

Combined Ultrasound-Microwave extraction

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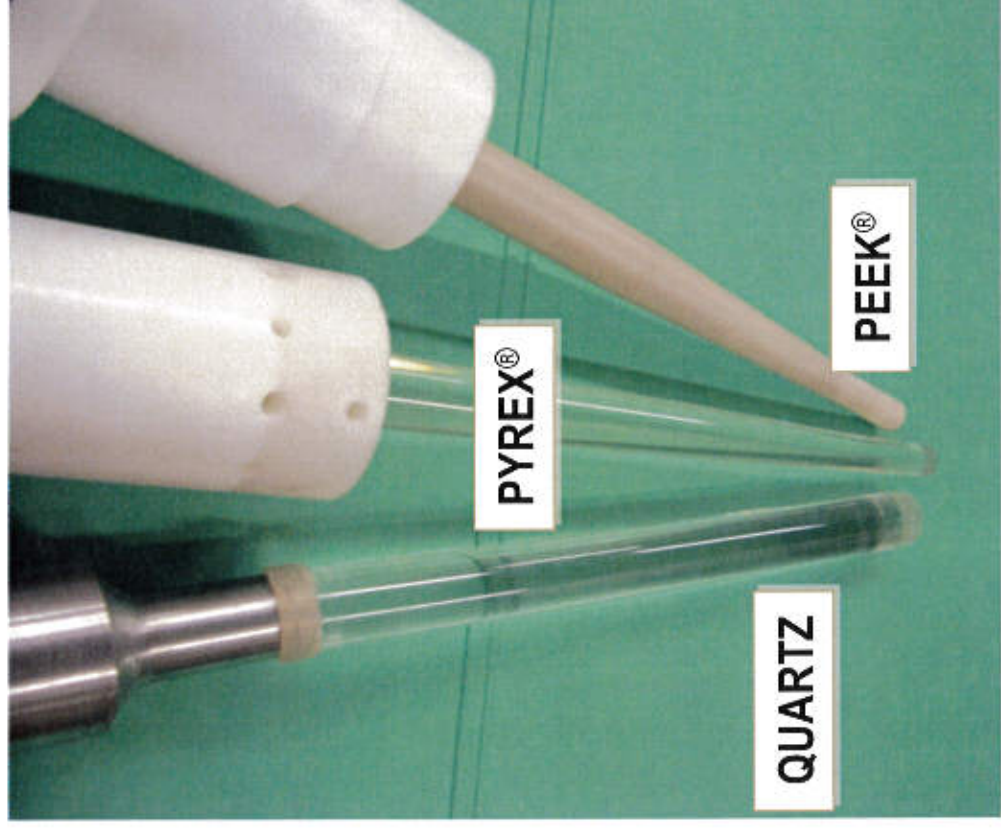
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RSC Publishing

CRITICAL REVIEW

Giuseppe Cavatito and Paolo Corio

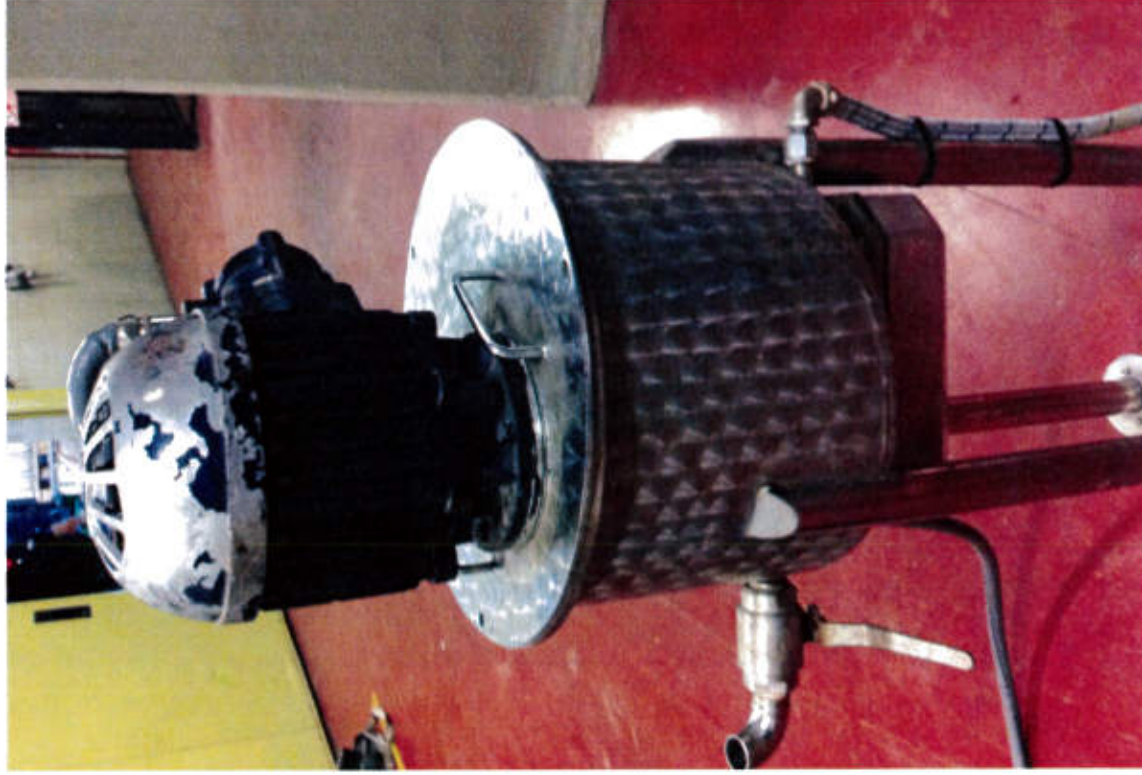
Power ultrasound in organic synthesis: moving conventional chemistry from academic to industrial and large-scale applications



CAVITATION MEASUREMENT



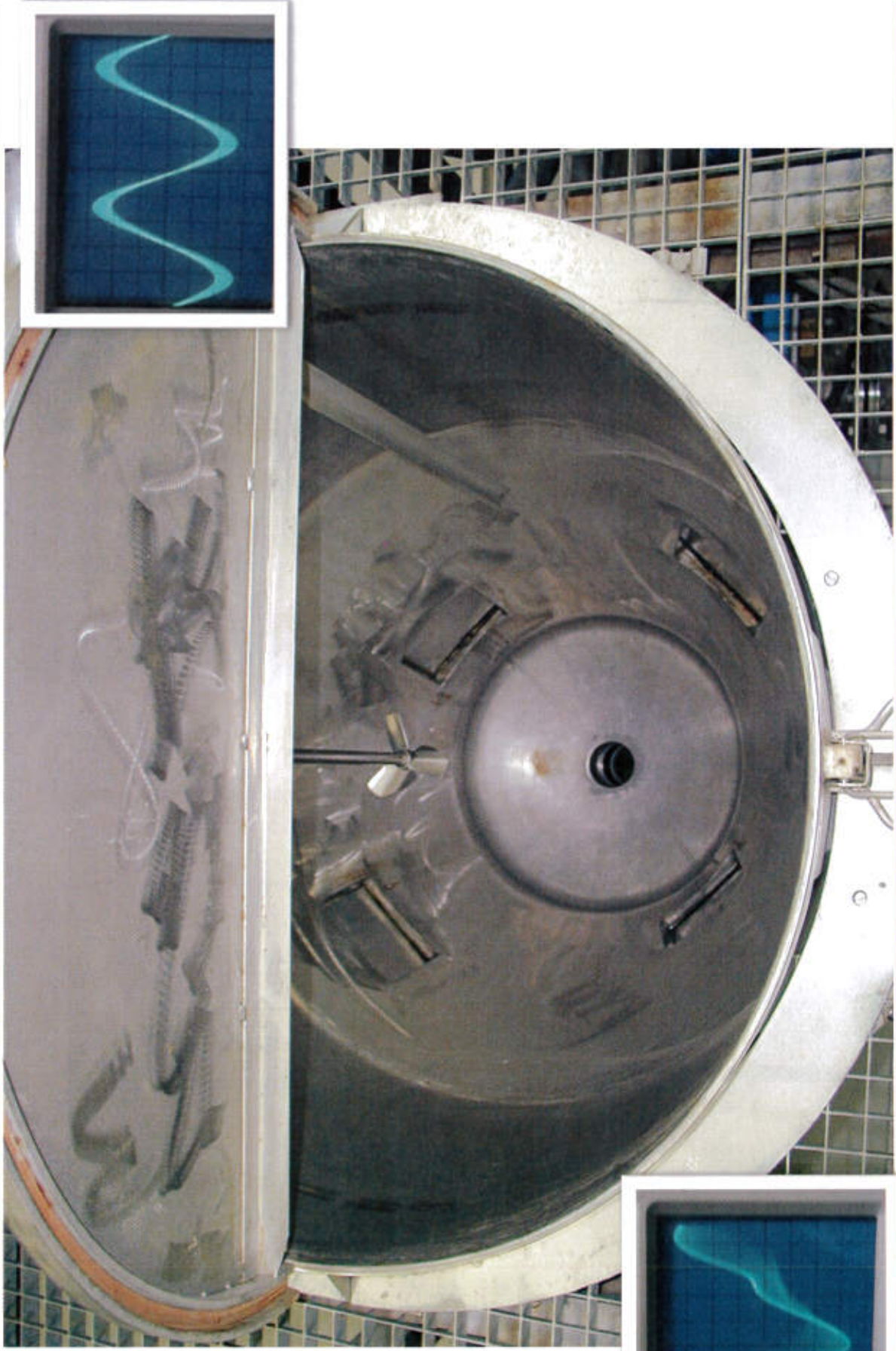
Ultrasound-assisted extraction (UAE)



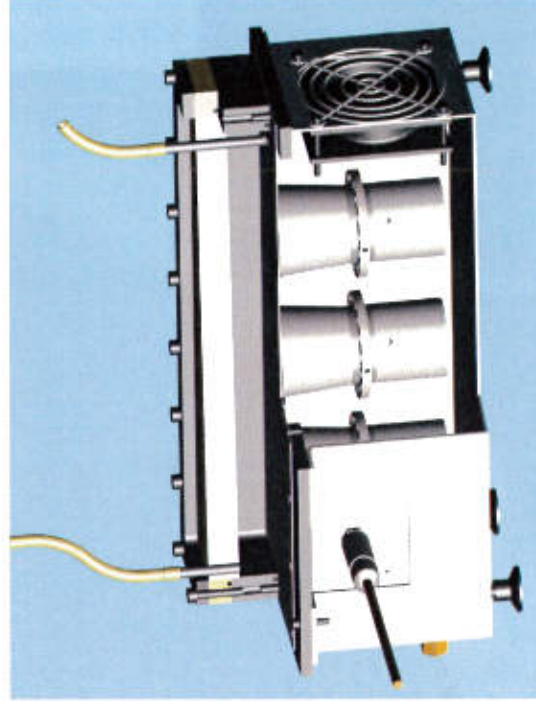
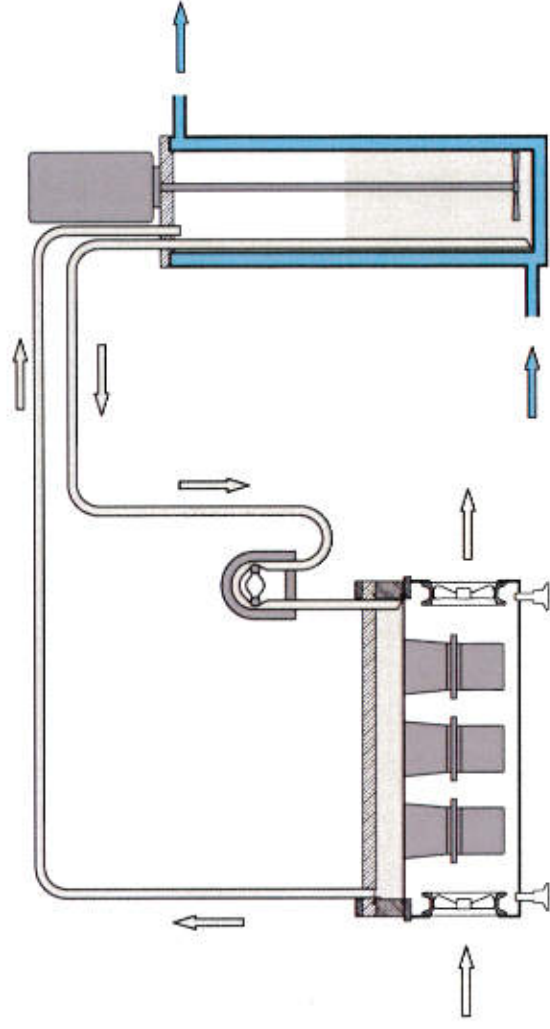
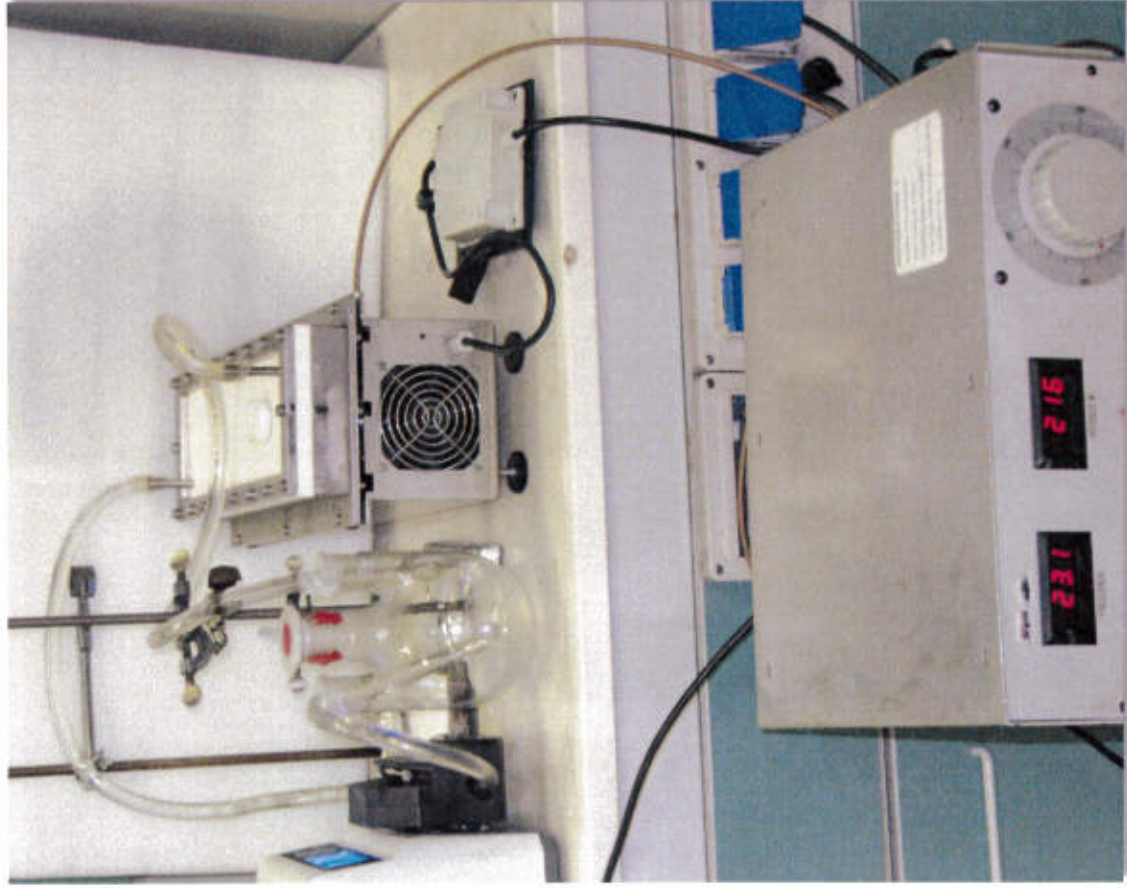
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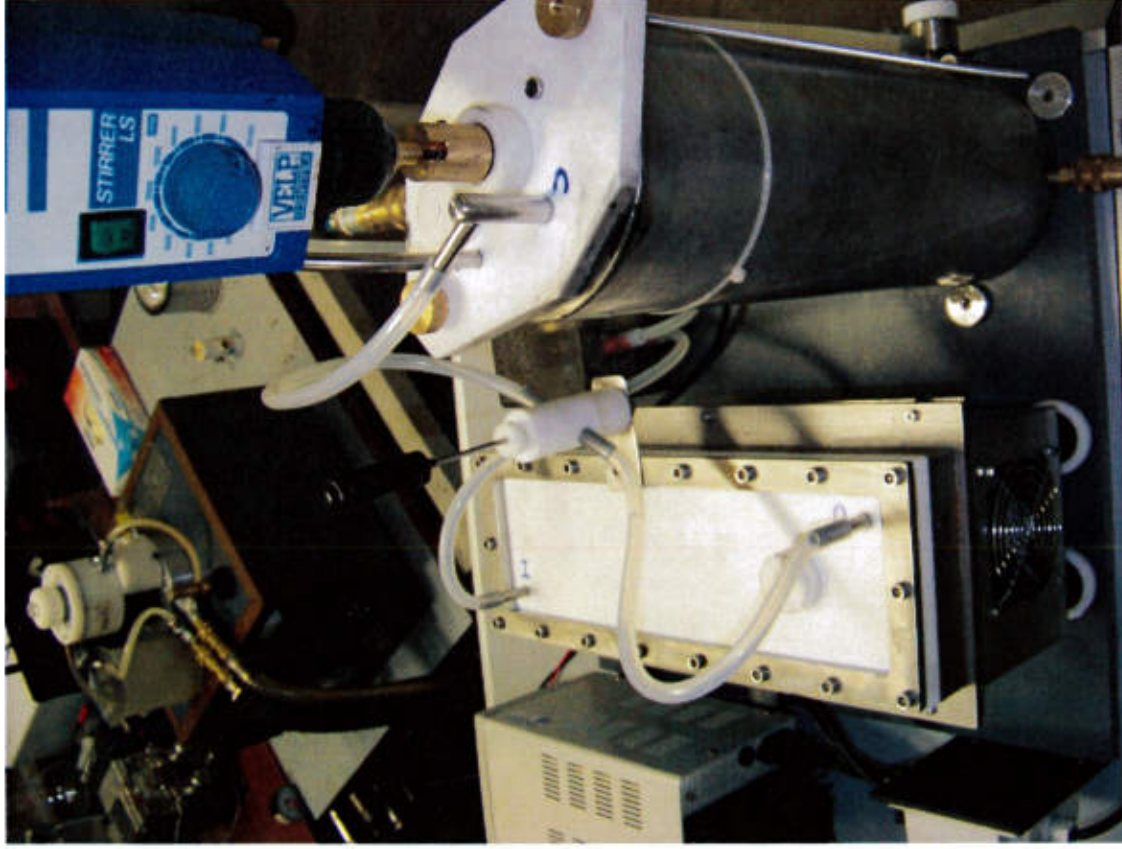
Ultrasound-assisted extraction (UAE)



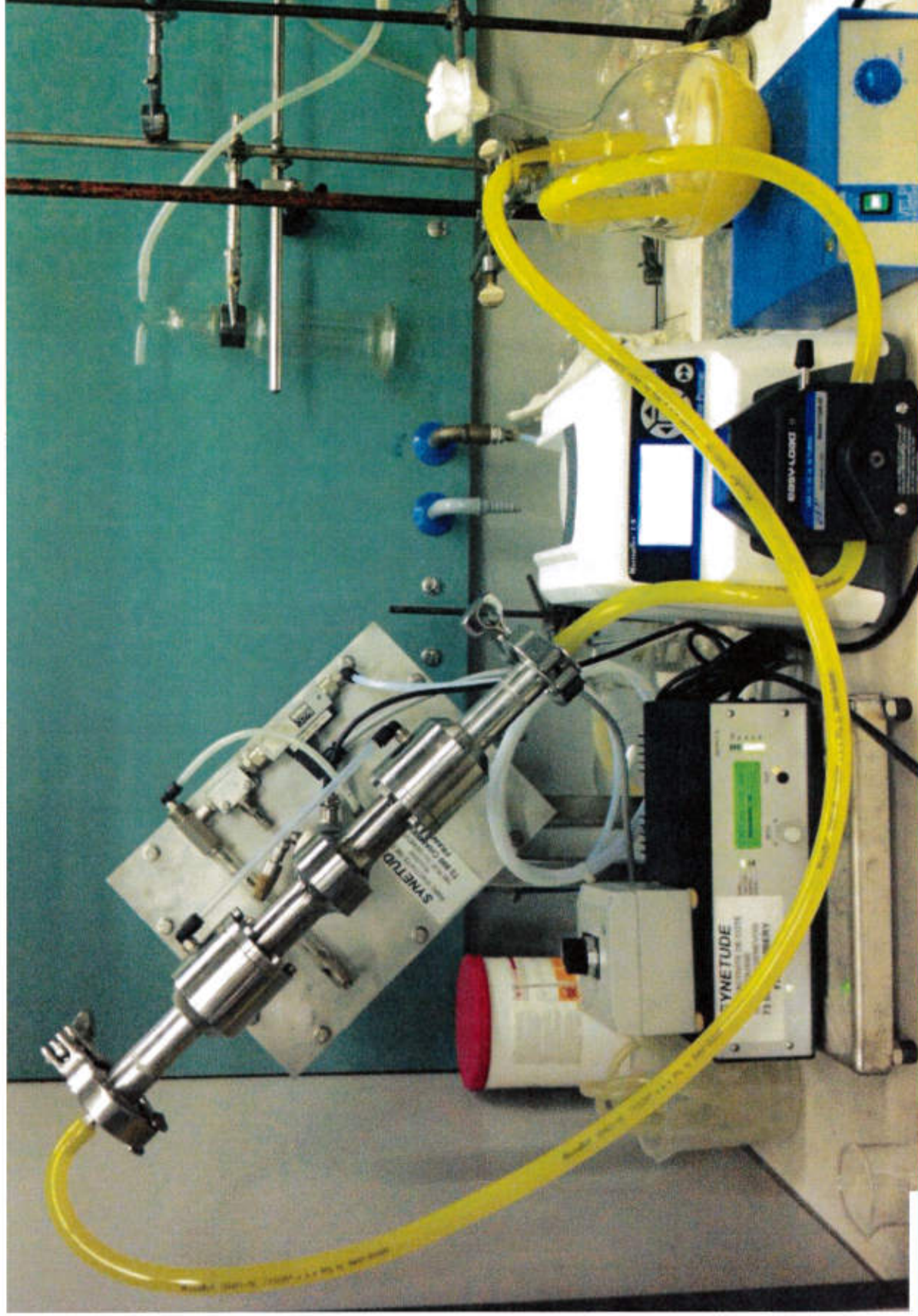
Flow-extraction in US reactors



Flow-extraction in US reactors



Flow-extraction in US reactors (SONOTUBE®)

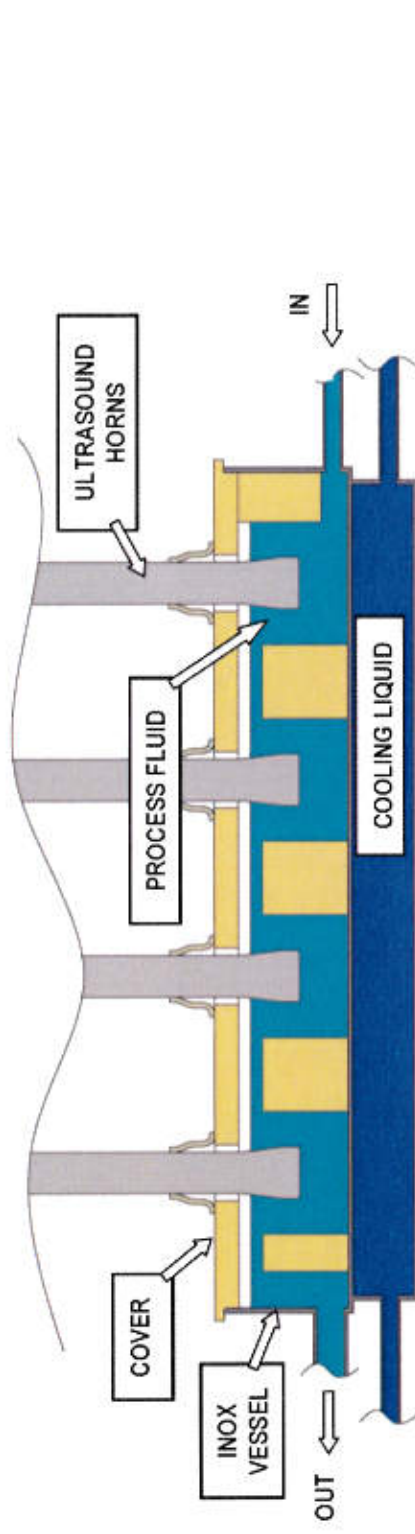


Green extraction techniques for high-quality natural products

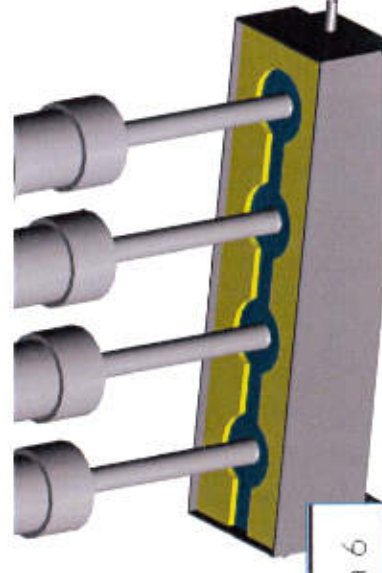
GIANCARLO CRAVOTTO*, ARIANNA BINELLO, LAURA ORIO
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University of Torino, Dipartimento di Scienza e Tecnologia del Farmaco
Via Giuria 9, Torino, 10125, Italy



Extraction techniques

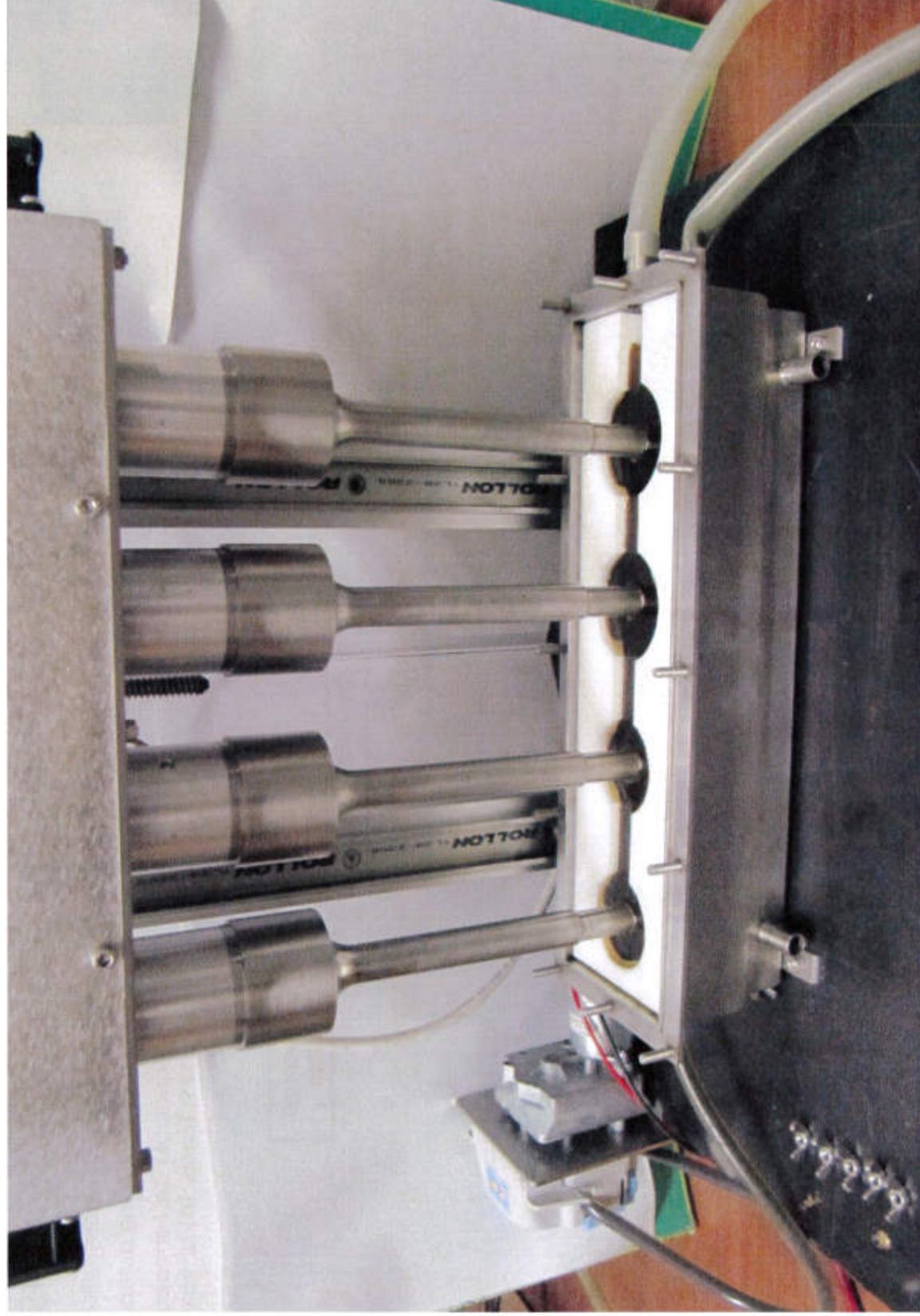


Green technologies
for the business
of the quality

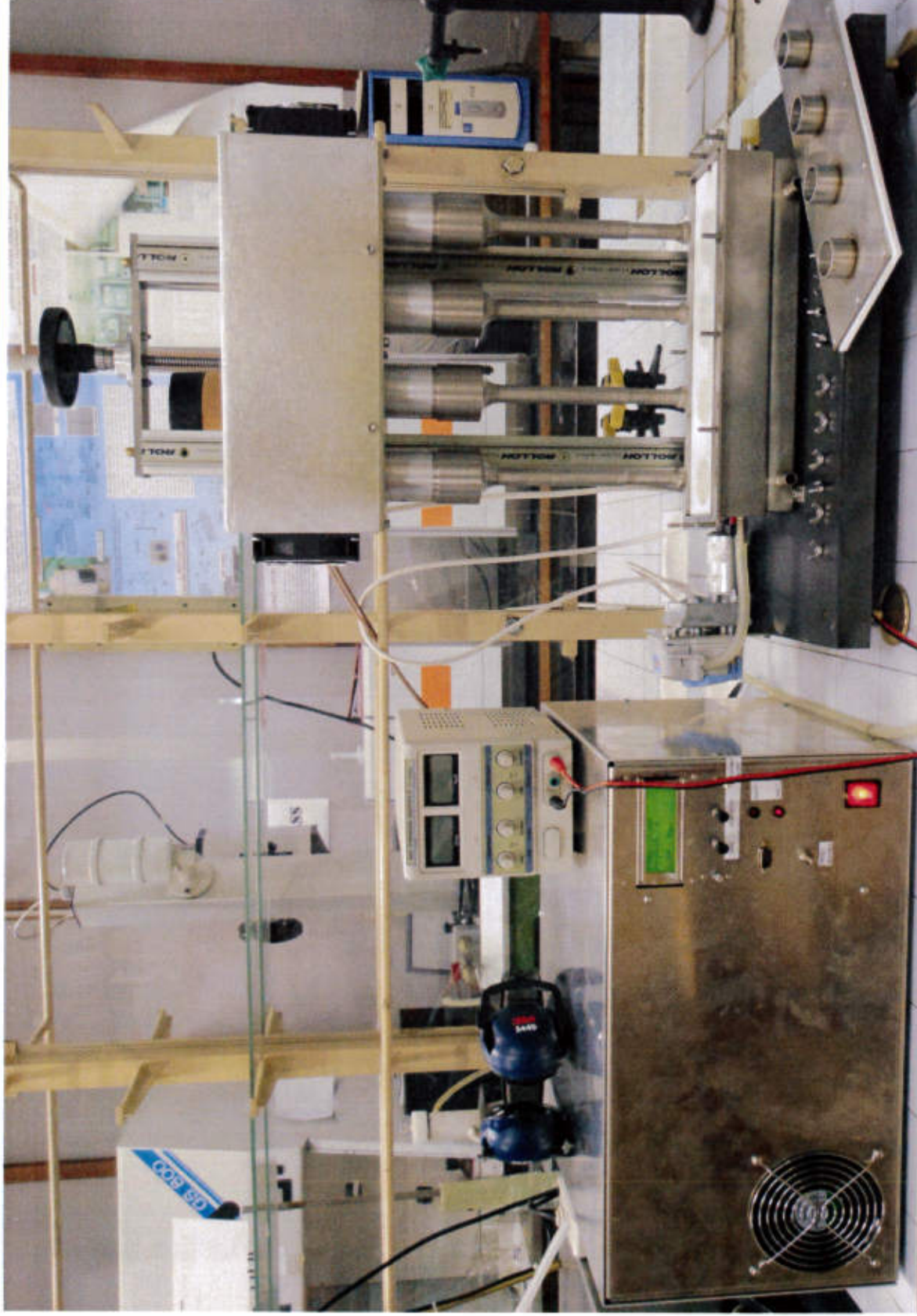


AgroFOOD industry hi-tech - November/December 2011 - vol 22 n 6

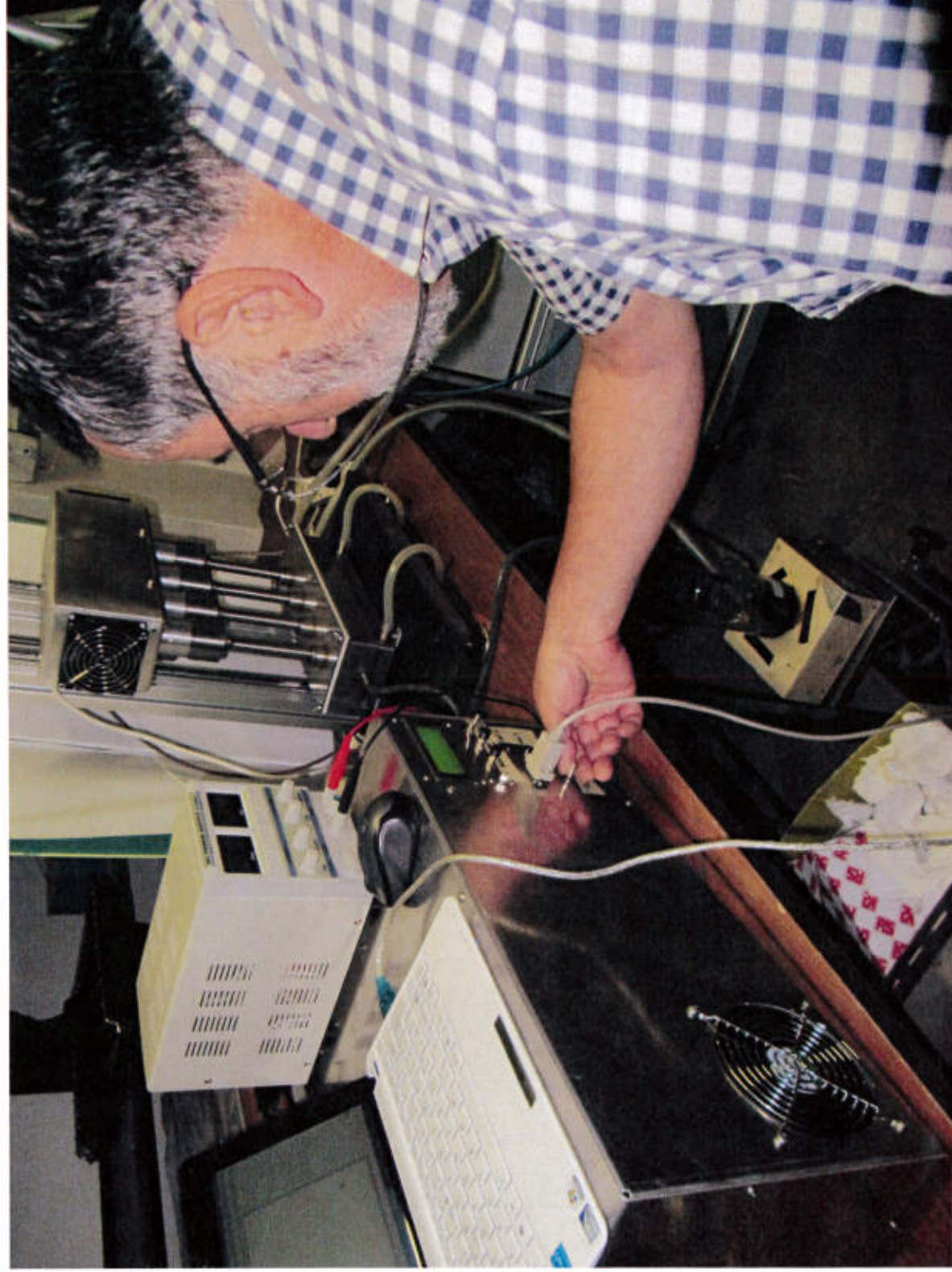
Flow-extraction in US reactors



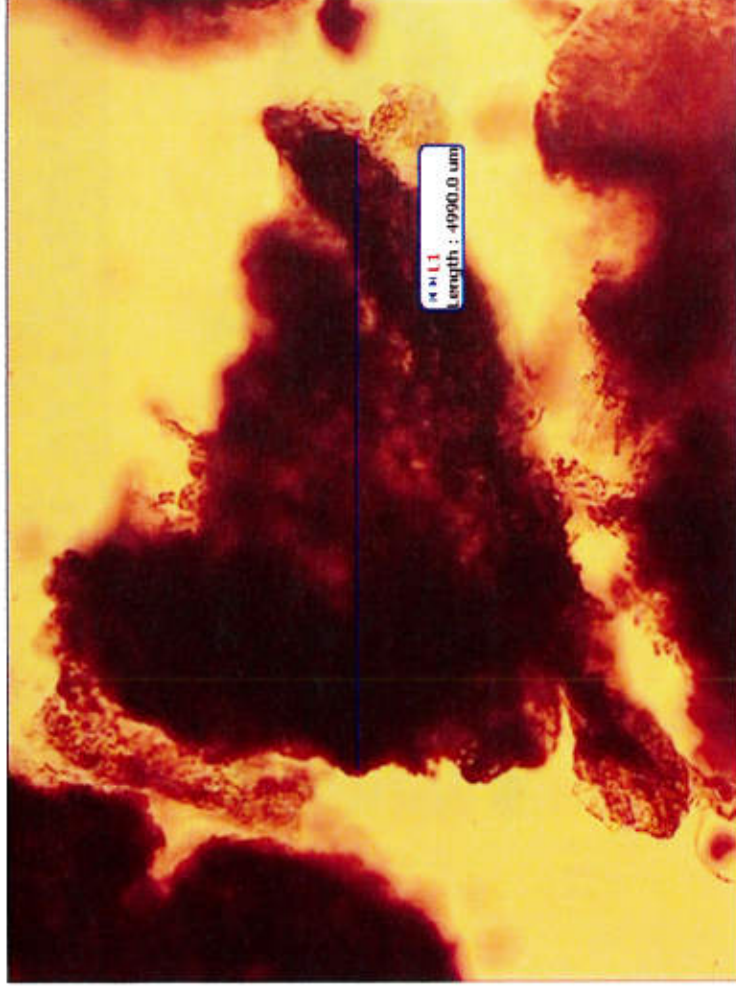
Flow-extraction in US reactors



Flow-extraction in US reactors



Flow-extraction in US reactors



61st International Congress and Annual Meeting
of the Society for Medicinal Plant
and Natural Product Research (GA)



September 1st - 5th, 2013
Münster, Germany

PN4

Green extraction techniques with highly efficient non-conventional reactors: a screening of secondary metabolites by LC-MS and GC-MS

Alexandra L¹, Binello A¹, Mantegna S¹, Chemat P², Cravotto G¹

¹University Of Turin, Faculty of Pharmacy, Turin (10125), Italy;

²Université d'Avignon et des Pays de Vaucluse, Avignon, France

TURBO-REACTORS “FLOW-PROCESS” EXTRACTION AND EVAPORATION



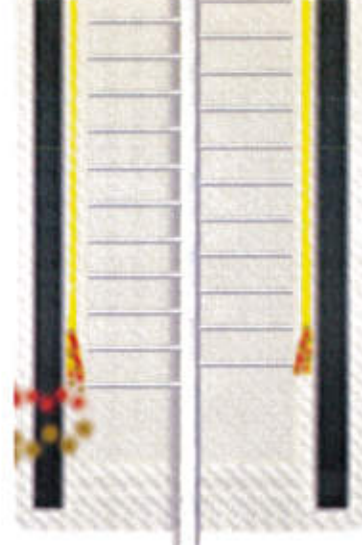
Simple and compact equipment:
maintenance free and energy saving.



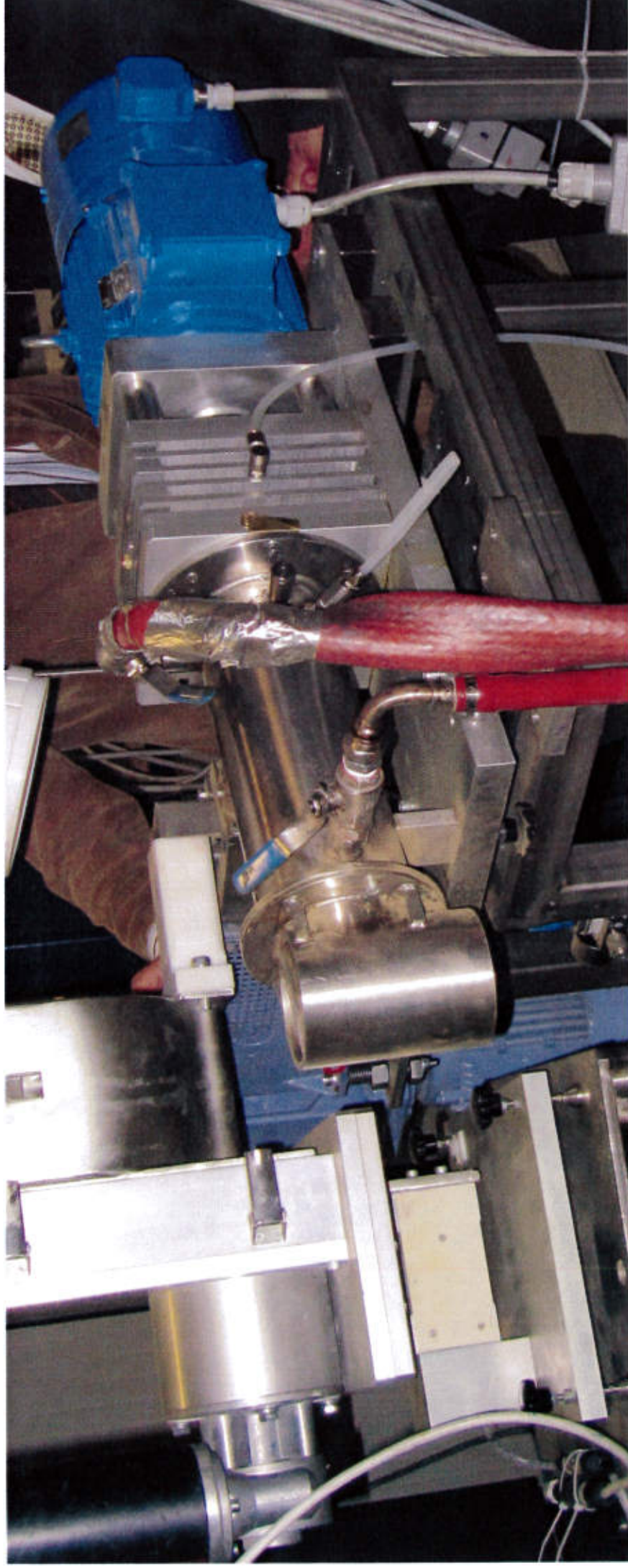
A very thin layer of product covers the wall:
the whole chamber wall is used as an
“exchange” surface.



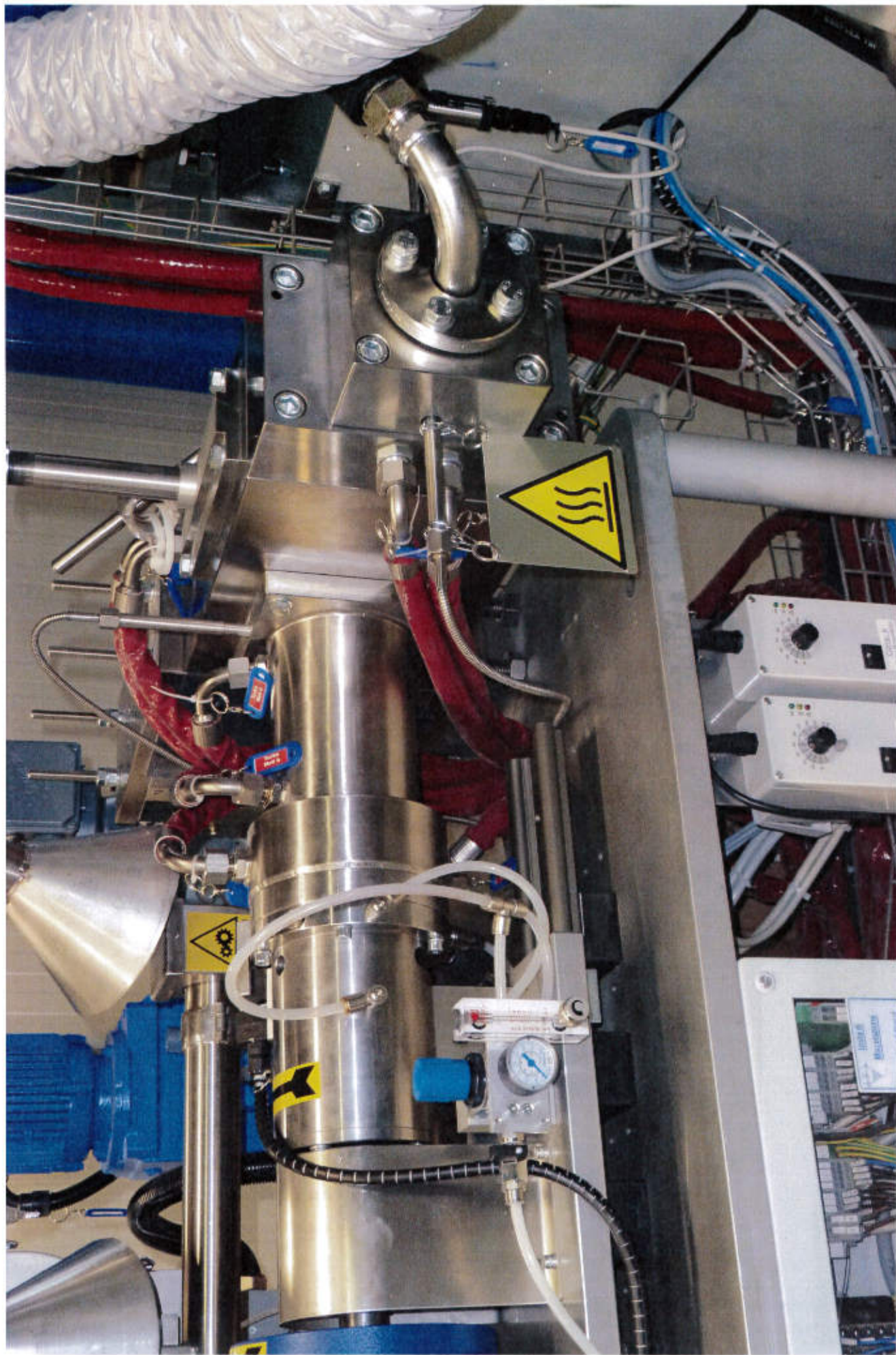
The Mixer is always empty.

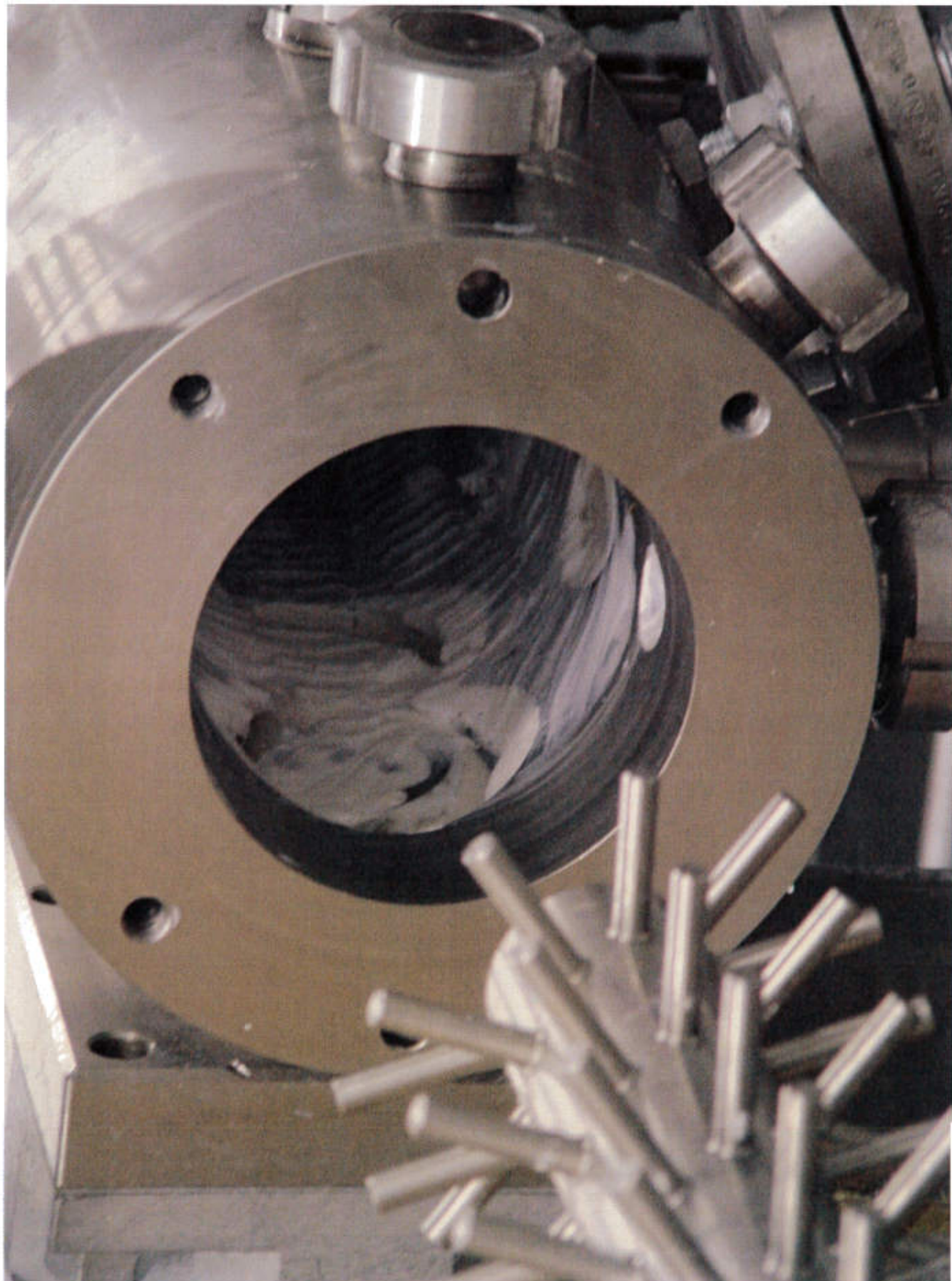


FLOW-TURBINE TECHNOLOGY

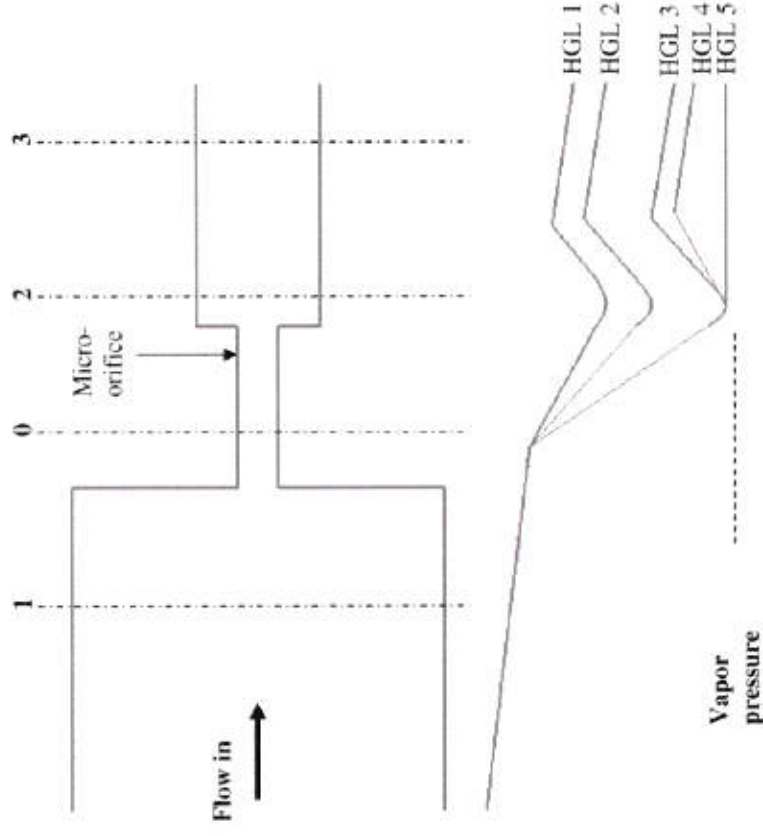
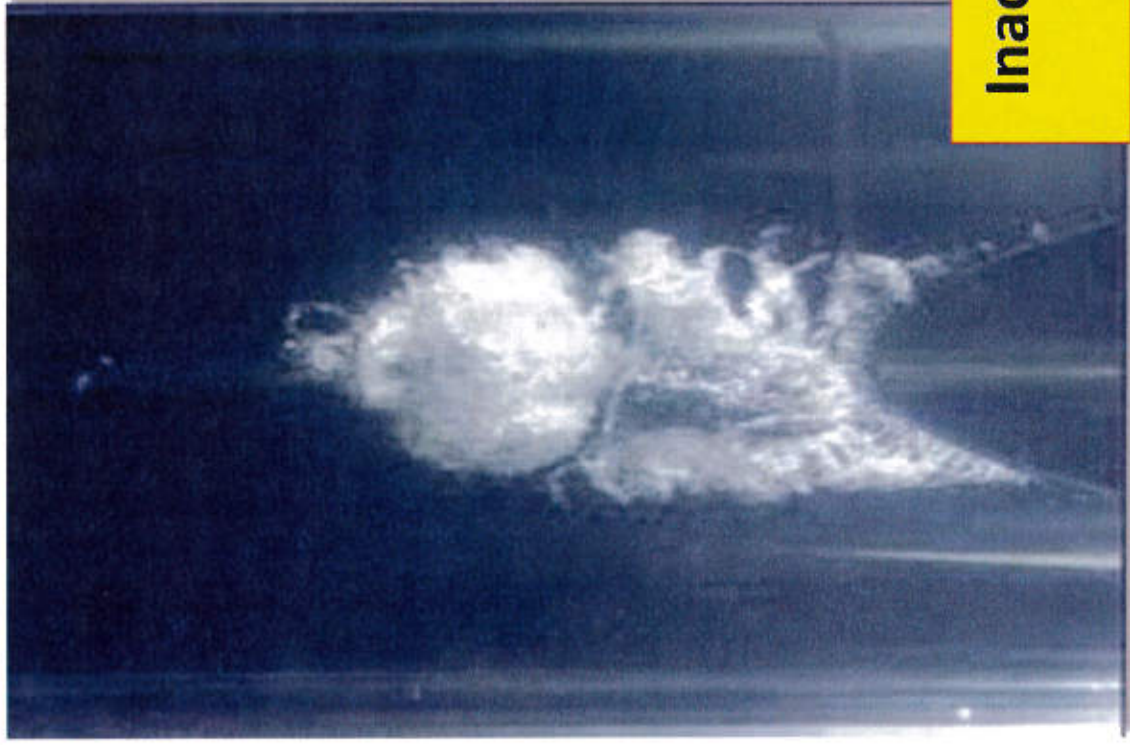


by **LICO spa (Italy)**





HYDRODYNAMIC CAVITATION



Inactivation of food spoilage microorganisms
by hydrodynamic cavitation

HYDRODYNAMIC CAVITATION



**A STEP FORWARD TO
SUSTAINABLE ENVIRONMENT**

**GREEN
SOLVENTS**

EXTRACTION

WATER

GLYCEROL

SC-CO₂

VEGETAL OILS

MONO- and DIGLYCERIDES

AGRO-SOLVENTS

SUITABLE COMBINATIONS

SOLVENTLESS