

EVALUATION OF THE MICROWAVE-UV RADIATION IN THE DECOMPOSITION OF MILK

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Microwave focused oven with an open-cavity have appeared to improve the conventional decomposition procedure using a digester block. However, at atmospheric pressure, a great amount of acid is necessary for complete decomposition of the sample, resulting in solutions with elevates acid concentration. Within the strategies to reduce acid concentration, the use of UV lamps activated by microwaves (MWL) was evaluated as an alternative for the organic samples preparation.

Procedures for the decomposition of milk samples in a focused-microwave oven (Star 6, CEM), with and without the use of MWLs were evaluated. An inductively coupled plasma optical emission spectrometer ICP OES (Vista, Varian) was used for traces metals and the residual carbon content (RCC) determination. The RCC had been used in systematic experiments, to choose sample mass, decomposition temperature, internal standard, and volume and sequence addition of the oxidation agents. After optimization, the obtained decomposition procedure presented in Table 1 was proposed.

Table 1 – Basic program for decomposition of the samples.

Stage	Reagent 1	Aliquot (mL)	Reagent 2	Aliquot (mL)	Ramp Time (min)	Temperature (°C)
Pre-digestion	Peroxide	3	Sulfuric	1	-	-
1	Nitric	3	Peroxide	3	2	160
2 – 5	Peroxide	3	None	None	1	160

The procedures using MWL showed improvement in the decomposition efficiency of about 5%, resulting in overall digestion efficiencies of $95 \pm 2\%$ relating with RCC in the different kinds of commercial milk. The amount of Ba, Ca, Cd, Co, Cr, Li, Mg, Mn, In, Ni, V and Zn in the digestates had been corrected with thallium as internal standard. The procedure was validated with a reference certified material (Whole Milk Powder-NIST 8435). With the use this procedure, it was possible digested milk samples (RCC $\leq 5\%$) with reduced acid concentration. In view of the shape of the digestion flasks, the MWL had small contact with the solution, which reduce their potential efficiency.

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