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NATURAL DYES AS ECO-FRIENDLY MATERIALS IN DAILY LIFE

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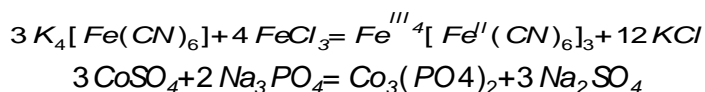
The goal of our work is to reveal experimentally the universality of eco-friendly dyes in our daily life. We have identified the following tasks: have studied the properties of organic dyes, compared chemical and organic dyes and conducted an experiment.

Vegetables such as beets and carrots are examples of the extensive and abundant sources of plant dyes available in nature. Turmeric is also a good coloring agent.

Beets are red due to betacyanins. Betacyanins are a mixture of red and purple pigments. Carrots are colored orange thanks to the carotenoid pigment. Turmeric contains curcumin – a natural dye [1].

Dyes derived from organic or inorganic compound are known as synthetic dyes. For comparison, we took the following substances: Prussian blue ($\text{Fe}^{\text{III}}_4[\text{Fe}^{\text{II}}(\text{CN})_6]_3$) is a dark blue pigment, lead monoxide (PbO) – light yellow powder, copper dihydrogen carbonate ($\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$) – dark green crystals, cobalt phosphate ($\text{Co}_3(\text{PO}_4)_2$) – violet substance [2].

Our experiment is to test the durability of dyes in solution and in the paint (we added pigments to the white acrylic paint). We have prepared beetroot and carrot dyes [3]. We took turmeric in its original crushed form. We got the Prussian Blue and cobalt phosphate as reactions:



Lead monoxide and dihydrogen carbonate were in the laboratory in their original forms.

All paints have a fairly dense coating, with the exception of carrots. This is due to the different phase states of the oil and paint (the dye can be extracted from carrots only in oil). The oil flaked off and the pigment could not completely dissolve in the paint.

We tested the interaction of various dyes with concentrated hydrochloric and nitric acids and 50% alkali. The results showed that all dyes reacted with these reagents, but a little bit different. Most dyes, both inorganic and organic, fade when interacting with acids. Chemical dyes are more reactive. They change their color when interacting with alkali and they react instantly. Natural dyes also react in alkaline or acidic environments. This is due to the aggressive environment of concentrated alkali and acid. So, we can conclude that dyes are not resistant to chemical attack on them.

Our research has shown that natural dyes are available to anyone, they are universal and easy to obtain. Thanks to their non-toxic properties, they can be used in any industry, both in food and in clothing painting.

References

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2. Hans Eduard Fierz-David and Louis Blangy. *Fundamental Processes of Dye Chemistry*.
3. Cardon Dominique (2007). *Natural Dyes: Sources, Tradition, Technology and Science*. Archetype Publications.