

# The Untold Story of Wine and Spirits Glass Evolution (Part 3 of 3, the Wine Glass)

## Part 3 of 3 (Applying Science to Spirits Glass Design)

Recapping Parts 1 and 2, wine and spirits glassware evolved as a result of manufacturing technology (leaded crystal, duran, stem pulling techniques), adopting someone else's design (Spanish copitas), monumental marketing efforts, (Riedel varietal marketing), or specifically to enhance intoxication (snifter). However, these approaches miss the mark simply because they are based on the previously unchallenged assumption that all glassware must be of a general shape that embodies convergent rim (rim diameter smaller than bowl diameter) to ensure that all aromas are collected in one small area under the nose. Along comes science.

Many spirits drinkers believe the smell of alcohol is an integral, inseparable part of the distilled spirit. When experts are asked, well in excess of 80% accept this as an unquestionable truth. Since no one ever figured out how to get rid of ethanol, and adopting convergent rim glasses perpetuated the problem, separation of an aroma has been thought of as impossible to achieve. Consequently, we have all been putting up with nose-numbing alcohol for almost two thousand years. We didn't always drive cars, fly in airplanes, or cook in microwave ovens, and there's no earthly reason why we have to numb our noses when drinking spirits, when we have technology to put a man on the moon.

Every spirit has characteristic aromas, even vodkas. Straight spirits may be only 40% ABV in the liquid, but the percentage of ethanol in the evaporated aroma cloud is much higher, since ethanol is one of the lightest compounds, has the highest vapour pressure and lowest boiling point, and evaporates at a much faster rate than other compounds in the spirit. Pour a shot of spirit in a rocks glass, mark the level, and leave it overnight. Notice the lack of ethanol smell and the lower liquid level the next morning to test this fact. Not much ethanol in the smell, and if you really want to taste it, not much ethanol in the taste, either. Try it with different glass shapes and come to your own conclusions.

What is so bad about ethanol? For starters, it fools the olfactory sensors, locking out other molecules and inhibiting detection of other aromas (see "lock and key" theory of olfactory senses). It also causes olfactory fatigue, anesthetizes olfactory sensors, pains sensitive noses, numbs and dumbs sense of smell, and causes toxic neuropathy. It is the enemy of evaluators, judges, blenders, and the average drinker, inhibiting both the enjoyment and analysis of any spirit. It is truly a wonder that anything other than ethanol is detected and recognized by untrained nosers. "I love the smell of ethanol", said nobody, ever.

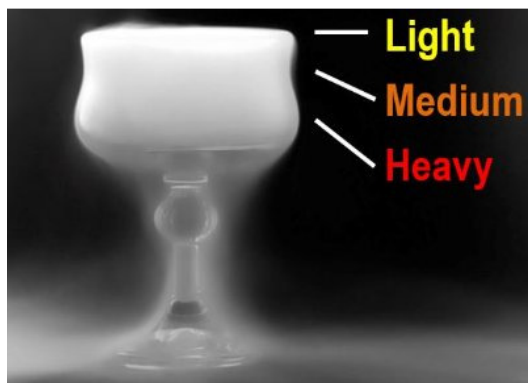
Bartenders have known this for years, and a few of the more unscrupulous discovered they can pass off "well" spirits as a favourite call brand to straight spirits drinkers by the third drink, knowing full well the vast majority of drinkers can't smell the difference once their noses have been properly "fatigued". This practice is even easier to get away with if the drinker adds water or ice.

As discussed in Part 2, the most common glassware, copita, chimney, and their derivatives were designed for spirits of 17-24% and are ill suited for drinking full strength, 40% ABV spirits without the addition of water. The vast majority of whisk(e)y, scotch, rum, tequila, and

gin drinkers drink their spirits straight up at bottled strength, and are left without a glass specifically designed to accommodate the high percentage of alcohol.

In 2002 a misguided instruction in a glass blowing class began the search for a spirits' glass which could overcome the faults of existing glassware, specifically for those drinkers who insist on drinking spirits at bottled strengths of 40% ABV or higher. After nine years of engineering and evaluation, over 52 different shapes later, Arsilica, Inc., a Nevada corporation released the NEAT glass in February 2012, the first ever glass design using an integrated approach to chemistry, physics, and biology to enhance drinking enjoyment. Determining the best glass design for straight, full strength spirits drinkers required a fresh approach, without consideration for previous designs, methods, and the nosing and tasting myths and methods developed using older, existing glassware.

Arsilica, Inc. applied six practical principles based on science and method, which, when properly applied to glass design will maximize spirits drinking enjoyment. These are:



**Principle 1:** Placing the nose closer to the surface of the drink detects more aromas. Aroma molecules range from the simplest shapes and lighter weights of ethanol to the complex long chains of heavier fatty acid ethyl esters. Fewer of the long chains break through the surface tension of the liquid to be detected in an evaporative aroma sample, and even fewer make the long journey to the top of a tall glass. Use shorter glassware to place your nose where the aromas lurk, close to the surface of the liquid. Heavy to light on the diagram can also indicate simpler molecules at the top, long chains at the bottom, or highly volatile at the top, and low volatility at the bottom. In any case the nose has to be within 4.5cm to detect most of the aromas, and the closer to the surface of the liquid, the better. Short glasses are better.



**Principle 2:** Maximize evaporation area. Wider vessel bowls allow more area to evaporate, both surface area of the liquid and wetted side area when swirled. Few know that evaporation from the thin film on the vessel sides is much more rapid than from the horizontal surface of the liquid as it sits in the bowl. If the glass is as wide as the hand can comfortably hold, the evaporation area becomes sufficient and functional to accomplish the task of enhancing evaporation. The three on the left have the highest evaporative surface areas.



**Principle 3:** Enhancing swirling increases aromas. Swirling breaks the surface tension and allows more aroma molecules to escape into the atmosphere. No swirl = less evaporation. Less evaporation = less aroma. Pretty simple. Wine glass designers have known this for decades as they encourage swirling prior to every sampling. Spirits drinkers are encourage not to swirl, since the overabundance of ethanol aromas increase, and small glassware concentrates ethanol right under the nose.



**Principle 4:** One simple mechanical design separates the ethanol, necking down the glass. Compress and release makes the lighter molecules (ethanol) move even faster, away from the heavier molecules. The combination of a neck to compress the aromas and a wide, divergent rim to release them does the trick. Continuous evaporation pushes the aromas into the neck where they are compressed, and they dissipate when they expand above the neck. Newton's Laws of Motion sends the lighter ethanol to the nearest exit ( $F = ma$ , thanks Newton, may the force be with you). The widely divergent rim above the neck provides the ethanol escape path.



**Principle 5:** There is a correct way to use every tool. Evaluating spirits is no different. Use the correct method to make it work. Swirl, swirl, swirl, hold level, nose over the centre of the rim and breath in through the nose only, with mouth

closed. Totally different than the best method for drinking straight spirits from a convergent rim glass designed for 20%ABV beverages.



**Principle 6:** Move your nose to where the aromas are to get the big picture. Characteristic aromas are in the centre of the glass at the rim level. Placing your lips on the rim of the glass will help you locate the “sweet spot”. Move your nose toward the edge to pick up lighter aromas. Ethanol is at the edge of rim, diluted so it can’t burn your nose. Miss the old strong alcohol of the copita, chimney, or snifter? Just place your nose below the rim level into the glass neck area and you can snort all the nose numbing alcohol your olfactory can’t handle.



The end result is a short, fat, squatty looking glass with neck and a flared rim. Quite the opposite of the tall, skinny, convergent rim glasses designed for watering down spirits to 20% ABV. Is it the final answer? For the time being, it’s the best answer, and another tool for enhancing the enjoyable pastime of drinking spirits, and the beginning of a third school of nosing spirits, necked/divergent rim glassware which dissipates nose numbing alcohol (the other two are the copita style and the snifter style).

Extensive GCMS studies by the chemistry department at UNLV (University of Nevada Las Vegas) using NEAT alongside existing glass styles, verified that the combination of these scientific principles efficiently dissipates ethanol alcohol away from the nose.

Most spirits competitions in the USA use NEAT as their official tasting and judging glass, because it enables them to make accurate evaluations throughout long hours of fast-paced, multi-sample spirits judging.

Just a couple of reminders. Swirling is the engine that powers the aromas. Swirl, swirl, swirl. Breathe through the nose with mouth closed, and you will not get the nose burn common with convergent rim glasses. Do not add water.

The addition of water is a crutch for those who cannot pick out the aromas mixed with the strong alcohol of convergent rim glassware. Unfortunately adding water is a necessary evil for all the old tall aspect ratio glassware just to dumb down the ethanol. If you happen to add water to NEAT, a rocks glass, martini, margarita or any divergent rim glass, you smell.....nothing. Water increases the surface tension and severely reduces all evaporation. Get the right glassware designed for how you drink, and let the glassware do what it was designed to do. The next article is “Why Add Water to Whisk(e)y?”

\*NEAT, the ultimate spirits glass, changing the way the world drinks, are all trademark property of Arsilica, Inc. and the NEAT glass is design patented USPTO, utility patented PRC, and utility patent pending USA, WIPO. Find out more at [www.theneatglass.com](http://www.theneatglass.com)