Essay: Plant pigment

July 28, 2019 by Essay Sauce

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Have you ever thought of what makes your lollipop blue? Do you know where all these colors come from? Many of the dyes we use in foods come from plant pigments. Plant pigment is a protein molecule that reflects a certain color of light from the sun. Many products take these pigments and compose them into dyes for use in food. Through a process called Chromatography, plant pigments can be mixes together to create one unique color only the eye can see. To extract these colors from plant pigments for dyes, various processes can be used.

According to Boonsong, Laohakunjit, & Kerdchoechuen (2010), the main idea about this subject is to detect the presence of pigments and polyphenols (colorants) in herbal plants using ultraviolet-visible spectrophotometry and HPLC for use in synthetic hair coloring products. Natural pigments and colorants are non-toxic and safe to the environment. For maximum development, plant material may be grounded in a blender and help a room temperature. To achieve complete pigment extraction, filter residue twice with the extraction solution. Methanol gives the highest percentage yield of pigments and polyphenols (colorants) when used to extract pigment. This occurs because pigments and polyphenol compounds such as flavonoids and non-flavonoids are soluble in methanol. In conclusion Boonsong, Laohakunjit, and Kerdchoechuen say methanol is the most effective solution for the extraction of natural pigments and polyphenol due to its solubility in water (Boonsong, et. al, 2015).

Another idea, by Downham & Collins (1999), is that that color suppliers constantly strive to improve technical and physical properties of their spectrum to improve the stability and meet demands on the functional additives used within color formulations. It is estimated that up to 70% of plants not fully investigated and only 0.5% exhaustively studied. Concerning anthocyanin based pigments, black carrots are a good source for its stability to heat light and SO2. To achieve stable colors from red cabbage anthocyanin, pink required a low pH, purple at pH 5-6, and blue at pH 7-8. Chemical structure and exposed environment determine the stability of plant pigments. Chlorophyll is a useful source of plant pigments because it seems to have potential agains environmental and dietary mutagens. In conclusion, Downham and Collins say that although of the many advances in food coloring, there will be more development in the field of developing stable dye colorants (Downham & Collins, 1999).

A third set of writers Tunic, Tanasi, & Aksu (2008) say there are potential uses for cotton plant wastes–stalk (CS) and hull (CH)–as sorbents for the removal of Remazol Black B (RB5), a vinyl sulfone type reactive dye. To remove pollutants from waste waters, adsorption is one of the best methods. In the case of reactive dyes, they are usually azo-based chromophores combined with reactive groups of a sort. The composed materials of cotton wastes are lignin, cellulose, and hemicellulose. Initial pH, dye, and temperature have use in RB5 reactive dye absorbents. The test solutions containing required dye was obtained by dissolving weighed quantity of RB5 dye in 1l of double-distilled water. The third set of authors conclude that for both sorbents adsorption at lower pH enhanced the efficiency of adsorption process, the effect of temperature on adsorption capacity was negligible and equilibrium uptake increased (Tunic, et. al, 2008).
A fourth source, Boo, Hwang, Bae, Park, Heo, & Gorinstein (2012) states that Antioxidant activities, total polyphenols and flavonoids, and antimicrobial effects in some plant pigments were determined in order to use these natural materials for cosmetics. According to pH, Anthocyanins can appear from red to blue colors. Polyphenol substances that are widely present in plants are known to play an important role for antioxidant effects and defense action in the plant or the human body. To show the formation of copigmentation complexes, color intensity occurs in addition of a variety of phenolic acids. Other strains do not compare to the higher value of antimicrobial activities of P. mirabilis and S. typhymurium. In plant pigment, the capacity of antioxidants showed high in onion peel, red cabbage, mulberry, paprika, and grape peel. This set of authors conclude that the pigments derived from natural plants had high biological activities, and exhibited different properties depending on each kind of pigments (Boo, et. al, 2012).

Another idea from Rebeiz and Castelfranco (1970) is that A crude homogenate obtained from greening cucumber cotyledons in tris-sucrose,is able to incorporate 4-4C-6-aminolevulinic acid into chlorophyll a and b in the presence of oxygen. Chloroform may be purified by rinsing it twice with H2O and drying it over hydrous sodium sulfate just before use. In the conducted experiment, C-chlorophyll a was separated from C-protochlorophyolide by chromatography in a dark room. This is due to etiolated cotyledons still subject to a lag phase of chlorophyll a and b biosynthesis in light. Two phases occurred during the chromatography process, one is that a deep green phase with C-chlorophyll a took place, and a pale yellow-green phase with C-chlorophyll b followed. Chromatography on Silica Gel H purified the C-chlorophyll a from other C-porphyrins. These authors conclude that when the homogenates are prepared from cotyledons illuminated for four and one-half hours, both C-chlorophyll a and b are produced (Rebeiz & Castelfrano, 1970).
To conclude the research, it was discovered that the best way to extract plant pigment, a molecule in plants that reflects certain color of light, is using methanol and filter paper. This allows the dye to be used in the

process of making food. To allow color to be mixed and used together, Chromatography many be used. This allows unique colors to be produced that attract to the masses in the food industry market. In all, the various colors if food may come from plant pigment dyes extracted using various processes.

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