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INVESTIGAÇÃO CIENTÍFICA ATRAVÉS DA EXPERIMENTAÇÃO DA AÇÃO DO GÁS ETILENO NO PROCESSO DE AMADURECIMENTO DE FRUTAS

INVESTIGACIÓN CIENTÍFICA MEDIANTE EXPERIMENTACIÓN DE LA ACCIÓN DEL GAS ETILENO EN EL PROCESO DE MADURACIÓN DE LOS FRUTOS

SCIENTIFIC RESEARCH THROUGH EXPERIMENTATION OF THE ACTION OF ETHYLENE GAS IN THE RIPENING PROCESS OF FRUIT

Presentation: Poster

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INTRODUCTION

One of the problems related to the quality of Chemistry teaching is the lack of experimentation (Silva; Machado; Tunes, 2010). Experimental activities are characterized as a didactic teaching strategy, as they provide an appropriate scope for theoretical and representational approaches to scientific knowledge (Oliveira, 2010). Experimental classes favor the production of student learning in the creation of concepts, encouraging observation, investigation of nature and resolution of proposed or observed problems. Observation and experimental practice provide, in addition to learning procedures and concepts, the optimization of various cognitive skills and understanding the nature of science (Zômpero; Laburú, 2011).

Scientific education cannot be based solely on the oral transmission of information, so the teacher must not abandon the analysis of data and observable facts that are part of the occurrence of a series of phenomena (Nunes; Bernardo, 2023). Investigative practice through experimentation becomes important interventions in the routine of Chemistry classes, with the aim of developing a new path to understanding Science.

The objective of this work was to verify the ripening of fruits, stored without and with paper and plastic packaging, subjected to room temperatures and 18°C for 16 days and to associate this fact with their production of ethylene gas, by 3rd grade students. year at a public educational institution, located in the city of Paraíso do Tocantins.

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THEORETICAL FOUNDATION

Chemistry teaching in many public educational institutions is carried out in a fragmented and decontextualized way. Overcoming this way of teaching through pedagogical practices that lead students to understand knowledge that is not segmented and decontextualized, but integrated into the areas of Natural Sciences and their Technologies, is a priority (Brasil, 2002). Several theories defend learning through the use of experimentation; however they are not carried out due to a lack of laboratories, materials and unpreparedness of teachers (Alves; Leão, 2017).

Experimentation can be carried out in environments that do not depend exclusively on schools, as the teaching-learning process depends on complementation with other activities, therefore it is important to use non-formal space to support conceptual classroom or practical activities, not to replace formal education, but with the possibility of promoting sensations, experiences and perceptions that science can provide in these environments (Carvalho, 2005). Non-formal education covers any educational activity organized and structured in an intentional way, which does not correspond exactly to what is established in the curricula for formal education (Souza et. al., 2021).

Carrying out contextualized, creative Chemistry teaching practices that take place in non-formal spaces can provide encouraging learning experiences and contribute to significant learning of scientific concepts for students (Rodriguez, 2016). According to the author, students who have difficulties in understanding Chemistry content can have these obstacles resolved with the use of didactic and methodological alternatives included in practical activities, which do not necessarily need to take place in the laboratory.

The teacher must create situations that promote the construction and production of knowledge through understood situations using practical activities that involve the student in the topics being taught (Nanni, 2004). The use of contextualized experimentation allows the creation of real problems where the student stops being a mere listener memorizing content to understand and relate Chemistry subjects in their daily lives. (Guimarães, 2009). Experimental activities motivate and expand learning capacity. Experimentation develops the skills of observing, comparing, grouping, collecting and interpreting data, making assumptions, planning and solving everyday problems (Alves; Leão, 2017). It plays a significant role in the

teaching-learning process, being responsible for motivation, while the discussion of results favors the carrying out of research, contributing to the formation of concepts, consolidation and expansion of knowledge (Lôbo, 2012).

METHODOLOGY

The research was carried out in an exploratory, descriptive way (Marconi; Lakatos, 2015), with the intention of evaluating an experimental activity, carried out in June 2022 with 20 students in the 3rd year of high school from a public educational institution located in the city of Paradise of Tocantins.

The scientific investigation was initially carried out exploring the hydrocarbon content, under the subtopic Alkenes, taught in the Chemistry discipline and the action of ethylene gas on ripening fruits. After the explanation, the students followed the methodology adapted from Sert and Kern (2006), where they began investigating the action of ethylene gas in the fruit ripening process. Three bananas and three lemons were separated and weighed. After weighing, the fruits were exposed to room temperature, serving as a control group. Three bananas and an apple were added in paper packaging. In another paper package, three lemons and an apple were placed. A plastic packaging was used to hold three bananas and an apple.

Three lemons and an apple were also packed in another plastic packaging. Paper and plastic packaging were sealed with masking tape and individually weighed. The plastic and paper packaging containing the fruits were separated into two groups, with the first group (paper and plastic packaging) subjected to room temperature and the second group (plastic and paper packaging) subjected to a temperature of 18 ºC. After 16 days, the texture, color and odor and mass of the fruits were analyzed and the fruits that were in the process of rotting were discarded.

After carrying out the experiment, the students answered a questionnaire with the following closed questions: 1. Did the experiment contribute to learning about the concepts of the action of ethylene gas on fruits and ripening techniques? 2. Was learning through the experiment motivating? 3. Did the experimental class contribute to the understanding of alkenes?

RESULTS AND DISCUSSION

Fruits stored at room temperature and without packaging underwent major changes in their texture, odor and mass (Figure 1). The fruits stored at room temperature in

paper packaging (figure 2) showed changes in mass, texture, color and odor and the appearance of a liquid with a very intense aroma.

Figure 1

Soure: Authors (2023)

Figure 2

Soure: Authors (2023)

When analyzing the fruits stored in plastic packaging (Figure 3) at room temperature, it was noticed that there was a large loss in their mass and the appearance of a large volume of a yellowish liquid. When subjected to refrigeration with paper packaging there was little change in the mass and color of the fruits (Figure 4). Regarding refrigeration with plastic packaging (Figure 5), there was no change in the mass of the fruits and they presented a lighter color.

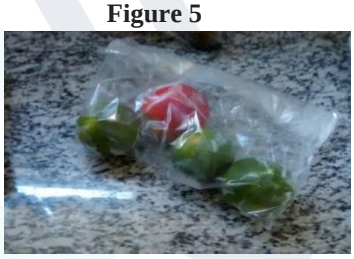
Figure 3

Fonte: Authors (2023)

Figure 4

Fonte: Authors (2023)

Figure 5



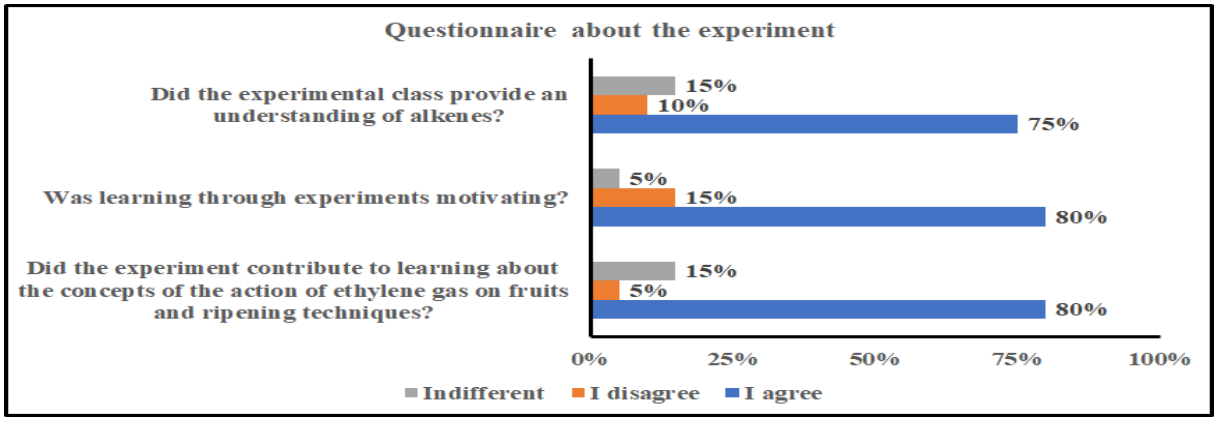
Fonte: Authors (2023)

Therefore, there were changes in the fruits used due to high concentrations of ethylene, which, as it is a gas, easily volatilizes, therefore its release was prevented due to packaging, and, as a result, it accelerated the respiration and metabolism processes of the fruits, causing their maturation.

Graph 1 shows the results obtained in the questionnaire on the experiment on the effect of ethylene gas on fruit ripening.

According to the aforementioned graph, we observed that when asked about the experiment contributing to learning about the concepts of the action of ethylene gas on fruits and ripening techniques, 80% said there was a contribution, 5% disagreed and 15% were indifferent. The students stated that the contributions received were due to the fact that the experimental class provided experience and control over the ripening of the fruits.

Graph 1: Questionnaire applied about ethylene gas during fruit ripening



Fonte: Authors (2023)

As for learning through the experiment being motivating, 80% agreed, 15% disagreed and 5% were indifferent. The fact that the students wanted to participate generated interest and consequently motivation with the experiment on fruit ripening.

When asked about the experimental class contributing to the understanding of alkenes, 75% of students agreed that the experimental class made it possible to understand alkenes, 80% stated that learning through the experiment was motivating, as it contributed to a more dynamic class, breaking with the monotony of the classroom centered on the whiteboard and paintbrush.

Francisco Junior et al. (2008) say that the experimental approach of an investigative nature aims to obtain information to support discussion, reflection, considerations and explanations, leading the student to understand the concepts and different ways of thinking about the world through science.

CONCLUSIONS

Scientific research contributes to the understanding of the contents of the curricular structure and encourages the search for knowledge, awakening interest in the subject, helping to develop new concepts and solutions to problems. An approach based on the phenomenon, theory and experimentation, made students deduce their own conclusions. The investigative experiment brought together academic and popular knowledge by building a theory to explain them in scientific language, showing that chemistry is related to everyday life.

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