

Texturizing Success in Sauces & Dressings

Crafting a restaurant-quality sauce that stands the test of time requires a little help from hydrocolloids.

by Nesha Zalesny

If you ask most classically trained chefs the difference between a home-cooked meal and a fine dining experience, most will answer “sauces.” Culinary schools spend a lot of time on the so-called mother sauces: béchamel, velouté, espagnole, tomato sauce, and hollandaise.

Of these, four are thickened with roux, and one is a delicate emulsion (hollandaise). Roux is a combination of fat (usually butter) and flour, cooked together and then added to the liquid that needs to be thickened. It becomes a part of a system that has been carefully cooked and

reduced to produce the best flavor and texture possible.

Food scientists have been working hard for decades to bring the flavors and textures of fine dining sauces to the home cook or prepared-foods consumer. The major problem with thickening a sauce with flour and butter is that the starch in the flour is subject to retrogradation.

This means the sauce needs to be consumed fairly quickly after it is made. In contrast, mass-produced sauces need to have a shelf life that lasts for months or more, not days like restaurant-produced sauces. Additionally, expanding waistlines and health concerns are driving consumers to reduce their consumption of butter and other fats. Enter the hydrocolloid.

Hydrocolloids are long-chain polymers that are indigestible. They thicken water, and by doing so, can accomplish much of what the chef does when working with roux to make a sauce. This article will take a look at some of the challenges of formulating a sauce or dressing and the role of the hydrocolloid in the system.

Modified Starch

If you’ve ever made homemade macaroni and cheese or a meat pie, chances are you’ve made a béchamel sauce at home. This is about as

basic a sauce that can be prepared—just butter, flour, and milk or cream. Seasonings are what distinguish this sauce. One popular variation in the US is alfredo sauce, which has egg yolk and parmesan cheese and is retort processed to make it shelf stable.

Bringing this sauce to the home cook takes switching the flour for starch and the addition of some xanthan gum to keep the starch suspended during cook up. These bottled or canned sauces are then processed under pressure and high heat to sterilize the sauce.

Because retort processing is harsh, modified starches are almost a necessity. There have been some great strides in technology with native starches that are cleaner label, but retort processing almost necessitates the use of modified starch.

Most current commercial products contain modified starch between 2%–4%. These starches are designed to withstand the processing conditions needed to keep the food safe and stable. The native or physically modified starches will have a slightly higher use level.

Riffs on the Classics

In the southern US, biscuits and gravy are a breakfast treat. In Sweden, meatballs are often served with a cream gravy. These familiar flavors and textures often come from a packet comprised of powdered cream (either dairy- or plant-based) and modified starch. This starch is designed to begin swelling when the gravy is cooked by the consumer, and it provides the perfect silky texture to the gravy once it is hot.

Tomato sauces such as marinara or even barbeque or ketchup rarely contain extra hydrocolloids. Rather, these sauces make the most of the native pectin in the tomato solids. Many companies even use tomatoes selected and bred specifically for the total solids they produce. This can make risk management from a procurement aspect difficult. A drought



HELLMANN'S TOMATO KETCHUP (GERMANY)

76% tomato paste, brandy vinegar/spirit vinegar, sugar, table salt, citrus fiber, spices, yeast extract, sweeteners (steviol glycoside).



TUSCAN GARDEN RESTAURANT STYLE ITALIAN DRESSING (US)

Water, soybean oil, distilled vinegar, sugar, salt, romano cheese (pasteurized cow's milk, cheese culture, salt, enzymes), contains less than 2% of egg yolk, dried garlic, onion powder, spices, xanthan gum, calcium disodium EDTA to protect flavor, annatto extract (for color), natural flavors.

FIT CUISINE LOW CAL SWEET CHILLI SAUCE (UK)

Water, thickeners (carboxy methyl cellulose, xanthan gum), salt, acid (acetic acid, citric acid), flavoring, concentrate (safflower, lemon, radish, carrot), chilli flakes, sweetener (sucralose) preservatives (potassium sorbate, sodium benzoate).



in the region where these specialty tomatoes are grown can mean high costs to producers.

There may be a solution to this problem in the form of functional fibers. Fibers such as citrus fiber can potentially reduce the total tomato solids used in a marinara or barbeque sauce while maintaining the thickness, cling, and mouthfeel of the sauce. Functional fiber has the added advantage of not changing the color or flavor profile of the sauce. Ketchup has a standard of identity in many regions, so check with local regulations before reducing tomato solids in this product.

Plant-Based Sauces

There are a few options available at the moment for plant-based cream sauces. Some options are coconut or cashew bases. Coconut curry is certainly not new for the home cook. Curry sauces are generally neutral pH sauces and are often stabilized with guar gum with a use level between 0.25%–0.35%. Healthier options may include reduced-fat versions. Reduced-fat curry sauces may also contain microcrystalline cellu-

lose (0.3%), which can help formulators make the most of any fat in the system. It does this by forming a lattice-like structure that gives a fatty mouthfeel. This structure can also help with the suspension of solids in the sauce. It is also very heat stable, so it can withstand retort processing.

Cashew nuts are used in plant-based cheese and have found a niche within the sauce industry as well. Cashews have a neutral flavor and make a good base for cream-based sauces. Cashew is relatively new as a base ingredient, and many processors are finding the starchier nut tricky to work with as it has a tendency to clog processing machinery. This makes scale up from the R&D bench to plant scale rather difficult.

Suspension of solids and emulsion of fat is critical for cashew-based sauces. Neutral pH sauces can be stabilized with xanthan gum or guar gum. Neither of these hydrocolloids are emulsifiers; they do not interact with both fat and water. Rather, they thicken the water in the system, which keeps fat globules physically separated.

Cleaner Label Hydrocolloids

Depending on the amount of fat in the recipe, the addition of a combination of emulsifiers is often needed for these sauces to have long-term stability. Some newer clean label options to try are citrus fiber and tamarind seed gum. Both of these products have emulsifying capabilities. Use levels will be 0.4%–0.6% for both ingredients.

Plant-based mayo is relatively new to the market. Traditional mayonnaise contains egg yolks which not only provide flavor, they also emulsify the fat. Plant-based proteins do have some emulsification properties, but they often need to be supported by other ingredients to be as effective as egg yolk. This is where citrus fiber or tamarind seed gum shine. The following vegan mayonnaise recipe is based on chickpea protein and tamarind seed gum. Potato protein may be substituted for chickpea protein. Add a little srira-

FONTANA ZERO FAT GREEN KIWI SALAD DRESSING (SOUTH KOREA)

Kiwi puree, kiwi extracts (kiwi extracts, crystalized grape sugar, dextrin, white sugar, citric acid), refined water, high fructose corn syrup, fermented vinegar, pineapple, white sugar, modified starch, refined salt, tamarind gum, lemon juice, high fructose corn syrup, complex yogurt powder, dl-malic acid, xanthan gum, sodium polyphosphate, complex agents (gardenia blue extracts, safflower yellow extracts, dextrin), gellan gum, coriander, tarragon, complex flavor substances (kiwi flavor).

Vegan Chickpea Mayonnaise Recipe

Ingredient	Use Percentage
Chickpea Protein Isolate	1.50
Sunflower Oil	70.00
Tamarind Seed Gum	0.3
Potassium Sorbate	0.13
EDTA	0.01
Sugar	1.80
Lemon Juice	3.10
Vinegar, 50 grain	4.73
Mustard Powder	0.40
Salt	1.42
Natural Carotene	0.01
Water	16.60



cha sauce or chipotle chili powder for a spicy kick.

New Processing, New Flavors

Do steaks exist without chimichurri sauce anymore? How much guacamole, hummus, and baba ghanoush can co-exist in a refrigerator? Many of these sauces or dips would not be commercially possible without high-pressure processing (HPP). This newer processing method is enabling an entirely new paradigm in sauces and dressings. Products like keto-friendly cauliflower hummus or cashew-based buffalo ranch and french onion dip are growing in popularity.

These all benefit from the ability of HPP to reduce pathogens and spoilage bacteria without deactivating enzymes. Foods processed in this way taste fresher and have an improved shelflife. The low-acid sauces can get a refrigerated shelf life of about 60 days with this method. High-acid foods like salsa can get up to 120 days. HPP processing has its own challenges. Generally speaking, starches hydrate extremely quickly and well under pressure. Many formulators have discovered that lowering starch use levels is necessary. If the sauce is intended to be keto-friendly, hydrocolloids like sodium alginate (high M type), xanthan, or guar gum hydrate in cold water can help prevent syneresis during the shelf life of the product.

Spicing Up the Sauce

From buffalo wing sauce to chipotle mayonnaise, hot or spicy flavors are becoming mainstream. There are a plethora of flavors within the spicy sauce genre. Spicy flavors are often enhanced by vinegar. Xanthan gum is, again, the hydrocolloid of choice for these sauces as it is acid-stable. However, low pH conditions can be challenging for proper hydration.

Often users rely on high shear

to fully hydrate xanthan gum, but this can be difficult if the sauce has chunks of tomato or pepper that need to stay whole. Large mix tanks often do not have enough shear for full hydration of the hydrocolloid as well. Most cold-soluble gums need a ratio of 10 parts dry ingredient to 1 part hydrocolloid. At this ratio, there is enough dry matter to separate the gum particles, which keeps them from sticking together when they touch the water.

Some salsas or hot sauces may not contain enough other dry ingredients to achieve this ratio. If concentrated vinegar is used in this system, try dispersing the xanthan

gum in it, and then adding to the other wet ingredients. Xanthan gum slowly hydrates in concentrated acids such as 150 grain vinegar. The xanthan gum will not fully hydrate until it is blended with the other water-containing ingredients. Hydrocolloids do not hydrate in oil so it is another good option for dispersing cold water-soluble gums. To use oil as a dispersant, try a 5 parts oil to 1 part gum. This hydration method would be appropriate for a buffalo wing sauce, which is a combination of butter and hot sauce.

Short Shelf Life Salad Dressings

A popular trend in the US is pack-

➤ Tamarind gum is used as a PGA replacement. It provides a creamy mouthfeel and helps to modify the texture of the xanthan gum. Gellan gum is also added to suspend fruits and spices without increasing the viscosity.



› Guar gum and xanthan gum are synergistic. A ratio of 75:25 guar to xanthan provides texture and stabilizes the emulsion of this aioli.

HEALTHYCO ROASTED GARLIC AIOLI (SWEDEN)

Rapeseed oil (60%), water, olive oil (5%), wine vinegar, mustard, egg yolk (free-range), salt, dried garlic (1%), lemon juice concentrate, natural garlic flavor, stabilizers: guar gum and xanthan gum, black pepper, antioxidant: rosemary extract (rosemary extract, maltodextrin, acidity regulator: citric acid, green tea extract), color: beta carotene.

aged salad mixes that contain a mix of lettuce and other vegetables with a salad topper such as shredded cheese, candied pecans, or tortilla chips with a packet of salad dressing. Long shelf life dressings almost always contain a mixture of xanthan gum, starch, and microcrystalline cellulose (MCC). Shorter shelf life dressings do not necessarily need long-term acid stability. For these dressing packets, a carboxymethyl cellulose (CMC) or guar should give enough stability for the dressing to maintain quality during the shelf life of the salad.

Whether it is a riff on a familiar sauce or a new exotic chili pepper sauce, there is a hydrocolloid appropriate for the job. Formulators often reach for starch when starting a new project as it is cost-effective and has a familiar texture and fla-

PANTAI NORASINGH SWEET AND SOUR SAUCE (THAILAND)

Water, pineapple 29%, sugar, tomato (15%), thickeners (modified cornstarch, xanthan gum), salt, acidity regulators (acetic acid, citric acid), natural paprika oleoresin, preservatives (sodium benzoate).

vor profile. New ingredients such as citrus fiber and tamarind seed gum can often help stabilize emulsions and can be used in clean label products. Because of its acid stability, easy hydration characteristics, and flow characteristics, xanthan gum is used extensively throughout the sauce industry. Other hydrocolloids such as guar and CMC have less acid tolerance, but can be used for low pH sauces with a shorter shelf life. ▼

Nesha Zalesny is co-author of *The Quarterly Review of Food Hydrocolloids*, an in-depth analysis on hydrocolloids, produced by IMR International since 1991.



› This contains modified corn starch and xanthan gum to provide a stable texture for this sweet and sour sauce.