

N-GLUCOSYLATION OF PROTEINS

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We have determined certain parameters of the Maillard reaction between bovine serum albumin (BSA) and D [^{14}C] glucose. The reaction has an induction period that is reduced with a rise in temperature. The induction period is followed by a protracted period during which the increase of BSA radioactivity is almost linear with time. The rate of reaction is influenced more by the reaction temperature than by the molar ratio of the reacting components. Fig. 1 shows that at the temperature of 25 °C and an equivalent ratio of BSA - glucose 1:1, the labeled carbon of glucose actually is not included in the structure of BSA during the first 500 hours of incubation (curve 1). An increase in concentration of glucose (equivalent ratio of BSA - glucose 1:5) notably intensifies due to this irreversible inclusion (curve 2); however, an inclusion degree in both cases is rather low. A rise in temperature of a reaction mixture up to 45 °C considerably intensifies the process of irreversible linkage (curves 3 and 4). At 65 °C the intensity of process sharply increases, even in a case of equivalent ratio 1:1 of reagents (curve 5). Consequently, the rate of Maillard reaction is influenced more by the reaction temperature than by the molar ratio of reacting components.

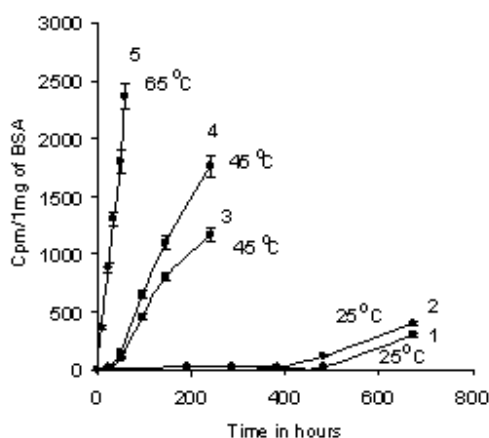


Figure 1. Effect of temperature and equivalent ratio of reagents on rate of irreversible inclusion of ^{14}C in BSA
1, 3, 5 - Equivalent ratio of BSA - glucose 1:1
2, 4 - Equivalent ratio of BSA - glucose 1:5

The reaction is intensified by an increase of basicity of the reaction medium. After a certain period of time, the moment of saturation occurs, and BSA does not bind more glucose in spite of the fact that BSA contains a sufficient amount of free amino groups for the linkage of glucose. As a result of blocking free amino groups (acetylation), BSA loses the ability to bind glucose.