CYCLING HYDRATION CALCULATOR

The Science in Your Bottle

A practical hydration & recovery guide

This guide explains what each ingredient in your formulas actually does, why the amounts are set where they are, and where the science is solid versus still uncertain. The numbers match the calculator's own values, so you can read this alongside the app. It is general information for healthy adults, not medical advice.

AT A GLANCE

What your four formulas deliver (per liter)

Formula	Sodium	Fueling carbs	Best for
Short Ride / Allulose	~614 mg	0 g (allulose only)	Short, easy rides — hydration & taste
Low-Sweat Endurance	~436 mg	60 g (2:1)	Cool weather, lighter sweat
Medium-Sweat Endurance	~614 mg	60 g (2:1)	Default long-ride fueling + hydration
Heavy-Sweat Endurance	~872 mg	60 g (2:1)	Hot weather, heavy sweat

Sodium figures are calculated from the calculator's own values (sodium citrate 232 mg sodium/g; pickling salt 393.4 mg/g). Carbs are maltodextrin + fructose in a 2:1 ratio.

ELECTROLYTE · THE BIG ONE

Sodium: the electrolyte that actually matters

Sodium is the main electrolyte you lose in sweat and the one that drives fluid balance. It helps you hold onto the water you drink, keeps plasma volume up, and sustains thirst so you keep drinking. Get sodium right and the rest of hydration largely follows.

The catch is that sweat sodium varies enormously between people — from roughly 200 to 2,000 mg per liter of sweat (around 1,000 on average). That individual spread is exactly why the calculator gives you a ladder of formulas rather than one fixed number.

Your formulas use a **sodium citrate + pickling salt blend** rather than salt alone. Pickling salt (sodium chloride) supplies both sodium *and* chloride, which is also lost in sweat. Sodium citrate adds more sodium with less of the harsh “salty” bite and acts as a mild buffer, so you can reach the sodium target while the drink still tastes good.

How this maps to the evidence

Typical sports drinks run 400–500 mg sodium/L; for hot, long, or ultra efforts, sports-nutrition guidance suggests roughly 460–920 mg/L (20–40 mmol/L). Your formulas span ~436 mg/L (Low-Sweat) to ~872 mg/L (Heavy-Sweat) — deliberately covering that whole range from cool conditions to hot, heavy-sweat days.

Dialing it in

Sodium is personal. If you cramp, fade on long hot rides, or finish with a salt-crusted kit, move up the ladder. If a drink tastes too salty, move down. A lab or patch sweat test removes the guesswork by measuring your actual sweat sodium.

ELECTROLYTE · MINOR PLAYER

Potassium: matters for you, minor in the bottle

Potassium is the main electrolyte *inside* your cells and works with sodium to manage fluid balance and nerve and muscle signaling. It absolutely matters for health and performance — just not so much as a mid-ride drink ingredient.

Two reasons it's left out of your formulas. First, you lose far less of it in sweat than sodium — on the order of 150–300 mg per liter of sweat. Second, the popular idea that potassium prevents cramps isn't well supported: controlled trials have generally failed to show a clear cramp benefit from potassium. It's easily and reliably replaced through normal food — a banana has around 400 mg, and potatoes, beans, yogurt, and orange juice are all rich sources.

Bottom line

Cover potassium with your post-ride meal rather than the bottle. The drink focuses on sodium, where the evidence for replacing losses during exercise is strongest.

ELECTROLYTE · SMALLEST LOSS

Magnesium: smallest loss, weakest case for the bottle

Magnesium is a cofactor in hundreds of reactions, including muscle and nerve function, so being adequately fueled with it over time matters. But the amount lost in a single ride is tiny — sweat magnesium runs only about 10–40 mg per liter (often closer to 12 mg).

As with potassium, the cramp story is weak: reviews and trials largely fail to show that magnesium prevents exercise-associated cramps. Added to a drink it can also taste bitter and, in larger amounts, upset the stomach. So your formulas leave it out and let your overall diet cover it — nuts, seeds, leafy greens, whole grains, and dark chocolate are all solid sources.

Bottom line

Magnesium is a diet-and-recovery nutrient, not a mid-ride one. Keep your daily intake adequate and you don't need it in the bottle.

FUEL · ENERGY FOR LONG RIDES

Fueling carbs: maltodextrin + fructose, the 2:1 story

Once a ride is long or hard enough to need energy, the three endurance formulas supply **60 g of carbohydrate per liter** as maltodextrin and fructose in a **2:1 ratio**. The two-sugar blend isn't marketing — it's about how your gut absorbs sugar.

Glucose (maltodextrin is just chains of glucose) crosses the gut wall through SGLT1 transporters, which max out near 60 g per hour. Fructose uses a completely different door, the GLUT5 transporter. By using both at once, you can absorb and burn more carbohydrate than glucose alone allows — about 1.5 g/min (90 g/h) versus roughly 1 g/min, a ~50% increase in carbohydrate oxidation.

Why 2:1 specifically, and not more fructose? Because 2:1 maximizes that oxidation benefit while staying gut-friendly. Push the fructose share higher and you overwhelm GLUT5, which is a fast track to cramping, nausea, and worse. Around 90 g/h is the practical ceiling most riders tolerate. Maltodextrin also earns its place by being nearly tasteless, low in sweetness, and lower in osmolality than the same amount of glucose — so it's easy to concentrate and gentle on the stomach.

In real bottles

A 24 oz endurance bottle holds about 43 g of carbohydrate. One bottle an hour is a solid fueling base; for long, hard efforts, drink more or add a gel to climb toward the 60–90 g/h range. Match the carbs to the ride — short, easy spins don't need fuel, which is what the short-ride formula is for.

FUEL · THE SHORT-RIDE EXCEPTION

The short-ride approach: allulose, not fuel

The Short Ride / Allulose formula skips fueling carbs on purpose. The goal there is hydration and good taste with minimal glucose impact — a refreshing bottle, not an energy source.

Allulose is a “rare sugar” that tastes sweet but is largely not metabolized by the body. It carries only about 0.4 kcal/g (roughly a tenth of regular sugar) and has negligible effect on blood glucose and insulin. That makes it ideal for short rides: it gives pleasant flavor and mouthfeel without spiking glucose or adding meaningful calories or fuel you don't need.

RECOVERY · AFTER THE RIDE

Tart cherry: a recovery add-on, not a bottle ingredient

Montmorency tart cherry is the best-evidenced “natural” recovery aid in sport. Its anthocyanins (the deep-red pigments) damp the inflammation and oxidative-stress spike that follows hard exercise.

Meta-analyses show reduced muscle soreness and faster recovery of strength and power — modest but real effects, biggest after hard, muscle-damaging, or back-to-back rides.

There's a sleep bonus too: cherries naturally contain melatonin, and concentrate has been shown to raise melatonin and lengthen sleep in trained athletes. Since most recovery happens while you sleep, that may be as valuable as the anti-inflammatory effect.

Form	Typical effective dose	Notes
Concentrate	~30 mL (1 oz), twice daily, diluted	Most practical and economical
Juice (not concentrate)	8–12 oz, twice daily	Bulkier and more sugar per dose
Powder / capsules	Per label	Lowest-sugar way to get the anthocyanins

Timing beats dose. Studies that loaded for 4–5 days *before* a hard event, then continued 2–3 days after, consistently beat post-ride-only use — the anthocyanins need days to build up in tissue. Treat it as an event protocol, not a daily habit.

> **Two caveats worth knowing**
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> **1. Don't take it every day, year-round.** High-dose antioxidants can blunt the very training adaptations you ride to earn — your body's inflammatory response to hard efforts is part of how it gets fitter. Tart cherry is lower-risk here than vitamin C/E, but use it around races and peak blocks, not during base and build phases. **2. The sugar.** Cherry juice and concentrate are naturally sugar-rich. Post-ride that's fine and even helps refuel; if you want the anthocyanins without the sugar, use capsules or powder.

Note: tart cherry is a separate post-ride drink — it is not part of your bottle formulas.

THE TAKEAWAY

The bottom line

- **Sodium does the heavy lifting.** Dial it to your sweat rate and the conditions using the low / medium / heavy ladder.
- **Potassium and magnesium matter for health but are minor mid-ride.** Cover them through food rather than the bottle.
- **Carbs fuel long rides.** A 2:1 maltodextrin-to-fructose blend lets you absorb more fuel without wrecking your gut; short, easy rides don't need it.
- **Tart cherry can speed recovery and sleep** around hard events — used strategically, not daily.

Selected sources

• Tart cherry & recovery (meta-analysis, 2021): pubmed.ncbi.nlm.nih.gov/33440334/

- Tart cherry juice in athletes — review & dosing/timing: pubmed.ncbi.nlm.nih.gov/28696985/
- Montmorency tart cherry & athlete sleep (RCT, 2022): ncbi.nlm.nih.gov/pmc/articles/PMC9408103/
- Antioxidants & training-adaptation trade-offs: jsperformancelab.com (athlete antioxidant guide)
- Sodium in endurance hydration: gssiweb.org (Sodium Ingestion, Thirst and Drinking During Endurance Exercise)
- Potassium & magnesium in sports drinks: trainingpeaks.com (Do You Need Potassium and Magnesium in Your Sports Drink?)
- Multiple transportable carbohydrates (glucose:fructose 2:1): gssiweb.org (SSE-108)