

Fuzzy Inference Method:

- By Generalized Modus Ponens[GMP],
 $A = \{pH > 5\}$
 $B = \{\text{Good Health}\}$
 $A' = \{pH < 5\}$
 $B' = \{\text{Bad Health}\}$
 IF Any Drink with pH value > 5
 THEN good to health.
 Soft Drink pH value < 5

Soft Drink is Bad to Health

- By Generalized Modus Tollens [GMT],
 $A = \{\text{Daily Consumption of Soft Drink}\}$
 $B = \{\text{High Risk factor}\}$
 $A' = \{\text{Daily Consumption of Water}\}$
 $B' = \{\text{No Risk factor}\}$
 IF Daily Consumption of Soft Drink
 THEN High Risk Factor
 No Risk factor
 Daily Consumption of Water

- Transitivity law states that,
 $P \Rightarrow Q$ and $Q \Rightarrow R$ to be True,
 $P \Rightarrow R$ is True

Now, P: All Soft Drinks are acidic in nature

Q: acidic has $\text{pH} < 7$.

R: $\text{pH} < 5$ terribly affect our body

$P \Rightarrow Q$ and $Q \Rightarrow R$ to be True,

$P \Rightarrow R$ is True.

$P \Rightarrow R$, All Soft Drinks terribly affect our body.

P : pH of Water is 7

Q : pH ranges between 7 and 7.5 provides highly oxygenation to blood cells

R : Profuse oxygenation to blood cells helps proper functioning of internal organs.

$P \Rightarrow Q$ and $Q \Rightarrow R$ to be True,

$P \Rightarrow R$ is True.

$P \Rightarrow R$, Water provides a way to proper functioning of internal organs.

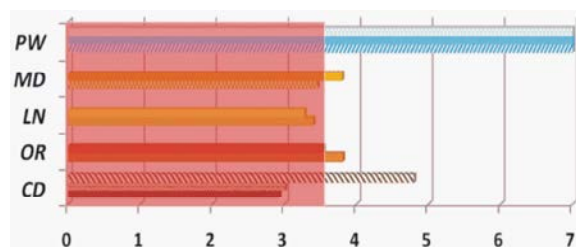


Fig. 2: pH levels of various packaged drinks.

The Shaded Portion Shows the Danger Zone: Various researches and experiments approve the fact that soft drinks have a perilous effect on human health. Thus it is not just a fact. It is an axiom. Even the pH level of acid rain is less than that of some soft drinks. This paper has brought out the startling truths about the effects of soft drinks. Increased consumption of water can remove the ill consequences of soft drinks thus helping in proper functioning of internal organs.

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