



Frequently Asked Questions (FAQs) on Sulfites in Spices

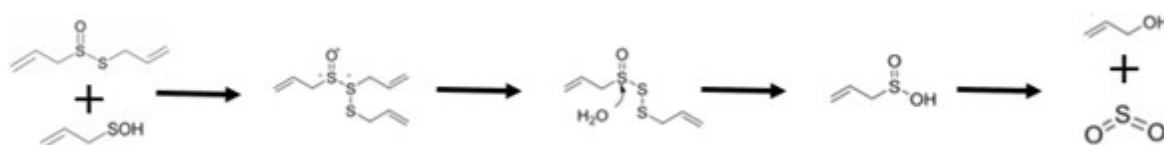
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1. What is the difference between “Added Sulfites” and “Naturally occurring sulfurous compounds”?

The following compounds are considered “Added Sulfites”: sulfur dioxide (SO₂), sodium sulfite (Na₂SO₃), sodium bisulfite (NaHSO₃), potassium bisulfite (KHSO₃), sodium metabisulfite (Na₂S₂O₅), and potassium metabisulfite (K₂S₂O₅). These are all inorganic compounds and do not contain any carbons.

Naturally occurring sulfurous compounds are organic compounds that contain carbon, hydrogen, sulfur, and sometimes oxygen. For example, thiosulfonates contain all four of these elements. The most well recognized thiosulfonate is Allicin. Allicin can react through oxidation, hydrolysis, enzymatic, and/or degradation pathways to produce sulfur dioxide (SO₂) molecules. See one example below.



Under acidic conditions many of these naturally occurring sulfurous compounds can react and form SO₂, thereby producing a positive result for “Added Sulfites” as SO₂.

2. Do naturally occurring sulfites >10 ppm in spices need to be declared?

No, naturally occurring sulfites do not require declaration, even if analytical results exceed 10 ppm, provided they were not intentionally added and do not have a technological function.

- The 10 ppm (mg/kg) total SO₂ threshold is a labeling trigger, not a source-attribution rule.
- FDA guidance explicitly states that naturally occurring sulfites (e.g., in garlic, onion, cabbage) are not required to be declared on labels. (21 CFR 101.100(a)(4))¹
- In the EU, Regulation (EU) 1169/2011² similarly requires labeling only for added or carry-over sulfites, not naturally occurring sulfites.

Key Takeaway: Exceeding 10 ppm alone does not obligate labeling if sulfites are naturally occurring.

¹ FDA has reiterated this position in recent updates to [Import Alert 99-21](#): Detention without Physical Examination of Food Products Containing Undeclared Added Sulfiting Agents. In the import alert, FDA recognizes that some foods contain naturally occurring sulfites, names onions, garlic and cabbage as examples of those foods, and states “[n]aturally occurring sulfites are not required to be declared on the label.” Although the Alert goes on to state “If these foods are found to contain sulfiting agent(s) at 10 ppm or greater, Divisions should consult with CFSAN, Office of Compliance . . .”, the Alert does not indicate a product in these circumstances is misbranded.

FDA distinguishes between “sulfiting agents” and “naturally occurring sulfites” for labeling purposes and uses these very specific terms to convey the difference in treatment. A 2017 [Warning Letter](#) from FDA to a ready-to-eat salad manufacturer lends further support to the conclusion that FDA distinguishes between naturally occurring and added sulfites for mandatory labeling purposes. The salad manufacturer evidently declared “sulfites” in the Contains allergen statement. FDA says in response: “While we do not object to a truthful, non-misleading statement regarding the presence of naturally-occurring sulfites, we note that *if sulfites are an added ingredient, they must be declared in the ingredient statement.*” (emphasis added).

² Regulation (EU) No 1169/2011. Available at <https://eur-lex.europa.eu/eli/reg/2011/1169/oj/eng>

3. What methods are available to test for sulfites in spices?

Available methods measure total sulfites only (free + bound), regardless of source:

- ASTA Method 30.0 – Determination of Added Sulfites in Dried Allium³
- LC–MS/MS total sulfite methods (Determination of Sulfites in Food using Liquid Chromatography – Tandem Mass Spectrometry Compendial Method C004.04)⁴

FDA regulations reference LC–MS/MS for enforcement testing.

Important Limitation: All accepted methods measure SO₂ concentration, not origin. Naturally occurring and added sulfites are analytically indistinguishable.

4. What levels would FDA consider as naturally occurring?

FDA does not define a numeric concentration that distinguishes naturally occurring from added sulfites. Instead:

- FDA recognizes that certain foods (including allium-derived spices) can naturally contain sulfites
- Results ≥10 ppm must be evaluated case-by-case, using process knowledge and supplier documentation, not concentration alone.

Industry and Codex guidance note that naturally occurring sulfites are typically low (<10 ppm) but may be higher in certain matrices, especially garlic and onion powders. For example, FDA has seen positive responses ranging from 25-98 ppm SO₂ when investigating commercial garlic powder when using the LC-MS/MS.⁵

Historical Clarification

Historically, FDA recognized that dried garlic can produce elevated apparent sulfite values when analyzed using the Monier-Williams (MW) method, which is susceptible to interference from naturally occurring organosulfur compounds. As a practical matter, FDA generally considered dried garlic samples with Monier-Williams results greater than approximately 230 ppm SO₂ to be indicative of added sulfites, while lower results could reflect naturally occurring sulfur compounds.

This historical threshold is referenced in the American Dehydrated Onion and Garlic Association (ADOGA) Official Standards and Methods⁶, which states:

"The FDA has recognized the existence of these naturally occurring sulfur compounds and has permitted levels as high as 230 ppm to be considered naturally occurring and not subject to labeling requirements."

³ Available at <https://astaspice.org/resources/asta-method-30-0-determination-of-added-sulfites-in-dried-allium-modified-monier-williams-method>

⁴ Available at <https://www.fda.gov/media/114411/download>

⁵ See FDA Foods Program Compendium of Analytical Laboratory Methods: Chemical Analytical Manual (CAM), Method C-004.04: Determination of Sulfites in Food using Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS), Published November 16, 2023. <https://www.fda.gov/media/114411/download?attachment>

⁶ Available at https://assets.noviams.com/novi-file-uploads/clfp/Member_Resources/PDFs_Documents/ADOGA_Manual_15th_Edition_Finalized_Review_1_5_23-8f5dd739.pdf

Similarly, a 2003 article⁷ published by two FDA scientists on the determination of sulfite in dried garlic noted:

"For example, in the case of dried garlic, the FDA has normally considered a sample yielding a result of >230 ppm by MW to contain added sulfite."

Lafeuille et al. (2007)⁸ further explained that:

"False-positive results between 50 and 200 ppm SO₂ generally occur for unsulfited garlic... FDA considers that a dried garlic contains added sulfites if the result is >230 ppm. This 230 ppm cut-off is an informal guideline and not official policy."

It is important to recognize that this 230 ppm value was not a regulatory limit or formal FDA policy, but rather an informal guideline developed in the context of the Monier-Williams analytical method, which is now known to overestimate sulfite concentrations in garlic because it converts naturally occurring organosulfur compounds to sulfur dioxide during analysis.

Since these publications, both FDA and industry have developed more selective analytical methods, including LC-MS/MS approaches, that substantially reduce these analytical interferences. An unpublished ASTA collaborative study (2011) demonstrated that garlic samples without added sulfites contained <10 ppm sulfite when analyzed using a selective LC-MS/MS method, whereas the traditional Monier-Williams method produced apparent sulfite values of up to approximately 250 ppm for the same samples. These findings demonstrate that the elevated results historically observed using the Monier-Williams method largely reflected method-induced artifacts rather than true sulfite concentrations.

Key Takeaway: The historical 230 ppm value should not be interpreted as FDA's current view of naturally occurring sulfite concentrations in garlic. Rather, it reflects the limitations of an older analytical method. Current analytical methods indicate that true naturally occurring sulfite concentrations are substantially lower, even though naturally occurring organosulfur compounds may still generate sulfur dioxide under certain analytical conditions.

5. Should I even bother testing spices that we know have naturally occurring sulfites?

Testing is optional and should be risk-based, not mandatory. Testing may be useful for:

- Trend monitoring
- Supplier verification
- Responding to customer or regulatory questions

However:

- Testing cannot determine intent or source
- Results may cause confusion if not interpreted with proper context

⁷ Perfetti, G.A. and Diachenko, G.W. (2003) Determination of Sulfite in Dried Garlic by Reversed-Phased Ion-Pairing Liquid Chromatography with Post-Column Detection. Journal of AOAC International. Vol. 86, No 3.

⁸ Lafeuille, J-L., Lefevre, S., Achouri, D. (2007) Determination of Added Sulfites in Dried Garlic with a Modified Version of the Optimized Monier-Williams Method. Journal of AOAC International. Vol. 90, No. 4.

- FDA does not require routine testing for naturally occurring sulfites when no sulfiting agents are used

Most companies rely primarily on supplier guarantees and process controls rather than routine sulfite testing.

5. Is there a clear threshold differentiating between naturally occurring levels and added sulfites? Is there an analytical method available to differentially between naturally occurring and intentionally added sulfites?

No. There is no clear numerical threshold separating natural from added sulfites. Moreover, there is no validated or regulatory-accepted analytical method that can differentiate between the two.

Key Takeaway: Source determination is based on **intent, function, and documentation**, not analytical discrimination.

6. How should we consider naturally occurring sulfites in non-allium species?

For non-allium spices (e.g., black pepper, paprika, cinnamon, cumin):

- a) Naturally occurring sulfites are less common and typically very low.
- b) Detectable results should prompt:
 - Review of agricultural practices and drying methods.
 - Assessment for inadvertent carry-over or cross-contact.
 - Supplier clarification—not automatic labeling.

FDA and Codex recognize that naturally occurring sulfites can arise in fermented or plant-based foods beyond alliums, but such cases are evaluated individually.

Best Practice: Use historical norms for the spice type and documented non-use of sulfiting agents as the primary basis for decisions.

7. Has there been any regulatory enforcement of added sulfites in spices?

Yes. FDA maintains Import Alert 99-21, which covers imported foods that contain undeclared sulfiting agents. A limited number of spice products (e.g., garlic, ginger, star anise, mustard powder, and seasoning blends) have been placed on the import alert following FDA analysis indicating the presence of sulfur dioxide (SO₂).

However, these listings represent a relatively small proportion of the products covered by Import Alert 99-21. Historically, the import alert has been used much more frequently for commodities such as dried fruits, vegetables, seafood, and other foods in which sulfiting agents are commonly added.

DISCLAIMER

The American Spice Trade Association (ASTA) prepared this document to provide general guidance on added sulfite regulations and requirements as they pertain to the spice industry. The information contained herein is for informational purposes only and is not intended as legal advice. While ASTA strives to ensure the accuracy and timeliness of the information provided, regulatory requirements may vary by jurisdiction and are subject to change. It is the responsibility of each company to verify information presented in this document before acting on it, and to comply with all relevant federal, state, and local laws. ASTA urges users of any of the information presented in this document to consult with appropriate experts, such as legal counsel or regulatory authorities, before acting on any of the information in it.