

Heavy metals in dark chocolate

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The short answer

Is dark chocolate safe from a heavy metal standpoint? That question does not have one answer for a whole category, because heavy metal content varies by product, by cacao origin, and by how a batch was processed. What is well established is that [lead](#) and [cadmium](#) are the heavy metals in dark chocolate that have drawn the most third-party testing attention, in large part because cacao takes up cadmium from soil more readily than many other crops. The only way to know what a specific product contains is to measure it against a published limit, which is what a certification does. Heavy Metal Tested & Certified (HMTc) tests a chocolate product on a wide metals panel at an accredited laboratory and checks the result against a numeric limit published for that chocolate subcategory before certification. The occurrence literature behind this category is compiled openly at the [Heavy Metal Index](#)^[2]; this page explains the category and routes to the standard and the testing pathway.

Why dark chocolate carries lead and cadmium

Cadmium and lead reach chocolate through different routes. Cadmium is taken up by the cacao tree from the soil it grows in: cacao is a bioaccumulator, drawing cadmium through its roots more readily than many other crops, so the metal is present in the bean before any processing begins. Lead is different. It is less a function of what the tree draws from soil and more a function of what settles onto beans after harvest, particularly during drying, when beans are commonly spread and exposed to airborne lead from soil dust or other environmental sources before being cleaned, roasted, and processed into cocoa mass, cocoa powder, or finished chocolate.

Because both routes scale with how much cacao ends up in the finished product, chocolate with a higher cacao percentage, dark chocolate and cocoa powder rather than milk chocolate, generally carries more of both metals than a lower-cacao product does. This is a general pattern tied to cacao content, not a statement about any specific product or brand, and it is why a chocolate standard is typically structured around cacao percentage rather than treating all chocolate as one category.

Lead and cadmium are two of the four metals conventional food-safety testing already screens for, alongside [arsenic](#) and [mercury](#). A full heavy metal panel adds four metals conventional testing typically leaves out: [nickel](#), [tin](#), [aluminium](#), and [chromium](#). Cocoa and chocolate are rarely discussed in connection with those four the way they are with lead and cadmium, but a certification built on a wider panel screens for them anyway rather than assume a category is clear of a metal it has not measured.

How chocolate is tested for heavy metals

Testing a chocolate product follows the same laboratory process used across food categories. An accredited laboratory prepares a sample, whether a bar, chips, or cocoa powder, by digesting it into solution, then measures each metal by inductively coupled plasma mass spectrometry (ICP-MS), the method sensitive enough to reach the low concentrations these limits are written at. Accreditation to ISO/IEC 17025 signals that the laboratory's numbers come from a controlled, externally assessed method, and a usable result names the laboratory, the method, its detection limits, and the basis the product was measured in.

Basis matters as much for chocolate as for any other product. A result reported as sold, the finished bar or retail package of cocoa powder as a consumer would buy it, is not the same measurement as one taken earlier in processing, because concentration changes as fat and other components are added or removed along the way. Cocoa and chocolate products are measured and certified on that as-sold, native basis, so a published limit and a test result for the same product are stated on the same footing and can be compared directly. The general mechanics that apply across any product category are set out in full on [what heavy metal testing is](#).

What a heavy-metal certification adds

A test result on its own is a concentration, not a judgment. HMTc adds the second half of that equation: for cocoa and chocolate products, the program publishes a numeric per-analyte limit on the [chocolate standard](#) for the relevant subcategory before any product is tested against it, so the exact figure a result will be measured against is public before testing begins. A product carries the mark only after an accredited laboratory measures it on the program's ten-analyte panel, covering lead, cadmium, arsenic in both its total and inorganic forms, mercury in both its total and methylmercury forms, nickel, tin, aluminium, and hexavalent chromium, and finds it at or below every applicable value in the chocolate standard's as-sold form.

That is a measurement claim, not a general safety verdict. The mark states that a specific tested product, on a specific panel, met a specific published number; it does not say that chocolate as a category is safe or unsafe. The occurrence evidence behind the standard's limits, along with the wider literature on heavy metals in cacao and chocolate, is compiled separately and openly at the [Heavy Metal Index](#), a public reference to the peer-reviewed and regulatory literature. The certification reads from that reference; the reference does not endorse the certification, and the two are kept editorially separate so the science can be checked independently of the program that applies it.

Where to go next

If you buy chocolate and want to understand the evidence, the occurrence and source literature behind lead and cadmium in cacao is compiled openly at the [Heavy Metal Index](#), independent of this certification program. A certification does not summarize that literature so much as vet a specific product against a published limit. The [comparison page](#) explains how HMTc's panel differs from other heavy-metal marks, and the [standards register](#) is where every subcategory limit, chocolate included, is published.

If you make chocolate and want to lower its heavy metal content, the same occurrence and source literature, including cadmium uptake by growing origin and lead exposure during drying, is available at the [Heavy Metal Index](#) to inform sourcing and process decisions. HMTc gives a published target to test against rather

than a moving one, and a nonpublic readiness pathway for working toward that target before a product is ready to carry the mark. [For brands](#) explains how that pathway works.

Common questions

▼ Does dark chocolate contain heavy metals?

Cacao takes up cadmium from soil as it grows, and cocoa beans can pick up lead from the environment after harvest, particularly during drying, so lead and cadmium are commonly present in cocoa and chocolate products at some concentration. Whether a specific product's level is a concern depends on how it measures against a published limit, not on whether the metals are present at all, and testing against that limit is what a certification checks.

▼ Why does dark chocolate have lead and cadmium?

The two metals reach chocolate through different routes. Cadmium is drawn up from the soil into the cacao tree itself, so it is present in the bean before processing begins. Lead is more a function of what settles onto beans after harvest, especially during outdoor drying, than of what the tree draws from soil. Because both routes scale with how much cacao is in the finished product, chocolate with a higher cacao percentage generally carries more of both metals than a lower-cacao product does.

▼ Is milk chocolate lower in heavy metals than dark chocolate?

In general, yes. Because milk chocolate contains a smaller proportion of cacao than dark chocolate, and cadmium and lead travel with cacao content, milk chocolate typically carries less of both metals. This is a general pattern tied to cacao percentage, not a guarantee about any specific product, and the only way to know a given product's level is to test it.

▼ How is chocolate tested for heavy metals?

An accredited laboratory digests a sample of the chocolate product, whether a bar, chips, or cocoa powder, into solution and measures each metal by inductively coupled plasma mass spectrometry (ICP-MS), reporting the result on the as-sold basis the product is actually sold in. Accreditation to ISO/IEC 17025 is the signal that the laboratory's method is controlled and externally assessed rather than merely asserted.

▼ Is there a certification for heavy metals in chocolate?

Heavy Metal Tested & Certified publishes a numeric limit for each metal on its panel, for cocoa and chocolate product subcategories, before any product is tested against it. A product carries the mark only once an accredited laboratory has measured it on the program's ten-analyte panel and found it at or below every applicable value in the chocolate standard, in its as-sold form.

[See the chocolate standard →](#)