Measuring Tea Color Using A Simple Spectrometric Assay

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ABSTRACT

A simple fast analytical method for measuring tea color was used to measure the color of various tea bases. Briefly, the method is to take tea concentrate or base and dilute to 0.3°Brix, take aliquot and dilute by a factor of 10, read the absorbance at 460nm and multiply by 10. Generally the tea bases had more color at pH 4.0 as compared to pH 2.7 . TBC-060 had the highest color, almost twice that of the Argentina teas. This test, being very fast and easy could be incorporated into GC test and specifications.
A second method used in the caramel color industry was added. It is the measure of Hue. It is ten times the log of the ratio of absorbances at 510nm and 610nm. The Hue Index usually ranges from 3.4 (very dark walnut brown) to 7.5 (amber red-brown) for caramel colors (0.1% solution)

INTRODUCTION

One of the important aspects of tea is the color of the infusion. For black teas, a richer darker color is desirable. In the past, Sensus didn't measure the color and it is not part of the specification for the tea base concentrates. Measuring this analytically could help provide a level of consistency in the product. It should be noted though that not meeting the color specification could result in problems. One of the most important aspects in a QC test is the easy of sample preparation and the speed of analysis. This method is incredibly quick (dilute to 0.3 °Brix followed by a 1:10 dilution, then measuring absorbance at 460nm. This leads itself to being useful as a both a research and possibly a quality control tool.

MATERIALS AND METHODS

The method is derived from Obanda et al. 5 mL of 0.3 °Brix tea solution was diluted with 45 mL of water for a 1:10 dilution. The absorbance of this solution was measured at 460 nm using a ThermoElectron Genesys 6 UV-VIS Spectrophotometer (Minneapolis, MN), and multiplied by 10 for convenience. Sensus A, Sensus B and two Argentina teas were measured at pH 2.7 and 4.0.
A second method based on measurements in the caramel color industry was also used (Linner, 1970). This method used the same samples and measured the absorbances at 510nm and 610nm and calculated the hue:
Hue=10*log(A510/A610)

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Along with hue, tinctorial power was also measured. In the caramel industry it is simply the measure of the absorbance at 560nm of a 0.1% solution. This was modified for tea to be the absorbance at 0.3°Brix.

RESULTS AND DISCUSSION

A consistent and analytical measurement of color is desirable. This method provides a very fast and easy way to obtain this data. From the data in Table 1, we can see that Sensus A has the highest color of the products tested. Additionally, the trend of darker color with higher pH is clearly present with color at pH 4.0 being higher than or equal to the same product at pH 2.7. Table 1 also has the Hue values for the various products.
A new objective analytical method is presented which enables rapid, consistent, color data that is useful for both R&D and/or QC/QA applications. As known, higher pH produces higher color.

Tables

Table 1. Tea color for various products

Product	Color value	Hue	Tinctorial Power
TBC-060 pH 4.0	0.93	2.87	0.042
TBC-060 pH 2.7	0.93	2.73	0.043
TBC-145 pH 4.0	0.75	3.30	0.031
TBC-145 pH 2.7	0.69	3.11	0.028
Argentina opt. B pH 4.0	0.57	4.18	0.021
Argentina opt. B pH 2.7	0.47	4.44	0.014
Argentina opt A pH 4.0	0.44	4.26	0.014
Argentina opt. A pH 2.7	0.40	4.97	0.011

REFERENCE CITED

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