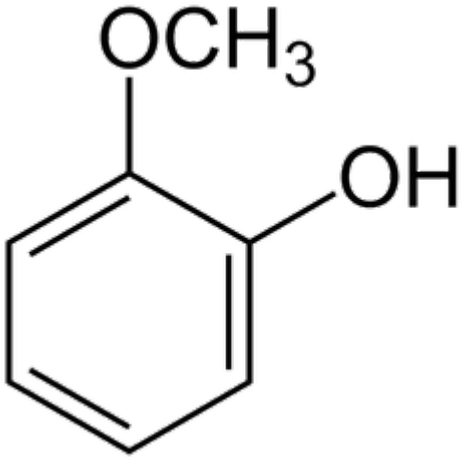
Many bartenders may tell you that adding a splash of water to your drink of **whiskey** will make it taste better. Those with an old school track of mind, may see this as a bartenders way of trying to pull a fast one over them by watering down their perfectly good whiskey. However, science has just proved those bartenders right.

A study released in the journal, **Scientific Reports**, discovered that a touch of dilution actually *improves* a whiskey solution- making it more flavorful-especially if it's Scotch.

There are essentially three types of whiskey. American whiskey (bourbon) is usually made from corn; Irish whiskey is made from a malted and regular barley; and Scottish whiskey (Scotch) from only malted barley. After the mash (fermented alcohol solution from a mixture of grains, yeast, and water) is made with its respective grain, whiskey makers pour it in distillers, or special containers that boil off the methanol-alcohol that is infamously known to cause blindness. Left behind is ethanol, along with the flavors of the original mash. The remaining liquid is put to age in charred oak barrels, which is where whiskey, especially Scotch, gains **guaiacol**. Charring wood creates wood creosote, and, as the liquid interacts with the barrel's walls, guaiacol migrates into the liquor.

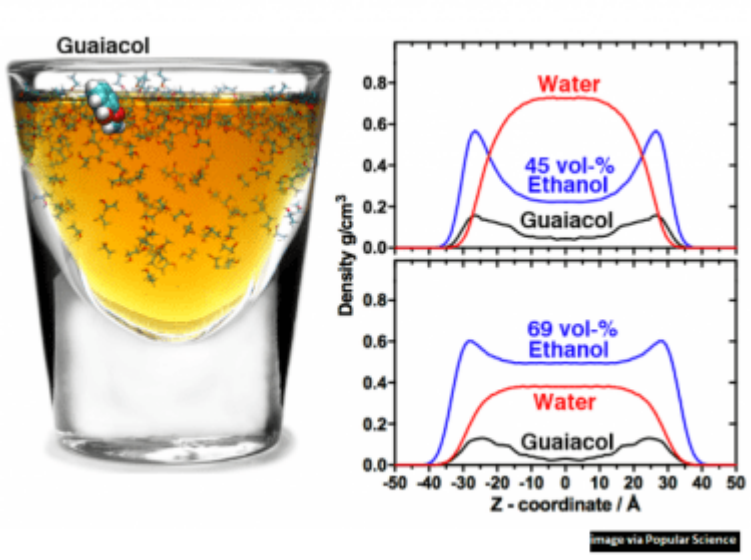


Bjorn Karlsson and **Ran Friedman** of the Linnaeus University Center for Biomaterials Chemistry are not your avid whiskey drinkers, but they knew of the dedication locals in

Scotland had to watering down even the most luxurious of Scotches. So, they decided to get to the bottom…of the glass…to find out if this phenomenon was true.

Of course, the two had to "test" their fair share of the sample, but also received assistance from computer simulations to model how the ethanol molecules in whiskey interacted with water. To capture the molecular motion precisely, they simulated the mixing using tiny time steps, equivalent to half a trillion frames per second.

Then they added the main molecule, guaiacol. This aromatic oil is what gives the liquor its distinctive smoky and bitter flavor. **Guaiacol** is present in guaiacum, which is a kind of slow-growing shrub with beautiful purple flowers, and the compound is also present in wood creosote.



Karlsson and Friedman found that when liquor is at or about 40 percent alcohol by volume, **guaiacol** molecules tend to stay in the body of the liquid and away from the surface. However, when the simulated whiskey was diluted to about 25 percent alcohol, the guaiacol floated to the top and brought its smoky scent and flavor with it.

"Whiskey is a complicated mixture of hundreds or even thousands of compounds…we found a result that supports the claims for diluting whiskey" says Karlsson.

However, Paul Hughes, a food scientist and distilling expert at Oregon State University, wasn't convinced by the study. Hughes believes that the study didn't take into consideration the variation of shapes of containers. The simulation used a box-shaped vessel, and Hughes points out that it's hard to say whether guaiacol would behave the same way in a flask, or mug, or decanter. "My sense is that the box they've used isn't tall enough," Hughes said.

Be it wanting to disrupt ethanol clusters, encourage guaiacum to rise to the surface, or drink like a true Scotsman, chemistry has shown that adding a splash of water to your glass of whiskey, just might make it taste a little bit better. Cheers.

For more studies and applications on whiskey, check out these technical notes!

Improved Analysis of Flavor Compounds In Scotch Whiskey Using An Aqueous-Stable Polyethylene Glycol Stationary Phase

Aqueuos Stability for Distilled Spirits Testing by GC