

# Easiest-Ever Macaroni and Cheese

We set out to make a smooth, creamy, cheesy sauce without the bother of a béchamel or custard. Making the whole dish in just 20 minutes was a bonus.

➤ BY ANDREA GEARY ⇐

I've always made mac and cheese the traditional way, and though the final product is comforting and delicious, getting there is a bit of a slog: I first cook flour in melted butter, whisk in milk, and simmer until the sauce, known as a béchamel, thickens. It's this béchamel that allows me to then add flavorful aged cheeses, such as extra-sharp cheddar, which are prone to breaking down and separating into a greasy, lumpy mess when heated (more later on why some cheeses "break"). Sometimes I add eggs for an even richer, more custardy result. Finally, I combine the cheese sauce with cooked macaroni, transfer it to a buttered baking dish, top it with bread crumbs, and bake it until it's bubbly. Creamy and cheesy? Yes. Fast? Definitely not.

So when I heard of an ultramodern recipe for the creamiest, cheesiest macaroni and cheese ever, I was curious. When I heard that it was also the fastest ever, I knew I had to try it. Modernist Cuisine, a research group at the forefront of the molecular gastronomy movement, devised a four-ingredient recipe said to have an extraordinarily smooth texture without relying on a béchamel. The key? An ingredient called sodium citrate, which isn't as scary as it sounds. It's an additive that's used as an emulsifier or preservative in foods such as gelatin desserts, jam, ice cream, and candy. Its downside is that it's a mail-order item—and therefore a nonstarter for the quick, pantry-ready recipe I hoped to produce. But I did get my hands on some just to see how it works. Following the Modernist recipe, I dissolved a tiny bit of sodium citrate in water, which I then brought to a simmer. Next, I used an immersion blender to incorporate handfuls of shredded crumbly, mature cheddar cheese (though subsequent tests showed that simply whisking did the job just as well)—a true test of the smoothing properties of the sodium citrate because the more aged and dry a cheese is, the more likely it is to break.



We cook the macaroni in water and milk and then stir two types of shredded cheese directly into the pot.

Dubious as I'd been, this sauce was remarkably creamy and homogeneous. I stirred it into cooked elbow macaroni, tasted it, and had to admit: It wasn't just fast (coming together in just 5 minutes)—it really was the smoothest and cheesiest, too.

In fact, with no milk, flour, or eggs to dilute it, this sauce was actually too cheesy and salty for me; I'd have to tame it a bit or I wouldn't be able to eat a whole serving. And though I loved the quick prep time, I missed that crispy top that you get on a baked mac and cheese. But these issues were easily fixable. The real hurdle would be making a quick, smooth, richly flavored batch of macaroni and cheese without using sodium citrate.

## Ugly Breakup

Back to why cheese breaks when heated: Cheese is an emulsion of fat and water bound up in a protein gel. When it's exposed to heat, the fat liquefies. As it gets even hotter, the protein network begins to break apart, the emulsion breaks down, the fat and water begin to separate out, and the cheese begins to

melt and flow. Then the protein molecules find each other again and begin to regroup, this time in clumps or strings rather than in that tidy gel formation. The result is melted cheese with a pasty, lumpy texture and pools of fat.

Most cooks prevent breaking the same way I did in my classic mac and cheese: by adding flour in the form of a béchamel. When combined with melting cheese, the starch granules in the flour release elongated threads of amylose, which then wrap around the proteins, preventing them from squeezing out fat and recombining into unpleasant curds. But making a béchamel adds work.

Sodium citrate works differently. It doesn't simply adhere to the cheese proteins; it changes them. When you add it to a cheese sauce, the calcium ions in the cheese proteins are replaced with sodium ions. This changes the structure of the protein in such a way that the protein itself becomes a stabilizing gel, holding the fat and water together so the sauce remains supersmooth.

In fact, the glossy flow of the sauce made with sodium citrate reminded me of the molten American cheese on a cheeseburger, and it turned out that this was no coincidence. So-called process cheeses, like American and Velveeta, contain "emulsifying salts" to keep them smooth when melted (see "Why We Can Skip the Béchamel").

So if I used process cheese instead of my usual cheddar, could I skip the sodium citrate? While I boiled macaroni in one saucepan, I whisked 2 cups of shredded American cheese into 1 cup of simmering milk in another saucepan, where it melted smoothly to form a sauce. I stirred the sauce into the drained macaroni and, to simulate the crispy top of a baked macaroni and cheese, sprinkled some toasted, buttered bread crumbs (made from white sandwich bread) on top.

## Fast and Fuss-Free

Our macaroni and cheese isn't just quick—it cooks entirely on the stovetop. And instead of using separate pots to boil the macaroni and to make a cheese sauce, we do both simultaneously in the same vessel.



### Watch: It's Amazing

A step-by-step video is available at [CooksIllustrated.com/apr17](https://www.cooksillustrated.com/apr17)

## SCIENCE Why We Can Skip the Béchamel

Most versions of macaroni and cheese achieve a smooth consistency by starting with a béchamel, the classic sauce made by combining a flour-and-fat paste with milk. When combined with aged cheese, which is prone to breaking, the starches in the béchamel release elongated threads of amylose, which then wrap around the cheese's casein proteins, preventing them from squeezing out fat and recombining into curds. By using American cheese, we're able to skip the béchamel. Thanks to its emulsifying salts, American cheese stays smooth when melted and acts as a stabilizing agent for aged cheeses such as the extra-sharp cheddar in our recipe.



### SHARP CHEDDAR ALONE = GRAINY

Without any stabilizing agent, the protein network in cheese breaks down when heated, fat breaks out, and proteins regroup in clumps. Aged (and thus drier) cheese is even more prone to breaking.



### SHARP CHEDDAR + AMERICAN = SMOOTH

American cheese contains emulsifying salts that replace calcium ions in dairy with sodium ions, stabilizing the cheese sauce so that it doesn't form curds and fat stays emulsified.

Crumb topping aside, it looked exactly like macaroni and cheese made from a box mix. The sauce was almost unnaturally shiny, but it sure was smooth. The flavor was as bland as one would expect, and the pairing of buttered bread crumbs and American cheese made it taste like a grilled cheese sandwich.

But this test showed that the emulsifying salts in process cheese were more than sufficient to prevent my quick cheese sauce from breaking. The trick would be to use a more flavorful cheese and supplement with enough process cheese to keep the sauce smooth.

### One-Pot Wonder

I went back to the extra-sharp cheddar I'd started with and tested it with various ratios of American cheese. A 1:1 ratio of cheddar to American was sufficient to maintain the smooth texture of the sauce, but it still tasted a touch bland, so I doctored it with a bit of Dijon mustard and a dash of cayenne pepper. I mixed the sauce with the cooked and drained macaroni, transferred it to a serving dish, and sprinkled the top with a new version of the crumb topping.

To minimize the grilled cheese sandwich associations, I substituted panko bread crumbs for the sandwich bread, and instead of toasting the crumbs in butter, I used olive oil. A bit of grated Parmesan sprinkled onto the still-warm crumbs reinforced the cheesy flavor of the dish and added some extra crunch.

The dish was everything I wanted: creamy, cheesy, and fast. But it occurred to me that I could make it even faster. The next time around, I cooked the macaroni in a mere 1½ cups of water and the 1 cup of milk I was already using in the sauce. After about 7 minutes, the macaroni was fully cooked, but instead of draining it, I simply stirred in the American cheese, mustard, and cayenne. Then I removed the saucepan from the heat and stirred in the cheddar until it was just distributed throughout. I let it sit, covered, so the cheese could melt gently in the residual heat while I made the topping. A final stir and a sprinkling of crumbs and I was done.

I was so delighted with the results that I immediately set about making a slightly more sophisticated version that calls for Gruyère and blue cheese in place of the cheddar. I'll welcome the variety because, with a recipe this easy and fast, there's a lot of macaroni and cheese in my future.

### SIMPLE STOVETOP MACARONI AND CHEESE

SERVES 4

Barilla makes our favorite elbow macaroni. Because the macaroni is cooked in a measured amount of liquid, we don't recommend using different shapes or sizes of pasta. Use a 4-ounce block of American cheese from the deli counter rather than presliced cheese.

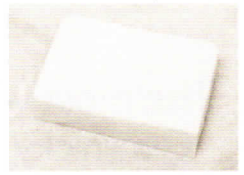
- 1½ cups water
- 1 cup milk
- 8 ounces elbow macaroni
- 4 ounces American cheese, shredded (1 cup)
- ½ teaspoon Dijon mustard
- Small pinch cayenne pepper
- 4 ounces extra-sharp cheddar cheese, shredded (1 cup)
- ⅓ cup panko bread crumbs
- 1 tablespoon extra-virgin olive oil
- Salt and pepper
- 2 tablespoons grated Parmesan cheese

1. Bring water and milk to boil in medium saucepan over high heat. Stir in macaroni and reduce heat to medium-low. Cook, stirring frequently, until macaroni is soft (slightly past al dente), 6 to 8 minutes. Add American cheese, mustard, and cayenne and cook, stirring constantly, until cheese is completely melted, about 1 minute. Off heat, stir in cheddar until evenly distributed but not melted. Cover saucepan and let stand for 5 minutes.

2. Meanwhile, combine panko, oil, ⅛ teaspoon salt, and ⅛ teaspoon pepper in 8-inch nonstick skillet until panko is evenly moistened. Cook over medium heat, stirring frequently, until

## SHOPPING American Cheese

Though it's hardly an exemplar of America's cultured dairy achievements, American cheese—the key to our sauce's remarkably velvety texture—is real cheese. It's



**BUY A BLOCK**  
Only American cheese from the deli case will do.

what the U.S. Food and Drug Administration calls "pasteurized process cheese," made by combining one or more mild cheeses with dairy, water, and emulsifying salts that keep its texture smooth when melted. We buy a 4-ounce block from the deli counter, which is easy to shred for the sauce.

There are two products you want to avoid, both of which are typically sold in packages of individually wrapped slices. The first are products such as Kraft Singles, which are technically considered American cheese since they contain 51 percent real cheese but are bland and contain added whey that made our cheese sauce too thick. The second is known as "imitation cheese food." These slices aren't cheese at all; they're a vegetable oil-based product loaded with stabilizers and thickeners and are more chemically related to plastic than to cheese. In our cheese sauce, they weren't just bland; they didn't even melt and instead formed large orange clumps.



**SAY NO TO SINGLES**  
The added whey in cheese products such as Kraft Singles made the sauce too thick.



**PASS ON THE IMITATION CHEESE**  
Products that list oil and starch among their primary ingredients don't even melt.

evenly browned, 3 to 4 minutes. Off heat, sprinkle Parmesan over panko mixture and stir to combine. Transfer panko mixture to small bowl.

3. Stir macaroni until sauce is smooth (sauce may look loose but will thicken as it cools). Season with salt and pepper to taste. Transfer to warm serving dish and sprinkle panko mixture over top. Serve immediately.

### GROWN-UP STOVETOP MACARONI AND CHEESE

Increase water to 1¾ cups. Substitute ¾ cup shredded Gruyère cheese and 2 tablespoons crumbled blue cheese for cheddar.