

Interaction of *D*-glucose with the *p*-amino benzoic acid in the presence of copper(II) ions in aqueous-ethanolic media

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Abstract

By the absorption spectroscopy method of the ultraviolet and visible range with application of an infrared spectrometry the interaction of *D*-glucose with *p*-aminobenzoic acid in acidic aqueous-ethanolic media in the presence of ions of copper(II) have been studied. On the base of the reactive systems electronic spectra analysis rise of browning intensity with the copper ion concentration increase in the range from 20 to 100 mg/l is marked; at concentration of metal about 20 mg/l and below acceleration of amino-carbonyl interactions is not observed. The mechanism of Cu(II) ions influence on carbohydrate-amines interaction rate based on the assumption of formed *N*-glycosylamines coordination with copper ions by the vicinal donor nitrogen and oxygen atoms on the initial stages of processes with the subsequent enaminol complexes oxidation to form the colored products is discussed. In view of retardation of accepted aglycones containing *N*-glycosylamines isomerization in the studied conditions, the copper ions coordination and the subsequent oxidative decomposition is assumed for glycosyl-amine structural form. Absence of melanoidin formation at the long-lived thermostating of the solutions containing the initial carbohydrate and copper ions only confirms the assumption of participation in reaction of amino conjugates is shown, and immediate oxidation of glucose by copper ions in experimental conditions is almost suppressed. Arrangement and character of bands in FTIR spectra of solid products isolated from the reaction systems show the nature of interaction constant and independent of a copper ion concentration, and the abundance in system of carbohydrate derivatives acyclic forms presumably is the factor determining kinetic limitation of reaction by a stage of enaminol formation in acidic media. Realization of process in the presence of metals and substances, capable to chelation, does not show acceleration carbohydrate-amine interactions: the studied reaction system heating in the presence of catalytic quantities of EDTA shows the results similar to behavior of the carbohydrate-amine systems that also demonstrates participation of copper(II) ions in the limiting initial stages, at the same time the mechanism of latest stages of oxidation processes is not clear in detail.

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