Microplastics in Teabags, Explained

From the teas.co.uk wiki

> **The short version:** A UK guide to microplastics in teabags: 11.6 billion particles per cup from plastic bags, 2019 McGill study, which UK bags are plastic-free.

One brewed plastic teabag can release billions of plastic particles. This sits at the centre of the teabag safety cluster beside plastic in tea bags.

Last reviewed by the teas.co.uk team in February 2026.

These microplastics notes draw on published studies and brand testing and were accurate in May 2026; the science is moving, the figures are estimates, and none of it is medical advice.

Microplastics in teabags at a glance

Detail	Fact
Headline 2019 finding	Single plastic teabag in near-boiling water releases ~11.6 billion microplastic and ~3.1 billion nanoplastic particles per cup
Source study	McGill University, Canada (Hernandez et al., 2019, Environmental Science & Technology)
Particle type	Polypropylene, nylon, PET fragments primarily
Why heat matters	Near-boiling water (95C+) accelerates polymer breakdown
Plastic-containing bag types	Polypropylene heat-seal paper bags, nylon mesh "silken" pyramids, PET pyramid bags
Plastic-free alternatives	Loose-leaf tea, PLA pyramid bags (plant-based), unbleached paper-only bags
Health uptake research	Lab studies show gut cells absorb particles; in-vivo human studies inconclusive
UK regulation	No specific teabag-microplastic legislation as of 2026
Cost of switch	Loose-leaf usually cheaper per cup; plastic-free bags slight premium
Advice	Switch to loose-leaf or certified plastic-free bags to eliminate exposure

The 2019 McGill study

The widely cited finding comes from a 2019 McGill University study (Hernandez et al., Environmental Science and Technology). Researchers removed the tea from commercial plastic pyramid bags, brewed the empty bags in near-boiling water at 95C, and analysed the result by electron microscopy. A single bag released roughly 11.6 billion micrometre-scale particles and 3.1 billion nanometre-scale particles into one cup, identified as the polypropylene and nylon used in pyramid-bag construction. It was published in a top peer-reviewed journal and has been cited extensively since. Critics note the protocol was somewhat extreme (an empty bag in a full boil), but real brewing is close enough that the finding is broadly representative.

Why heat matters

The shedding is fundamentally a function of temperature. Cold-stored plastic sheds almost nothing; warm water sheds moderately; near-boiling water sheds a lot. The mechanism is polymer breakdown: at higher temperatures the polymer chains lose integrity and small fragments break off, with significant shedding starting around 70C. British black tea is brewed at 95 to 100C, exactly the range that maximises it, which is why a hot-brewed bag is a far bigger source than the same plastic stored cold. Cold-brewing the same bag for hours produces dramatically less.

Which teabags contain plastic

Plastic turns up in several forms. Traditional paper teabags often carry a polypropylene heat-seal around the edges, roughly a fifth to a third of the bag's mass. Silken pyramid bags are typically nylon or PET mesh, close to entirely plastic. There can also be plastic in the wrapper, the tag and the string. Loose-leaf has none. PLA, a plant-based plastic, is used in some bags marketed as plastic-free, but it is still a polymer (more on that below). The clearest plastic-free options are unbleached paper-only bags without heat-seal, or loose leaf, bypassing the bag entirely. See are teabags plastic.

The PLA "plastic-free" question

One subtlety worth understanding is the PLA (polylactic acid) claim. Some brands call PLA pyramid bags plastic-free because PLA is made from corn starch or sugarcane rather than petroleum, but it is still a polymer and may shed particles under heat much like other plastics, so the plastic-free label is misleading when read strictly. Research on PLA-specific shedding at brewing temperatures is thinner than for conventional plastics, and the conservative position is that PLA bags are not equivalent to true paper-only bags or loose leaf. Some PLA brands have switched to calling them compostable instead. See what is PLA in teabags.

The health question, answered carefully

What remains really uncertain is the long term effect on the body of regularly drinking these particles. Lab work shows microplastics can be absorbed by gut cells in culture, nanoplastics can cross intestinal barriers in animal models, and particles have turned up in human stool, blood and various tissues. What is not established is whether typical dietary exposure causes measurable harm in people over years, what conditions it might cause, or what doses matter. Where that leaves us: high exposure, uncertain consequence, neither panic nor dismissal. See do they harm you.

What to do

Three approaches cut or remove the exposure. Switch to loose-leaf with a stainless-steel infuser, a teapot and strainer or a gaiwan, where no bag means no plastic and the cup is usually better anyway. Switch to certified plastic-free bags from brands that have completed the transition: Clipper, Pukka, Yorkshire Tea (since 2020), Heath and Heather, Hampstead. Or switch to cold-brewing, steeping in cold or room-temperature water for several hours, which sharply reduces shedding from any bag. The cost is minimal, since loose leaf is usually cheaper per cup and plastic-free bags are only a slight premium. See the switch guide.

What to buy to avoid it

For complete microplastic-free drinking buy loose-leaf tea (no bag, no plastic). For certified plastic-free bags buy Clipper, Pukka or Yorkshire Tea (plastic-free since 2020). For PG Tips plastic-free buy PG Tips. For loose-leaf kit buy a teapot, a stainless-steel infuser or a gaiwan.

Reference noted

- Hernandez et al., Plastic Teabags Release Particles (2019)
- Food Standards Scotland: Microplastics in food

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teas · Drink the tea you like, bagged or loose, not what the shelf says you should. Curiosity is the only reliable guide.

More tea reading

For the broader plastic question see plastic in tea bags and are teabags plastic. For which UK brands are plastic-free see which teabags are plastic-free. For the PLA question see what is PLA in teabags. For switching guidance see the plastic-free teabag switch guide. For brewing loose-leaf see brewing loose leaf tea.

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