

Understanding Sodium Benzoate Grades and Certifications

When buying sodium benzoate, the "grade" tells you two things: how pure the chemical is and what kind of testing it has undergone. High purity alone doesn't always make a chemical "safe"—a 99.9% pure laboratory chemical might still contain trace amounts of a specific toxic solvent that would never be allowed in pharmaceuticals. Additionally, while less likely in the case of a preservative, a 100% pure product does not mean it is tested to ensure it is not contaminated with living organisms (e.g., bacteria).

Below is a breakdown of what various labels on chemicals and compounds mean.

IMPORTANT NOTE: The following is not meant to constitute medical advice. Nor is this meant to indicate that you should or need to change wherever you may get your sodium benzoate. It is only meant to help educate you so that you can best use all the information available to make an informed decision.

1. Regulatory, Safety and Other Common Grades

Below are the most common grades or certifications you may run into when buying sodium benzoate.

- **USP Grade (United States Pharmacopeia):** Meets the standards of the US Pharmacopeia. It is high-quality and suitable for food, drug, or medicinal use. It ensures the product was manufactured in a facility following Good Manufacturing Practices (GMP).

Note: While a US label, USP is a global designation and used in numerous countries. It is the most common Pharmacopeia certification worldwide (see below for others).

Note: GMP standards are the same standard manufacturing practices used to make all formal medicines.

- **NF (National Formulary):** The USP and NF merged into one organization (1975). NF standards usually apply to "excipients" (inactive ingredients like preservatives). For sodium benzoate, USP and NF are essentially interchangeable.

Note: NF can still be found online as a standalone (i.e., not mentioned with USP) designation for some products including sodium benzoate occasionally; however, it has been heavily phased out. Use of the NF designation alone could indicate an old product (e.g., something that has sat on the shelf).

- **FCC (Food Chemicals Codex):** This is the international standard for food-grade chemicals. If a product is FCC-rated, it is specifically tested for contaminants like lead or arsenic to ensure it is safe to eat.

***Food Grade:** A generic term often implying the product meets FCC standards, but without a specific "FCC" label, you are relying on the manufacturer's word rather than a third-party monograph.*

***Kosher / Halal:** Food grade chemicals can optionally come in Kosher or Halal designations which follow certain cultural/religious practices for the preparation of products to be consumed. These do not reflect chemical purity, but rather sourcing, processing, and handling practices as set by each designation.*

- **E 211:** This is the European Food Additive number. If you see this, it confirms the product is approved as a food preservative within the European Union. In principle, this is equivalent to FCC grade. FCC and USP are global standards while E 211 is EU specific.
- **Combined USP/FCC:** This is the "gold standard" for commercial use. It means the sodium benzoate satisfies the requirements for both the pharmaceutical industry (USP) and the food industry (FCC). Please see table at the end of this document.

Note: It is theoretically possible to find USP/FCC/E 211 rated sodium benzoate, but this is much less common.

- **Cosmetic Grade:** Tested for skin compatibility and purity levels suitable for lotions and shampoos. It focuses on preventing irritation and ensuring stability in beauty formulations. It is not tested for safety in human consumption and may be dangerous even if it has a stated purity of 99-100%.
- **GRAS (Generally Recognized As Safe):** This is an FDA designation. While most sodium benzoate is GRAS, this does not tell you much about the specific sodium benzoate you have.

2. Industry-Specific and Other Less Common Grades

Below are the less common grades or certifications you may run into when buying sodium benzoate. Some of these are generally not available for purchase by the average consumer, but in theory you could run into them.

- **Laboratory Grade:** High minimum purity (often 97–99%), but not necessarily safe for food or skin. It is designed for educational or general lab use. The manufacturer hasn't gone through the expensive certification process to prove it's safe for human consumption.
- **Ph. Eur. (or EP): European Pharmacopoeia | BP: British Pharmacopoeia | ChP / JP: Chinese / Japanese Pharmacopoeia:** All are generally comparable and can be treated similarly to USP grade. They are typically less common for the average consumer, but may be more common in select areas.
- **CRM (Certified Reference Material):** This is the “most certain” version of a chemical. It comes with a certificate that tracks its purity back to a primary national standard. It is typically only available to scientists (chemists) and can often come in methanol as it's used for calibrating specific scientific instruments.

3. Purity, Stability, & Documentation

These are important aspects of knowing what product you are purchasing. Documentation can be hard to find and is often at the bottom of web pages or only available upon request.

IMPORTANT NOTE: Just because a supplier only provides the information on request and not on their website does not mean they are bad. Additionally, resellers are probably less likely to care about documentation, but may be the only options available. In this case it's best to look at what it says on the container which usually states things like USP, FCC, etc clearly.

Purity Levels

- **>95% vs 99% vs 100%... etc:** In chemistry, “100%” is a theoretical goal. Most high-purity sodium benzoate is listed as 99.0% to 100.5% (the >100% figure accounts for slight variations in moisture or analytical margin of error). Higher is generally better... BUT due to rounding as part of advertising, 99% vs 100% for example might be the same in principle. To know the true purity, you should look at the SDS or COA (see below for more).

Stability

- As a preservative, sodium benzoate is highly shelf stable, but there are several conditions to avoid and conditions that could be hazardous according to manufacturers. This information is found in the SDS (more below).

Conditions to avoid: *Avoid storing in humid, moist environments.*

Possibly hazardous reactions: *Strong oxidizing agents (certain cleaning chemicals).*

SDS (Safety Data Sheet)

- An SDS is a detailed document from a chemical's manufacturer providing crucial information on its properties, hazards, and safe handling, storage, and emergency procedures.
 - *The SDS refers to details about the entire product line and not an exact batch.*
 - *The SDS is a standardized document with specific sections, but specific to each company's 'version' of a product. This means it should have the company's name at the top and will state its exact stats like purity (or a range if that is the level of accuracy they have).*
 - *Any reliable dealer should have an SDS attached to their product. Often there will be a link to the SDS on the product page (see below examples), but sometimes you have to request it. Indeed, you should always be able to request the SDS from the seller.*
 - ***If a seller is not willing to provide their SDS, this should raise suspicion (please see note at the beginning of this section)***

Examples of SDS pages from various website:

Key Documents

[SDS](#)[COA](#)[COO](#)

Documents:

[Safety Data Sheet \(SDS\)](#)[Animal Testing Statement](#)[View All Documentation](#)[View Manufacturer Info & Data Sheets](#)

Example snippets highlighting purity section of an SDS (always Section 3) for sodium benzoate:

SECTION 3: Composition/information on ingredients

3.1 Components

Chemical name	Common name and synonyms	CAS number	Concentration
Sodium benzoate	Benzoic acid, sodium salt; Sobenate	532-32-1	> 99%

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

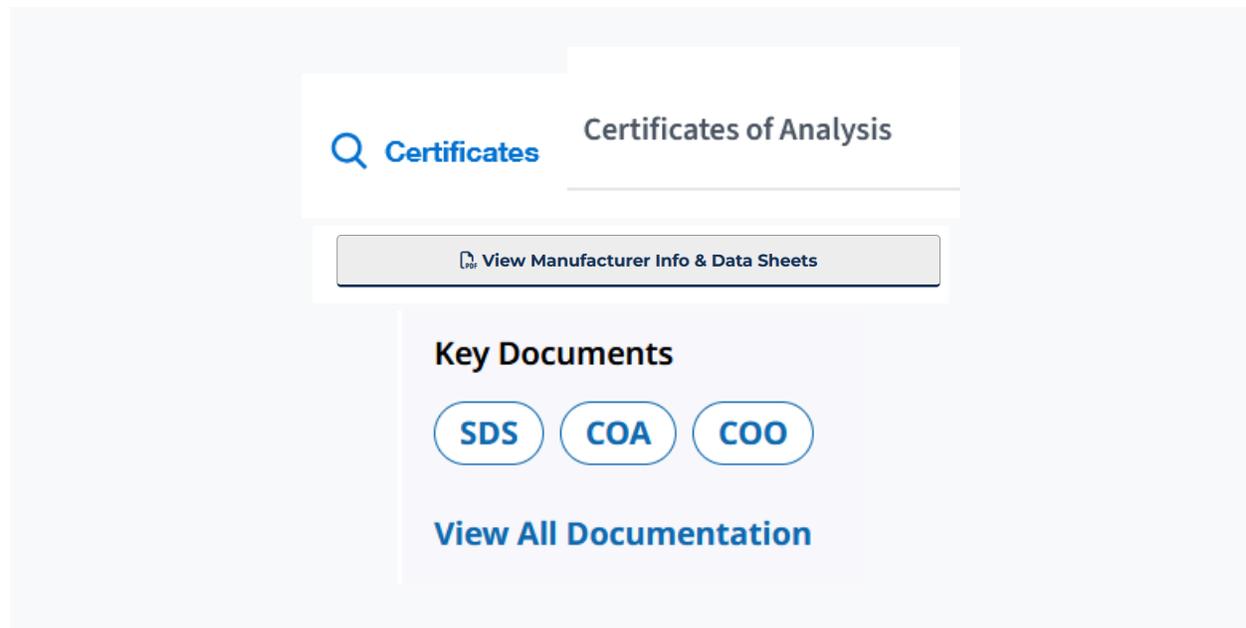
3.1. Substances

Component	CAS No	EC No	Weight %	CLP Classification - According to GB-CLP Regulations UK SI 2019/720 and UK SI 2020/1567
Sodium benzoate	532-32-1	208-534-8	>95	Eye Irrit. 2 (H319)

COA (Certificate of Analysis)

- A COA is a short document from a chemical's manufacturer providing the exact purity of a product's batch.
 - *The purity here represents as close as possible to the exact purity of the product you are buying. It is more precise than an SDS in regard to purity.*
 - *It should be signed and dated by an inspector. This document just presents purity data.*
 - *Any reputable dealer should have a COA, but this is less commonly available on the website and often will need to be requested. This is, however, often shipped with the product. The SDS is usually more easily accessible.*

Examples of COA pages from various website:



Q Certificates Certificates of Analysis

View Manufacturer Info & Data Sheets

Key Documents

SDS COA COO

View All Documentation

Example snippet highlighting purity section of a COA for sodium benzoate (note it should always be under assay):

Result Name	Test Value
Appearance:	White prills
Assay (Non-aqueous-acid base titration):	100.2%
Identification (FTIR):	Conforms

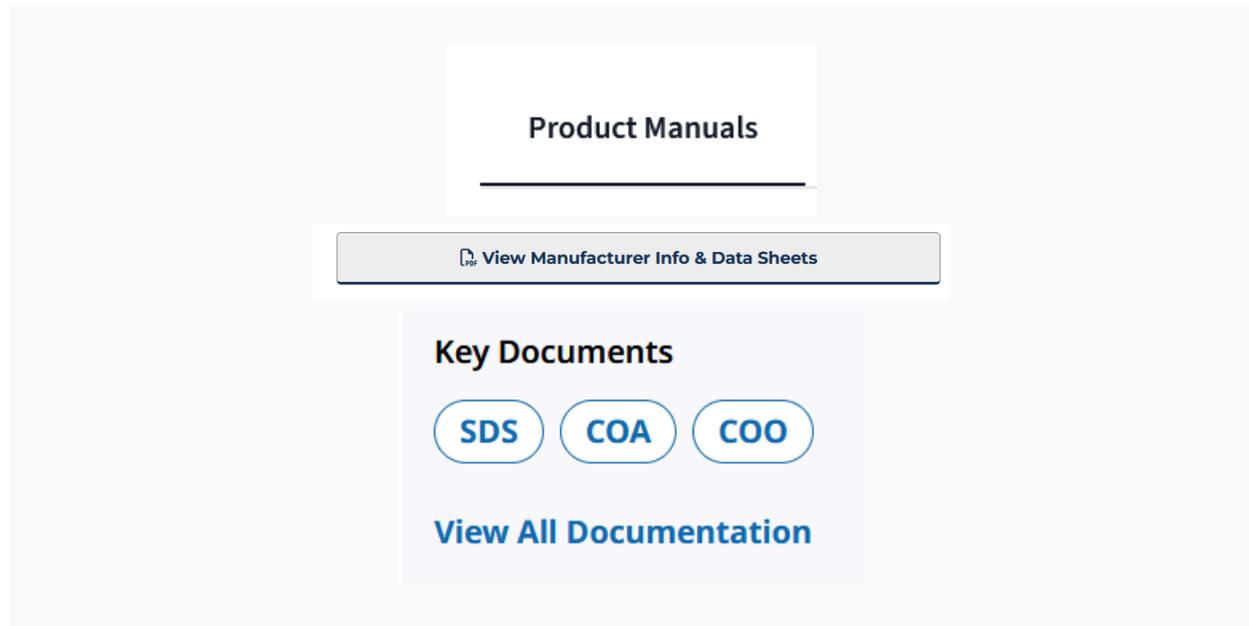


Date printed: 30 May,2024
Jonathan Davis, Quality Control Team Leader

TDS/Product Specification (Technical Data Sheet)

- A TDS will provide details on testing for specific harmful substances like lead and mercury. Not always on the website. Likely available upon request.

Examples of TDS pages from various website:



Example snippet highlighting purity section of a TDS for sodium benzoate (note these values will never be zero, but this document highlights that the manufacturer ensures the values are as low as possible):

SPECIFICATIONS

Property	Minimum	Maximum
Assay	99	100.5
Moisture % (Loss on Drying)		1.5
Appearance	Pass	
Acidity / Alkalinity (0.1 mol/l NaOH), ml		0.2
Chlorinated Organic Compounds %		0.06
Heavy Metals (as Pb), ppm		10
Arsenic (As), ppm		3
Mercury (Hg), ppm		1
Lead, ppm		2
Solution Clarity/Color	Pass	

USP vs. FCC: A Detailed Comparison

Both USP and FCC grades are high-quality standards, but they have different testing emphases. Certain compounds like sodium benzoate can be both USP and FCC certified.

Category	USP (United States Pharmacopeia)	FCC (Food Chemicals Codex)	Relevance for Ingested Products
Primary regulatory intent	Pharmaceutical ingredients used in drug products	Food additives and ingredients intended for direct consumption	FCC is purpose-built for substances that are eaten
Identity testing	Required (e.g., IR spectroscopy, chemical reaction, chromatography)	Required (e.g., IR spectroscopy, chemical reaction)	Confirms the material is authentic sodium benzoate
Assay (purity/content)	Typically 99.0–100.5% (monograph-specific)	Typically $\geq 99.0\%$	Ensures correct potency and limits adulteration
Organic impurities / related substances	Explicit limits on specified and unspecified impurities	Explicit limits on related substances	Prevents exposure to synthesis byproducts
Residual solvents	Tested when relevant to manufacturing process	Tested when relevant to manufacturing process	Limits toxic solvent exposure

Category	USP (United States Pharmacopeia)	FCC (Food Chemicals Codex)	Relevance for Ingested Products
Heavy metals (total)	Typically $\leq 10\text{--}20$ ppm (ICP-MS or equivalent)	Typically ≤ 10 ppm	Chronic exposure risk; FCC is often more conservative
Lead (Pb)	Explicit limit (commonly ≤ 2 ppm)	Explicit limit (commonly ≤ 2 ppm)	Lead accumulates with repeated ingestion
Arsenic (As)	Explicit limit	Explicit limit	Historically relevant for benzoate salts
Cadmium (Cd) / Mercury (Hg)	May be included depending on monograph	Commonly specified	Food standards emphasize broader elemental safety
Microbial limits	Generally not required for solid excipients	Required (TAMC, TYMC)	Critical for substances ingested without sterilization
Specified pathogens	Rarely specified	Absence of <i>E. coli</i> , <i>Salmonella</i> , etc.	Protects against foodborne illness
Loss on drying / moisture	Required	Required	Impacts stability and microbial risk
pH (aqueous solution)	Required	Required	Detects degradation or contamination
Inorganic impurities	Limits for sulfates, chlorides, etc.	Limits for sulfates, chlorides, etc.	Ensures proper synthesis and purification
Packaging expectations	Pharmaceutical-grade containers	Food-contact–safe materials	Prevents leachables and contamination