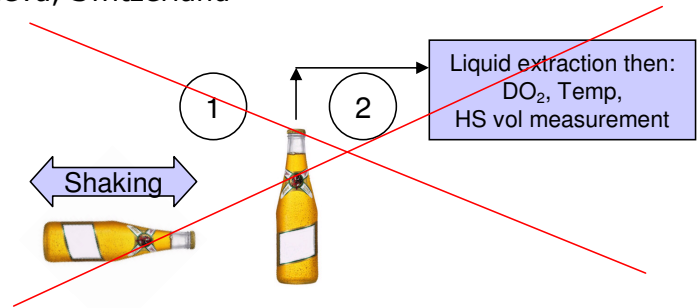


# TPO and CO<sub>2</sub> analysis in packages using ultra-sound for gas extraction

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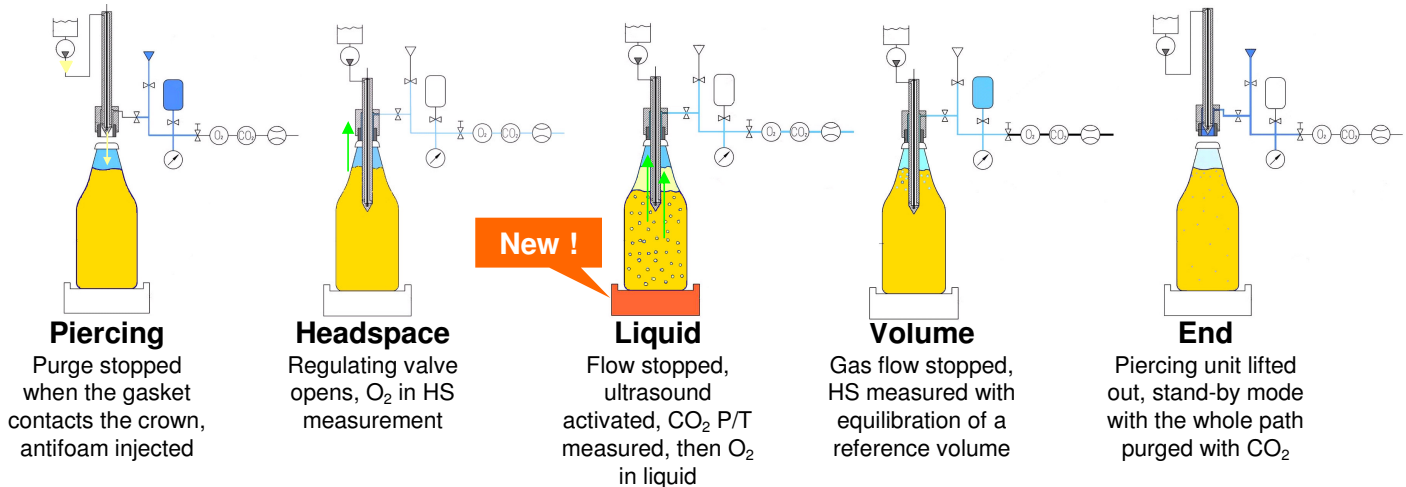
## Introduction

Actual TPO procedures use the Uhlig-Vilacha technique (Z-factor) which requires sample preparation, liquid extraction and measurement. Drawbacks associated are: sample preparation time, equilibration efficiency, operator influence, etc. The new Orbisphere 6110 principle is based upon a direct O<sub>2</sub> measurement in headspace and a liquid stripping via ultra-sound for the analysis of O<sub>2</sub> in the liquid. CO<sub>2</sub> is measured via pressure and temperature.



## Results in 5 steps

The complete fully automatic measurement process is performed in 5 steps.



## Validation results

	Lab test (ref volume)			Field test (same filler head, 660 ml bottles straight from the line)					
	HS vol [ml]			HS vol [ml]		TPO [ppb]		CO <sub>2</sub> [v/v]	
	Weight	3625	6110	3625	6110	3625	6110	3625	6110
<b>Average</b>	25.1	24.1	24.4	28.0	29.0	123	85	2.66	2.68
<b>Std dev</b>	0.04	0.07	0.08	3.00	1.00	26	16	0.02	0.01

Good correlation between the differential weight method and the two analyzers

HS volume smaller with the Orbisphere 3625 as it does not remove the foam!

TPO comparison may differ as the O<sub>2</sub> HS transfer in the liquid can not be 100%

CO<sub>2</sub> comparison show good results  
Difference may change according package size and type

The new Orbisphere 6110 that includes the new technology



## Key breakthroughs

- Direct and accurate O<sub>2</sub> HS, O<sub>2</sub> liq, TPO and CO<sub>2</sub> analysis
- Removal of liquid extraction and system cleaning operations, time consuming
- Robustness and reliability
- Minimization of downtime and operator involvement