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An alternative to carbonation of sparkling wine

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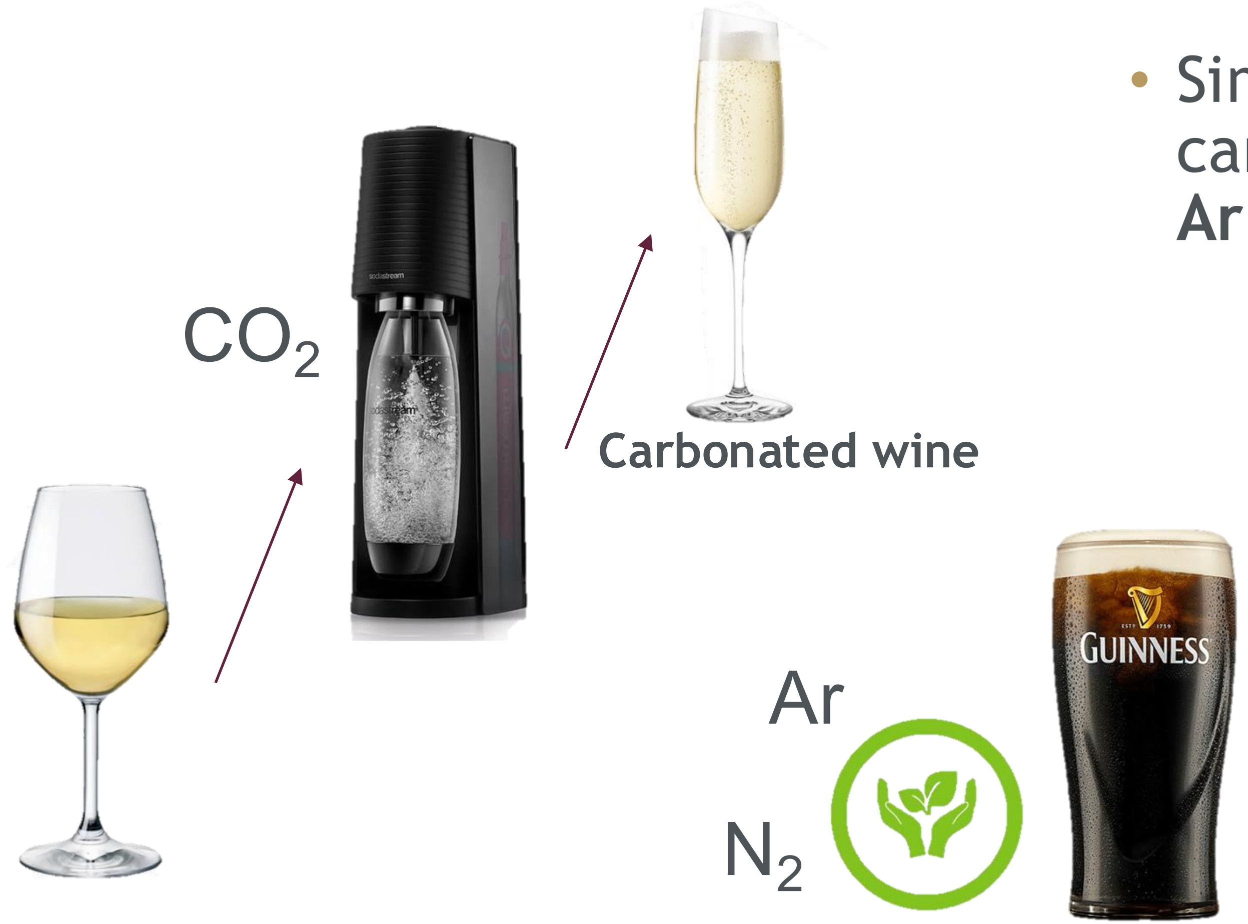
Photo by Stefan Els

a New kind of bubbly: Alternative Gas ‘Sparkling Wine’



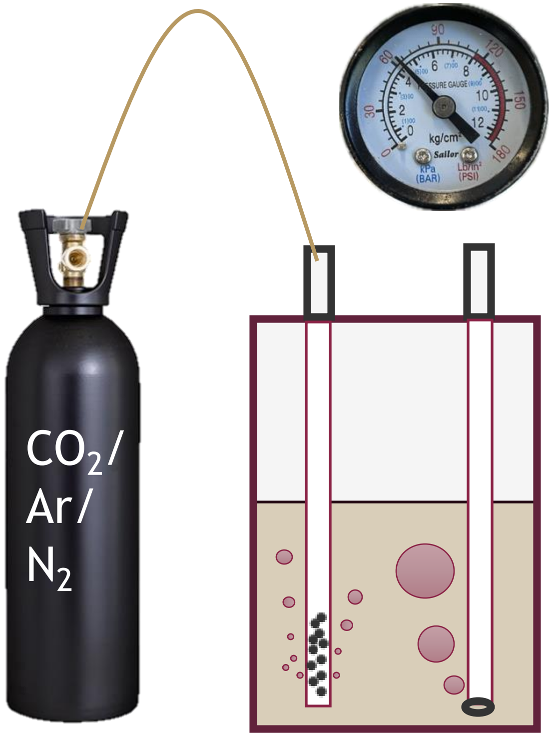
- Similar to carbonated wine, but instead of carbon dioxide saturate it with **CO_2, N_2 and Ar** in differing ratios

- Regular use in industry
- Great success in beer
- More environmentally friendly
- Smaller bubbles & more stable foam
  - Lower solubility
  - Desirable
- Novelty

(Yenne, 2010), (Liger-Belair et al., 2024)

Production of Alternative gas ‘Sparkling Wines’

Step 1: Pour wine and close keg.



Step 2: Pressurize to desired level with gas.

Step 3: Agitate (shake) to saturate, continue until pressure stabilizes.

REPEAT 2 & 3

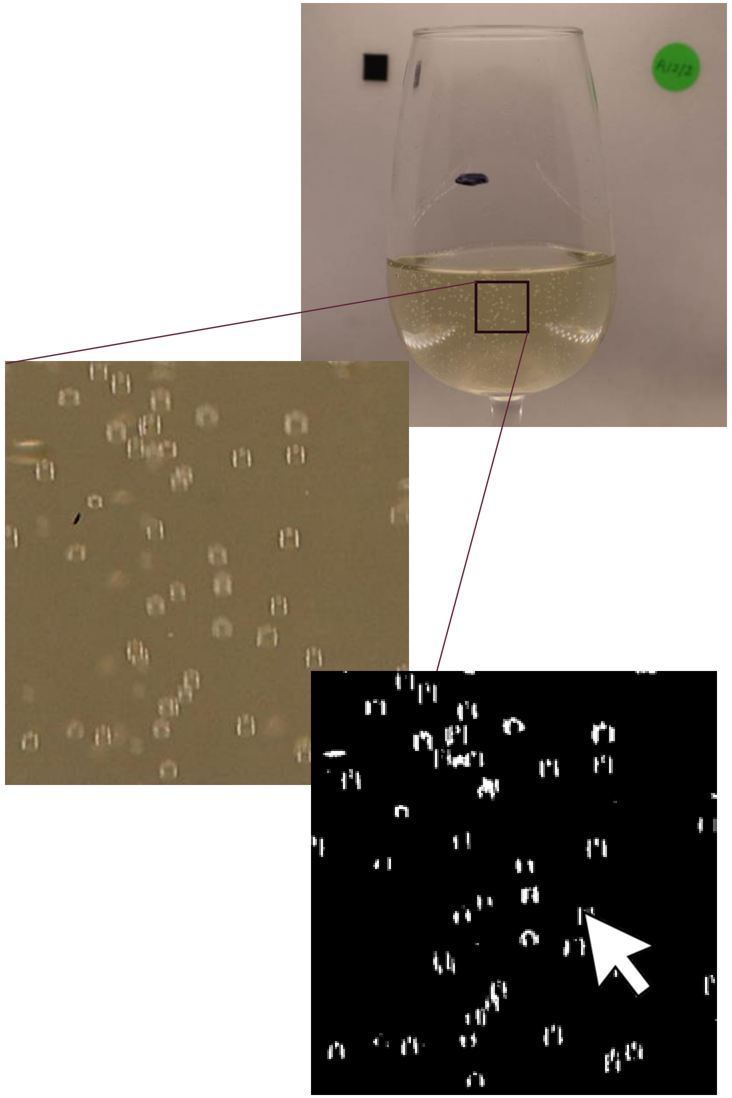
Step 4: Repeat 2 & 3 until agitation does not cause pressure drop.

Step 5: Open keg and pour

Bubble Size Determination

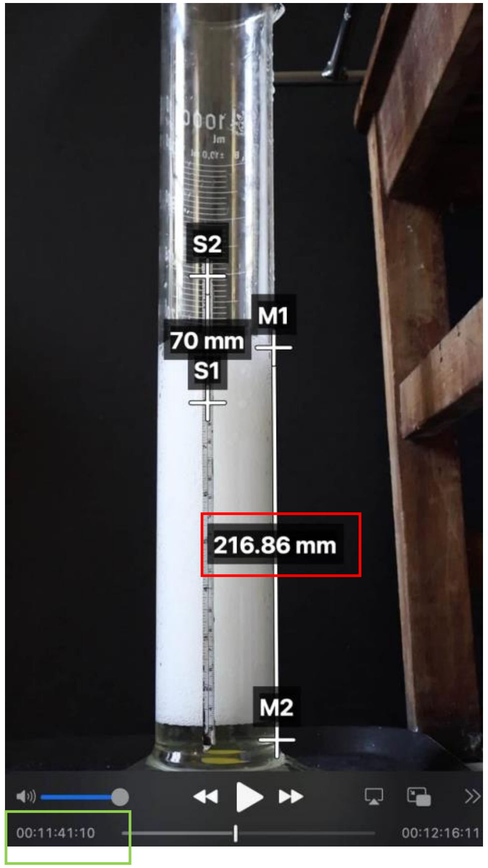
- **High-speed photography**
  - Size reference square
  - Bright lighting

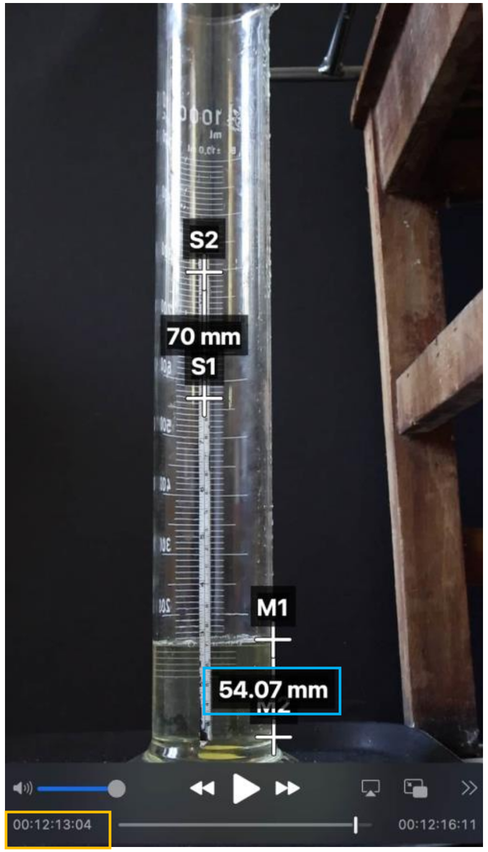
- **Matlab photo analysis**
  - Each bubble selected
  - Bubbles counted
  - Size & area calculated



	A	B	C
1	Bubble	Diameter_mm	Area_mm2
2	1	0,778534318	0,476042145
3	2	0,778534318	0,476042145
4	3	0,882338894	0,611449689
5	4	0,778534318	0,476042145

Determining the Rate of Foam Disappearance





- Foam behavior recorded as videos
  - Poured at consistent angle
  - Into glass column
  - With size reference
  - Foam peak height & time taken
  - Final volume height & time taken

$$Rate\ of\ foam\ dissapearance = \frac{\boxed{h_{foam\ peak}} - \boxed{h_{final\ volume}}}{\boxed{t_{foam\ peak}} - \boxed{t_{final\ volume}}}$$

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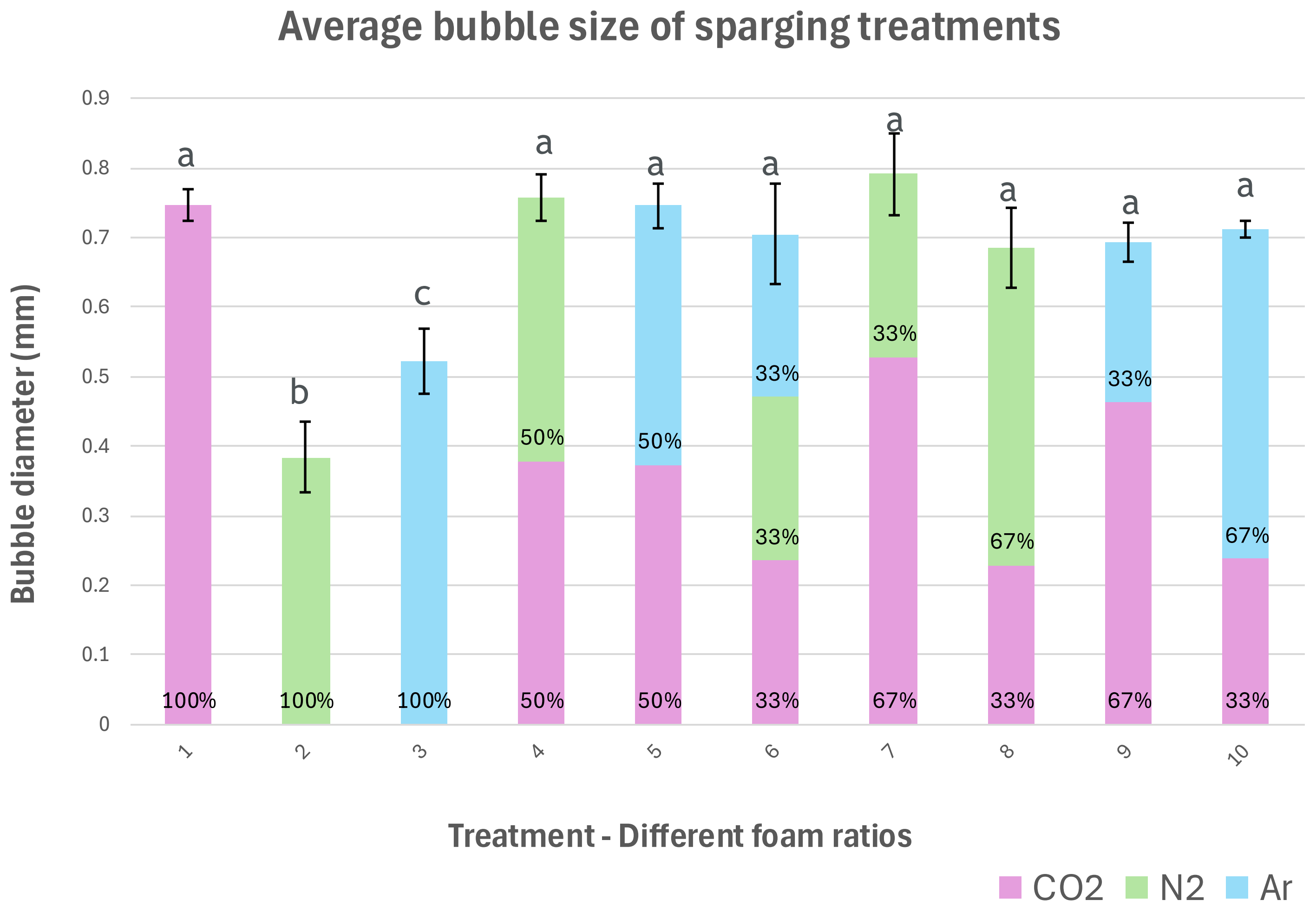
Results: Bubble size

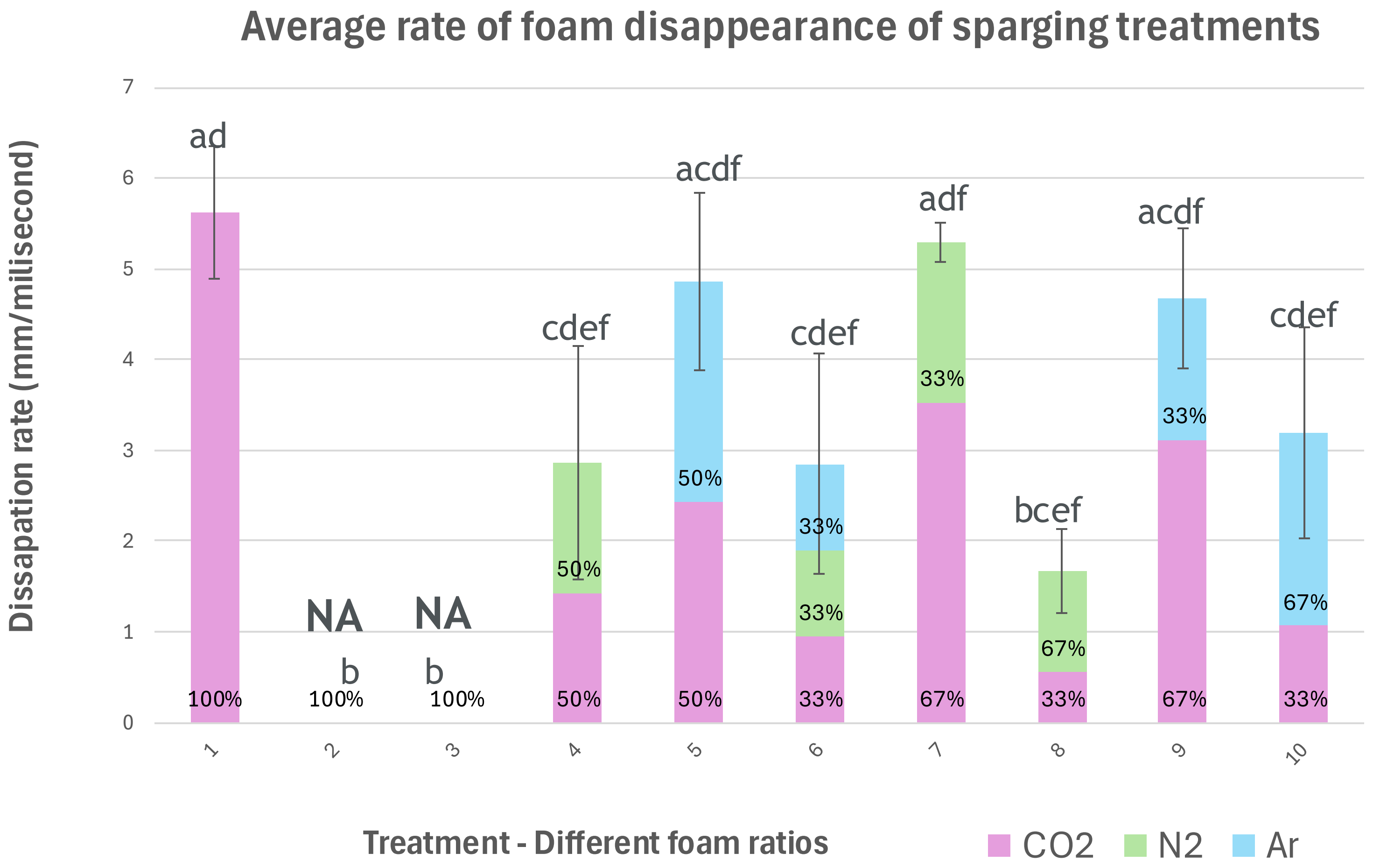
- 100% N_2 & Ar (2 & 3) have **smaller bubbles** than 100% CO_2 (a)

- Preliminary tasting suggests differences in **fizziness** of treatments
  - Though bubble sizes are similar
  - Proper sensory analysis to be done in 2026



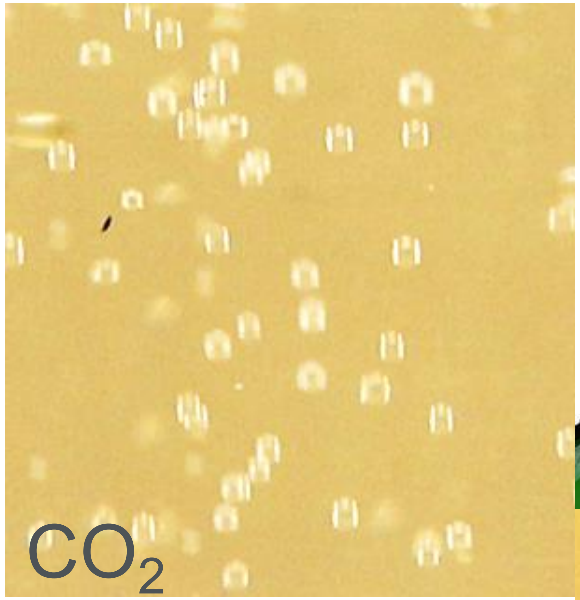
Results: Rate of foam disappearance

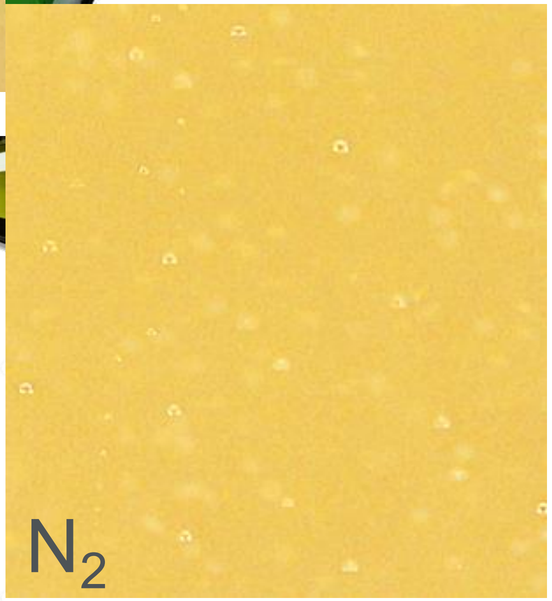
- Lower rate = slower rate of disappearance = more stable foam
- 100% N_2 & Ar (2 & 3) did not form proper foam – cascading effect instead
- Increased N_2/Ar incorporation = increased foam stability



Conclusion

- **Bubble size**
  - 100% CO_2 bubbles > 100% Ar bubbles > 100% N_2 bubbles
  - Combination treatments don't show significant differences
- **Foam stability**
  - Combination treatments show increased stability with increased ratios of N_2/ Ar
- **Further research**
  - Sensory analysis – Mouthfeel
  - Foam enhancers





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Thank you
Enkosi
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