

## Fine Line Between Wine & Vinegar

*Keeping nitrogen generators running is key to preventing air from turning wine into vinegar.*

*Winemaker  
Andrew Post  
beside nitrogen  
generator.*

BY JERRY FIREMAN

**I**N 1872, JACOB POST LEFT HIS FAMILY WINERY in Baden-Baden, Germany and moved to Illinois, then to Arkansas. He began selling wine the next year; the Post Familie winery he founded in Altus, AR is the oldest commercial vineyard between California and New York.

The winery is a family affair. Jacob's daughter-in-law, Katherine Post, notorious for serving 18 months in federal prison—for violating prohibition—announced upon her return home, "That was the best vacation of my life!" Seven children of Mathew Post, Katherine's grandson, work in the winery; all 12 have worked the farm. The 200 acres of grapes at Post produced 180,000 gallons of wine last year. The unique climate of Altus, which once supported 40 wineries, can grow all five major winemaking grape species. Post produces 45 varieties of wine ranging in price from inexpensive to moderate. The company has won 20 gold, 16 silver and 20 bronze medals in global competitions in the past two years.

### Need for Oxygen-free Bottle

The winery uses state-of-the-art equipment. A Gai bottle rinser<sup>1</sup> removes foreign matter and a Krones filler<sup>2</sup> flushes the air from the bottle before filling. Oxygen enables the growth of naturally present bacteria and can turn the alcohol into acetic acid, yield a vinegary taste and eventually turn the wine into vinegar.

The fermentation process is usually oxygen-free; a great amount of carbon dioxide is produced when yeasts turn sugars into alcohol. Removing the oxygen preserves the wine's flavor. Some winemakers fill bottles with carbon dioxide which the wine tends to absorb. This can have a negative flavor impact on many wines.

The Post Familie winery replaces oxygen in the bottle with nitrogen. Traditionally, compressed nitrogen is purchased in large cylinders. "We were spending far too much money paying for nitrogen and as our production volume increased, our expenses rose at a steady rate," says winemaker Andrew Post, Mathew's son. "We had to monitor gas levels; if we ran out, that meant shutting down our bottling line." Gas cylinders require careful handling since the gas is confined under very high pressure. Several years ago the winery purchased—and eventually outgrew—a 150-cubic-foot-per-hour nitrogen generator. As the company approached a production rate of 150,000 gallons per year, the nitrogen generator lagged behind the bottling line. So bottling lines were shut down to wait for the nitrogen generator to catch up.

### Maintenance-free Nitrogen Generator

"It was clear that we needed a larger generator," says Post. "I checked out three different models that were capable of providing the capacity that we needed. I was most concerned about maintenance. All of the equipment separate the nitrogen from air using either membrane separation technology—for low-purity applications—or pressure swing adsorption (PSA) for higher purity applications. Most require frequent changing of filters and other pretreatment componentry, especially the prefilters used to remove impurities from the air before separation." One nitrogen generator Post researched—the Balston MB-400 Pressure Swing Absorption (PSA) nitrogen generator from Parker

Hannifin Corp., Filtration and Separation Division, Tewksbury, MA—only needs prefilters changed once every 12 to 18 months; no other maintenance is required. "I was looking for a nitrogen generator that I could buy, turn on and forget about."

Parker Balston PSA nitrogen generators use filtration and pressure-swing absorption technologies. Prefiltration removes all contaminants to 0.01 micron from the compressed air. Air entering the generator, 21% oxygen and 78% nitrogen, is separated; the oxygen is preferentially adsorbed over nitrogen using a carbon molecular sieve (CMS). Molecular sieves are devices with discrete pore sizes that can discriminate among different molecule sizes, providing molecular separations based on rate of adsorption rather than differences in adsorption capacity. Under consistent conditions, the rate of adsorption can be influenced by the equilibrium uptake, or capacity of the sieve, and the diffusivity, or rate of diffusion of the porous material. The relative diffusivity determines the rate of molecular sieving. CMSs are stable at high temperatures, have low affinity to water and pore sizes can be controlled by preparation method. The CMS has a greater affinity for oxygen, carbon dioxide and water vapor at high pressures than at low pressures. By raising and lowering the pressure within the CMS bed, all contaminants are captured and released, leaving the CMS unchanged. This process allows nitrogen to pass through as a product gas (gas that goes into the bottle with the wine) at pressure. The depressurization phase of the CMS releases adsorbed oxygen and other contaminant gases to the atmosphere.

PSA nitrogen generators produce up to 99.95% pure, compressed nitrogen from almost any compressed air supply. Installation involves connecting a standard compressed air line to the inlet and connecting the outlet to a nitrogen line. Plug the electrical cord into a wall outlet and the unit is ready for continuous operation. The unit requires minimal monitoring; an optional oxygen monitor can measure the oxygen concentration of the nitrogen stream. An audible alarm supplied with relay outputs signals high or low oxygen concentration.

Post has had no nitrogen-related shutdowns since installing the new generator. Now he concentrates on "making a high-quality, wholesome product and delivering it to wine lovers around the world."

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### REFERENCES

1 [www.gai-it.com](http://www.gai-it.com), 2 [www.krones.de](http://www.krones.de)

**Parker Hannifin Corp., Industrial Gas  
Filtration and Generation Division  
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