Study of Critical Operation Variables on Concentration Juice by Vacuum Evaporation

陳儒儀、王維麒

E-mail: 9318505@mail.dyu.edu.tw

ABSTRACT

The research is concentrated on the effect of using vacuum concentration to extract juice. Various factors contributing to influencing the quality of the product, for example, the colors, the value of pH, the Brix, vitamin C and the aroma, are used to match with the sensory evaluations in order to compare with juice from fresh fruit. Oranges and pineapples are used to extract for fresh juice at 32℃ or 35℃ for concentration. The vacuum chamber is kept at 25 mmHg or 30 mmHg. The juice becomes 1/3 or 1/4 of its original physical volume. Water is added to the fresh juice to return to the original form. The result showed that after being processed the color of oranges and pineapples becomes lighter than fresh juice. Yellow also becomes lighter in color. Through out the process of processing, color changes because of oxygenation. The best condition to preserve the products were at 35℃、30 mmHg. The Brix was obviously reduced due to sugar dissolution. The Brix was best maintained at 32℃、25 mmHg. In addition, concentration processing caused the loss and oxygenation of the organic acid, causing pH value to increase. It changed trend the same with vitamin C, showing they contained certain relation. Vitamin C remained at highest level in 32℃、25 mmHg. The aroma also evaporated less in this condition. Obviously, under the high temperature and low vacuum processing, all readings at the quality subsided. Data of physical properties all went down. Data of sensory evaluation showed that orange juice in C3225-3c had the closest reading to their original physical properties. Pineapple juice C3225-3c and C3225-3b had the closest reading to their original physical properties. They both have been the consumer ’ s favorite. The concentration condition C3225 in physical properties showed that it has best efficiency with concentration juice in low temperature, high vacuum and short time also increase product quality. Key words: vacuum concentration, concentrate juice.

Keywords : vacuum concentration ; concentrate juice

Table of Contents

REFERENCES

1. 王家仁（1975）鳳梨皮汁濃縮之研究。食品科學 2（2）:100-101。 2. 王豐洲（1978）談果（菜）之內外銷。食品工業 10（7）:7-12。 3. 王德男；朱添進；洪清煌（1992）果樹。地景企業股份有限公司出版部。 4. 王正方；王惠珠；李嘉展；孫芳明；陳政雄；劉世銓；駱錫能；韓建國；蘇正德（2001）新編食品化學。華格那企業，台中。 5. 方祖達；趙先文；溫紹功（1991）加工製程對百香果濃縮果汁品質之影響。中國園藝 37（4）:226-236。 6. 左瀅妮；許明仁；吳瑞碧（1995）使用聚醯氨膜逆滲透濃縮技術製造高品質還原番茄汁品質之研究。食品科學 22（5）:505-513。 7. 史宏財（1994）仙草凝膠物質之萃取及其凝膠性質之研究。桃園區農業改良場研究報告

（16）:1-9。 8. 史宏財（1994）仙草膠熱可逆性質之探討及其於商業上生產之應用。桃園區農業改良場研究報告 (21):20-27。 9. 史宏財；許明仁（1998）濃縮仙草汁加工之研究。桃園區農業改良場研究報告第33號（8）:1-8。 10. 余哲仁（1985）利用超過濾及減壓蒸發法濃縮百香果汁之研究。海洋大學食品科技研究所碩士論文。基隆。 11. 李錦楓（1971）果汁的濃縮。工業簡訊 1（6）:27-30。 12. 李金星（1984）百香果汁的加工及濃縮。食品工業 15（12）:29-36。 13. 李彥希（1984）蕃石榴澄清果汁加工之初步探討及其香味研究。中國文化大學實業計劃（農學組）研究所碩士論文。台北。 14. 沈葆彭（1986）經濟果樹（上）。財團法人豐年社附設出版部。 15. 邱應模（1991）台灣自然觀察圖鑑（15）台灣的水果。渡假出版社有限公司。 16. 徐惠民（1978）濃縮果汁。食品工業 8（10）:23-27。 17. 徐進財（1988）實用食品加工手冊。復文書局。 18. 許千堯（1972）濃縮果汁。食品工業 4（2）:7-8。 19. 陳肅霖（1974）百香果汁濃縮過程中香味回收與黏度降低之研究。台灣大學食品科技研究所碩士論文。台北。 20. 陳自珍（1983）蔬菜與水果商品之製造。復文書局。 21. 陳清泉、林欣榮、陳素月、曾淑滿、程竹青（1990）柳橙果汁熱加工條件之探討。食品工業發展研究所研究報告。 22. 陳美玲（1988）以模式系統探討混濁番石榴果汁酵素性褐變機制。台灣大學食品科技研究所碩士論文。台北。 23. 陳雅珠（1996）淺談濃縮課程理論。資優教育 58:23-28。 24. 康有德（1992）水果與果樹。黎明文化事業公司。 25. 彭秋妹、王家仁（1991）食品官能檢查手冊。食品工業發展研究所。 26. 黃正財（1978）從品質方面探討果汁製造技術發展之動向。 食品工業 10（7）:16-20。 27. 黃錦城（1992）最新果汁飲料加工技術。長達印刷有限公司。 28. 張炳揚（1978）食品在濃縮和乾燥過程中香氣之回收和保留。食品工業 8（9）:16-23。 29. 溫紹功；方祖達；許明仁（1992）梅汁加工之研究（5）:蒸發濃縮對梅汁品質的影響。食品科學 19（2）:177-187。 30. 劉素娥（1990）以不同的分離法所得百香果揮發性成分之比較。香料資訊 2（2）:34-36。 31. 廖貴燈；吳碧鏗（1978）鳳梨、桶柑及梅子濃縮果汁之製造研究。食品工業 10（7）:23-28。 32. 廖貴燈；吳碧鏗（1978）柑桔果汁品質改進之研究。食品工業 10（7）:29-35。 33. 趙先文（1991）百香果濃縮與香氣回收之研究。台灣大學園藝學研究所碩士論文。台北。 34. 鄭怡琳（1995）果汁中抗壞血酸及單寧類化合物相互作用造成褐變之研究。台灣大學食品科技研究所碩士論文。台北。 35. 賴滋漢；金安兒（1991）食品加工學 製品篇。精華出版社。 36. 謝錦堂（1986）番石榴濃縮果汁之香味品質及香氣回收。中國文化大學家政學研究所碩士論文。台北。 37. 蘇秦法（1992）真空濃縮及殺菌貯藏條件對蕃茄汁品質之影響。台灣大學食品科技研究所碩士論文。台北。 38. Anonymous, （1983） Reverse osmosis ready for juice. Food Eng. Feb:106. 39. Ashoor, S.H. and Zent, J.B. （1984） Maillard browning of common amino acids and sugars . J. Food Sci. 49 : 1206. 40. Boyko, A.L., Morgan, M.E. and Libbey, L.M. （1978）Porous polymer trapping for GC-MS analysis of vegetable flavors. Academic Press. P.57. 41. Beveridge, T. and Harrison, J.E. （1984）. Nonenzymatic browning in pear juice concentrate at elevated temperatures. J. Food Sci. 49 : 1335. 42. Chan, H.T. and Kwok, S.C.M. （1975）Identification and determination of sugars in some tropical fruit products. J. Food Sic. 40:419-420. 43. Chan, H.T. and Caraletto, C.G. （1982） Effects of deaeration and storage temperature on quality of asepically packaged guava puree. J. Food Sic. 51:165. 44. Dirinck, P., Schreyen, L. and Schamp, N. （1977）Aroma quality evaluation of tomatoes, apples and strawberries. J. Agric. Food Chem. 25（4）:759. 45. Deshpande, S.S., Bolin, H.R., and Salunkhe, D.K. （1982） Freeze concentration of fruit juices. Food Tech. May : 68-82. 46. Del Pilar Buera, M., Chirife, J., Resnik, S.L. and Lozano, R.D. （1987）. Nonenzymatic browning in liquide model systems of high water activity : Kinetics of color changes due to caramelization of various single sugars. J. Food Sci. 52 : 1059. 47. Freed M.: L-ascrobic acid. In “ Methods of vitamin Assay, ” 3rd. Edited by the Association of Vitamin Chemists, Inc., Interscience Publishers, New York. p.287-344（1966）. 48. Farmer, J.W., Hume, A. and Burt. J.K. （1973） Review of isolation and concentration technique. Chem. Ind. 279. In progress in flavoe research. Applied Science Publisher, England. 49. Handwerk, R.L. and Coleman, R.L. （1988） Approaches to the citrus browning problem. J. Agri. Food Chem.36:231-236. 50. Jennings, W.G. and Filsoof, M.（1977）Comparison of sample preparation techniques for gas chromatographic analysis. J. Agric. Food Chem. 25（3）:220. 51. Jennings, W.G. and Shimamoto, T. （1980）Qualitative analysis of flavor fragrance volatiles by glass capillary gas chromatography. Academic Press, New York. 52. Klein B.P. and Perry A.K.: Ascrobic acid and vitamin A activity in selected vegetables from different geographical areas of the united states. J. Food Sci. 47:941-945（1982）. 53. Kirk, D.E., Montgomery, M.W. and Kortekas, M.G. （1983） charification. J. Food Sci. 48 : 1663. 54. Mannheim, H.C. and Kopelman, J. （1964）a. Evaluation of two methods of tomato juice concentration. I. Heat-transfer coefficients. Food Technol. 18:117. 55. Nisperos-Carriedo, M.O. and Show, P.E. （1990） Comparision of volatile of flavor components in fresh and processed orange juices.J.Agric.Food Chem. 38:1048. 56. Reineccius, G.A. and Anandaraman, S. （1981）Innovative methods for isolating volatile flavor. Perfumer and Flavorist. 6:62. 57. Rosemary, A.C. （1980）The use of porous polymers for the collection of plant volatile. J. Sci. Food. Agric. 31:1242. 58. Simon, P.W., Lindsay, K.C. and Peterson, C.E. （1980）Analysis of carrot volatiles collected on porous polymer trap. J. Agric. Food Chem. 28:549. 59. Sheu, M.J. and Wiley, R.C. （1983）Preconcentraion of apple juice by reverse osmosis. J. Food Sci. 48 : 422-428. 60. Swafford, T.C. （1983） New concepts of juice concentration use centrifugation and membrane filtration. Food Eng. April : 153-154. 61. Vitzthum, O.G. and Werkhoff, P. （1978）Aroma analysis of coffee, tea and cocoa by headspace techniques. Academic Press. p.81. 62. Williams, A.A. and Tucknott, O.G.（1973）The selective extration of aroma components from alcoholic distillates. J. Sci. Food. Agric. 24:863. 63. Wyllie, S.G., Alves, S., Filsoof, M. and Jennings, w.G. （1978）In analysis of food and beverage-headspace techniques. Academic Press. p.1. 64. Wong, M. and Stanton, D. W. （1993）Effect of removal of amino acids and phenolic compounds on non-enzymic browning in stored kiwifruit juice concentrates. Lebensm-Wiss. U. Technol.26:138-144.