A Mini review on Natural Colorants in Toys

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Abstract

Synthetic colors are widely used due to its attractive shades. Children are widely attracted towards these colours. Most of the toys available in the market are made out of plastics. Several synthetic colorants are added which are toxic to health and environment. Natural colorants could be an alternative as in most of the cases, these are non-toxic. Natural colourants that are based on minerals, plants and organisms can be employed. This mini review discusses about various natural sources of colors that can be employed in toys.

Keywords

Natural colorants, minerals, organism

Introduction

Synthetic colors are widely used in fabrics, cosmetics, pH indicator, paints, dyes, food colors, kitchen wares, toys etc. There are numerous problems associated with synthetic colors ranging from skin allergies to cancer. Due to their vibrating look synthetic colors are often used even in toys. Children who are unaware of its toxicity are at high risk of these synthetic colorants. Hence it is of utmost important to look for natural colorants in toys. This article discusses the types of natural colorants that are available which can be used in staining or dying wooden toys or which can be added during the manufacturing of plastic toys [1,4].

Sources of natural colorants

Mineral-based colors

Every substance in nature has its own beautiful color. A few colors obtained from minerals are listed in Table1. The colors ranging from yellow to red is obtained from iron oxides which is a component of earth pigment , Ochre. The source for black color is manganese oxide which is obtained from pyrolusite ore. The another source for black color is charcoal. Umbers are obtained from iron oxide and manganese oxide give reddish-brown color [1,2,5].

Table 1. List of colors obtained from minerals

Source	Chemical component	Color
Earth pigment-Ochre	Iron oxides	Yellow to Red
Pyrolusite ore	Manganese oxides	Black
Ilmenite ore	Titanium dioxide	White
Earth pigment-Umbers	Iron oxides and Manganese oxides	Reddish-brown
Charcoal	Carbon	Black

Plant-based colors

A few beautiful colors obtained from plant-based sources are listed in Table2. The chemical component anthocyanin obtained from fruits and vegetables is an excellent source of color like blue, magenta, pink and purple. The Betalains obtained from flowers, leaves, stem and bracts of plants gives colors ranging from yellow to red. The carotenoids which is responsible for bright colors like red, orange is obtained from vegetables like carrot and tomato [6-10].

Table 2. List of colors obtained from plant-based sources

Source	Chemical component	Color	Example	Solubility
Fruits and vegetables	Anthocyanins	Blue, Magenta, Pink and Purple		Water soluble
Flowers, leaves, stem and bracts (Roselle)	Betalains	Yellow and Red		Water soluble
Apricots, carrots, Marigold etc.	Carotenoids	Orange, Red and Yellow		Lipid soluble
Leaves	Chlorophyll	Green	Spinach,	Lipid soluble

(Spinach, Alfalfa, Lettuce)			Alfalfa, Lettuce	
Sappan wood	Brazilin	Red		Water soluble
Turmeric		Yellow		
Water lilly Butter pea, Gardenia		Blue		

Organism-based colors

Table 3 lists a few colors obtained from living organisms. A variety of colors are also obtained from living sources like yeast, bacteria, plants and animals. The bacteria offer a wide range of colors. Molluscs is a source of purple color which contains the chemical component 6,6 -dibromoindigo. The octopus contains chemical component melanin which is responsible for brown color. The lac insects and a variety of bugs are the source of red color, carminic acid. The cow urine is yellow in color and has a chemical component magnesium euxanthate [4-8].

Table 3. List of colors obtained from organism-based sources

Source	**Chemical component**	**Color**
Bacillus	Zeaxanthin	Brown
Molluscs	6,6’-dibromoindigo	Tyrian purple
Octopus	Melanin	Brown
Lac insect	Carminic acid	Red
Cow urine	Magnesium euxanthate	Yellow

Natural colorants in Dying and staining of wooden toys

Staining is the process of applying color on the surface of wood whereas dying involves the absorption of color in the wood. The world famous channapatna wooden toys are colored using natural dyes. The toys are colored with natural lac resin [8]. Hence these toys are called lac-ware toys. It is non -toxic and completely safe for children. The vibrant yellow colors are made with haldi. The extracts of cinnamon, tea, coffee, tobacco, nut husks, herbs etc in vinegar and steel wool gives bright colors which are used in staining and dying wooden articles.[7,8] Beewax and almond oil is used for polishing. As an alternative these natural colorants can be added even during the preparation of plastic toys.

Conclusion

Nature-based colors are alternatives to synthetic colors. Both water soluble and lipid soluble colors can be obtained from plants. Mineral based colors are good choice for colors of yellow, white and red. Even organism based colors provides colors ranging from brown to purple.

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