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A taste of things to come

Tel. ++44 (0) 1628 628635

Fax. ++44 (0) 1628 781220

***EVALUATION OF
SODIUM HYDROGEN SULPHATE
IN FLAVOURED WATERS***

A Report Prepared for Jones-Hamilton Co.

August 2002

INTRODUCTION

Following an initial evaluation of the performance of sodium hydrogen sulphate (SHS) in lemonade style beverages it was deemed appropriate to evaluate the performance of this acid with a range of flavour types to assess the best fit of flavour with the particular acid profile provided by SHS.

A range of flavoured waters was prepared acidified with SHS and sweetened with aspartame. These beverages were directly compared with their counterparts that had been acidified with citric acid to an equivalent pH. The base formulations are given in appendix 1. The flavour details are given in appendix 2.

The tasting was conducted as a round table exercise with a small panel of trained Food Technologists skilled in describing the overall flavours in these systems.

RESULTS

The taste testing of the various flavours with SHS compared to citric in this sugar free beverage are summarised below.

Flavour Type	Beverage with Citric Acid	Beverage with Sodium hydrogen Sulphate
<i>Strawberry</i>	<i>A green strawberry aroma with a confectionery red fruit flavour characteristic and an intensely sweet, lingering aftertaste.</i>	<i>A less intense aroma with a more natural ripe fruit pulp flavour. Some softer more vanilla notes also apparent and a bright clean aftertaste.</i>
<i>Peach</i>	<i>A floral style peach flavour with a slightly acid bite and some vanilla notes. A lingeringly sweet aftertaste.</i>	<i>A fresh fruit flavour characteristic of peach flesh. A softer, less acidic flavour overall with a clean, juicy aftertaste.</i>
<i>Elderflower</i>	<i>A very floral flavour with an intrusive acid note and lingering sweetness.</i>	<i>A fragrant, light flavour with a mild acidity and a bright fresh flavoured aftertaste.</i>
<i>Pear</i>	<i>A synthetic, confectionery style of flavour with a bitterness and lingering sweetness in the aftertaste.</i>	<i>Flavour very true to ripe pears. Good sweetness acid balance with a clean, bright, fruity flavour in the aftertaste.</i>
<i>Raspberry</i>	<i>A confectionery style of raspberry flavour with some pippy bitterness in the aftertaste and a lingering sweetness.</i>	<i>Overall a fruitier, more balanced flavour with a good raspberry flesh flavour and a clean bright, sharper aftertaste.</i>
<i>Cranberry</i>	<i>A fruity impact for this flavour but a very pronounced bitterness and lingering sweetness.</i>	<i>A good berry flavour with a balanced acidity and clean bright aftertaste.</i>
<i>Apricot</i>	<i>A sweet fruity flavour with some peach notes and an unbalanced acidity and lingering sweetness.</i>	<i>More ripe apricot flavour with a balanced acidity and clean aftertaste.</i>
<i>Tropical</i>	<i>Mixed tropical style flavour with pronounced passion fruit notes. Astringent and bitter aftertaste with lingering sweetness.</i>	<i>Overall more balanced juicy flavour with a clean, fresh, fruity aftertaste.</i>
<i>Mint</i>	<i>Very unbalanced combination with the acidity very out of character with the flavour. Once more the aftertaste was</i>	<i>Much more balanced, softer flavour. More of a spearmint character. Acid sweetness balance good with a bright</i>

	<i>intensely acidic.</i>	<i>aftertaste.</i>
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CONCLUSIONS

The performance of SHS as an acidulant for this style of flavoured water is consistent across all the flavour types tested. The overall acidity release on the palate gives a softer, rounder flavour type that is particularly compatible with fruit flavours, bringing out the juicy notes in the flavour. In conjunction with intense sweeteners SHS gives a more natural overall flavour characteristic with a brighter cleaner aftertaste.

RECOMMENDATIONS

This set of data gives a consistent response for flavours when formulated with SHS as the acidulant. This should, therefore, be used as a marketing message with those ingredient companies or manufacturing companies interested in flavour manipulation and product improvement.

Product benefits include:

- *More balanced flavour profiles*
- *Softer, less intrusive acidity*
- *Juicier fruit notes*
- *Riper fruit character*

The benefits with the use of intense sweeteners should be particularly highlighted.

- *Masking of aftertastes associated with intense sweeteners*

APPENDIX 1

BEVERAGE FORMULATIONS

Product Data Sheet

Flavoured waters

Flavour: *Various*

Product: *Citric acid/ Aspartame Sweetened*

Formulation:

<i>Syrup Ingredients</i>	<i>% w/v</i>
1. <i>Aspartame</i>	<i>0.351</i>
2. <i>Anhydrous Citric Acid</i>	<i>0.910</i>
3. <i>Sodium Benzoate - 20% Solution</i>	<i>0.488</i>
4. <i>Tri-sodium Citrate</i>	<i>0.260</i>
5. <i>Flavour</i>	<i>as required</i>
6. <i>Water</i>	<i>To volume</i>

Syrup Preparation:

1. *Place sodium benzoate into volumetric flask.*
2. *Add a portion of the water to the flask.*
3. *Add aspartame, citric acid, tri-sodium citrate and flavour.*
4. *Make up to volume with water ensuring all ingredients are dissolved.*

Finished Product Preparation:

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

Final Product Characteristics

Acid concentration 0.14%w/v

pH 3.2

Aspartame 540ppm

Ingredient Suppliers:

1 & 2 Direct Food Ingredients
3 & 4 Fiske Food Ingredients
5 Various: see Appendix 2

Telephone Number:

01625618617
01908 362200

Product Data Sheet

Flavoured waters

Flavour: *Various*

Product: *Sodium Hydrogen Sulphate/Aspartame Sweetened*

Formulation:

<i>Syrup Ingredients</i>	<i>% w/v</i>
1. <i>Aspartame</i>	<i>0.351</i>
2. <i>Sodium Hydrogen Sulphate</i>	<i>0.520</i>
3. <i>Sodium Benzoate - 20% Solution</i>	<i>0.488</i>
4. <i>Tri-sodium Citrate</i>	<i>0.260</i>
5. <i>Flavour</i>	<i>as required</i>
6. <i>Water</i>	<i>To volume</i>

Syrup Preparation:

1. *Place sodium benzoate into volumetric flask.*
2. *Add a portion of the water to the flask.*
3. *Add sucrose, citric acid, tri-sodium citrate and flavour.*
4. *Make up to volume with water ensuring all ingredients are dissolved.*

Finished Product Preparation:

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

Final Product Characteristics

Acid concentration 0.08 %w/v

pH 3.2

Aspartame 540ppm

Ingredient Suppliers:

- 1 *Direct Food Ingredients*
- 2 *Jones Hamilton Co*
- 3&4 *Fiske Food Ingredients*
- 5 *Various: see Appendix 2*

Telephone Number:

- 01625618617
- ++1 419 666 9838
- 01908 362200

APPENDIX 2

FLAVOURS

Flavours used in programme

<i>Flavour Type</i>	<i>Reference</i>	<i>Supplier</i>	<i>Status</i>	<i>Dose RTD (%w/v)</i>
<i>Strawberry</i>	<i>5SX- 75442</i>	<i>Synergy Flavours Ltd</i>	<i>NI</i>	<i>0.15</i>
<i>Peach</i>	<i>5SX- 70584</i>	<i>Synergy Flavours Ltd</i>	<i>NI</i>	<i>0.10</i>
<i>Elderflower</i>	<i>2LX- 71413</i>	<i>Synergy Flavours Ltd</i>	<i>NI</i>	<i>0.15</i>
<i>Pear</i>	<i>2SX- 75508</i>	<i>Synergy Flavours Ltd</i>	<i>NI</i>	<i>0.10</i>
<i>Raspberry</i>	<i>2SX- 73028</i>	<i>Synergy Flavours Ltd</i>	<i>NI</i>	<i>0.10</i>
<i>Cranberry</i>	<i>2SX- 74234</i>	<i>Synergy Flavours Ltd</i>	<i>NI</i>	<i>0.08</i>
<i>Apricot</i>	<i>DA 32838</i>	<i>Quest International</i>	<i>NI</i>	<i>0.10</i>
<i>Tropical</i>	<i>QL 10817</i>	<i>Quest International</i>	<i>NI</i>	<i>0.10</i>
<i>Mint</i>	<i>M30023</i>	<i>Mane</i>	<i>NI</i>	<i>0.10</i>