



13-14 November 2025

THE EXPERTISE OF THE SOFT DRINK JUICES COCA-COLA AND PEPSI WITH SUGAR AND WITHOUT SUGAR

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ABSTRACT.

The research experiment aimed to assess these varieties, both classic ones with sugar and those without sugar, from the perspective of chemical composition, nutritional values and organoleptic properties. The experimental results recorded were: variation in acidity (0.27-0.3 g/100 ml) in Coca-Cola lemon and Pepsi with lemon, and 0.315-0.34 g/100 ml in Pepsi

with sugar/without sugar. A correlation is noted between the soluble substance and the extract of the 10.1% Coca-Cola with sugar and 90% extract, 10.2% Pepsi lemon with 85% extract. The sugar concentration in the analysed samples evolved between 5.9% -10.2% for Pepsi and between 9.9-10.1% for Coca-Cola. The pH ranged from 2.38 to 3.12, so an acidic range. Regarding the suspicions of sample adulteration, a significant decrease in the alkaloid is observed from 10-11 mg/100ml to 7.0-7.5 mg/100 ml, a nitrite level between 2790-3260 ppm for Coca-Cola, 1190-1689 ppm for Pepsi compared to the admissible nitrite limit of 70 ppm.

Keywords: expertise, adulteration of soft drinks

Introduction

One of the important research directions aimed at comparing the chemical composition between the Coca-Cola and Pepsi assortments, both in the classic version and in the sugar-free versions, such as Coca-Cola Zero, Pepsi Max. Using modern analytical methods, such as high-performance liquid chromatography (HPLC) or spectrophotometry, subtle differences between the two brands were identified in terms of sugar content, phosphoric acid levels, caffeine concentration and flavour profile. The research revealed that Pepsi contains slightly more sugar than Coca-Cola, which gives it a sweeter and stronger taste compared to the more balanced flavour found in Coca-Cola. In contrast, Coca-Cola has a more pronounced acidity, which contributes to the intense freshness felt by consumers.[3](<https://alicepiperea.ro/coca-cola/>)

Material and methods

Determination of extract. The extract was determined at 700-710 g of juice by drying, subsequently weighing the remaining solid part. M1=196 g, m2=17 g, m3=196 g, m4=196 g, m5=196 g, m6=195 g. The extracts obtained from the analyzed samples was as follows: Sample 1-Coca Cola with sugar= 90% Extract, Sample 2-Coca Cola without sugar= 0%, Sample 3-Coca Cola with lemon= 83%, Sample 4-Pepsi with sugar= 95%, Sample 5-Pepsi without sugar= 0%, Sample 6-Pepsi with lemon= 85%.[5]

Determination of glucose/inverted sugar. Using Fehling I and Fehling II solutions and titration with Na₂S₂O₃. The amount of Na₂S₂O₃ used in the titration represents the amount of reducing sugar present in the sample. Reagents, utensils and consumables: Erlenmeyer, Berzelius beakers, pipettes, graduated cylinder, glass funnel, burette, electric hotplate, Fehling I solution, Fehling II solution, distilled water, KI, H₂ SO₄, Na₂S₂O₃, 1 ml starch solution 10% as indicator. The method was included : in the first stage, the blank sample is made as follows: 10 ml of Fehling I and 10 ml of Fehling II solution, 10 ml of distilled water are introduced into an Erlenmeyer flask. Boil the mixture for 3 min. and cool in a stream of water. After cooling, add 20 ml of 10% KI and 15 ml of H₂SO₄ d=1.11 and immediately titrate the released iodine with Na₂S₂O₃ 0.1 n, using starch as an indicator. The number of milliliters of Na₂S₂O₃ solution used to titrate the blank samples corresponds to the amount of copper sulfate taken to analyze the blank sample V_m. For the determination of glucose, 10 ml of Fehling's solution I and 10 ml of Fehling's solution II are introduced into an Erlenmeyer flask, to which 10 ml of juice from the sample to be analyzed is added. The contents of the flask are boiled for 3 minutes, cooled and titrated as for the blank sample. The volume of Na₂S₂O₃ used to titrate the sample to be analyzed corresponds to the amount of copper sulfate released in excess V_p. Titrate until the color changes from mustard yellow to milky white. [6]

Acknowledgement: The article was made as applied innovation at the experimental research hub for food industry APECC Iasy.

Results and discussions

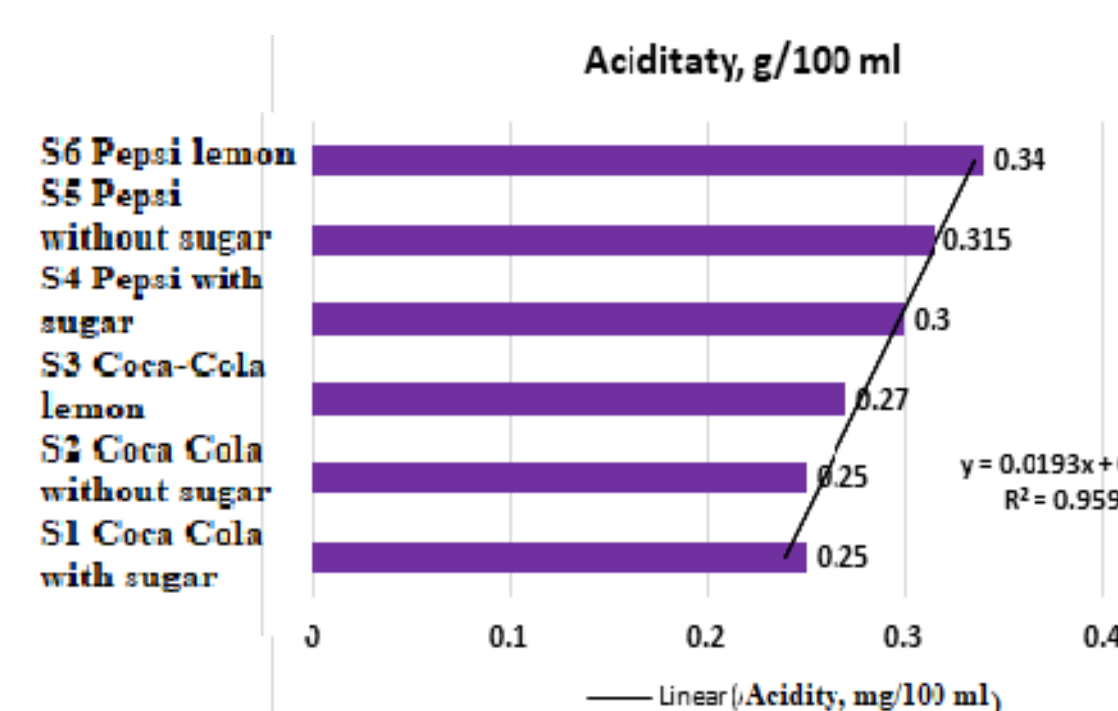


Fig.1-Evolution of acidity of Cola and Pepsi samples

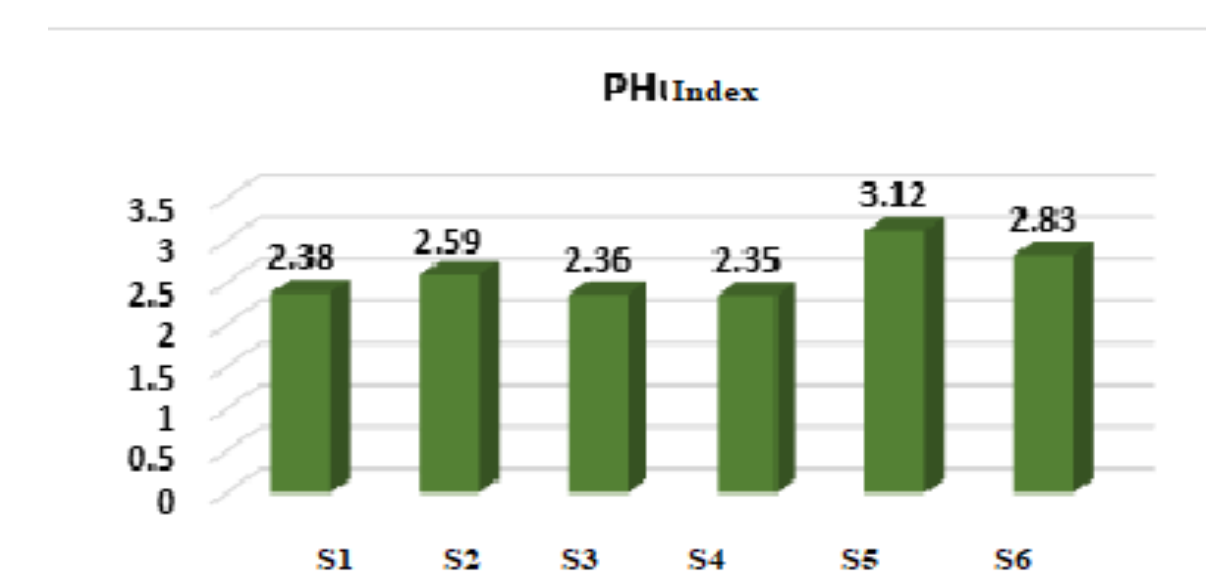


Fig.2 Dynamics of pH of Coca-Cola and Pepsi

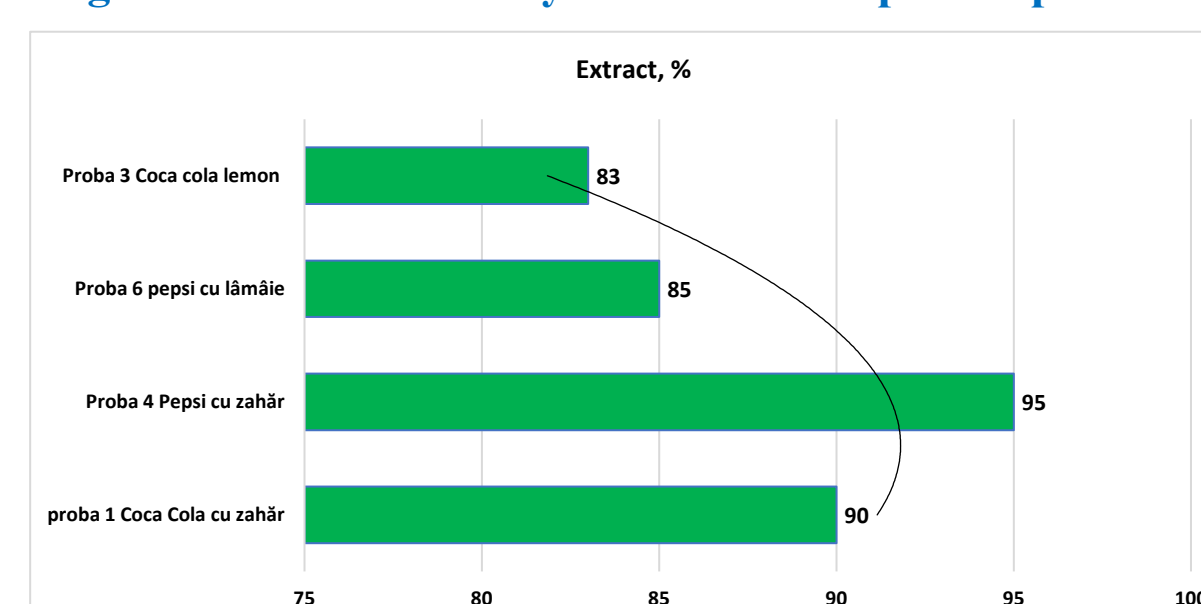


Fig.3 -Evolution of the extracts samples

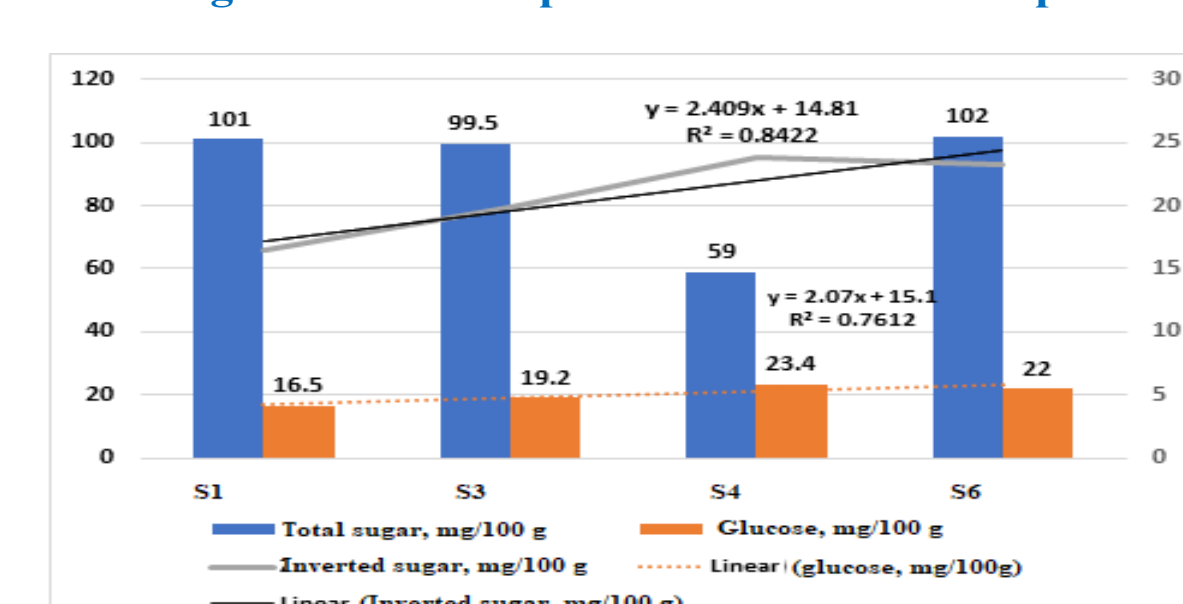


Fig.4 Evolution of glucose and invert sugar in Coca cola and Pepsi

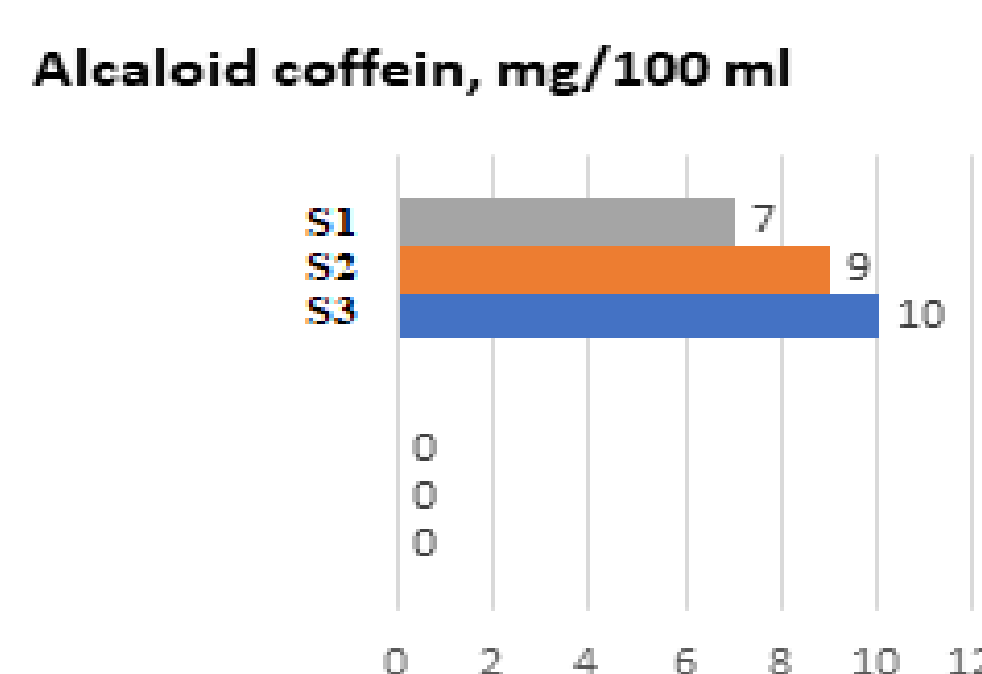


Fig.5 Level of coffein alcaloid at Coca-Cola

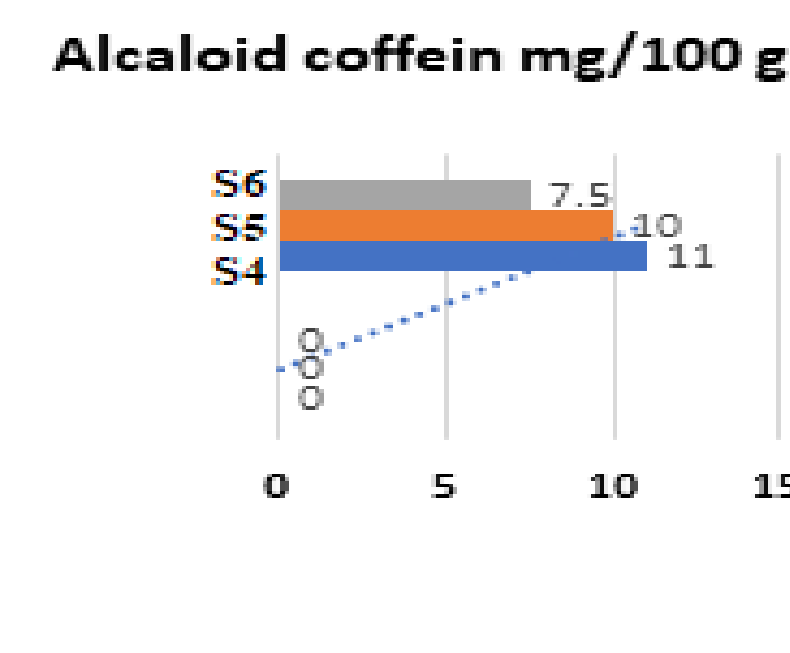


Fig. 6 Level of coffein alcaloid at Pepsi

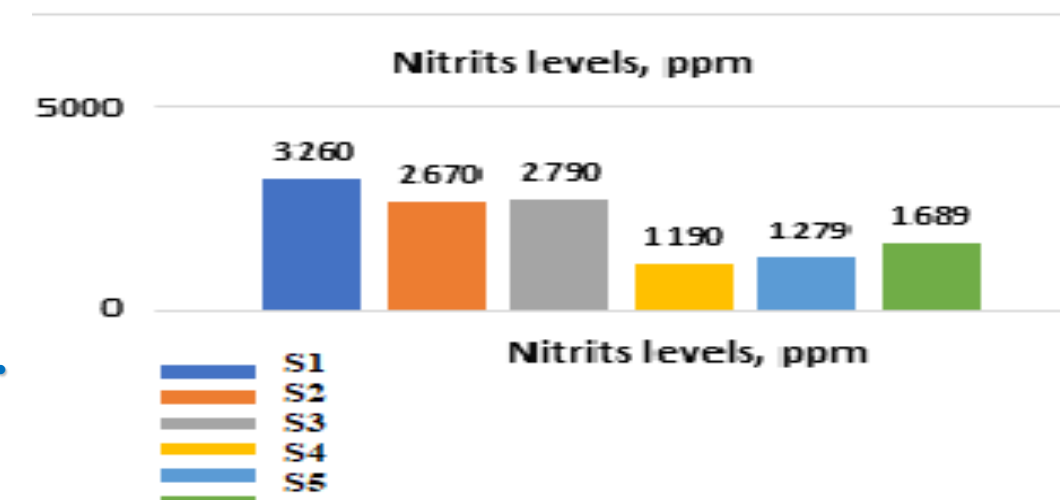


Fig.7 Nitrits levels in Coca-Cola, Pepsi

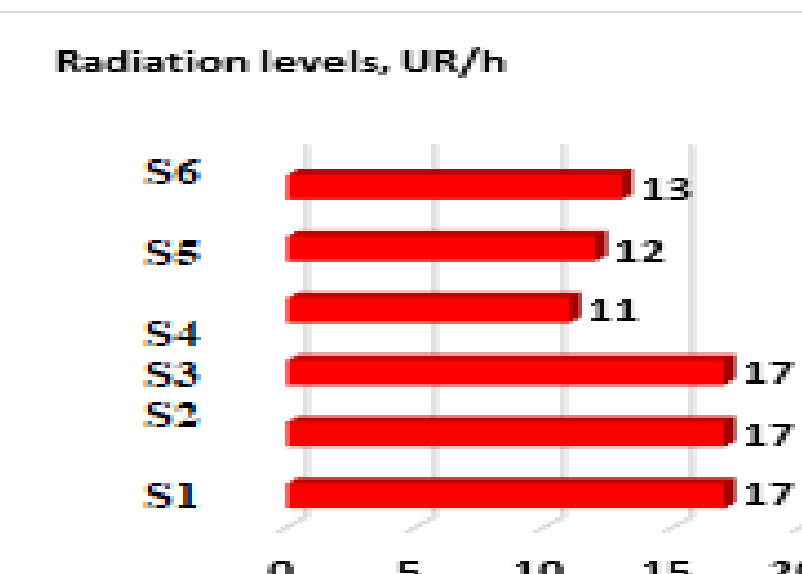


Fig.8 Radiation levels in Coca-Cola, Pepsi

Conclusions

- The manufacturing recipes indicate a correlation between the soluble dry matter and the extract of the assortments 10.1% soluble matter for Coca cola with sugar and 90% extract, 10.2% for Pepsi lemon with 85% extract.
- The glucose content varied from 16.5 to 26.5 mg/100 ml which is directly correlated proportionally to the sucrose content added to each assortment.
- Regarding the expertise of the Coca-Cola and Pepsi varieties studied, a significant decrease in the alkaloid concentration from 10-11% to 7.0-7.5 mg/100 ml is observed, which leads to a suspicion of fraud, which could have occurred when reconstituting the concentrate by adding a larger amount of water when preparing the manufacturing recipe.
- Another suspicion of product adulteration may be related to the nitrite level that varied between 2790-3260 ppm in Coca cola, the level with very hard significance, much higher than the nitrite concentration in Pepsi 1190-1689 ppm. And in these juices, the permissible limit dose of nitrites of 70 ppm was exceeded 20-30 times.