Why Does Milk Curdle in Tea? The Chemistry

From the teas.co.uk wiki

> **Why milk curdles in tea, in summary:** Curdling is chemistry not off milk; triggers are acid, boiling heat, hard water and soya; fixes are keep lemon and milk apart and switch to barista oat.

Milk curdling in tea is alarming and almost always misunderstood. It is usually not "off" milk; it is chemistry. This sits in the milk cluster beside best milk for tea.

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

The real cause

Milk proteins coagulate, curdle, when pushed by acidity and heat. Very hot tea, an acidic strongly brewed black, and especially any lemon, drive the proteins to clump. It is the same mechanism as making cheese, just unwanted in a cup.

The lemon trap

The single most common cause is milk and lemon in the same cup. Lemon is strongly acidic and will split milk almost instantly. The rule is absolute: milk or lemon, never both, see milk in tea or not.

Heat is the second factor

Milk added to fiercely boiling hot tea is more likely to split than milk added to tea rested for thirty seconds. Letting the brew settle slightly before the milk goes in prevents a lot of curdling, see the temperature guide.

Milk on the turn

Milk close to its date is already mildly acidic and will split where fresh milk would not. If tea curdles fresh milk, suspect heat or acidity; if it splits one carton and not another, suspect the milk.

Plant milks split differently

Soya and almond curdle readily in hot acidic tea; oat is the most stable; barista versions are stabilised to resist it, see oat milk in tea. With plant milks, cooler tea and a slow stirred pour matter even more.

How to stop it, the checklist

Fresh milk; tea rested briefly off the boil; pour milk slowly while stirring; never with lemon; barista plant milk if using plant. That removes curdling almost entirely, see best milk for tea.

The clear takeaway

Curdling is acidity plus heat, not bad luck. Keep milk and lemon apart, let the tea settle a moment, use fresh or barista milk, and it stops happening.

The chemistry, and the off-milk smell test

Milk's casein proteins normally float in stable micelles held apart by a negative charge. Lose that charge and they clump, and three everyday things strip it: acid (below about pH 4.6 the structure collapses), heat held at the boil, and high calcium, which is why very hard water makes everything worse. In tea the acid trigger dominates, from the tannins and especially from lemon, which is why lemon in milky tea splits almost instantly. Milk that has actually gone off is the rarest cause: it has a sour, slightly cheesy smell, a thicker texture and a yellow tinge before it ever reaches the cup. So smell the carton first; if it smells clean and the cup still split within seconds, that is chemistry, acid, heat or hard water, not spoilage. A cup whose milk smelled fine but slowly turns sour as it sits is the milk.

The essentials: stop curdling, the checklist

Trigger	Defence
Lemon plus milk	Never combine; choose milky black or lemon black
Hibiscus / very acidic herbal plus milk	Skip milk in acidic herbal cups
Very hard water	Filter or descale kettle; soft water reduces calcium
Boiling milk in tea	Add milk off direct heat, do not re-boil
Soya milk	Adds least stable; switch to barista oat
Cold milk into very hot brew	Pour milk first or temper milk gently
Older milk near date	Smell-check; replace if sour
Stale tea (very astringent)	Fresher tea is less acidic

Is it safe, can you rescue it, and a regional note

A cup that curdled from fresh milk through acid or heat is harmless, just unattractive, so tipping it away is a flavour choice, not a safety one; if the milk smelled or tasted sour beforehand, that batch was already off and the cup belongs in the sink. Rescue is sometimes possible: a gentle stir without more heat can re-disperse light surface flocculation, a splash of cold fresh milk can mask mild splitting, and a brisk whisk can re-emulsify a slightly broken chai, but a fully separated cup with visible curds is past saving. Worth knowing: tea with lemon and no milk is simply the standard format across Russia, Turkey, the Middle East and much of eastern Europe, so the British milk-and-sometimes-lemon muddle is our quirk, not a universal rule.

Reference noted

- PubMed: Green tea catechins and human health

Sensible options on the same shelf: English Breakfast, Earl Grey, green tea, loose leaf tea, Darjeeling, oolong, and herbal tea. The full tea shop is open, and UK delivery is free past £35.

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teas · Milk or no milk, compare teas on the cost of each cup. Loose leaf usually comes out ahead; some supermarket bags keep up.

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