"Right to Know! Fizzy Drinks, No More!"

"Toxic Chemicals and Disturbing Side Effects of Soda"

"If benzene is unsafe in drinking water, why should it be safe in soft drinks?"

- Richard Watts, Children’s food campaigner.

7th Grades A & B
BACKGROUND

Like most other science fields, nutrition is constantly changing. New research often leads to new dietary advice. In a world full of conflicting health information, it turns fundamental to follow and be aware of scientific-based researches.

Soft drinks are the beverage of choice for millions of Paraguayans. Sodas can be refreshing drinks, but may pose as a health risk. Many companies manufacture several variations of sodas and soft drinks and non-natural juices. They offer to the public different flavored variations and no-calorie versions, light or sugar–free options.

Different investigations have shown that soft drinks have several potential negative health effects related to ingredients added to the beverage. The Harvard School of Public Health warns that the constant consumption of high-sugar beverages may increase the risk of type 2 diabetes. The school also says that drinking just one soft drink a day increases your risks of experiencing blood sugar level problems by 25 percent. In our country, current investigations revealed that type 2 diabetes in young kids and teenagers has registered an increase of 17 % in the last 5 years. (Photo Credit cola image by Melissa Schalke from Fotolia.com)

In a 2004 medical research study published in the "American Journal of Clinical Nutrition," researchers found that high fructose corn syrup is not metabolized the same way standard sugar is, so our body does not naturally tell us to stop consuming the high fructose product. They concluded that beverages like Coke "may enhance caloric overconsumption."

Benzene in soft drinks is of another potential concern due to the carcinogenic nature of the benzene molecule. This contamination is a public health concern and has caused significant outcry among environmental and health advocates. Benzene levels are regulated in drinking water nationally and internationally, and in bottled water in the United States, but only informally in soft drinks.
In November 2005, the FDA received test results conducted by private citizens that benzene was forming at low levels in several types of beverages.


In February 2006, an unnamed former chemist at the FDA publicly revealed that benzene may be created as part of a chemical reaction during production of soft drinks, particularly those having an orange flavor. Full scale investigations immediately started at the Food Standards Agency (UK) and in Germany to reveal exactly which amounts of benzene, if any, were present, with several other organizations awaiting their findings. (http://en.wikipedia.org/wiki/Benzene_in_soft_drinks#cite_note-28)

In 2008 Coca-Cola announced that it would be phasing out sodium benzoate from many of its drinks, but not Fanta and Sprite.

As of August 2012, Coca Cola Zero still contains benzoate (added as potassium salt and sodium salt respectively).

In 2013 a Belgian study found that plastic packaging may play an important role in the formation of benzene in soft drinks.

In February 2015, following the new national and international trends in Nutrition to ensure the health of people, the school has announced its decision to stop selling soft drinks in the school’s canteen.

Undoubtedly our school gets every day greener and greener!

**OBJECTIVES**

**GENERAL**

To compare the levels (amount) of salt, sugar and other toxic substances in sodas with the maximum allowable levels that a person can consume per day without harm.

**SPECIFIC**

1. To research and find out information about soft drinks, elaboration processes, ingredients, presence and amount of sugar, salt, caffeine, artificial sweeteners, savory flavorants, Benzene, and Phenylalanine in sodas, such as coke, and others; Sodas and Obesity, Sodas and tooth decay, Sodas and cancer and other diseases and health problems; healthy drinks, awareness campaigns against obesity and diabetes, packaging and logo design.
2. To detect and measure the presence of sugar, salt, carbon dioxide, caffeine, benzene, artificial sweeteners, savory flavorants, Benzene, and Phenylalanine in soft drinks.
3. To design a method to compare the allowable levels of sugar, caffeine, and salt a person can consume with the levels found in soft drinks.
4. To develop an Awareness Campaign with 8th and 9th Grade students of San Ignacio of Loyola School to inform about the harmful effects of sodas’ consumption and to raise awareness and understanding of obesity and diabetes, its consequences, management and prevention of Type 2 diabetes and obesity.
5. To visit a company that elaborates and sells natural juices (Frutika).
6. To design and create a logo and the packaging of a healthy drink.

PROBLEM

Can great amounts of salt, sugar, and other toxic substances in sodas have health side effects when compared with the maximum allowable levels a person can safely consume per day?

HYPOTHESIS

Great amounts of salt, sugar, and other toxic substances in sodas can have health side effects when compared with the maximum allowable levels a person can consume per day.

VARIABLES

DEPENDANT

The amounts of sugar, salt, caffeine, benzene, artificial sweeteners, savory flavorants, Benzene, and Phenylalanine in soft drinks, compared with the maximum allowable levels for people to consume.

INDEPENDANT

Safe and Unsafe Levels of Sugar, salt, caffeine, benzene, artificial sweeteners, savory flavorants, and Phenylalanine in soft drinks.

INTERVENING

Sugar, salt, caffeine, benzene, artificial sweeteners, savory flavorants, Benzene, and Phenylalanine amounts in different soft drinks, sampling design and sample collection, laboratorial procedures, methods & procedures for measuring and obtaining the amount of toxic substances from soft drinks, Right-to-Know Awareness Campaign, Logo and Packaging Design for Healthy Beverages and Grain and seeds-based drinks.
Guidelines and Criteria. 7th Grades A & B

EVALUATION

Total points of the project: 85 points, distributed in two semesters or periods as follows:

FIRST SEMESTER. STAGE 1: 20 P. GATHERING INFORMATION

1st FORMATIVE TUTORIAL: (9 p)

GROUP EVALUATION (5 p)

• Selects the most relevant, current and local information on the assigned topic and presents in the Evidence folder (2p)
• Presents clear and personal work: introduction, rationale, objectives: general and specific, problem definition, hypotheses and variables. (2p)
• Presents the Evidence Folder as required (1p)

INDIVIDUAL ASSESSMENT: (4p)

• Presents the Evidence Folder on time with the structure assigned by the teacher (2p)
• Points to: sources, bibliography and identification of / the topic researched / the group work and meetings/ name of the group/ leader of the group, member of the group (2p)

SUMMATIVE TUTORIAL: (11 p) - EXECUTING

GROUP EVALUATION (8p)

• Presents the report taking into account the structure of the established background (introduction, objectives: general and specific, problem definition, hypotheses and variables. (4p)
• The literature and other sources used (minimum 5 articles and 4 Web sites) are cited in the report. (1p)
• Presents the report on time (1p)
• Presents activities scheduled in the Chronogram sheet. (1p)
• The Evidence Folder is decorated and it contains the structure requested by the teacher (cover pages, dividers, annex) (1p)

INDIVIDUAL EVALUATION (3P)

• Answers the teacher’s questions about main concepts and group work. (1p)
• Participates and gets involved in the process (group work, group meetings, assigned role, etc.) (1p)

SECOND PERIOD. STAGE 2: 25 P. PERFORMANCE (Experimental)
1st. FORMATIVE TUTORIAL: (5p)

- Communicates in both, oral and written reports the results of the experiments performed. (2p)
- Follows the correct structure of the experimental work guided by the teacher (2p)
- Attends and brings all the materials requested for the lab experiment (1p)

SUMMATIVE TUTORIAL (20P)

EVALUATION GROUP (14 p)

- Follows the correct structure of the experimental work guided by the teacher (2p)
- Attends and Participates actively during the lab entrances (2p).
- Develops a study design (model, questionnaire, sample) (2p)
- The results are expressed clearly using graphs, charts, tables, photos, statistics (2p)
- The conclusions of the experimental work are expressed clearly and in accordance with the objectives of the research (2p)
- Designs the flyers or brochures (Diptych or Triptych draft). (2p)
- Uses the standard lab format to present the lab written report (2p)

INDIVIDUAL ASSESSMENT: (6p)

- Applies the rules of respect, tolerance and timeliness as the result of a critical and participatory attitude. (2p)
- Cooperates actively in the implementation of the work (2p)
- Attends lab entrances provided with all of the materials needed to perform the field work and/or experimental work. (2p)

FINAL PRESENTATION. STAGE 3: 40p – DRAWING CONCLUSIONS & COMMUNICATING RESULTS

1ST. FORMATIVE TUTORIAL : WRITING RESULTS (15p)

GROUP EVALUATION (10p)

- Cover pages, acknowledgments, index (3p)
- Body of work (correct order and sequence) (1p)
- Results: a) Surveys (1p) b) Cost Study, graphics and other (1p) c) Methodology (1p)
- Conclusion (1p)
- Annex (1p)
- Bibliography & References (1p)

INDIVIDUAL EVALUATION (5p)

- Applies the rules of respect, tolerance and timeliness as the result of a critical and participatory attitude. (2p)
- Cooperates actively in the implementation of the work (1p)
- Answers the questions formulated by the teacher about any part of the work or research or experiments performed (2p)

SUMMATIVE TUTORIAL (10p)
GROUP EVALUATION (7p)

• Presents the written report in a ringed booklet. (2p)
• Presents a PowerPoint in a pen drive as a complement to the oral presentation (2p)
• Presents the Evidence Folder with the work developed during the three periods with the teacher’s corrections (1p)
• Hands in the identification cards following the standard format and clips on the back (1p)
• Hands in the final flyers or brochures (3 or 5 samples) (1p)

INDIVIDUAL EVALUATION: (3p)

• Writes his/her personal conclusions (1p)
• Applies the rules of respect, tolerance and timeliness as the result of a critical and participatory attitude. (1p)
• Cooperates actively in the implementation of the work (1p)

ORAL DEFENSE (15p)

GROUP EVALUATION (5p)

• Presents the written report in a ringed booklet. (1p)
• Uses the PowerPoint as a visual support or complement to express the main ideas (1p)
• Presents the Evidence Folder with the work developed during the three periods (1p)
• Hands in the identification cards following the standard format and clips on the back (1p)
• Hands in the final flyers or brochures (1p)

INDIVIDUAL EVALUATION: (11p)

• Does not read from the PowerPoint or papers in his/her hands (1p)
• Uses the technical vocabulary appropriately (1p)
• Demonstrates ability to interpret the theme (1p)
• Explains clearly and with good diction the ideas, graphs, tables and diagrams (1p)
• Answers questions with confidence and without rambling (1p)
• Expresses conclusions consistent with the proposed objectives (1p)
• Takes and appropriate posture & behavior as well a positive attitude to express proper conduct and formality during the oral defense (1p)
• Comes with the correct uniform and name tags. (2p)
• Uses appropriate and effective visual support materials. (1p)

IMPORTANT OBSERVATIONS:

Procedural assessments are made through the tutorial system according to the schedule established by the institution.

The evaluation of the product is verified by:

a) Field trips and/or experimental work with written reports.
b) A written presentation of the work done by the group using the standard formats in the Evidence Folder and in a Final Ringed Booklet.
c) Presentation of the best science fair projects nationally and internationally if the institution proposes to do so.
d) A Final Oral Defense will take place through an examination table, conformed for the purpose, with internal and external professionals who will listen and evaluate each group.

**Cronogram – Science Annual Project 2015**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Deadlines</th>
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<tbody>
<tr>
<td>The teacher hands in the project topic to the groups with guidelines and normative.</td>
<td>Week 23 - 27 March.</td>
</tr>
<tr>
<td>Each group presents raw information about the topic as well as the evidence folder (structure &amp; decoration)</td>
<td>Week 13 - 17 April</td>
</tr>
<tr>
<td>1st Formative tutorial. The teacher returns Evidence Folder with first correction and guidelines for the first summative tutorial.</td>
<td>Week 4 - 8 May</td>
</tr>
<tr>
<td>1st Summative tutorial. Each group hands in the Evidence Folder (introduction, objectives: general and specific, problem definition, subtopic, hypotheses and variables, bibliography).</td>
<td>Week 18 - 22 May AWARENESS CAMPAIGN</td>
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<tr>
<td>Talk with a Specialist: Dr. Esteban Riera</td>
<td>May 19th</td>
</tr>
<tr>
<td>2nd Formative Tutorial: Lab Reports, Methodology, type of investigation. Field Trip to Frutika</td>
<td>Week 2 - 6 June FIELD TRIP</td>
</tr>
<tr>
<td>2nd Summative Tutorial: Implementation (product development, experimentation, final product elaboration)</td>
<td>Week 23 -27 June</td>
</tr>
<tr>
<td>The teacher returns the Evidence Folder with corrections. Product Elaboration</td>
<td>Week 6-10 July PRODUCT ELABORATION</td>
</tr>
<tr>
<td>3rd Formative Tutorial: Final structure (Acknowledgements, Index, Introduction, Analysis of Results, General conclusion, individual conclusion)</td>
<td>week 3 to 7 August</td>
</tr>
<tr>
<td>3rd Summative Tutorial (ringed booklet, and evidence folder, PowerPoint, ID cards, flyers and brochures)</td>
<td>Week 07 - 11 September</td>
</tr>
<tr>
<td>Final Oral Defense</td>
<td>Week 16 – 18 September</td>
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**REMARKS:** The dates above will be governed by the schedule of activities submitted by the Evaluation Department and might suffer changes that will be announced with anticipation.
STEPS FOR DEVELOPING A SCIENTIFIC PROJECT.

- DESIGNING A RESEARCH IDEA: The ideas are the first approach to the reality that will be investigated, sources may be: individual experiences, written materials, discoveries, personal conversations, observations of facts, beliefs, newspapers, etc.

- SUMMARY: It has to be written at the end of the research and after drawing conclusions. It is a synthesis of the project in no more than 150 words including key words and results, with the following requirements: Log of the institution (upper left), name of the Institution Area, Course, Project Name, Tutor, Project Summary (as title), authors (such as footer).

- INTRODUCTION: explains what is going to be researched, the background of problem, and the subject of the project, establishing the chapters to be developed in the investigation.

- OUTLINE OF THE PROBLEM OF RESEARCH: It is a formal explanation of the idea and structure of the research and the justification of the topic. Including the following steps
  a) THE DEFINITION OF THE PROBLEM: Set by a question that covers briefly and concisely the problem of research.
  b) OBJECTIVES: Establish a general idea of the intended research.
  c) BACKGROUND OR JUSTIFICATION: Indicates the reason for the investigation. It must describe the objective of the project following these steps: Relevance of the topic to research, feasibility & analysis of available resources.

- MAKING A HYPOTHESIS: A tentative explanation of a particular event or phenomenon. It is stated in a true propositional form and tries to explain the actual relationships between variables.

- VARIABLE: An entity or attribute that can vary and whose variation is likely to be measured.
  a. DEPENDENT VARIABLE: Is that part of the hypothesis clearly known, and which are unknown elements that produce, modify and influence it. It is what you measure in the experiment and what is affected during the experiment. It responds to the independent variable. It is called dependent because it "depends" on the independent variable. In a scientific experiment, you cannot have a dependent variable without an independent variable.
  b. INTERVENING VARIABLE: facilitates a better understanding of the relationship between the independent and dependent variables when the variables appear to not have a definite connection.
  c. INDEPENDENT VARIABLE: An independent variable is the variable you have control over, what you can choose and manipulate. It is usually what you think will
affect the dependent variable. In some cases, you may not be able to manipulate the independent variable. It may be something that is already there and is fixed, something you would like to evaluate with respect to how it affects something else, the dependent variable like color, kind, time.

d. CONTROL VARIABLE: is something that is constant and unchanged in an experiment. A control variable is any factor that remains unchanged and strongly influences values; it is held constant to test the relative impact of an independent variable. In scientific experimentation, a control variable is the one that must not be changed throughout an experiment because it affects the independent variables and thus affects the outcome of the experiment.

• CHAPTER I. THE THEORETICAL FRAMEWORK: Consists of the literature review, identification, collection, query, retrieval, collection and processing of relevant information, so as to give theoretical support to scientific research.

• CHAPTER II. METHODOLOGICAL DESIGN: is a clear and concise statement of each of the stages of the investigation. The description of how the investigation will be conducted.

CHAPTER III. ANALYSIS OF RESULTS: The process by which the student prepares and presents the research report with charts, diagrams and others, such as Surveys and Study of costs, Marketing Research, etc.

• CONCLUSION: The conclusion is a final comment or idea that summarizes the most important aspects of the topic as well as the results of the experiments or activities that took place during the course of the investigation. The conclusion should be expressed in a paragraph of small size and is designed to meet the following objectives:

  • Identify and summarize aspects of the subject that the student was expected to discover through the development of the project and research.

  • Encourage the student's reflection on the importance of the topic research to their daily lives or the environment in which they live.

  • Provide a final comment on the results of the activity being performed, in order to provide a feedback to the students or to make suggestions that may improve the process that involves a scientific research.

• ANNEX: in this section additional information is attached (photos, clippings, diagrams, schedules, tables, etc.) and other materials to enrich the research.

• BIBLIOGRAPHY & REFERENCES: the name or names of the author - year of publishing - editorial - page. Internet pages, the page address.

**REQUIREMENTS FOR A SCIENTIFIC REPORT.**

Written reports for each tutorial will be monitored and evaluated by the teacher, according to the criteria presented in the corresponding item or term. The final written report must be drawn to computer, using the following guidelines:

• Font size 12.
TOPICS TO RESEARCH

2. The presence and amount of sugar, salt, caffeine, artificial sweeteners, savory flavorants, Benzene, and Phenylalanine in soft drinks.
3. Sugar in soft drinks, Type 2 Diabetes, Sugar Addiction, Obesity, and Alzheimer’s Disease.
4. Corrosiveness of Soda and Tooth Decay and Dental Cavities.
5. Caffeine in sodas, heart failures and hyperactive response.
6. Artificial Sweeteners, Phenylalanine, Savory Flavorants, Sodium benzoate, ascorbic acid, benzene and blood cancer.
7. Salt (sodium chloride) in soft drinks and hypertension.
8. Healthy Beverages and Water. Grains and seeds-based drinks. Quinoa smoothie, Chia seeds juice, sunflower seeds milkshake, aloe flavored water, sesame seed, cinnamon and pineapple colada, pumpkin seeds and banana milkshake, barley water and barley tea, chlorophyll drink, fig coffee, lactose-free alternatives.
9. Awareness Campaigns to prevent Diabetes and Obesity.
10. Logo and packaging design for healthy drinks.

REFERENCES

1. Aurora A. Saulo (March 2005). "Sugars and Sweeteners in Foods". College of Tropical Agriculture and Human Resources.


6. International Council of Beverages Associations. ICBA Guidance Document to Mitigate the Potential for Benzene Formation in Beverages

7. Martin Hickman, “Coca-Cola to phase out use of controversial additive after DNA damage claim”, The Independent 25 May 2008. (http://www.independent.co.uk/404/)

8."Soft Drinks and Disease". http://www.hsph.harvard.edu/nutritionsource/healthy-drinks/soft-drinks-and-disease/


Lic. Susana Ismael Basualdo.