



DETERMINATION OF POTENTIAL CONCENTRATION OF SULPHITES IN MAPLE SYRUP

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The International
Maple Syrup
Institute

WHAT DOES SULPHITES MEAN?

- ✖ The term Sulphites or Sulfites can designate all inorganic salts containing the trioxidosulfate ion SO_3^{2-}
- ✖ Sulfur dioxide and several form of inorganic sulphite that liberate (SO_2), under the condition of use, are called sulphiting agents

SULPHITES & FOOD

- ✘ Sulphites are used as Food additives due to their antioxidant and preservative properties :
 - prevent enzymatic and nonenzymatic browning
 - control growth of microorganisms
 - act as bleaching agents
 - antioxidants, or reducing agents
- ✘ Sulphites occur naturally in some foods and beverages as a result of fermentation(e.g. beer and wine)

REGULATIONS CONCERNING SULPHITES


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Sulphites - One of the nine most common food products causing severe adverse reactions

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Sulphite sensitivity reactions
Allergic reactions are severe adverse reactions that occur when the body's immune system overreacts to a particular allergen. These reactions may be caused by food, insect stings and medications. In Canada, the nine priority food allergens are peanuts, tree nuts, sesame seeds, milk, eggs, seafood (fish, crustaceans and shellfish), soy, wheat and sulphites (a food additive). Although sulphites do not cause a true allergic reaction, sulphite-sensitive people may experience similar reactions as those with food allergies. Those who have asthma are most at risk to sulphite sensitivity and other forms of sulphite reactions.

 **Sulphites**
One of the nine most common food products causing severe adverse reactions





REGULATIONS CONCERNING SULPHITES

- ✗ Consequently, several food regulation agencies in the world have adopted new rules to control the use of sulphiting agents. Thus, the presence of sulphites in food at more than **10 ppm** would be declared on the food labelling (*Lecos, C.W. 1986, Health Canada 2010*).

MAPLE SYRUP & SULPHITES



- ✗ A natural product free of any colouring or additives



No Sulphiting Agents added as food preservatives



MAPLE SYRUP & SULPHITES

- ✖ Some publications mention that maple syrup may contain sulphites (*Taylor et al, 1986*).
- ✖ These published data are based on theoretical estimates or assumptions and to our knowledge, analytical tests of sulphites in maple syrup have never been conducted.

SULPHITE TESTING FOR MAPLE SYRUP

✖ Sampling parameters :

- Color class effects : relationship between color classes of maple syrup and period of sugar season or microorganism activities have been clearly established in several studies. Also natural occurrence of sulphites has been related in certain cases to microorganism activities or fermentation.
- Contamination by sulphiting agents : Several cleaning products are employed in sugar industry. Some of these products may contain sulphiting agents (storage of the reverse osmosis membranes). Thus, if these products are applied inappropriately, sulphite residues might be found in concentrated maple sap, and then in maple syrup.

SULPHITE TESTING FOR MAPLE SYRUP

- ✖ Color class or microorganism activity effects :
20 maple syrup samples were evaluated (4 samples per color classes)
- ✖ Contamination by sulphiting agents :
Sulphites were monitored in the first productions of maple syrup during 10 days (1 sample per day)

SULPHITE ANALYSIS

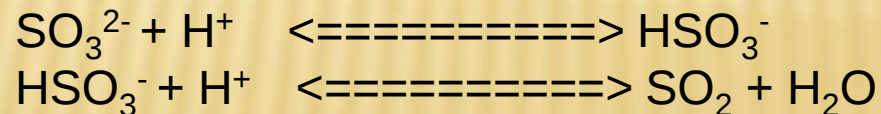
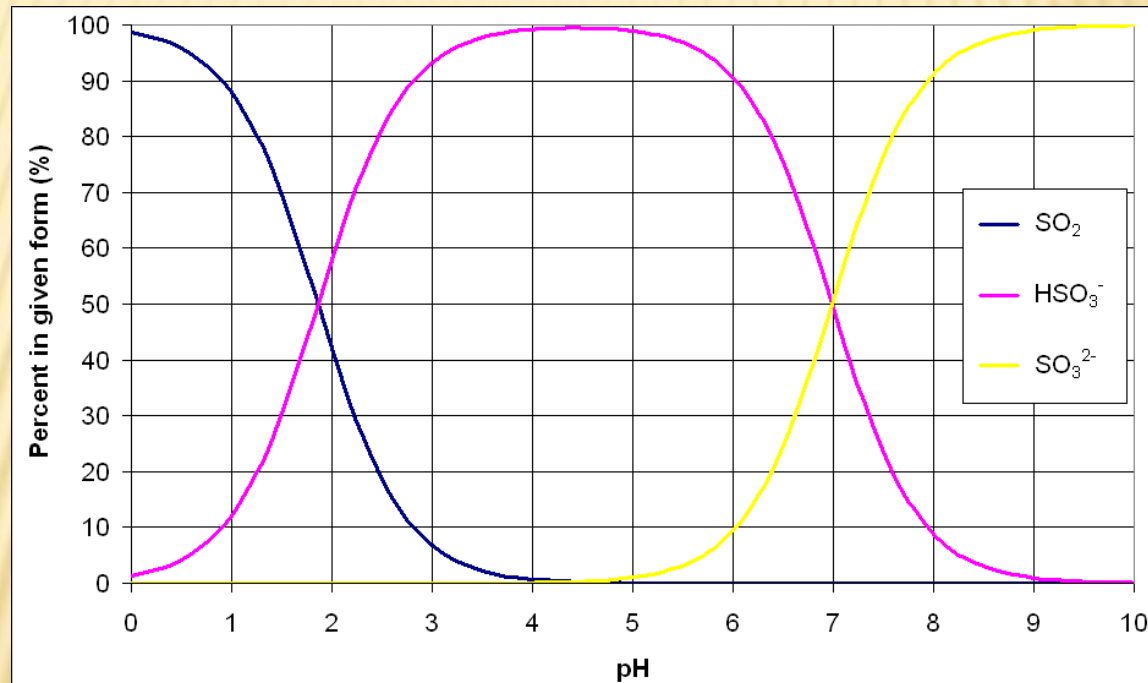
- ✖ 20 samples to assess the color class effects
- ✖ 10 sample for investigation of maples syrup contamination by sulphiting agents
- ✖ Sulphite analysis were conducted by Maxxam Analytics (Mississauga, Ontario), a laboratory accredited by the Standards Council of Canada and is an ISO 17025 accredited laboratory.

SULPHITE ANALYSIS METHOD

- ✖ AOAC Official Method 990.28, Sulfites in Foods (Optimized Monier-Williams Method)
- ✖ The method measures free sulphite plus reproducible portion of bound sulphites, such as carbonyl addition products.

SULPHITE ANALYSIS METHOD

- ✗ In a Distillation apparatus, sample is heated with refluxing HCL (1M, pH~0) to convert sulphite to SO₂



SULPHITE ANALYSIS METHOD

- ✖ SO_2 is oxidized to H_2SO_4 with 3% H_2O_2 solution
- ✖ H_2SO_4 is immediately titrate with 0.01M NaOH.
- ✖ Sulphite concentration is expressed in mg SO_2 /L maple syrup

SULPHITE CONCENTRATIONS IN MAPLE SYRUP

Maple syrup tested covering all color classes

Sample #	Sulphite concentrations (mg/L)				
	AA (>75%)	A (75 – 60.5%)	B (60.5 – 44%)	C (44 – 27%)	D (<27%)
1	<10*	<10	<10	<10	<10
2	<10	<10	<10	NA	<10
3	<10	<10	<10	<10	<10
4	<10	<10	<10	<10	<10

* 10 mg/L correspond to Reporting Limit (RL) or Reported Detection Limit (RDL)

SULPHITE CONCENTRATIONS IN MAPLE SYRUP

✖ Testing of sulphite residue in maple syrup

Sample # (Production Day)	Sulphite concentration (mg/L)
1 st Production Day	<10
2 nd Production Day	<10
3 rd Production Day	<10
4 th Production Day	<10
5 th Production Day	<10
6 th Production Day	<10
7 th Production Day	<10
8 th Production Day	<10
9 th Production Day	<10
10 th Production Day	<10

SULPHITE CONCENTRATIONS IN MAPLE SYRUP

- ✖ Sulphite concentrations observed in maple syrup are less than **10ppm** , which corresponds to the limit fixed by different regulation agencies for sulphite to be declared on the food labelling
- ✖ Maple syrup from other area in Canada (Ontario & New Brunswick) as well as from United State will be investigated to generalise our conclusion