My Coffee Just Killed My Computer!

We've all had that moment of panic when our beverage of choice, possibly sitting a little too close to the computer, gets bumped by a careless, quick movement or an unnoticing coworker passing by. Have you ever wondered, "will this just be a pain to clean or will it actually damage my computer (or keyboard, mouse, etc.)?" If the computer is on, this has everything to do with a possible short. A short is only possible if your drink is conductive. So, how conductive do you think drinks are? DfR Solutions has taken conductivity measurements of a sizable number of common drinks using a graduated cylinder, a conductivity meter, and a dip cell.

Conductivity through a solution, in theory, works only so well. In this field, experimental data spawns models for solutions. Basically, charge is carried through a solution by ions, charged atoms or molecules, in that solution. For example, simple table salt, sodium chloride, when dissolved in water breaks up into sodium cations (positive charge) and chloride anions (negative charge) and makes the mixture much more conductive than pure water. Substances that increase the conductivity of a solution can be called electrolytes. Electrolytes are split into two categories, weak and strong electrolytes. Examples of weak electrolytes (in water) are weak organic acids like citric acid and lactic acid. Strong electrolytes (also in water) include sodium chloride, hydrochloric acid, and copper sulfate. The basic difference between weak and strong electrolytes is the average amount of time they spend in their ionic form. This time is dependant on a given species, its concentration, any other species also present and their concentrations, the solvent these species are dissolved in, and temperature. Weak electrolytes spend more time on average as their neutral species and strong electrolytes spend much more time on average as their ionic species.

DfR tested twelve commonly found beverages. A table with a specific conductivity for each drink was prepared. Not too surprising, fruit juice tops the list. Citric acid is among many conductive species found in juice. Also not surprising is the next highest, Gatorade. As advertised, they pack it with electrolytes for the physically active. Next on the list is coffee with cream and sugar followed closely by straight, black coffee. It does not appear to be related to caffeine content as Mountain Dew is at the bottom of the list. Mountain Dew, as friends of mine found when comparing caffeine content in sodas using GC/MS, has more caffeine than many other major brands of soda. Coffee does contain a number of acids. Coffee oils may also contribute some conductivity. Sodas are next up, containing almost entirely water and high fructose corn syrup. Corn syrup is weakly conductive. Diet sodas typically contain aspartame and, more recently, a mixture of aspartame and potassium acesulfame as artificial sweeteners. These sweeteners are hundreds of times sweeter than sucrose and are added in very small quantities, making diet sodas almost entirely carbonated water.

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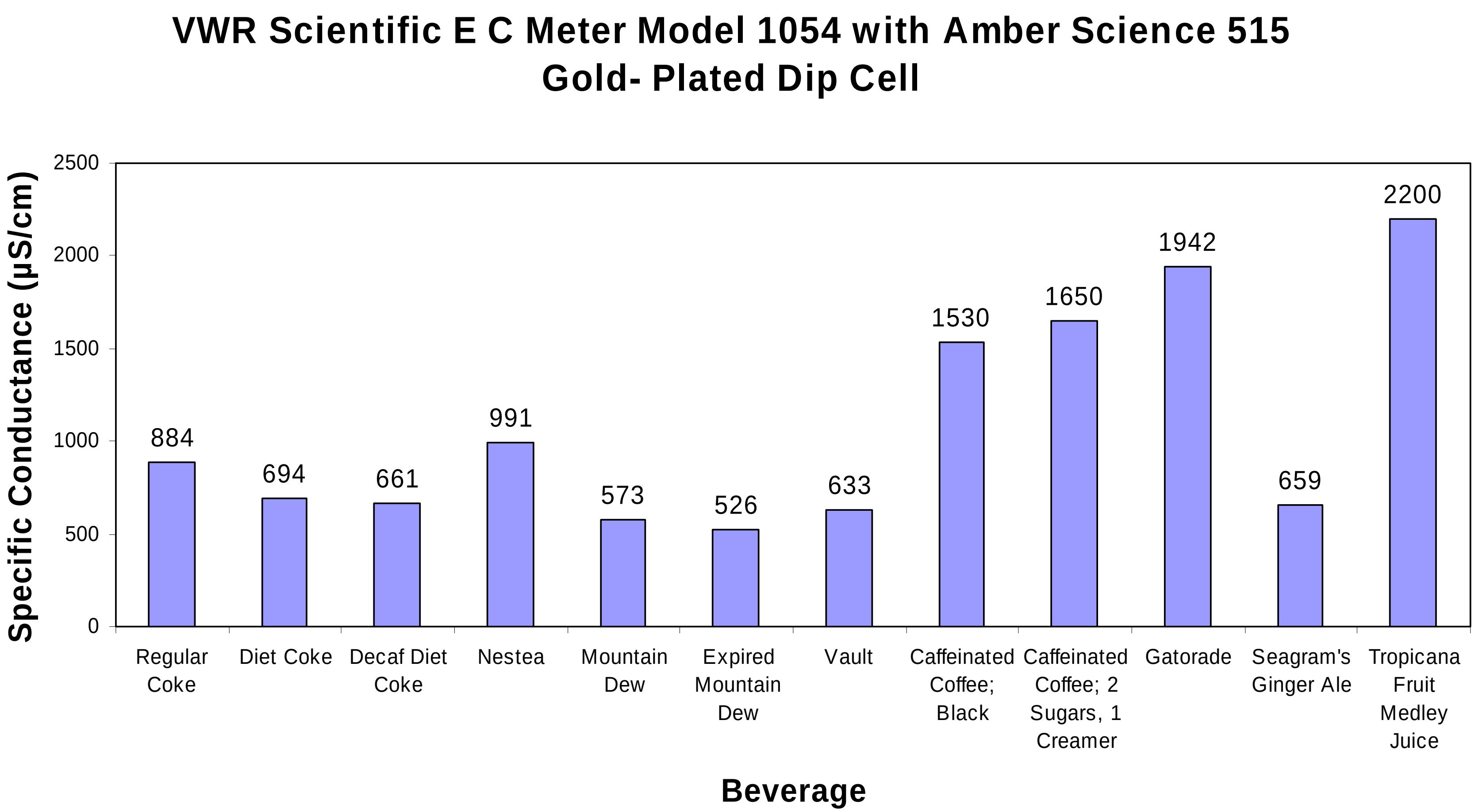
VWR Scientific E C Meter Model 1054 with Amber Science 515 Gold- Plated Dip Cell
Specific Conductance (µS/cm)
2500
2000
1500
1000
500
0
884
694
661
991
573
526
633
1530
1650
1942
659
2200
Regular Coke
Diet Coke
Decaf Diet Coke
Nestea
Mountain Dew
Expired Mountain Dew
Vault
Caffeinated Coffee; Black
Caffeinated Coffee; 2 Sugars, 1 Creamer
Gatorade
Seagram's Ginger Ale
Tropicana Fruit Medley Juice
Beverage

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