The Prediction of Shelf-life on Pasteurized Red Ginseng Beverage

Wu-Seon Kim¹, Myung-Sub Chung², Yong-Soo Kim¹, Tae-Eun Chang³

¹Department of Food Industry, Korea Health Industry Development Institute, Osong Health Technology Administration Complex, 187 Osongsaengmyeong2(i)-ro, Osong-eup, Cheongwon-gun, Chungcheongbuk-do, South Korea, 363-700
²Department of Food Science and Technology, Chung-Ang University, 72-1 Naeri, Ansung, Gyeonggi-do, South Korea, 456-756
³Department of Food Lab., Safety R&D Center, SGS Korea Co., Ltd. #322, The O Valley Bldg. 555-9, Hogye-dong, Dongan-gu Anyang, Gyeonggi-do, South Korea 431-080

This study was carried out to determine the optimum shelf life of pasteurized red ginseng beverage by an accelerated storage test. For accurate estimation, the difference in shelf-life by actual storage temperature which was obtained by checking duration time in actual storage step (manufacture, logistics, distribution, consumption) was investigated.

The experiment was carried out on three batches of pasteurized red ginseng beverage in a glass bottle. They were stored in constant temperature chambers at 10°C, 25°C and 37°C for 45 days with 4°C as a control. Then, pH, acidity, total bacteria counts, Coliforms and sensory test (duo-trio test) was conducted at every 5 days. To predict the shelf life of all data, Arrhenius Equation was used. Total bacteria counts and coliforms were not detected during the storage period. The minimum answers (24 persons) which are necessary to conclude that there is difference during the storage period was not reached in a sensory test either. In other words, no difference was observed compared to the initial sample. As acidity decreased by 0.04, 0.07 and 0.30 at 10°C, 25°C and 37°C respectively, the reaction rate constant (K) ranged from -0.0065 to -0.0008. In pH, on the contrary, no correlations were observed between the reaction rate constant(K) and temperature($R^2<0.8$). Therefore, it was excluded in inducing the correlations between reaction rate constant (K) and temperature (T). Therefore, the equation obtained from the result of the acidity test ($y=-64701x+15.614(R^2=0.8978)$) has been used to predict a shelf life. When theoretical room temperature (25°C) was added, the shelf-life was 409 days. When actual storage temperature (25.5-26.0°C) was added, however, the shelf-life was 397 days.

In conclusion, a quality index which is appropriate to set the shelf life for red ginseng beverage was acidity. Because about 3% of temperature difference existed between theoretical room temperature and actual storage temperatures, it is necessary to generalize a model for actual storage temperature to set an accurate shelf-life.