

Tequila! Chemists help assure quality of popular Mexican beverage

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Whether you're celebrating Cinco de Mayo or just having another relaxing day in Margaritaville, you might one day thank a chemist for assuring the authenticity of your tequila. New tests developed by scientists in Mexico and Germany will help distinguish the real thing from fraudulent versions, which are a potential threat as this alcoholic beverage grows in popularity.

The findings could help provide a "shot" of quality assurance to the estimated billion-dollar tequila market, the researchers say. Their study is scheduled to appear in the June 14 issue of the American Chemical Society's *Journal of Agricultural and Food Chemistry*.

But there's no reason for consumers to panic, the researchers say. "Tequila is one of the best regulated spirits in the world with strict Mexican standards and labeling regulations," says study leader Dirk Lachenmeier, Ph.D., a chemist with Chemisches und Veterinäruntersuchungsamt Karlsruhe (Chemical and Veterinary Investigation Laboratory of Karlsruhe) in Germany. Thanks to advancements in chemistry, the quality of this ancient Mexican beverage can now be protected.

Tequila is made from the blue Agave plant and its production is limited to certain geographic areas, primarily to the state of Jalisco in West-Central Mexico. Although it is subject to strict production standards and labeling regulations, adulterated samples have occasionally been reported, the researchers say. The exact percentage of fraudulent

samples on the market is unknown, they add.

High-quality tequila is made with 100 percent Agave, while lower-end, mixed tequila is made by adding up to 49 percent sugar prior to fermentation. This so-called mixed-tequila is usually shipped out in bulk containers for bottling in the importing countries. Labeling fraud can result when these bulk tequilas are identified as "100 % Agave" or if alcohol from other sources is added. These practices are more likely to take place when these products are bottled in other countries outside the strict regulatory watch of the Mexican government, Lachenmeier says.

Using ion and gas chromatography, scientists analyzed 31 tequila samples of the 100 percent Agave category and compared the results to 25 mixed-tequila samples. The pure Agave tended to have significantly higher levels of certain chemicals, including methanol, 2-methyl-1-butanol, and 2-phenylethanol, allowing them to be chemically distinguished as real, high-quality tequila, the researchers say. Although methanol was present, levels were small and did not reach toxic levels, they add.

In addition to these new tests, a screening test using Fourier Transform Infrared Spectroscopy (FTIR) may be used to identify fake tequilas from the real thing, the researchers say. The process, also known as molecular fingerprinting, takes only two minutes, they say. In general, the strategy of combining different spectroscopic and chromatographic methods is more accurate than previous identification attempts, which focused on other chemicals or the isotopic composition found in tequila, the researchers say.

The researchers also analyzed several other Mexican spirits made from Agave, including mezcal (the one with the worm in it), sotol and bacanora. With the exception of mezcal, the scientists were similarly able to identify the other spirits by their distinctive chemical profile, a

finding that could also aid in quality control efforts among the other Agave spirits, they say.

Source: American Chemical Society

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