

Mineral partitioning in milk and milk permeates at high temperature

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Abstract

The soluble phase of milk was separated at 20 and 80°C using ultrafiltration. The resulting permeates were then subjected to further ultrafiltration and dialysis at close to these two temperatures. It was found that pH, Ca²⁺ and soluble Ca decreased as the separation temperature increased both in original UF permeates and in dialysates obtained from these permeates, but P decreased only slightly. The major reason for these changes was due to the precipitation of calcium phosphate/citrate complexes onto the casein micelle with concomitant release of H⁺. The pH of both permeates and dialysates from milk at 20°C were slightly higher than for milk. When UF permeates collected at 20 and 80°C, were each dialysed at both these temperatures, the dialysate collected at 80°C showed much less temperature dependence for pH and ionic calcium compared with that collected at 20°C. This is in contrast to milk, which shows considerable temperature dependence for pH and ionic calcium. Further experiments revealed that the pH and Ca²⁺ concentration of permeates showed high temperature dependence above the temperature at which they were separated, but a much lower temperature dependence below that temperature. These findings suggest that dialysis and UF of milk at high temperature provide the best means yet for estimating the pH and ionic calcium of milk at that temperature.

Keywords

Ultrafiltration;
Dialysis;
pH ionic calcium;
Soluble minerals