MICROWAVE-ASSISTED DECOMPOSITION OF PROTEIN- AND FATH-RICH SAMPLES UNDER MILD ACIDIC CONDITIONS

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The effect of acid concentration and power in the decomposition of protein- and fat-rich bovine-derived samples has been investigated. The work proposes a decomposition under mild acidic conditions and low acid consumption. The procedure efficiency was evaluated by the residual carbon content determined by inductively coupled plasma optical emission spectrometry with radial view configuration (ICP-OES). This approach reduces costs associated to the high purity nitric acid necessary in these processes, and yet provides more desirable work conditions due to the lower acid vapours emission in the environment. It also decreases the time to cool down the reaction vessels after sample digestion. Materials containing high amounts of protein or fat are, in general, of difficult dissolution and are usually decomposed under high acid concentration. Studies were conducted employing 2 mL of 1, 2, 3, 4, 5, 7 or 14 mol L^{-1} nitric acid and 1 mL of 30 % (v/v) hydrogen peroxide in a closed vessel microwave oven. The control of temperature and power in each reaction vessel allowed a more efficient monitoring of the digestion process. In addition, after the completion of decomposition, the digestates were cooled down inside the microwave cavity to temperatures below 50 °C, followed by dilution to 10-mL. In this system, the resulting digestates do not need extensive dilution before introduction by pneumatic nebulization into the ICP-OES. The dependence of power and acid concentration on sample decomposition efficiency were also demonstrated through reaction curve plots. Viscera presented the highest fat content (~ 70 %) and the lowest protein contents in contrast with blood, which contains high crude protein contents of up to 99 %. In accordance to previous work[1], the difficulty in efficiently decompose these samples seems to be related to the fat content present and showed no significant variation under different acid concentration for protein-rich samples. Remaining carbon in blood samples were around 11 % for different acid concentrations use. However, eventhough lower acid concentrations decomposed viscera, their residual carbon contents decreased by increasing the acid concentration. Furthermore,

[1] E. N. V. M. Carrilho, A. R. A. Nogueira, J. A. Nóbrega, G. B. Souza, G. M. Cruz, Fresenius J. Anal. Chem., 371, 536 (2001).