## MEET YOUR METAL

BROOKLYN COPPER COOKWARE.

Congratulations! You've just acquired a fine piece of heavy copper cookware, perhaps the best cooking tool you've ever owned. It's shiny and bright and ready to take your kitchen performance to a higher level. Unlike most other cookware; pure, elemental copper and tin are uniquely capable of letting you know how they're improving with every use. It will be evident in the character of the metals themselves as well as the quality of your preparations.



#### **Before We Start...**

...it's worth revisiting something that will have been stated (perhaps boldly) in the use and care instructions that came with your cookware:

## Make sure there's enough liquid or cooking fat in the pan to cover the bottom *before* applying heat.

Tin-lined copper cookware is extremely energy efficient, so excessive heat risks damaging the tin lining. Generally, we advise that lined pans of any kind be filled before heating. Doing so will protect enameled iron from shattering ("dinner plating"), stainless steel from delaminating and non-stick surfaces from outgassing toxic compounds. If you have to dry-sear or toast any food, it's best to use a cast iron or heavy carbon steel pan.

Oh yes - definitely use wooden or silicone implements. Stainless steel tools bully the tin (which is pretty non-stick when it's new, and only becomes more so with time meaning, you won't need to scrape to get food to release (more below)).



# Copper

Copper cookware comes with a fine, hand-buffed finish. Buffing is in fact a way of microscopically etching metal, which create microscopic prisms to refract more light at more frequencies, resulting in the shine for which new copper is especially famous. As you first heat the pan, you activate the metal surface and cause it to begin reorganizing itself from a granularly chaotic (i.e., polished or buffed) crystalline structure into a harder, smoother, more uniform lattice of larger crystals ("aggregates" or "grain growth"), which registers visually as the patina.

Patina is often confused with oxidation. While the two processes can occur on the same pan surface, influence each other, and represent state changes, patination is a mechanical process (operated on by force/energy) while oxidation is a chemical process (disparate molecules reacting to form new molecules).



A little off-color

The beginnings of patination is often first evident on the bottom of a pan, which makes first contact with heat. This is sometimes wrongly referred to as "scorching", which would suggest the copper has burned. It has not; the buffed surface has begun to settle down and form larger crystals. As the fine etching diminishes, light refracts along changing parts of the visible spectrum, resulting in the characteristic purple-blue-shifted coloration emerging from the pan base. At Brooklyn Copper Cookware we call this short-lived phenomenon the "bruise".



First time on heat. No pain, all gain.

Same pan, second use.

What hue of pure copper's many colorings your pan assumes will depend a lot on how much heat you put into it. Low heat will tend to shift to the red end of the spectrum, as evinced in the pictures above and characteristic of copper crystals organizing slowly. Higher heat and faster cooking will tend to shift to a yellower effect (see below), betraying larger crystal structure and shorter wavelengths of light reflecting from the surface. Generally speaking, you'll get the same or better results from copper using lower heat, as the pan itself heats thoroughly without squandering energy.

Whether red or yellow shifted, the bruise yields fairly quickly to more uniform development of copper's patina. Again, with use the copper is becoming tougher and more efficient, progressively doing everything you count on it to do really well that much better.

It bears mentioning that, irrespective of which color shift your copper is showing, polishing will return a copper pan back to its original orange/pink copper hue.

A copper pan wears its patina like a badge of honor.



### Tin

Much the same process will occur on the interior tin lining, but whereas copper needs polishing to remove the signs and stresses of its making into cookware, tin emerges from the molten handwiping process already shiny. Tinsmiths don't generally polish linings after they wipe them in, which leaves the evidence of their hand-work intact as the classic wipe marks.



Shiny fresh wipe marks.

The transformation of tin from molten to solid ("seizing") forms the bronze-like "intermetallic bond" between the lining and the copper pan body. Like copper, tin's shine is a visual effect of a complex surface crystallization that will change with use, settling out to a matte gray color signifying a tougher, larger, smoother, highly uniform ("cured") tin crystal lattice.

You can often see the tin organizing itself into larger crystals as you use the pan. This, again, is completely normal and signifies the working surface is becoming more durable and easier to use.

These effects are collectively known as tin's patina. Patination is a characteristic common to materials that benefit from use. At Brooklyn Copper Cookware we encourage owners to think of tin (and copper) as they might leather — a bit of conditioning improves its performance, increases its lifespan and mellows its appearance.



Eminently gray.



Lining up for inspection.

With regard to cookware all of this "work-conditioning" is not exclusive to copper, but the thermally efficient nature of pure copper and tin allow the benefits to accrue quickly and uniformly. For many other cookware metals, such as stainless steel, work-conditioning happens slowly or not at all unless a great amount of heat is applied to an empty pan (never recommended), and then the conditioning can be irregular, as below.

Stainless steel has an extremely hard and complex crystal structure; curing and conditioning happen more readily and quickly through the thermally efficient nickel element of the alloy than, for example, through the iron element. These localized regions of bruising (i.e., conditioning) are what become the hot-spots for which stainless steel is unfortunately renowned.



Lacunae in performance.

### Iron

Traditionally, iron handles on copper cookware are treated with a bit of culinary wax before shipping, which forms a "seasoned" finish at room temperature. Handling a handle softens the wax and causes what does not wipe off to penetrate over time, leaving plenty of surface porosity available for additional seasoning. The best quality iron handles for copper cookware are made with a specific process that, with the addition of a tiny bit of carbon and silicon, forms a finely



tessellated crystalline lattice and allows them to expand and contract with the copper and tin. This tight crystal lattice has a concomitantly tight surface porosity, which seasons more readily as lipid chains settle closer to each other and link (polymerize) more easily.

With use a new iron handle will begin to shift shadings, likely darkening more toward the pan body, with variegated effects emerging further out from the pan. Whatever fats get on your handle (including skin oils), repeated heating and cooling cycles continuously re-season the iron, protecting it from corrosion and giving it its own character — strictly speaking not patination (since the crystalline structure remains relatively unchanged), but no less lively.

#### Living With Lively Cookware

Pure elements such as copper, tin and iron are extremely responsive to energy and contact. You might think of these cookware ingredients as "living metals", born dramatically, developing refinement and grit with experience, improving in all their relationships — with each other and with you.

You've likely already seen the care instructions that came with your Brooklyn Copper Cookware, but here's a quick rundown of our recommendations. For a copy of care instructions, please visit the Resources section of our website-**www.brooklyncoppercookware.com.** 

#### **Get Your Copper Glow On**

For the copper pan "body" we recommend drying the pot as soon as you finish washing it. This keeps water mineral spots from marring the finish. Also, washing the exterior promptly yields the best results and is long-term easier than allowing residues to build up. Generally, if the pot is still slightly warm, food residues come off more easily.

For light polishing, we use a 2 – 1 ratio of ketchup and fine salt stirred into a paste and applied uniformly. It's important to note the ingredients in your salt; common table salts and even some putatively "pure" culinary salts contain anti-caking agents (especially silicates) that can



scratch copper. Generally a fine, light-colored sea salt is a safe bet, but check your salt's ingredients for additives such as silicon dioxide, calcium silicate, or sodium aluminosilicate (aka, sodium silicoaluminate).

Left for a minute or two, rubbed in gently and then rinsed in cool water, salt and ketchup will brighten your copper finish beautifully, and the method is completely non-toxic.

For more intensive polishing, you may wish to add flour and vinegar to the mix (3 parts flour, 2 parts ketchup and salt, one part vinegar). This creates more of a paste and remains stable in position longer, thus allowing the acids more time to act on the copper. After a few minutes, rub in, rinse and wipe as above.

As a chemical alternative, we find Wright's Copper Polish does the best job with the fewest caustic compounds, best pasting and finest abrasives. For a slightly less brilliant but more durable polish with low VOCs and caustic ingredients, we also think well of Flitz Metal Polish. For the toughest jobs we like Red Bear, which is based on the same jeweler's rouge we use for mechanical polishing. Note, Red Bear does contain strong caustics, so use caution and wear gloves! Also, commercial copper polishes should never be used on tin (that's the surface you eat off of, after all!).







Even with disciplined polishing, copper will harden with repeat exposure to heat and slow cooling, forming the characteristic patina described above, and of which die-hard copper fans are so fond. While a desirable property (it improves the metal's already exceptional thermal efficiency), deep patination can only be fully removed by high-friction mechanical compound polishing. Otherwise home polishing will always leave a bit of patina (which we love).

#### **Attending to Your Tin**

One of the nicer things about copper cookware is that it cleans up beautifully and will last several lifetimes with a little attention.

A tin lining is highly non-stick, but even so you may occasionally have food adhered to the interior. Soaking for an hour with a few drops of dish detergent in warm water usually does the trick. For food that has burned to the pan, a good

solution is to fill with water, boil and add a generous quantity of pure, unscented ammonia. This will break down carbonization (fully reduced carbohydrates bonded to tin) over 24 – 48 hours (we recommend that the pan sit outdoors, as ammonia fumes are an irritant). Thereafter, gently remove the softened residue with a plastic scouring pad (Scrunge, or similar).

Otherwise, to keep a tin lining going strong for many years it's critical to never to heat your copper cookware empty (see above). Remember, this is good practice for all lined pans – certainly for plastic non-stick linings, but also for enameled linings on cast iron. Carbon steel and naked cast iron are the only materials safe to heat empty.



Tin will darken and smooth with time and use, and this actually improves a pan's performance. If you like, you can brighten a tin lining by encouraging a few tin oxide electrons to switch teams with a simple galvanic technique.

Fill the pan with water and bring to a boil. Removing from heat, dissolve 1 - 3 Tbsp each of non-iodized table or sea salt and sodium bicarbonate (baking soda) in the hot water (this is called an electrolyte). Fold a sheet of aluminum foil into several layers such that it fits in the bottom of you pan, and push this down gently in the hot water. Use only a wooden spoon to do this, as other metals will corrupt the process.

Oxidized tin is the cathode (negative pole) in this reaction, and the aluminum is the anode (positive pole). The light current created from negative to positive reduces oxidation on the outgoing tin side and increases it on the incoming aluminum side by shifting the oxide's electrons, such that the tin will brighten and the aluminum will darken. Give the

reaction 10 – 30 minutes to equalize, and then remove the aluminum foil. It should be noticeably darker.

And the tin should be noticeably brighter; simply empty the pan and wipe down with a clean cloth. This process is completely non-toxic and safe, and assumes that the tin has been cleaned of food residues (oils in particular insulate against electron transfer).



#### A Season for Iron

In keeping with our pure metal ethos (and because BCC doesn't have to spend weeks at sea in shipping containers), we do not coat our iron handles with plasticine lacquers, which are difficult to remove completely and frustrate regular maintenance (such as what you're going to read about below). We do apply a thin layer of butcher's wax following final hand buffing to make sure your BCC arrives to you rust-free, but butcher's wax is soft so it will penetrate as the pan is heated and otherwise wear off relatively quickly at the surface.

Fortunately, looking after your cast iron BCC handles is very easy, and the attention you give to it (like winding a good watch or oiling good shoes) pays dividends in the long run.

Your skin oils will go far toward keeping the iron handles rust-free, but we advise very occasional wipes with a clean seed oil, such as flax or grapeseed. Fruit and nut oils, such as olive, coconut, walnut, etc., which have a lot of aromatics, polymerize too slowly and can go rancid with long exposure to oxygen in the air.

To season, simply address the pot shortly after use while the handle is warm, not hot. 4-5 drops of oil on a paper towel, rubbed on all the iron you can see, including right down in the joint, will hold you in good stead for weeks to months. Re-season as needed.

Although one is less likely to have it in the pantry, an especially durable solution for treating your handles is carnauba wax – a natural, hard palm oil wax that polymerizes well at room temperature. To apply, prepare the handle by rubbing down with fine emory paper or 0000 steel wool (to remove other oils and traces of oxidation), warm the pan in a 250° oven for 10 minutes, remove from the oven and lightly apply carnauba wax (in block form), melting the wax into the

handle. Liquified, carnauba penetrates the iron's pores and as the handle cools, the wax polymerizes and forms a vapor barrier. Take care to apply sparingly, as too thick a layer will slicken the grip!

Even severe rust on an old pan is usually superficial. Rust (i.e., superficial oxidation) is in fact an aspect of iron's patination process, and like patination on other metals forms a barrier against further deterioration. So don't worry about discoloration that appears to be embedded in the handle.

To remove rust use 0000 steel wool or extra-fine grit sand/emory paper to simply rub down the offending spots, wipe with a clean, dry cloth and season as above. If in removing the superficial rust the iron appears pitted or manifestly decayed, this is then corrosion, the result of repeated application of moisture or caustic materials to untreated oxidation. The integrity of a corroded handle may be compromised, especially around the rivets. Even so, on a heavy copper body that's otherwise in good shape handles can often be replaced.

Finally, once you have a well-seasoned or waxed iron handle, the only thing to keep in mind is when washing: As one does with cast iron cookware, avoid using detergents or soaps on seasoned handles. The surfactants in even mild cleaners will break down the polymer chains and destroy the protective layer. If by accident this happens, simply run through the seasoning or waxing steps again (but don't be surprised if you're removing a fair amount of rust first!).



#### **Good Goods**

Your new Brooklyn Copper Cookware will change and improve right along with your cooking, quickly becoming a reliable ally and restorable to better-than-new whenever you need it. You are first of the countless generations to use your BCC, and everything you cook is conditioning it for a centuries-long service life. You own very good goods.

If you'd like to know more about any of the above, have any other questions, or just want to talk copper (and other good goods), drop us a line anytime at hello@bccookware.com or give a call to 347-866-2600.