

Kinetics of Coffee Infusion – Rates and Diffusion Coefficients of Caffeine and Mineral Ion Infusion from Medium Roasted Coffees

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SUMMARY

The rates of infusion of caffeine, H_2PO_4^- , K^+ , Mg^{2+} and Mn^{2+} into Milli-Q-water were measured at 80°C. Five different types of medium roasted coffees; Special Kenya (Kenya), Santos (Brazil), Blue mountain Java (Sumatra-Dutch East Indies), Mocha (Ethiopia) and Zimbabwe (Zimbabwe) in the particle size range 1.70-2.00 mm were used in the investigation. The analytical techniques employed were HPLC and ICP-AES. Diffusion coefficients of caffeine and mineral ions were calculated in two separate ways using rate constants and half-lives of infusion. These were then compared with known diffusion coefficients of the same species in water for determination of hindrance factors. The hindrance factor for caffeine was found to be much smaller than the corresponding factors recorded at 25.5°C (Spiro et Chong, 1977). In general the hindrance factors in the bean were all in the order of 10. Indicating that the infusion of the various species through the coffee bean is a hindered process. This is because of the association of caffeine and mineral ions with other coffee soluble, and the physical restraints within the bean matrix. The equilibrium concentration of the different species was found to be independent of the various coffees.