



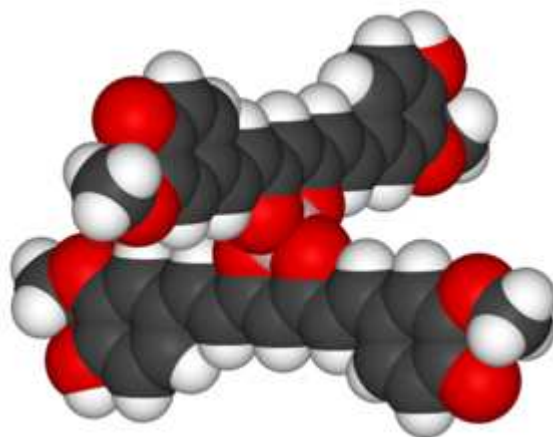
# VKR TEX - Tutorials

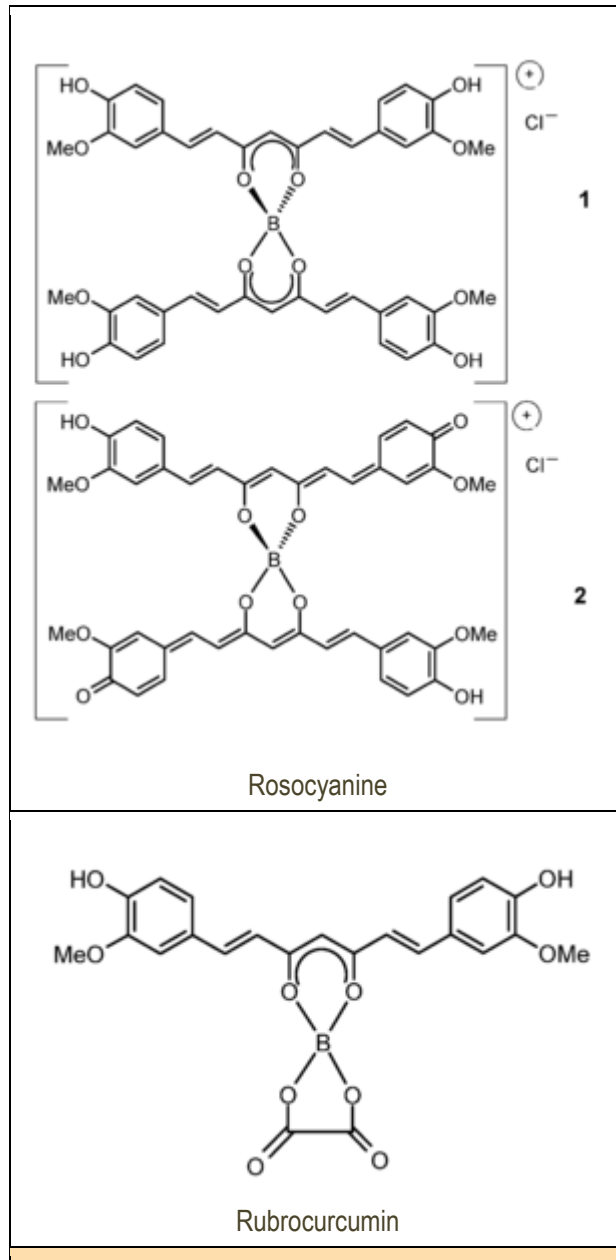
Manufacture of All Kinds of Auto loom Fabrics and Natural Dye Fabrics.

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## Rosocyanine

Structural formulae





- Rosocyanine**  
 and  
 Rubrocurcumin  
 are two red  
 colored  
 materials, which  
 are formed by the  
 reaction between  
 curcumin and  
 borates.

## Application

The color reaction between borates and curcumin is used within the spectrophotometrical determination and quantification of boron present in food or materials. Curcumin is a yellow coloring natural pigment, found in the root stocks of some *Curcuma* species, especially in *Curcuma longa* (cf. turmeric) in concentrations up to 3 %. In the so called curcumin method for boron quantification it serves as reaction partner for boric acid. The reaction is very sensitive and also smallest quantities of boron can be detected. The maximum absorbance at 540 nm for rosocyanine is used in this colorimetric method. The formation of rosocyanine depends on the reaction conditions. The reaction is carried out preferentially in acidic solutions containing hydrochloric or sulfuric acid. The color reaction also takes place under different conditions, but in alkaline solution however gradual decomposition is observed. The reaction might be disturbed at higher pH values, interfering with other compounds.

Rosocyanine is formed as 2 : 1-complex from curcumin and boric acid in acidic solutions. Curcumin possesses a 1,3-diketone structure and can therefore be considered as a chelating agent. The formed boron complexes are called dioxaborines (here a 1,3,2-dioxaborine). The structural formula **1** given for rosocyanine (a cationic dicurcuminatoboron complex, here written with chloride as counter ion) is idealized. Investigations on the structure show that the positive charge is distributed all over the molecule, and therefore a structure as indicated in formula **2** rather describes the molecule condition. In rosocyanin the two curcumin molecules halves are not plain within the same level, but are twisted against each other. The same applies to rubrocurcumin.

In order to exclude the disturbing presence of other materials during the boron quantification using the curcumin method, a variant was developed. 2,2-Dimethyl-1,3-hexanediol or 2-ethyl-1,3-hexanediol are added, in addition to curcumin, to a neutral solution of the boron-containing solution. The formed complex between boron and the 1,3-hexanediol derivate, is removed from the aqueous solution by extraction in an organic solvent. After acidifying the organic phase, rubrocyanine is formed, which could be measured by colorimetric methods. The reaction of curcumin with borates in presence of oxalic acid therefore produces the coloring material rubrocurcumin.

## Characteristics

Rosocyanine - [sum formula  $[B(C_{21}H_{19}O_6)_2]Cl$ , here given as chloride] - is a dark-green colored solid with glossy-metallic shine, forming red colored solutions. In water and some organic solvents it is almost insoluble, in ethanol it is very slightly soluble (up to 0.01%), but in pyridine, sulfuric acid and acetic acid a clearly better solubility is observed (approx. 1%). An alcoholic solution of rosocyanine temporarily turns deeply blue on treatment with alkali.

In rubrocurcumin one molecule curcumin is replaced with oxalic acid. Rubrocurcumin produces a similar red colored solution.

Rosocyanine is build from ions, while rubrocurcumin is a neutrally charged composition.