

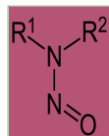
# DO RUBBER NETTINGS CONTRIBUTE TO HAM MEAT CONTAMINATION BY N-NITROSAMINES?



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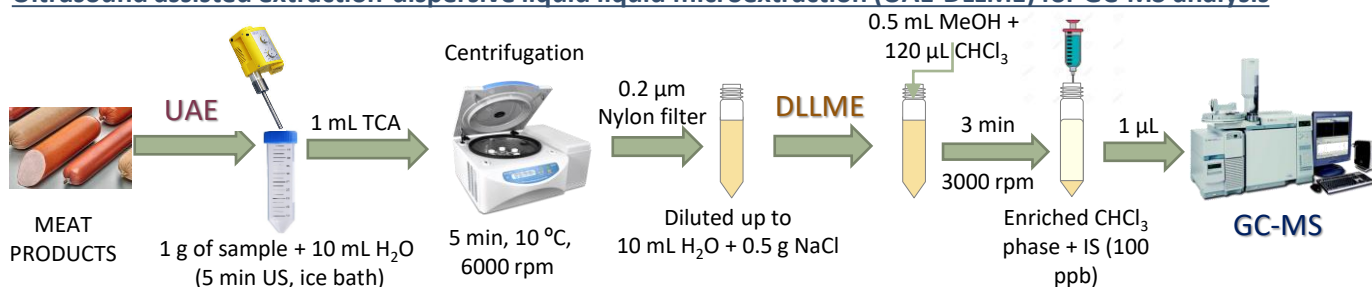
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**INTRODUCTION AND OBJECTIVES:** Nitrosamines (NAs), which are catalogued as carcinogenic compounds by the International Agency for Research on Cancer, may be present in meat products, due to the conversion of nitrites (used as preservatives) into NAs and as a result of migration from the materials that come into contact with the product such as packaging papers, waxed containers and, especially, rubber nettings. This work evaluates the effect of elastic rubber nettings on the contents of twelve NAs in ham meat samples. Moreover, the effect of temperature on NA levels in the samples was evaluated.

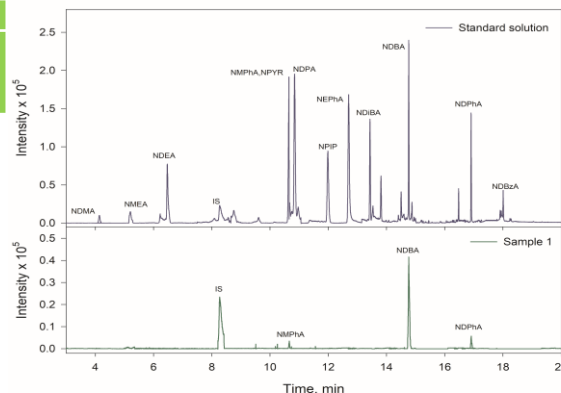
## Ultrasound assisted extraction-dispersive liquid liquid microextraction (UAE-DLLME) for GC-MS analysis



### Analytical characteristics of the UAE-DLLME-GC-MS method

Compound	$t_R$ , min	LOQ, ng g <sup>-1</sup>	LOD, ng g <sup>-1</sup>	RSD <sup>a</sup> , %
N-nitrosodimethylamine (NDMA)	4.13	4.4	1.3	5.2 (6.9)
N-nitrosoethylmethylamine (NEMA)	5.23	2.2	0.67	4.3 (5.4)
N-nitrosodiethylamine (NDEA)	6.48	3.9	1.4	8.9 (10)
Octanone (IS)	8.27	-	-	-
N-nitrosomethylphenylamine (NMPPhA)	10.65	0.7	0.2	5.1 (6.5)
N-nitrosopyrrolidine (NPHYR)	10.67	1.5	0.5	4.6 (5.9)
N-nitrosodi-n-propylamine (NDPA)	10.85	0.9	0.3	9.2 (11)
N-nitrosopiperidine (NPIP)	11.99	1.4	0.42	9.7 (12)
N-nitrosoethylphenylamine (NEPhA)	12.70	0.8	0.24	6.0 (7.9)
N-nitrosodiisobutylamine (NDiBA)	13.43	1.6	0.48	6.2 (8.0)
N-nitrosodi-n-butylamine (NDBA)	14.76	0.5	0.15	8.8 (9.7)
N-nitrosodiphenylamine (NDPhA)	16.91	1.2	0.4	5.0 (6.4)
N-nitrosodibenzylamine (NDBzA)	18.01	4.6	1.4	4.0 (5.2)

<sup>a</sup>Interday analysis (n=21). Values in brackets refer to the analysis without IS



### MATRIX-MATCHED CALIBRATION

Significant differences between the slopes in the absence and in the presence of matrix

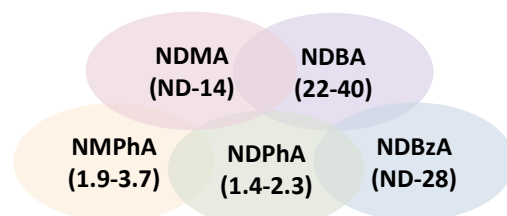
### Cooked ham samples

Sample number	Elastic rubber netting <sup>a</sup>	Meat	Additive
1	No	Pig	NATPRE
2	Prolan V-22	Pig	No
3	Prolan V-22	Pig	NATPRE
4	Prolan V-22	Pig	20 mg kg <sup>-1</sup> nitrite
5	Prolan V-22	Chicken	NATPRE
6	Prolan M-0	Pig	NATPRE
7	Prolan V-66	Pig	150 mg kg <sup>-1</sup> nitrite

<sup>a</sup>Polyamide/polyolefin composition with different permeability to oxygen and water vapour

**CONCLUSIONS:** An evaluation of the effect of elastic rubber nettings on the levels of twelve NAs in meat products established that there is no relationship between the elastic rubber netting used in the manufacturing process and the NAs content, since there were no differences between the levels found in the products made with several plastics or thread in the presence of additives.

### NAs found in the samples and concentration ranges (ng g<sup>-1</sup>)



No significant differences were detected between different portions in the same sample → **Signed rank test**

No significant differences between the content of each NA in different samples → **One-way ANOVA**

7 samples

NAs content in the presence of additives is independent of the plastic coating used