

Kinetics of Conversion of Cow Milk and Soy Milk Curd to Gels by Fermentation Process at Acid pH

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Abstract

Dairy chemistry emphasises the gelation of milk proteins that is the crucial step in curd manufacture. Casein micelles are the primary building blocks of casein-based gels; that are held together by hydrophobic interactions and salt bridges. In the present paper formation of milk gels are discussed with emphasis on water holding property of the gel formed. With the decreasing pH of milk, the casein micelles present in normal milk will undergo change in shape, size and alter physical properties of the system. The physical properties of probiotic curd gels prepared with addition of different ratios of lactic acid bacteria have been compared with water holding capacity at five different temperatures ranging from 33 °C to 43 °C. Water holding capacity initially at 37 °C gradually decreases with the increase of fermentation time. The kinetics of gradual formation of curd from milk with increase of fermentation time has been found to be of the first order. The rate constant K of water holding capacity of the gel is found to increase with temperature. From the linear plot of K against 1/T, the energy of activation for gel formation for different systems has been evaluated according to the Arrhenius equation. This indicates that the mechanism of curd gel formation by reduction of water holding capacity is indeed similar in character for different systems. The change of activation of free energy for the reaction of curd production has been evaluated by using Arrhenius Eyring equations for absolute rates that are found to contain enthalpies and entropies for activation of each reaction under different systems.

Keywords: Activation Energy and Mechanism of Gel Formation, Casein Micelle, Gelation Kinetics, Probiotic Curd, Water Holding Capacity