

Creating the perfect Bloody Mary: Good chemistry of fresh ingredients

March 29 2011

After tackling the chemistry of coffee, tea, fruit juices, soda pop, beer, wine and other alcoholic beverages, why not take on the ultimate challenge, the Mount Everest of cocktails, what may be the most chemically complex cocktail in the world, the Bloody Mary? And in this the [International Year of Chemistry](#) (IYC), why not include its global offspring, the International Mary?

Those challenges underpin a presentation today reviewing the Bloody Mary's [composition](#) and the taste sensations created by those ingredients at the 241st National Meeting & Exposition of the American Chemical Society (ACS), being held here this week.

"It's a very complicated drink," said Neil C. Da Costa, Ph.D., a expert on the chemical analysis of flavors at International Flavors & Fragrances, Inc., Union Beach, N.J. "The Bloody Mary has been called the world's most complex cocktail, and from the standpoint of flavor chemistry, you've got a blend of hundreds of flavor compounds that act on the taste senses. It covers almost the entire range of human taste sensations — sweet, salty, sour and umami or savory— but not bitter."

Da Costa said those flavors originate in the basic ingredients in the traditional Bloody Mary, which by one account originated in a Paris bar in the 1930's. Stories link the name to various historical figures, especially Queen Mary I of England, noted for her bloody repression of religious dissenters. The ingredients include tomato juice, Worcestershire and Tabasco sauce, fresh lemon or lime juice,

horseradish, black pepper, and celery salt. Shaken with ice or served over ice, it is often garnished with celery and a lemon wedge.

"Most of the ingredients have been analyzed for their key flavor volatiles, the chemicals that can evaporate from the glass and produce the aroma," Da Costa explained. "Similarly for the non-volatiles, which are the chemicals that stay in the liquid and contribute toward the flavor there. My presentation reviews the composition of these ingredients and highlights the key components and their sensory attributes."

Some of the ingredients have been linked with beneficial health effects, Da Costa, noted, citing the rich source of lycopene, for instance, in the tomato juice; horseradish with its allyl isothiocyanate, which can be effective at lower concentrations; other phytochemicals in lemon; and even the alcohol in vodka, which some studies suggest can be beneficial when taken occasionally in small amounts.

Does Da Costa's research provide any insights for making a good Bloody Mary? He cites several:

- Make it fresh. Chemically, the Bloody Mary is a "highly unstable" concoction, and the quality tends to deteriorate quickly.
- Ice it up. Serving Bloody Marys on ice helps to slow down the chemical reactions involving acids in tomato juice and other ingredients that degrade the taste.
- Mind your mixes. If you use a cocktail mix, add some fresh [ingredients](#) to enhance the flavor and aroma.
- Splurge on the juice. Tomato juice makes up most of the Bloody Mary's volume, so use high quality juice that has a deep, rich

flavor.

- Economize on the vodka. The intense, spicy flavor of a Bloody Mary masks the vodka, and using premium vodka makes little sense.

In the spirit of the IYC, Da Costa discussed the variations on the Bloody Mary consumed in other parts of the world. These "International Marys" include Denmark's Danish Mary; the Highland Mary (a.k.a. the Bloody Scotsman); the Russian Mary; the Bloody Geisha (yes, that's sake instead of vodka); the Bloody Maureen (replace vodka with Guinness); and the Bloody Molly (Irish whiskey replaces vodka).

Provided by American Chemical Society

Citation: Creating the perfect Bloody Mary: Good chemistry of fresh ingredients (2011, March 29) retrieved 30 April 2024 from <https://phys.org/news/2011-03-bloody-mary-good-chemistry-fresh.html>

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