Potassium Carbonate,
A new mead standard additive?

Based on a pH issue dialog from a group pyment brew, I thought it might be timely to discuss a related topic that I believe may reach the notoriety of staggered nutrient additions (a notion I first began to develop over 6 years ago, and introduced 11/08/03).

Over that past two years, I have been working on establishing a new ingredient as a standard traditional mead recipe additive - **potassium carbonate** - K_2CO_3. Without going into to excessive detail, I believe that the addition of 5g potassium carbonate to traditional mead must will supplement honey's sub-standard potassium levels, improving its pH buffering capabilities - without risk of adding off-flavors, and strengthen the yeast's resistance to EtOH toxicity.

Based on my empirical observations, and supported by scientific findings by **Dr. Clayton Cone** (Lallemand), **Haydak**, et al, and **Bisson** (as summarized in **Ken Schramm**'s Nov/Dec 2005 *Zymurgy* article), I believe an "up-front" addition of potassium carbonate will serve to improve mead fermentation, and help mitigate stuck fermentations.

It is well known that honey is a poor source of nutrients & trace minerals needed for healthy yeast growth, and has poor pH buffering capabilities. One of those important minerals is potassium, whose level impacts the must's pH buffering capacity.

Research has shown, that the potassium level in varietal honeys range from 100 ppm to 4700 ppm (light to dark honeys), with an average 205 ppm for light honeys. Add to that, the dilution effect on those potassium levels after some volume of water is added to the honey. The must potassium levels are further reduced.

Adding 5g of K_2CO_3 to a 5 gal batch of mead adds ~**136 ppm** of supplemental potassium, while the carbonate serves to temper the characteristically low honey pH and the normal pH drop created by the fermentation process.

> Minerals are also a large part of the buffering capacity of must. Clayton Cone notes that potassium levels above 300 ppm are critical to maintenance of pH levels. Haydak, et al, reported levels from 100 ppm in light honeys (not enough) to over 4700 ppm in darker honeys (more than enough). The average of 205 ppm for light honeys, however, would predict a substantial shortfall when diluted with water at ratios of 3:1 or 4:1. When potassium levels drop below 300 ppm, pH levels in the cell can drop below 2.7, and metabolic activity will virtually cease. Especially in the case of traditional and show meads, early monitoring of the pH is a wise preventative measure. Bisson also comments on the need to establish potassium levels early, as well as the strong possibility that potassium plays a role in strengthening the plasma membrane's resistance to ethanol toxicity.

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While other potassium-based compounds might be used, my experience and observations are based solely on potassium carbonate. Also, because of the physical nature of K_2CO_3, I recommend it be **added by weight** measurement rather than by volume.

Q: Would $CaCO_3$ provide the same buffering effect?
A: The molar weight of $CaCO_3$ is different than that of K_2CO_3. Second, the balanced chemical equations are not the same. Those differences mean that concentrations of the constituents are not the same - per unit weight.

Moreover, $CaCO_3$ is **insoluble** in water; whereas K_2CO_3 has a solubility of 112g/100ml. This means that any CaCO3 added to the must does not dissolve as quickly as the potassium based carbonate, and (because of the slower reaction rate) is likely to lead to over-adding; resulting in a chalky taste contribution to the product.

I have never advocated using $CaCO_3$ because it is simply "chalk", it is slow to react, and can easily contribute off-flavors to a mead. I have always recommended the use of K_2CO_3.

2/8/07