

A Study of the Natural Dyes Destructive Oxidizing

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For all dyes, independent of their structures and properties, in sufficiently long or strong lighting in the presence of oxygen, there is a photo-reaction, or irreversible destructive oxidizing. With this reaction fading of pointed stuff is connected. The aim of this work is the investigation of the kinetics of fading for a number of the natural dyes under the influence of light of different wavelength.

It is considered that the fading of dyes can occur at high speed under the influence of UV radiation. However, studying the kinetics of fading of samples of the natural dyes that are under, for a long period of time, the irradiation of different wavelengths showed that this process is very effective also at the IR irradiation. In conditions of dark fading – by turning off the light – intensive fading of the irradiated sample from the IR light continues for some time. The spectrum of absorption also changes as well as colour indexes of the dye. Therefore, fading in this case may be caused by oxidation under the influence of light and thermodestruction so that the last is the prevailing mechanism of fading and it may be quickened by transformation of light energy into the energy of thermal action. Dark fading, which continues by long living active radicals, is also a confirmation of this assumption. For joint UV irradiation with bearer (cellulose and polyvinylalcohol) action the destruction is decelerated.

Analysis of the spectral dependence of fading allows us to make a more important conclusion: the rules of Grotgouse about fading of painted stuffs happens more under the influence of additional colour that are not applicable in the case of natural dyes. No conformations according to this problem were found. The kinetics of fading such complicated compositions of solutions of the natural dyes does not follow any dependence. Light-firmness is strongly dependent on concentration of hydrogenous ions of a medium where destructive fading takes place. Light-firmness is higher in acids, and lower in alkalis. In these cases different groups may be affected because COOH groups are ionized in acid and in alkali groups. Natural dyes of the antocyane NH group are very sensible to the acid. On the speed of the fading nature of bearer renders specific influence besides the bearer itself can participate in photochemical processes. For example, for hard pellicle that form from dyes solution there is a proportionality of speed of the fading versus time, in that time interval where dye solutions display retreat from this dependence. The fact that fading of painted pellicle in some cases has greater value is explained by the influence of molecules of bearer on photochemical processes and its destruction. These processes take place only in irradiating by UV light. This means that short UV radiation affects not only the molecules of dye, but also the molecules of the bearer directly.