



Universidad
Zaragoza



Instituto Universitario de Investigación
en Ciencias Ambientales
de Aragón
Universidad Zaragoza

TREATMENT WITH KAOLIN SILVER COMPLEX (KAgC)

Identification of silver species in wines treated with KAgC

Francisco Laborda

Professor of Analytical Chemistry, University of Zaragoza

Eduardo Bolea

Assistant Professor of Analytical Chemistry, University of Zaragoza

Total silver content

Sample code	Sample description	KAgC treatment g L ⁻¹	Total Ag content mg L ⁻¹
43/11	Red wine; Merlot	0.1	< 0.010
45/11	Red wine; Merlot	1	< 0.010
23/11	Red wine; Tempranillo	1	< 0.010
84/11	White wine; Parellada	1	< 0.010
18/11	White wine; Chardonnay	1	0.013

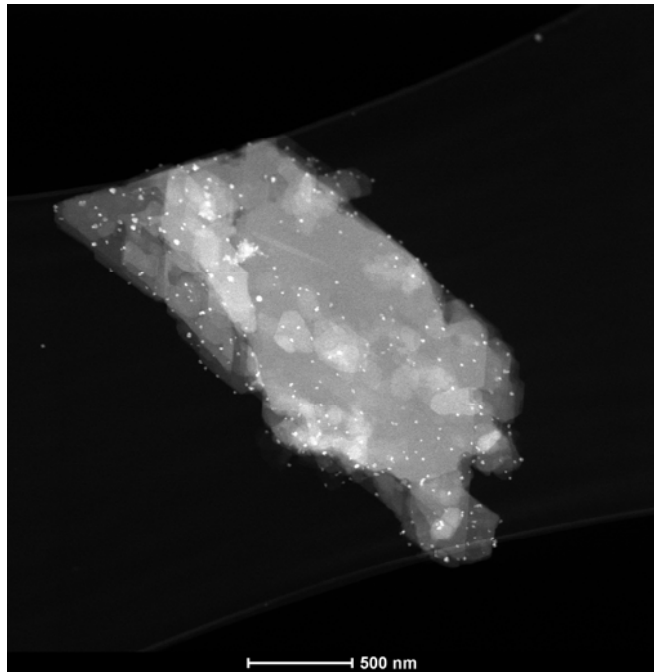
Wines from experiences carried out by INCAVI.

Samples analysed in the Food and Agricultural Laboratory of the Ministry of Agriculture, Food and Environment (MAGRAMA).

All values are below the maximum limit established by the OIV (0.1 mg Ag L⁻¹)

Silver species in wine

Potential species of silver in wines treated with KAgC



KAgC microparticles

wine



ionic Ag(I)



Ag(I) complexes



Ag(0) nanoparticles



aggregated nanoparticles

Identification of silver species

Asymmetrical Flow Field Flow Fractionation (AsFIFFF)

Continuous separation with respect to size/molecular mass of macromolecules (>5 kDa) and nanoparticles

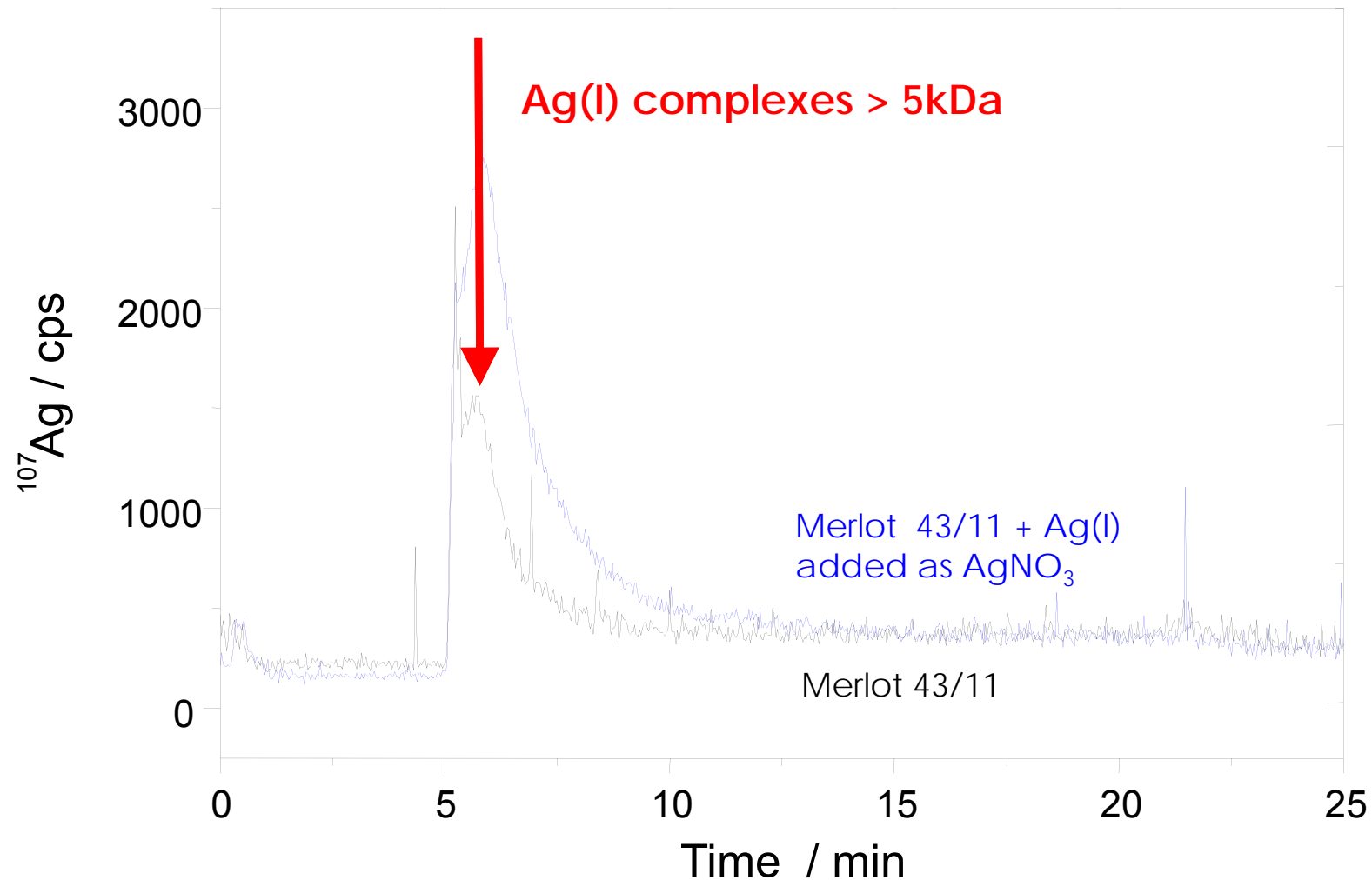


ICP-MS



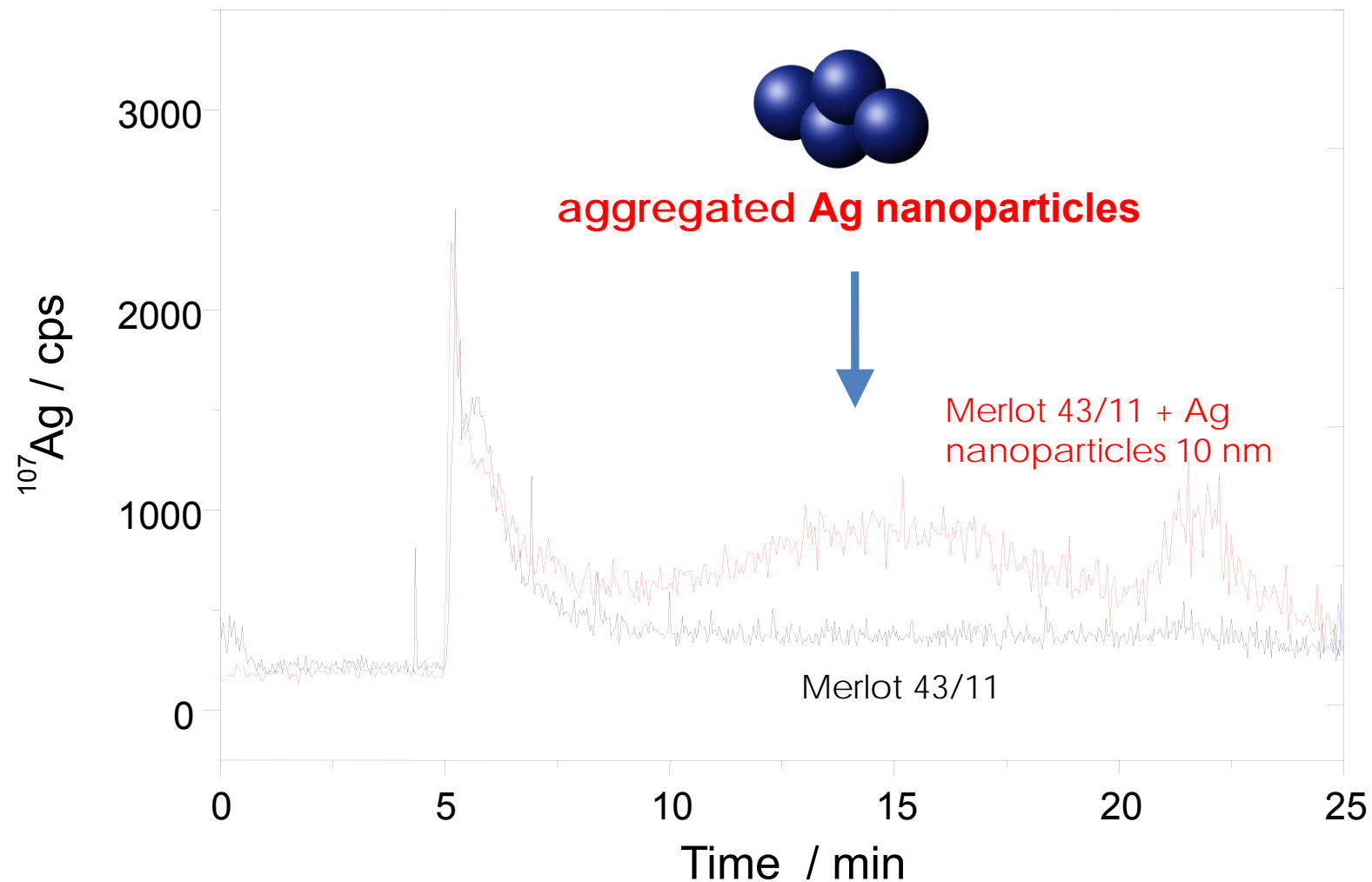
Results. Identification of silver forms

Fractogram of Merlot 43/11 and spiked with 0.05 mg L⁻¹ Ag(I)



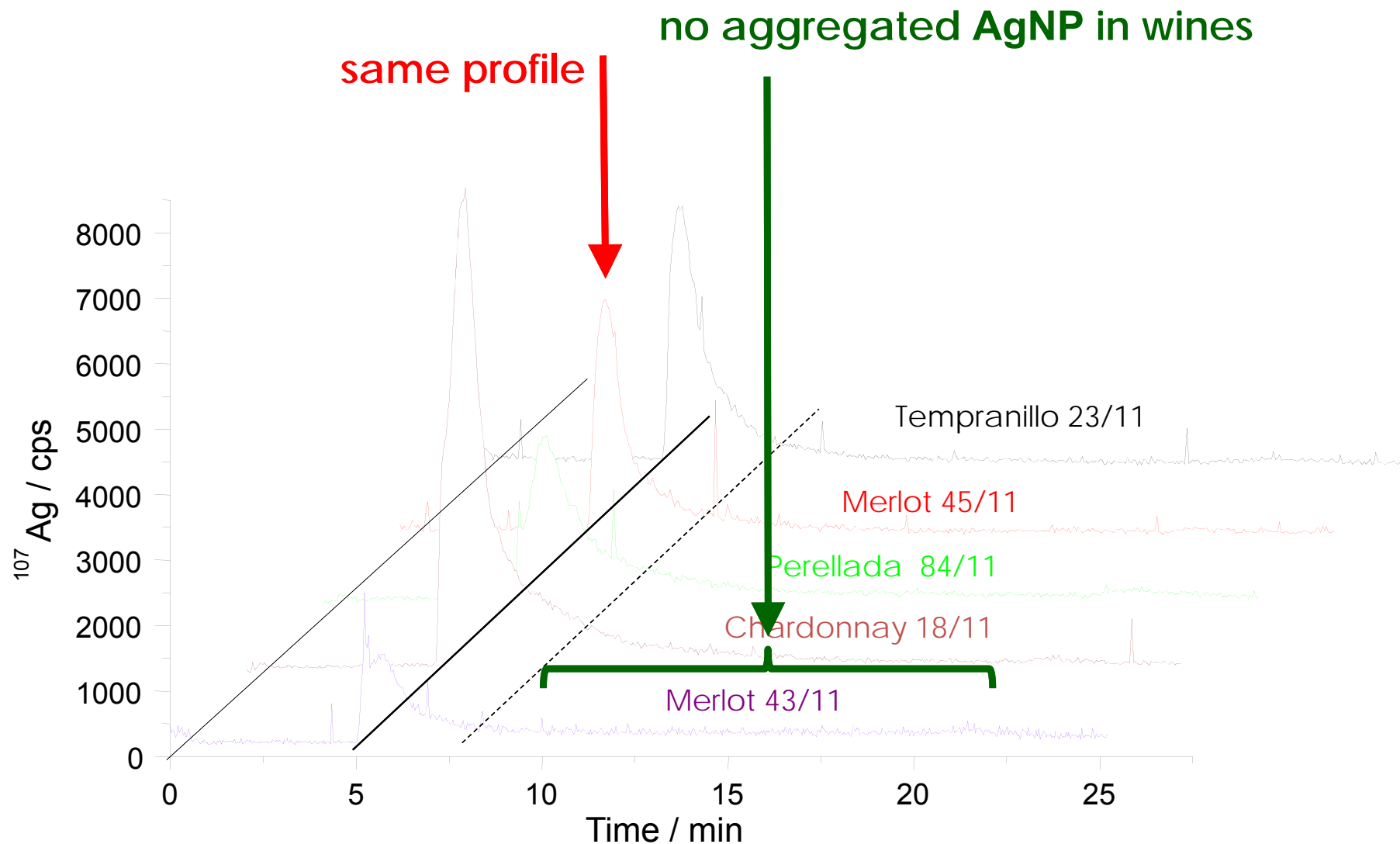
Results. Identification of silver forms

Fractogram of Merlot 43/11 and spiked with 10 nm Ag nanoparticles

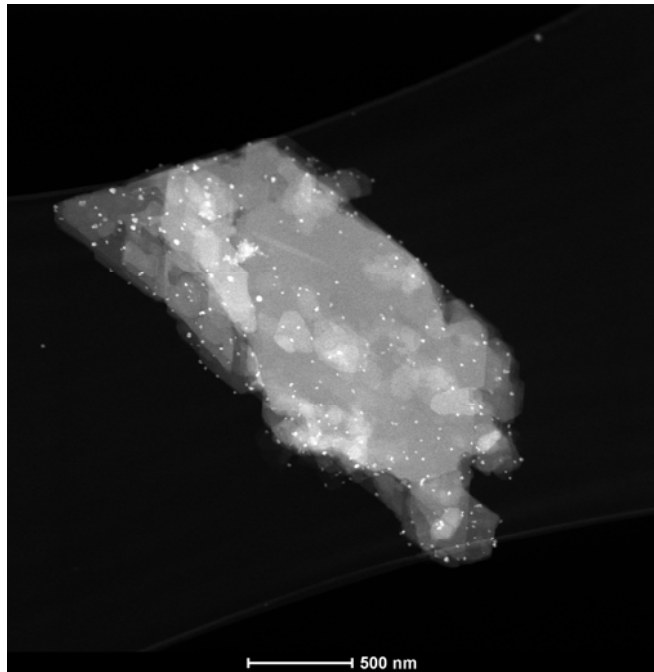


Results

Fractograms from wines treated with KAgC



Conclusion: Silver species in wine



KAgC microparticles

wine



ionic Ag(I)



Ag(I) complexes



Ag(0) nanoparticles



Aggregated nanoparticles

Potential Ag(I) complexes

thiol containing compounds

compound	log K' formation
thiol	
2-mercaptoethanol HOCH ₂ CH ₂ SH	13.2
cysteine HOOCCH(NH ₂)CH ₂ SH	11.9
amine	
methylamine CH ₃ NH ₂	3.06
carboxilic	
acetic acid CH ₃ COOH	0.73

Smith RM, Martell AE. 1997. NIST Critically Selected Stability Constants of Metal Complexes Database

