

COMPARISON OF THE PERFORMANCE OF THE POTASSIUM AND SODIUM SALTS OF ACID SULFATE IN SELECTED BEVERAGE SYSTEMS.

Background

Sodium acid sulfate is being developed as an acidulant for foods and beverages. This is the principle material currently produced by Jones Hamilton Co. This material is not recommended for the following applications:

- Powdered foods and beverages, as it's slightly hygroscopic nature means that it absorbs the moisture from the other ingredients, forms a highly concentrated local liquid environment in the powder and dark specking results from localised hydrolysis of some ingredients.
- Low sodium foods and drinks as with 20% of the salt being the sodium ion this makes a measurable contribution to the product.

The potassium salt is the answer to both these issues and, in a medium term, could be manufactured by Jones Hamilton Co.

The potassium salt is self affirmed GRAS in the US. In Europe it is legislated as potassium hydrogen sulphate, it is in schedule 1 of the Miscellaneous Food Additives Regulations 1995 No. 3187. It has the E number 515ii within the potassium sulphates category. It is prudent, therefore, to evaluate the performance of this salt in systems where the benefits of the sodium salt are relatively understood.

To this end the potassium salt has been compared to the sodium salt in three beverages. A citric acidified beverage was also included as an internal reference to any differences noted.

Formulations

Pear Flavoured water

Syrup Ingredients

	% w/v
1. Aspartame	0.351
2. Acid	as required
3. Sodium Benzoate - 20% Solution	0.488
4. Tri-sodium Citrate	0.260
5. Pear Flavour (Natural) 2SX- 75508	0.650
6. Water	To volume

Finished Product Preparation:

1. Dilute 1 part syrup with 5.5 parts carbonated water.
2. Cap and invert.

Acid Concentrations

Citric	0.14% w/v
Sodium acid sulfate	0.08 %w/v
Potassium acid sulfate	0.08%w/w

Apple and Pear Drink

Ingredients

	%w/v
1. Apple Juice	50.000
2. Acid	as required
3. Pear Flavour (Natural) 2SX- 75508	0.100
4. Aspartame	0.025
5. Water	To volume

Acid Levels

Citric	0.12%w/w
Sodium acid sulfate	0.07%w/w
Potassium acid sulfate	0.07%w/w

Red Grape and Cranberry Drink

Ingredients

	%w/v
1. Red Grape Juice	50.000
2. Acid	as required
3. Cranberry Flavour (Natural) 2SX- 76435	0.100
4. Aspartame	0.025
5. Water	To volume

Acid Levels

Citric	0.12%w/w
Sodium acid sulfate	0.07%w/w
Potassium acid sulfate	0.07%w/w

Tasting Results

Pear Flavoured water

Citric Acid	Sodium Salt	Potassium Salt
<i>A synthetic, confectionery style of flavor with a bitterness and lingering sweetness in the aftertaste.</i>	<i>Flavor very true to ripe pears. Good sweetness acid balance with a clean, bright, fruity flavor in the aftertaste.</i>	<i>Flavor softer as with the sodium salt but less depth of flavor and less overall body. More lingering to the sweetness when compared to the Na salt but much better than the citric beverage.</i>

Apple and Pear fruit drink

Citric Acid	Sodium Salt	Potassium Salt
<i>A more floral flavor with a colder mouthfeel and less body and a bitterness and lingering sweetness in the aftertaste.</i>	<i>Full flavored product much more syrupy in the mouth with a balanced ripe fruit flavor. Good sweetness acid balance with a clean, bright, fruity flavor in the aftertaste.</i>	<i>Flavor softer as with the sodium salt but less depth of flavor. Mouthfeel generally colder with less fruity taste in the aftertaste. More lingering to the sweetness when compared to the Na salt but much better than the citric beverage.</i>

Red Grape and Cranberry fruit drink

Citric Acid	Sodium Salt	Potassium Salt
<i>A more floral flavor with a colder mouthfeel and less body and an astringent tannin bitterness and lingering sweetness in the aftertaste.</i>	<i>Full flavored product much more syrupy in the mouth with a balanced ripe fruit flavor. Good sweetness acid balance with a clean, bright, fruity flavor in the aftertaste.</i>	<i>Flavor softer as with the sodium salt but less depth of flavor. Mouthfeel generally colder with less fruity taste in the aftertaste. More lingering to the sweetness when compared to the Na salt and some astringency but much better than the citric beverage.</i>

Conclusions

Each of the beverages tested in this exercise showed a similar difference between the two salts. The marked benefits that have been demonstrated when comparing a citric acid acidified system with one containing sodium acid sulfate are slightly muted when the potassium salt is used in the same formulations. The flavour profiles are generally less intense and there is less body and syrupy mouthfeel in the beverages. There is also a tendency for the sweetness of these intense sweetened beverages to be more apparent in the aftertaste.

There is still a softer overall flavor when the potassium salt is used in these systems but the overall taste difference is subtler.

These differences are consistent with the flavour enhancing effects normally associated with sodium ions. This is adding to the overall character of the acid and also affecting the aftertaste.

Clearly there are advantages to using the potassium salt in dry mix products and in low sodium products but it should be recognised that there will be performances differences in the overall taste delivery this form of the acid delivers.

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