



Title

Ukrainian coloring eggs with natural pigments

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Table of activities

School subject	<i>Applied sciences</i>
Topic	<i>Natural pigments and its applications</i>
Age	<i>17 years</i>
Required time fo the activity	<i>90 minutes</i>
Required materials	<i>Boiled eggs, vinegar, water, spinach leaf, black and purple onion peel, turmeric, chamomile flower, dandelion, coffee</i>
Cultural concept	<i>Easter eggs coloring</i>



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Teaching concept

During this activity, students extract natural pigments from different types of plants, which are then used to dye Easter eggs.

Cultural concept

Pysanka is a traditional way of painting and decorating eggs, which goes back to pagan times. The custom of painting eggs on Good Friday has been preserved until today, and the main mentioned reason is the birth of a new life, while the eggs that are painted red symbolize the blood of Jesus Christ. Today, the tradition of dyeing eggs has expanded to the use of various synthetic colors and additives, and primarily eggs were dyed with natural pigments and drawn with wax. Many nations paint eggs for Easter, but Ukrainian egg decoration is one of the most colorful, and painted eggs called "pysanki" feature traditional patterns from Ukrainian culture.

Applied sciences concept

Natural pigments are substances in the form of droplets or crystals attached to proteins, and they are the carriers of the color of a living organism. The most common pigments are: porphyrins (chlorophyll and hemoglobin), carotenoids (yellow xanthophylls and orange carotenes), anthocyanins (red and blue colors), flavones (yellow colors).

Aim of activity

The goal of the activity is for students to become familiar with the types and nature of pigments through workshops on color extraction, paper chromatography and practical application of natural colors in human nutrition. The activity will provide students with a complete picture of the types and nature of plants that have a pigment of a certain color in their composition.

Activities

Student activities are divided into three stages.

The first stage is the preparation of the eggs, which includes boiling the eggs and bleaching the shell, with the aim of better adsorption of the pigment. The second stage is the extraction of the pigment from the plant using boiling water or alcohol and the coloring and decoration of the eggs. The third phase is expanding the knowledge about synthetic pigments and their application in the food industry.

By cooking eggs, students learn about the properties of proteins and the changes that occur when proteins are exposed to high temperatures. Also at this stage, students can observe the

reaction of acetic acid with calcium carbonate from the egg shell, i.e. the process of removing the top layer of the shell, in which carbon dioxide is obtained as a side product, which can be observed based on the gas bubbles that are released during the process reactions.

The skin of black and purple onions, spinach, nettle, purple cabbage, dandelion, turmeric and coffee are used as sources of natural pigments. The intensity of the color varies depending on the amount of the plant added, which gives students the opportunity to explore the shades and intensity of the color depending on the type of plant used and their amount. The idea is to leave the eggs prepared for dyeing in the dye solution for a certain period of time, so that the conclusion of the dependence of time/intensity of the dye could be made.

The final stage is the use of synthetic dyes for dyeing eggs and a comparative analysis of the intensity, durability and availability of natural and natural pigments.

In the course of the following activities, students could become familiar with the laws that regulate the healthiness of synthetic colors and the domain of use in the food industry.

Additional materials



Figure 1 Preparation for the dyeing process



Figure 2 Final result of dyeing process