Clear thinking, dark thoughts

Tom Stevenson

I have mentioned this subject before, but always *en passant*, so I make no apologies for devoting an entire column to dangers of light-struck aromas (*goût de lumière*) and the suicidal vanity of producers who use clear-glass bottles, which are so vulnerable to this fault.

Producers may wrap their clear-glass bottles in a UV-proof film and pack them into cellophane-wrapped presentation boxes, advising customers not to remove either, but once they leave the cellars, anything can happen. Since clear-glass bottles are chosen exclusively for their looks, producers should not be surprised if consumers ignore the warnings, remove the packaging, and display the bottles, little realizing that within minutes they will become tainted with a smell that can only get worse.

How can a flash of light wreak such havoc on a wine? Specific wavelengths of light activate electrons on vitamins B2 (riboflavin) and/or B5 (pantothenic acid), which are found naturally in wine. This photochemically oxidizes sulfur-containing amino acids (principally methionine and cysteine), degrading their components to dimethyldisulfide (DMDS), dimethylsulfide (DMS), hydrogen sulfide (H_2S), methanethiol, and ethyl methyl sulfide.

How quickly does this happen? According to laboratory tests under fluorescent lighting, these compounds start forming after just 60 minutes (Vierra) of accumulated—not necessarily continuous—exposure. If that exposure is to direct sunlight, which provides 4,286 times the amount of UV radiation compared to fluorescent lighting (Bruer), the process begins almost instantly.

How bad do these compounds smell? At their very lowest detectable threshold, they merely inflict the barest hint of something not quite fresh to a wine aroma. If you do not look for the light-struck aroma at this point, you might not notice it, but its course has been set, and it will not be long before the wine reaches the wet-dog/wet-wool stage. As the process persists, more of these compounds are produced, and they take on a mercaptan-like smell of stale cabbage, eventually developing into an extremely pungent stench of dirty drains, stagnant water, and sewage. Each of the compounds responsible is bad enough on its own, but when combined they create a truly repulsive smell, like that of the rotting-flesh odor of the carnivorous Arum plant. This plant smell is from DMDS and DMS and can be detected by the human nose up to half a mile away. H_2S has a rotten-egg pong, and while this smell is not always recognizable as part of the light-struck aroma, its presence turbocharges the already putrid DMDS and DMS. Methanethiol smells like stagnant water and is the primary active chemical compound responsible for halitosis, while methylthionine (aka ethyl methyl sulfide) is responsible for the stale-cabbage odor. Put these compounds together, and you have the mother of your worst wine-stink nightmares in one bottle. Having begun, the light-struck process will always persist, however cool and dark you store the wine, with age or exposure to air only exacerbating the problem.

Why are sparkling wines particularly prone? White wine is most prone, then rosé, but although sparkling white and rosé wines are not more prone per se, the light-struck aroma itself is more easily recognizable because carbonic gas magnifies the detection of DMDS. Red wines are more protected by the filtering effect of their color but are not immune.

Glass color	Protection against:	
	UV light	All harmful light
Dark amber	99.9%	90.5%
Light amber	97.4%	89.5%
Green	79.2%	50%
Blue	23%	12.5%
Clear	66.9%	10%

Why are clear-glass bottles such a problem? Clear-glass bottles offer 100 percent protection up to wavelengths of 300nm but just 10 percent protection to harmful wavelengths above 300nm, not just of UV (ie, up to 400nm), but visible light (above 400nm), too. UV-absorbing coatings exist but cannot provide 100 percent UV protection without leaving a yellow hue to the glass, which defeats the purpose and still leaves bottles vulnerable to harmful visible light.

How safe are green bottles? They are better but fall a long way short of good, averaging only 50 percent protection, whereas amber-colored bottles provide more than 90 percent, and dark amber virtually 100 percent. All protection can be increased by thickening the glass, but we are in an age of lighter, not heavier, bottles for reasons of sustainability.

With so much literature focusing on UV light as the culprit, visible light is often overlooked, but it, too, can be harmful, particularly at the violet-blue end of the spectrum (440nm, 441nm, 446nm...). Even between the harmful peaks of both UV and visible light, other wavelengths also pose a threat. They are seldom mentioned because they excite the electrons a little less and need a tad more time to achieve the same effect, but eventually they can be just as debilitating. Maujean, the most prolific researcher into light-struck aromas, found that complete protection could be achieved only by filtering out all light up to 523nm. That would necessitate an opaque black-glass bottle, but for all practical purposes a dark amber bottle like those recently introduced at Nyetimber should suffice. UV-proof film or coatings, presentation boxes, and warnings are just Band-Aids.

If you are a collector with a cellar that boasts stunning light displays to show off your wines, and you have had those lights switched on for periods that add up to 60 minutes or more, I advise you to check the wavelengths before your most highly prized wines turn to sewage. ■

Illustration by Dan Murrell