Roth's Maple Syrup

Quality products for 60 years!

Roth's Maple Syrup
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Chemistry of Pure Maple Syrup

Pure maple syrup consists primarily of sugars—90 to 100% sucrose and 0 to 10% glucose. Other chemical components of maple syrup include amino acids, proteins, and organic acids and trace levels of vitamins. The caloric content of maple syrup at standard density is 40 calories per tablespoon **(Table A-2.7)**. The composition of sugar sand is presented in **Table A-2.6**. However, a large amount of mineral material has been found dissolved in maple syrup with potassium and calcium being the most prevalent **(Table A-2.8)**.

Table A-2.6. Composition of Sugar Sand[1].

Sugar sand (in run)	percent	0.05-1.42
pH		6.30-7.20
Ca	percent	0.61-10.91
K	percent	0.146-0.380
Mg	percent	0.011-0.190
Mn	percent	0.06-0.29
P	percent	0.03-1.18
Fe	p.p.m.	38-1,250
Cu	p.p.m.	7-143
B	p.p.m.	3.4-23
Mo	p.p.m.	0.17-2.46
Free Acid	percent	0.07-0.37
Total malic acid	percent	0.76-38.87
Acids other than malic	percent	0.08-2.62
Undetermined material	percent	6.94-34.16
Calcium malate	percent	1.30-49.41

Table A-2.7. Organic Composition of Maple Syrup[1].

Carbohydrates	
Sucrose	88 -> 99%
Hexoses (Fructose & Glucose)	0 - 11%
Other sugars	Trace
Calories	
Maple Syrup	252/100g = 40/tablespoon = 80/oz.
Karo Corn Syrup	295/100g = 60/tablespoon = 120/oz.
Honey	304/100g = 45/tablespoon = 90/oz.
Molasses	252/100g = 40/tablespoon = 80/oz.
Organic Acids	
Malic	0.141%
Citric	0.015%
Succinic	0.012%
Fumaric	0.006%
Unidentified	Trace
Amino Acids	
Primary amines	Trace

Sugars in dried samples	percent	33.90-85.74
Sugar sand in dried samples	percent	14.26-66.09
[1]Willits and Hills, 1976, p. 66.		

Phenolic compounds	Depending upon syrup grade
Vitamins	
Niacin (PP)	276 mg/L 8.2 mg/oz
Pantothenic Acid (B5)	600 mg/L 17.7 mg/oz.
Riboflavin (B2)	60 mg/L 1.8 mg/oz.
Folic Acid	Trace
Pyridoxie (B6)	Trace
Biotin	Trace
A	Trace
[1]Morselli, 1975.	

Table A-2.8. Mineral Composition of Maple Syrup[1].

	parts per million	**milligrams/oz.**
Potassium	1300-3900	38.4-115.3
Calcium	400-2800	11.8-62.1
Magnesium	12-360	0.4-10.6
Manganese	2-220	0.06-6.5
Sodium	0-6	0-0.2
Phosphorus	79-183	2.3-5.4
Iron	0-36	0-1.1
Zinc	0-90	0-22.7
Copper	0-2	0-0.06
Tin	0-33	0-1.0
Lead	0-.25	0-0.007
[1]Morselli, 1975.		

Maple sap is concentrated by heat to develop a grade of syrup with a characteristic color and flavor. The most important factor affecting syrup volume production is sap sugar concentration. All sugar makers are aware of the Jones' Rule of 86: if the sap concentration of sugar is 1%, then 86 gallons (391 liters) of sap are needed to make one gallon (4.55 liters) of syrup. For example, at 2% sap sweetness, only 43 gallons (162 liters) are needed to make a gallon (4.55 liters) of syrup. The sweeter the sap, the more volume of syrup can be produced and less fuel and time will be necessary for sap processing. Sugarbush management to increase the average sugar content of the sugarbush pays off directly to the producer in savings elsewhere.

All maple syrup is required to be finished to the same minimum density—66.0° Brix at 68°F (Federal US and Canadian law). Some states, like Vermont, require

higher density (66.0° Brix at 60°F). If syrup is too thin, it spoils quickly during storage. If syrup is too thick, sucrose crystals slowly precipitate and settle to the bottom of the container. Accordingly the producer loses profit due to decreased volume, while the consumer does not get full value of the sugar produced.

Information on this page was taken from the North American Maple Syrup Producers Manual, 2nd Edition, produced by Ohio State University Extension in cooperation with the North American Maple Syrup Council.