Mixing ferments using gas: past and present

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Harnessing the carbon dioxide from fermentation

At a time before rural areas had electricity and steam-powered pumps were not mobile, carbon dioxide from fermentation was an obvious energy source to use to mix ferments.

In 1891, Cambon proposed a system with a closed vessel, from which fermentation CO₂ would drive liquid up and into a basin. When the basin level rose enough a float valve would allow liquid to pass back over the cap. A criticism made of this and other similar devices was that all the liquid in the basin was not quickly and completely returned to the tank when the valve was triggered.

In the early 1980s Pulsair introduced large bubble mixing for fermentations that facilitated cooling and had no moving parts. Pressure would build up in the tank, pushing liquid up past a water-filled heat exchanger into the upper basin. As pressure built up in the tank, the water in the small hydraulic trigger valve was gradually pushed down until it reached the bottom lip, breaking the equilibria, blowing the water out and mixing the contents of the upper basin to flood in over the cap. This system was effective at dissipating heat that might kill the yeast (a major issue in hot climates like Algeria), because the amount of pumping over past the heat exchanger is directly related to the speed of fermentation and associated heat produced. These systems were ultimately used quite extensively in Australia. Ron Potter noted that they resulted in much lower VAs than had typically been achieved in open-topped fermenters, which in turn led to a series of closed fermenter designs for his company, beginning with the Potter drainer/fermenter.

In the early 1990s the Australian Wine Research Institute, together with the Australian Alcoholic Beverages Institute and several wineries, investigated large bubble mixing and gas injection for mixing during fermentation, because the current methods were inadequate to mix fermenters.

Pressure tank CO₂ release

Gas mixing was used in the 1950s in pressure tanks. Mixing was by rapid releasing the tank pressure, causing CO₂ to come out of solution and mix the tank. This was practiced at Orlando Wines on one tank with a larger hatch from which skins could be removed and therefore red ferments could easily be performed in.

Gas injection

In the early 2000s, portable pulsing systems were released for wineries.

Large bubble mixing

Emaillit-lined pressure tanks at Orlando Wines could easily be performed in.

Gas rummaging in France

Initial work in France in the 1980s looked at the use of compressed air/fluidized recycled CO₂ from ferments (pulses are not mentioned) via lance or fixed multi-point systems for larger tanks.

In Spain a couple of manufacturers are now selling systems for gas mixing based on the use of recycled CO₂.

CO₂ is commonly recovered in beer production

The circumstances are of course different. Breweries use a smaller number of tanks and have greater requirements for CO₂.

Acknowledgements: Winery staff and suppliers that provided information and the AWRI Library.

Article: This paper is a summary only - a more detailed article may be written in the future.

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