THE RESEARCH ARCHIVE

How to Read a Certificate of Analysis

A certificate of analysis (COA) is a laboratory report that describes what was measured in a specific sample. This guide explains what each part means, how to check that a report is genuine, and what a COA can and cannot tell you.

1. What a COA is

A COA is issued by a laboratory after it tests a sample. It is tied to one lot, on one date, using specific methods. It is a record of measurements, not a general statement about every batch a company makes.

2. The parts of a COA

Section	What it tells you
Lab name and contact	Who ran the tests. A real lab lists a name, address, and a way to reach them.
Sample and lot number	Which material was tested. The lot number should match the lot you are asking about.
Dates	When the sample was received, tested, and reported. Older reports may not reflect newer lots.
Identity	Confirms the compound is what it is labeled as, often by mass spectrometry, which measures molecular weight and compares it to the expected value.
Purity	Usually measured by HPLC. It reports the share of the signal that belongs to the main compound versus other detected components. It is not the same as the amount of compound in the vial.
Net content	The measured amount of the compound itself, often in milligrams. It can be lower than the labeled amount because materials also contain water and counter ions.
Safety screens	Where included, tests such as endotoxin and sterility look for contamination. Not every COA includes them.
Method	The technique and conditions used. Without it, a number is hard to interpret.

3. Purity and net content are different

A report can show very high purity and still show a net content that differs from the label. Purity describes how clean the measured compound is. Net content describes how much of it is present. Look at both, and see whether the report states how the amount was determined.

4. How to check a report

- ☐ The lab is named, and you can find it independently online.
- ☐ The lot number on the report matches the lot you are looking at.
- ☐ The compound name and amount match the label or listing.
- ☐ The report shows a test date and a report date.
- ☐ The method is stated, and the result is shown with units.
- ☐ The full report is available, not only a cropped image.
- ☐ You can contact the lab to confirm the report came from them.

5. Common red flags

- No lab name, address, or contact details.
- No lot number, or a lot number that does not match.
- A purity percentage with no method or chromatogram.
- Results for a different compound than the one being discussed.
- Images that are cropped, edited, or too low quality to read.
- One report reused for many lots over a long period.

6. Reading the chromatogram

Many reports include a chromatogram, a graph of detected signals over time. A single tall peak with small ones beside it supports a high purity figure. Several large peaks suggest a mixture. The report should say what the peaks are.

> **What a COA does not tell you.** It does not say that a material is safe or suitable for any use, and it applies only to the lot and sample tested. It also does not replace independent verification.

7. Questions worth asking

- Which lot does this report cover?
- Which laboratory tested it, and is it independent of the seller?
- What method produced the purity and content numbers?
- When was it tested, and is the report still current?

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