**How to Use the Right Pots and Pans for the Job**

What’s the best pan to cook with? To ensure your every dish is seared, roasted, or steamed to perfection, here’s a guide to common cookware materials and which are best suited to cook your favorite foods.

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Ever stepped foot in a kitchen? You likely already have a good grasp on which cookware pieces are best suited for certain jobs. While your kitchen might not be equipped with both a stock pot and a Dutch oven, it’s unlikely that you’d try to cook spaghetti in a sauté pan.

But what about knowing **which pot or pan is right for a specific job?** Or, equally important, which materials can’t handle the ingredients on hand?

Before we dig into the details, let’s explored *why* different types of cookware materials are best suited for certain foods.

**The Chemistry of Cooking: Two Reactions That Shape Your Cookware Choices**

There are lots of reasons why we cook, beyond killing bacteria and making it safe for consumption. Cooking can improve the texture of tough chunks of meat, change the color of ingredients, help improve their flavor and aroma, or make cruciferous vegetables easier to digest.

Each is the result of a chemical reaction caused by heat energy, which is transferred from your stovetop to your ingredients using different kinds of cookware.

Simple enough, right? Sure, until you realize that the cookware’s material also reacts with heat – and each material behaves differently.

With this in mind, conductivity and reactivity are the two primary factors that affect how well each cookware material can get the job done. Let’s take a closer look.

**Thermal Conductivity Affects How Quickly Your Cookware Heats Up**

Writing for [Cooking For Engineers](http://www.cookingforengineers.com/article/120/Common-Materials-of-Cookware/print), Michael Chu points out that the term ‘thermal conductivity’ references “how readily [a] material absorbs and transmits (releases) energy” in the form of heat. Therefore, he adds that “The higher the thermal conductivity of a material, the faster it will heat up.”

In most cooking, you want your pots and pans to heat as quickly and as evenly as possible, so those with high thermal conductivity are generally more desirable.

**Materials With Low Thermal Conductivity Also Create Hot Spots That Burn Food**

It’s not just how fast your cookware heats, but how evenly. Thermal conductivity is important because heating elements—whether natural gas, electrical, or induction—don’t release heat all the way across the base of a pot or pan.

For example, stainless steel has relatively low thermal conductivity. It’s such a poor conductor that if you placed a sheet of aluminum on a burner, only the area directly over the heating element or flame would get hot.

In this instance of pots and pans, this means that by the time the outer edges of stainless steel cookware become warm, the center would be extremely hot, increasing the chances of burning your food.

**Materials With High Thermal Conductivity Heat Quickly and Evenly**

Alternatively, a material with high thermal conductivity won’t just heat up in areas touched by your heating element; it’ll also quickly spread heat to the entirety of the pan. Copper is a great example of this, which is why the cookware material is coveted for making delicate candies.

In a nutshell, materials that have low thermal conductivity will heat slowly, create hot spots, and can burn delicate ingredients. Materials that have high thermal conductivity will heat quickly and evenly.

Again referencing the Cooking For Engineers link from earlier, from high to low, here’s what they report regarding how five popular cooking materials compare when conducting heat:

| **Material** | **Thermal Conductivity** |
| --- | --- |
| Copper | 401 W/(m·K) |
| Aluminum | 237 W/(m·K) |
| Cast Iron | 80 W/(m·K) |
| Carbon Steel | 51 W/(m·K) |
| Stainless Steel | 16 W/(m·K) |

How do you apply this understanding of thermal conductivity when choosing the right pots and pans for the job?

While you can certainly reference our list at the end of this article to match different cookware materials with common ingredients, it helps to understand *why* certain materials are a no-go when cooking different meals.

**The Do’s and Don’ts of Stainless Steel Cookware**

Let’s assume you have a thin stainless steel pan or skillet. We know that **stainless steel is a poor conductor of heat,** so you’ll want to avoid cooking delicate ingredients such as:

* Pancakes - Liquid pancake batter is prone to seeping across a pan, allowing it to cook unevenly in stainless steel. This will lead to some areas being burnt while others are undercooked.
* Chocolate or candy - Despite constant stirring, these temperamental liquids are prone to scorching and require an even application of heat throughout.
* Sauté - Flash frying foods requires cookware that is sensitive to temperature changes.

Unfortunately, stainless steel by itself is such a poor conductor of heat that it makes a miserable cookware material by itself.

If you have cookware that’s made from stainless steel alone, it’s best used for ingredients that will be constantly moving around the pan. This includes:

* Boiling water or heating broth-based soups. The movement of liquid ingredients helps to evenly distribute heat so that no area burns. If your soup contains heavy chunks of meat or vegetables, be sure to stir frequently.
* Stir-fried vegetables. Items that are constantly stirred while being cooked at high heat, such as stir-fried vegetables or breakfast potatoes can benefit from high temps at the center of the pan, then being moved to the cooler edge while other items sear.

*Related:*[*Comparing Cookware: Stainless Steel vs. Copper*](https://www.highya.com/articles-guides/comparing-cookware-stainless-steel-vs-copper)

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Don’t use stainless steel or carbon steel cookware for delicate ingredients unless clad with another metal.

Even moderately conducive cookware, such as cast iron, should be avoided when immediate heat is required. Although, cast iron is thick enough to retain a heated charge, and will give you a lasting cooking surface for browning. (More on this material shortly.)

**Reactivity – When Cookware Changes the Taste of Your Food**

After reading the section above, you might be wondering why all cookware isn’t made of copper or aluminum. Sadly, thermal conductivity comes at a price – cookware materials that heat quickly and evenly are reactive.

A reactive pan contains metals that might interact with certain foods. Aluminum and unlined copper are all examples of reactive metals. (Note that cast iron gets its own special section shortly.)

The good news is that not all types of foods react similarly. Here are the do’s and don’ts of cooking with reactive materials.

**The Do’s and Don’ts of Cooking With Copper and Aluminum**

Avoid cooking the following in your reactive cookware:

* Acidic foods - Tomato sauce, anything with lemon or citrus, even fruits and hams will take on the flavor of your metal cookware and should be heated in a non-reactive pot instead.
* Light colored foods - Items like eggs will take on a dark color or develop gray streaks.

However, because cookware made of these materials conducts heat very well, copper and aluminum are ideal for cooking rice, melting sugar, and pan-browning meat. The consistent heat and fast reaction time of reactive materials allow you to control what’s happening inside your pot or pan.

*Note:* Every time you cook with reactive cookware materials like copper and cast iron, your food will pick up traces of these chemical elements, which are then transferred to your body once eaten. But while our body processes iron relatively easily, it has a harder time eliminating copper, so you’ll definitely want to avoid using copper cookware on an everyday basis.

*See Also:*[*The Pros and Cons of Copper Cookware*](https://www.highya.com/articles-guides/the-pros-and-cons-of-copper-cookware)

Reactive metals are great for cooking items that require a responsive material. But, avoid cookware made from copper or aluminum when cooking anything with a pH of 4.6 or below (the lower the pH, the higher the acid content). Additionally, save your copper for special occasions.

**Cladding Helps Poorly Conducting Materials Heat Faster and More Evenly**

Manufacturers have been able to mitigate the poor thermal response of materials like stainless and carbon steel by combining different layers of metals to make what’s called clad cookware.

Basically, different materials are bonded under high pressure to create a high conductivity “filling,” which is then encased in stainless steel. Michael Chu reports that common materials include “steel- or tin-lined copper, stainless steel with aluminum or copper disk, stainless steel-cladded aluminum, and stainless steel-cladded copper.”

Wondering which materials combination is best based on your cooking style and favorite foods? Take a look at the handy reference chart below:

| **Cladding Composition** | **Pros & Cons** |
| --- | --- |
| Copper with tin lining | Although tin lining can melt at high temps and a copper exterior is more demanding from a care perspective, the heat conduction is excellent. |
| Copper with stainless steel lining | Another excellent thermal combination, although (again) copper exteriors require extra care. |
| Aluminum with stainless steel lining | With just a thin interior steel lining, even thick aluminum can deliver superb thermal conductivity. |
| Copper fully clad in stainless steel | In many instances, the copper in this cladding is thinner than what’s found with stainless steel, although both the interior and exterior offer ease of maintenance and durability. |
| Aluminum fully clad in stainless steel | Similarly, the aluminum in this cladding can be thinner than what’s found with stainless steel, although both the interior and exterior offer ease of maintenance and durability. |
| Aluminum with stainless steel lining and copper exterior | On the upside, you can achieve the same general performance as cladded aluminum, although it comes with copper’s maintenance challenges. |
| Stainless steel with copper disk | Compared to cladded copper, the bottom’s curved edge on these models can lead to inferior heat conduction. |
| Stainless steel with aluminum disk | Many of the same advantages and disadvantages as stainless steel with copper disk.  |

**The Do’s and Don’ts of Cooking With Cast Iron Cookware**

You might have noticed that cast iron is both moderately thermally conductive and, conversely, moderately reactive. Based on those factors alone, you might think that cooking with cast iron offers the worst of both worlds.

But, because iron is so cheap, cast iron pans are made to be incredibly thick. Their heft means that, while cast iron takes some time to charge (heat-up), they consistently maintain this heat for a long time.

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What about reactivity?

[Seasoning your cast iron](https://www.highya.com/articles-guides/comparing-cookware-materials) is a process by which layers of fat are slowly cooked into the porous iron until the it polymerizes and forms a protective barrier, thereby creating a non-stick surface that reduces a cast iron’s reactivity. (Though seasoning doesn’t eliminate it completely.)

This makes cast iron pans cookware great for cooking lots of things. But the trick to great results is knowing when to use them and when another pan might be better for the job at hand. Here are five things not to cook in a cast-iron skillet:

* Tomato sauces
* Deglazing with an acidic liquid, such as wine or vinegar
* Desserts
* Eggs
* Delicate fish

On the upside, cast iron's ability to get and stay really hot makes them ideal for searing meats and cooking stir-fries. Additionally, they can go straight from stovetop to oven, which makes them perfect for baked goods like cornbread.

**The Do’s and Don’ts of Cooking With Non-Stick**

Non-stick pots and pans are generally made of aluminum. However, it's less the cookware's material that we're concerned with, and more the interior non-stick coating.

We’ve covered the properties, chemical composition, and safety concerns surrounding non-stick in our [Non-Stick Cookware Pros and Cons](https://www.highya.com/articles-guides/non-stick-cookware-101-is-teflon-safe) guide.

But, here’s what you need to know in a nutshell: Various non-stick coatings can withstand different temperatures ranging from 350° to 500°. Once the coating is heated beyond their temperature limit, it may begin to "off-gas," which can cause flu-like symptoms in humans and can be fatal to pet birds.

Because you need to reach at least 500° to brown meat and 600° to achieve a good sear, non-stick cookware isn’t a good choice for those ingredients.

**The Right Pots and Pans for the Job**

**There is really no single cookware material that is perfect for all foods,** so it’s a good idea to buy different pieces to suit different needs on hand.

Here are the best options for your favorite foods:

* **Steak:**Cast iron is the best material to help you achieve a sear. However, aluminum or stainless steel clad cookware will also work well. Don’t use non-stick coated cookware.
* **Tomato sauce:**Stainless steel clad with an aluminum or copper disc will keep tomato sauce true-to-taste without creating hot spots. Avoid copper or cast-iron.
* **Braised meats:**Since deglazing requires an acidic liquid, braised meats follow the same rules as tomato sauce.
* **Baked goods:**If you like a good, crisp edge to your cakes and brownies, cast iron provides a surprisingly great alternative to coated baking sheets. However, this material takes on the taste of ingredients, so consider having a separate cast iron for sweets.
* **Eggs:**Since eggs don’t require high heat, non-stick cookware is best to provide an even, slippery surface that yields perfect omelets. Stay away from cast iron for reasons of discoloration.
* **Hard-boiled eggs:**A stainless steel sauce pot gets the job done.
* **Fish:**Like eggs, very flaky fish fillets can stick to a pan, making non-stick surfaces your best option. Avoid cast irons, lest they take on a lasting fishy flavor and require deep cleaning before cooking other ingredients.
* **Sautéing veggies:**A stainless steel skillet can handle any temperature range without imparting any unwanted tastes.
* **Whipped egg whites:**This is one place where copper cookware shines, since whipped egg whites are protected against overbeating or “unfolding” due to its chemical reaction with the metal.

**Final Thoughts**

Whether you’re building your first kitchen’s arsenal of tools or just decluttering and purging your outdated and old equipment, it can be tough to know which pots and pans you really need and which are just taking up precious cupboard space.

Love steak? Stick with cast irons. Enjoy a good omelet? Be sure to have a non-stick pan on hand. Want to make candied treats? Copper is your go-to cookware material.

Now, with a solid grasp on the relationship between different types of cookware materials and your favorite food, you can tailor your stock of pots and pans for the foods you love to cook.

*Read Next:*[*How to Find the Perfect Pots & Pans for Your Cooking Style*](https://www.highya.com/articles-guides/finding-the-perfect-pots-and-pans-for-your-cooking-style)

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