

Applications Note

ANALYSIS OF TOMATO PASTE

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Introduction

The analysis of tomato paste and puree is an application where the GPR refractometer excels. The instrument's superb optics, state of the art electronics and emulsion scale operating system provide the means of determining the Brix value of either a diluted or undiluted sample.

The GPR gives a rapid, direct output of results with virtually no sample preparation.

The standard analysis method is defined in Pearsons Chemical Analysis of Food published by Churchill Livingstone, ISBN 0 443 02149 X.

The results in this application note were obtained during experimental work carried out on behalf of customers.

Pearsons method

Pearsons method states that the standard for tomato puree were recommended by the Comite International Permanent de la Conserve (CIPC1959). Draft European Community proposals recommended five gradings according to the dry solids content as determined by refractometry. These are as follows:

Puree type	Minimum percent dry solids
Semi-concentrate	12%
Concentrate	18%
Double concentrate	28%
Triple concentrate	36%
Sextuple concentrate	55%

Under the regulations, it is permitted to add salt (maximum 10% of dry solids) and spices. Tomato purees prepared to these standards can be marketed either without any indication of quality (standard product) or with the indication 'Extra' quality. Various standards for each quality group were proposed including the following (all figures are expressed as percentage dry solids)

	Standard quality	Extra quality
Total sugar (as invert sugar), minimum	45	50
Titratable acidity (as citric acid), minimum	10	9
Volatile acidity (as acetic acid), maximum	0.30	0.15
Mineral impurities Insoluble in water, maximum	0.10	0.05

Analysis

Two methods are given, the first is by weighing, drying and reweighing, the second relates to the total solids content to the refractive index as follows:

Mix 10g sample with 20g water and filter through a small paper. After rejecting the first runnings determine the refractive index of a drop of filtrate at 20°C., Obtain the solid content of the filtrate from the data in table 1 and then obtain the concentration in the original sample by multiplying by 3. Less concentrated samples can be strained directly through muslin.

Table 1

Relationship between refractive index and total solids of tomato puree and pulp.

% Total solids*	Refractive index @ 20°C
5.0	1.3398
7.5	1.3433
10.0	1.3468
12.5	1.3502
15.0	1.3538
17.5	1.3575
20.0	1.3611
22.5	1.3651
25.0	1.3690
27.5	1.3731
30.0	1.3772
32.5	1.3816
35.0	1.3860

*after drying in-vacuo at 70°C

Worked examples

Using samples of tomato paste obtained from Turkish and Italian sources, the following results show that measurements of undiluted tomato paste made on the GPR 12-70 using the in-built Brix scale give results in good correlation with the Pearsons method.

Avoiding the dilution step both saves time and eliminates one source of error. It is also best to avoid filtering samples as microscopic particles from the diluted paste can be retained in the filter paper and introduce a consistent reading error. Different filtering media affect the reading to various degrees.

The samples do not need to be filtered so this problem is avoided.

Sample 1 Turkish sample

Direct measurement (with no sample preparation) on GPR 12-70 @ 20°C, Brix scale	30.2 Brix
Using Pearsons method - 10g sample with 20g water and filtered Refractive Index=1.3468=1% solids according to table 1, multiply x 3, (see method)	30.0% solid

Sample 2 Italian sample

Direct measurement (with no sample preparation) on GPR 12-70 @ 20°C, Brix scale	29.4 Brix
Using Pearsons method—10g sample with 20g water and filtered Refractive Index 1.3465=9.8% solids according to table 1, multiply x 3 (see method)	29.4% solid

Disclaimer

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