Old time workshop hints.

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You are welcome to share it with others.

Many valuable old time recipes and formulae have been relegated to the “not used now” basket.

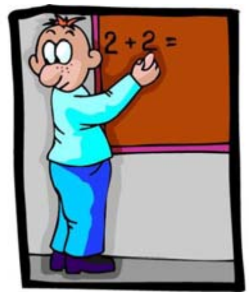
But it is amazing to see the number of people who are re-discovering **“Old technology”** from yesteryear, not because it’s better than what’s available today, but many old formulae use readily available common household substances, and some of the old time methods are really quite good.

You only have to look at the number of people making luxurious handmade soaps from pioneer recipes rescued from old decaying books. People sell it on the Internet, craft shops, and farmers markets all over the country, value added and converted into cold hard cash.

Old workshop hints and formulae are much the same, if you’re prepared to experiment with the various methods & compounds used to make these products, you will surely save quite a bit of money as well as enjoy cooking up your own brews. But also be aware that some substances that were commonly used in days gone by may be considered dangerous today. Always read instructions and MSDS sheets if available before using.

Good luck
Enjoy the read.

We hope you enjoy reading and learning about these old time methods and formulae



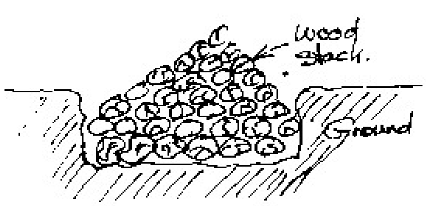
Australian Pioneer Charcoal.

The pioneers of Australia learnt to do things their own way. Charcoal was the basic fuel required by the local blacksmith, farmer, village foundry, and any one else who required good quality fuel for heating. Whether for forge work, charcoal furnace, or for the cupola melting of cast iron & Bronze.
The following method is an old pioneer technique for making high-grade charcoal.

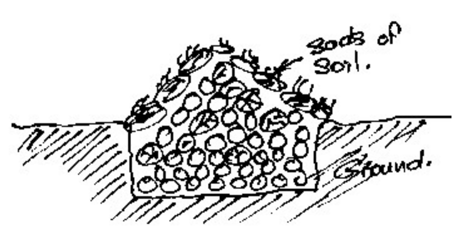
Method 1:
Hollow out a small area of ground about **ten feet by four feet**, and about **eight inches** deep. Pack in short pieces of wood. Use different size's to pack the wood in as tight and close as possible. Build each layer up on top of the other and make each one smaller than the last. The idea is to make your woodpile the shape of a house roof ridge. (See below)

At each end make a good pile of light twigs and other fire lighting material to ignite the wood. Cover the entire stack with earth, with the grass on the outside. Do not cover the ends until the fire has a good hold of the wood stack. (This is a strictly winter time only process)

Watch the wood stack for some time to make sure that the sods do not crumble and let air into the woodpile. You may have to sprinkle water onto the soil & sods if the heat dries it out too much. The wood will be calcined into charcoal in about four or five days. When the stack cools down, break open the soil cover, and collect and bag the charcoal. This is actually better charcoal than that made by the drum method, explained in the next method.



Sketch 01.



Sketch 02

The sketches above show the end view of the ground trench, sketch 02 shows the wood stacked into the trench and covered with sods of soil, the soil must be moist, and make sure all the gaps are covered by the sods, if air can get into the stack it will simply burn away and not leave you much charcoal, the idea is to let the fire **"slow burn"** to calcine the hardwood into charcoal.

Note:
This method is a fairly hard way to go about making charcoal, but you will get top quality fuel, perhaps you could dig the ditch with a backhoe, or something that takes the backbreaking work out of it.

This method could make a very substantial charcoal supply; **don't** try this in a residential area, as you will smoke your neighbors out, make your charcoal out in the countryside somewhere. Locate a farmer willing to let you do this!

Method 2: Charcoal making the modern Aussie style.

Australians have been known to do things differently. A trait that's been with us since the convict days. The pioneers of this great country were very resourceful; they survived on instinct and good basic knowledge.

Fig 01.
Preparing the wood.

Fig 02.
Burning wood in the drum.

Fig 03.
The end result, beautiful hardwood charcoal.

These three images help to show you a simple way to make good quality charcoal for your **forge** or **cupola furnace.**

Fig 01.
Burning charcoal. This method is actually called beehive charcoal. Make it from old waste hardwood limbs and branches; it is possible to set up two or three drums and make quite a bit of charcoal at the same time.
Cut the wood up with a chainsaw into small pieces 6 to 8" inches long. Split anything that is too large. Pack as much wood in the drum as you can. When the fire dies down. Block the air holes at the bottom of the drum with a few shovels full of earth, pop a **steel lid on the drum**, and place a heavy weight on the lid. **Let the fuel burn for a full day or overnight,** and then return to bag the charcoal up.

Fig 02.
Flames are leaping out of the drum, with so much fuel and heat the drum becomes red hot, Don't put the drum near dry matter as it will ignite, which could easily start a scrub or bush fire. The best time of year to make charcoal is in the winter or spring.
Fig 03.
A bag of fresh charcoal ready to burn in the cupe, forge or furnace. This is value adding isn't it? **Turning old waste wood into a valuable fuel**. This bag of charcoal will deliver some serious heat for sure.

Enjoy a day out in the bush.

Cutting wood and making charcoal. Find a farmer who will let you onto his property to make your charcoal, Tell him what you intend to do, he may even help you. DO NOT MAKE CHARCOAL DURING DRY TIMES or YOU WILL START **A SCRUB or bush FIRE, YOU** COULD BE **HELD RESPONSIBLE FOR DAMAGES**. **Charcoal making should be done in the winter or spring time while it is wet and safe.**

Preparing the drums.

Find two good 44 Gal drums (or similar size) with a tight fitting lid, cut two wedge shape holes down at the bottom rim opposite each other.
Make the holes about 6" wide with about 2" or 3" opening. The actual burning process is started by lighting a fire in the drum with twigs and rubbish and some kero or diesel to hurry it up a bit (Be Careful).

Start cutting up the limbs & branches into pieces about 6 to 8 " long split any larger than 4" dia. Throw them into the drum as the fire starts to take hold.

The idea is to pack as much wood in as possible, get the fire very hot. Keep adding wood as it burns away. When the drum is really super heated and full of wood let the fire burn for a while. When the flames start to die down a little, throw several small pieces into the drum to top it up, and then put some leather gloves on and put the lid on and secure with a weight (Bricks etc).

Plug the air holes with damp earth to stop the air entering the drum. Let it smolder for a day. Then bag up your fuel. (Repeat the process to make more fuel) The charcoal is produced/calcined by the severe heat build up in the drum, a certain amount of the wood is actually burnt away, but the bulk of it will be calcined into good quality charcoal.

A large quantity of gas is generated by this method, do not be tempted to lift the lid "to check" the process, if you lift the lid again after you have shut it down, it could create an explosion and injure you. **WALK AWAY** from the drum when you have shut it down

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We hope you enjoy peeking into the past, who knows what useful hints you will find in this ebook, feel free to pass it around your circle of friends.

Tempering and annealing metal.

Tempering and annealing is not a difficult task to carry out, it requires careful attention to temperature control but you can judge this by eye once you have had some practice.
Steel is hardened by heating and then quenching in water, this process has the reverse effect on non - ferrous metals such as copper, brass etc, thus if **brass or copper** is heated to a red heat, then quenched, it is softened, or annealed, as it is called.

Add some salt to the water for better results. If you are working with **brass** and hammering and forming it into shape, it will work harden and become quite springy, if you continue to work with it while it is in this state it will most likely crack and damage the work piece. Several annealing processes may have to be carried out before you are finished your metal forming.

Copper is annealed in the same way as you do for brass; it may not need to be re annealed as much as brass though, as it is a softer and more workable ductile metal than brass.

Aluminium generally won't need annealing, as it is already quite soft, but certain types of alloy sheet may need annealing. When annealing aluminium, simply heat it until you notice a faint smoke come off the metal, cease at this point, other wise you will end up with a molten glob of metal on the workshop floor. Allow to cool and continue with your work, in some instances several annealing cycles may be required.

Lubricants for drilling steel..

Certain lubricants have a very beneficial effect when taping and drilling metals, there a number of different compounds available, a good standby and very effective lubricant for steel is **carbonate of soda** mixed with water, it will not rust steel and is cheap to make.
Brass will not require any lubricant, just drill it dry. When drilling or taping **aluminium** use **turps or kerosene,** it gives a good thread and stops metal drag in the tap.

Metal spinning.

Was once a major industry where a huge amount of different wares were made by spinning sheet metal on special formers in metal spinning lathes. Hard wood, steel, or aluminium formers were made up and held in the lathe chuck, another end former was held against this former with the sheet metal to be formed or spun, wedged between the former and the backing plate, the whole assembly is spun at a high or med speed and the metal is forced over the main former by using blunt smooth forming tools pivoted against special pins on the lathe tool post. (Brass spigots are used on the end of the tools)
A lubricant such as **animal fat** may need to be used to ensure that a good finish is achieved. You may also need to anneal the metal while you are spinning, especially if it is brass or copper, some metal spinning operations can be achieved by making up a rolling tool out of an old sealed roller or ball bearing and held in the lathe tool post, use it the same way as the normal

tools by forcing the metal onto the former, there is no need to use any lubricant as the roller is simply pressed against the metal, this method is only suitable for very simple shapes with flat a surface.

Handy tips & formulas.

Solder for aluminium.

A great drawback to the use of aluminium for many purposes is the difficulty in soldering it. A number of solders are known that are fairly successful when manipulated by skilful hands. The following one was recommended by the industry and was said to give good results.
The quantities given may be scaled up or down as the case may be, to make the required amounts.

Take 28 pounds block tin, 3 1/2 pounds of lead, 7 pounds spelter (zinc), and 14 pounds of phosphor- tin. The phosphor tin should contain 10 % phosphor.
The following instructions should be followed when soldering aluminium: Clean off all dirt and grease from the surface of the metal with BENZINE, Apply the solder with a copper bit, and when the molten solder covers the surface of the metal, scratch through the solder with a wire brush by which means the oxide is broken and taken up. Quick manipulation is necessary.

To prevent rust on tools.
To prevent rust on tools, use Vaseline, to which a small amount of powdered gum camphor has been added; heat together over a slow flame.

Coppering polished steel surfaces.
To copper the surface of iron or steel wire, have the wire perfectly clean, then wash with the following solution, when it will at once present a copper surface; rain water, 3 pounds; sulphate of copper 1 pound.

Miscellaneous information.

TO FIND;
Area of a circle = diameter X .7854
Circumference of a circle = dia X 3.1416
Given the area of a circle to find the diameter, divide the area by .7854 and extract the sq root.
Area of a hexagon = length of one side X 2.598

The surface speed in feet per minute of an emery wheel or milling cutter: Divide the number of revolutions of the wheel per minute by 12, and multiply the result 3.1416 times the diameter of the emery wheel in inches

To find the number of revolutions a wheel must run for a given surface speed, multi ply the surface speed per minute by 12 and divide the result by 3.1416 times the diameter in inches.
Given the diameter of a hexagon nut across the flats, to find the diameter across corners, multiply the diameter across the flats by 1.156

Old Time Domestic Weights & Measures

Avoirdupois weight

4371/2 grains	1 ounce
16 ounces	1 pound
25 pounds	1 quarter
4 quarters 1	1 cwt (hundred weight)
20 cwt	1 ton
2240 pounds	1 long ton.

Cast iron cement.

Take clean borings or turnings of cast iron, (16 parts)
Sal ammoniac, 2 parts.
Flour of sulphur, 1 part.
Mix ingredients together in a mortar and keep dry. When required for use, take of the mixture 1 part, clean borings 20 parts, mix thoroughly, and add a sufficient quantity of water. A little grindstone dust added will improve the cement

Composition used to hammer weld cast steel.

Borax, 10 parts.
Sal ammoniac 1 part.
Grind or pound them roughly together, then fuse them in metal pot over a clear fire, taking care to continue the heat until all spume has disappeared from the surface. When the liquid appears clear, the composition is ready to be poured out to cool and solidify; Afterwards being ground to fine powder, it is ready to use.

To use this hammer welding powder composition, the steel need's to be raised to a bright yellow heat, it is then dipped into the welding powder, and again placed into the fire until it reaches the yellow heat again, it is then ready for hammer welding, if joining two pieces they of course have to be likewise treated as above.

To loosen rusted steel screws.

The simplest way to loosening a rusted screw is to apply heat to the head of the screw. A small iron bar or rod flat at the end, if reddened in the fire and then applied to the head of the screw for two or three minutes, will enable the screw to be removed without too much trouble, the heating on the head expands the screw shank slightly, and helps to break the rust bond, the addition of a light lubricant such as kerosene will promote the removal also.

Lubricant For Cutting tools.

When milling, shaping or turning steel or wrought iron, use the following cutting fluid for good results. 1 Lb of tallow, lard or soft soap. Boil and add water until about the consistency of cream, let cool and use as is.

The home workshop Anvil.

If you cannot afford to buy a genuine Blacksmiths Anvil, the next best thing would be an anvil fashioned from a length of heavy gauge railway line, the diagram below shows how to cut the railway stock into a very useful workshop tool.

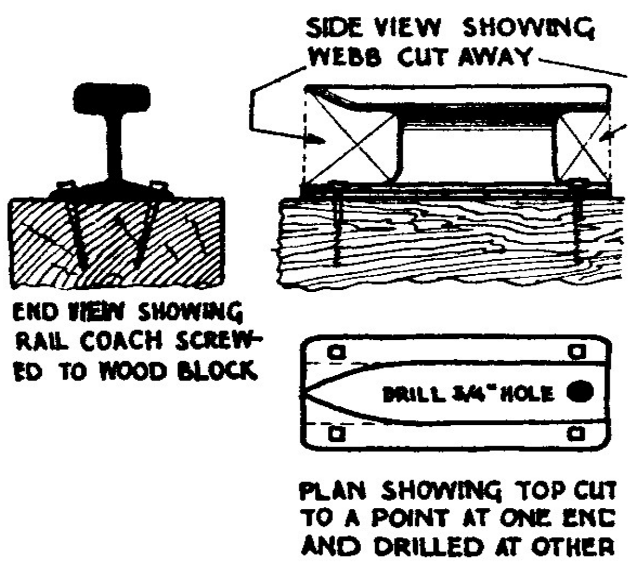
Buy a piece of scrap rail line measuring about 300 mm to 450 mm in length, get the heaviest gauge possible, draw some cutting guide lines on it with engineers chalk, (as shown in the sketch below) and then use an oxy torch to cut out the shape.

Clean up all the rough edges left by the oxy cut with a small angle grinder, give it a good clean up. Finish the anvil with some paint on the main body, but not on the top.

Drill x 4 7/16" holes in the base and mount it on a solid block of wood, like red gum. Don't mount it on a metal stand as there is no shock absorption, and the anvil will be very noisy when struck. Now it is ready to use with some of your metal work projects.

You may also find it handy to drill a 3/4" hole on the tail end of the anvil to use as a punching hole, or to insert tools for doing small shaping work.

Make a simple workshop anvil.



This small workshop anvil will serve you well for doing all those small jobs requiring the use of an anvil. The railway line is surprisingly effective when it has been cut and finished as shown in the picture.

You must mount it on a hardwood block and at a suitable height; this helps to absorb the shocks from the hammer blows, and provides a sturdy base for the anvil while you use it.

While it is not as large as the normal blacksmiths anvil, you will find that you can carry out a large variety of hammering jobs with it.

This is an ideal tool if you want to take a small anvil to another job away from your workshop.

How to make water glass.

An old foundry-mans recipe.
Water glass is easy to make at a good profit if you have the market to get rid of it. Eg, other small foundry workers who are building cupe furnaces etc.
Now, to make the water glass **(silicate of soda)** there are several ways to make it.

The easiest way to go is to make up a solution of naoh **(sodium hydroxide + silica sand & lye)** using some where between **50 and 70 % lye solution.**

I would go 70% naoh (solid lye = 100 %), therefore if you add 70 lbs of solid naoh to 30 lbs of water you have a 70% solution) then you heat this up real hot and dissolve clean silica sand into it until you reach the consistency of the water glass you desire.

This process is known as hydrothermal. (Water + heat) the other way you can go, is to mix **soda ash** and **sand** and fuse this together, then **cool it** and **grind it up,** at this point you have **solid silica of soda**.

Dissolve in hot water and you are back to water glass of the first formula
(LYE + SAND) now you have water glass.

Beware of splashes to the eyes and skin; wear protective safety gear when working with chemicals of any sort. Make sure to have your first aid kit close by just in case.

As with all old technology formulas and compounds explained in this guide, no guarantees of any sort are given as to the accuracy of any recipe or the safe operation of said formula.

These formulas were created in another era when work safety practices were none existent.

Once you get the hang of these old methods, it will be all plain sailing for you; you'll have a bit of fun.

Simple wax recipes for investment casting.

Moulding wax for investment casting requires special properties, it needs to be neither to soft or pliable nor too brittle, it needs to be solid at room temperature, that could be tricky, as it depends entirely on where you live.

Some types of wax will appear to have a memory i.e.; after forming, it may tend to return to its original shape. It is important to be able to work the wax, eg carve, model, cut and twist, with out it breaking or cracking.

It must also be able to stick to itself; especially if you want to build up your model with several layers of wax…you do not want it to delaminate.

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Another property required of this wax material is colour, don't be fooled into making a nice clear wax…you need an opaque look about it, so that as you model and work with it you can see what you are doing.

For beginners and semi advanced people wishing to try their hand at this metal casting art, a good wax can be easily made from:
>> Beeswax.
>> Paraffin Wax.
>> Petroleum.

As with all types of casting, considerable trial and error will be entered into, you will have to experiment with different ratios of mixes and the temperature of your region will have a large bearing on your success or otherwise with lost wax, or investment casting…it is not as easy as some people will have you believe.

If you are already a well-practiced green sand caster, you should not have to much trouble learning the tricks required for this very ancient, and fairly technical form of metal casting.

Investment or lost wax casting, is the oldest known form of metal casting on earth, the ancients were the real masters at it, perhaps you should do some research on how these old masters applied the techniques.

Many superb bronze castings are still made in third world countries using primitive methods, the equipment, materials and tools used to melt and pour these castings is simple beyond belief.

The techniques have been handed down from father to son over many generations; every step of the mould making process is done according to well-tried & proven methods. They do not use any sophisticated temperature measuring equipment, nor any scientific metal analysis exists in most of these small third world foundries, every step is judged by eye alone.

Their basic skill levels and well-rehearsed methods enable them to produce some incredibly detailed art castings, as well castings to be used in light industry eg machine components etc.

A simple wax recipe.

Paraffin wax.	
(needs to be in the 60 to 65 C range)	4 parts.
Refined bees wax	1 part.

Blend into the mix one of the following:
Copal.
Damar 10 to 15% by volume
Add some crayon chips to give an opaque colour.
Melt into the mix about 5% by volume of polythene (plastic) bags, The polythene adds strength and will improve the smoothness of your wax models.

An advanced wax modelling recipe.

Paraffin wax	27.5%
Refined bees wax	27.5%
Petroleum oil	15%
Petroleum jelly	15%
Clarified animal fat or lard etc (Dripping)	10%
Melt polythene bags into the mix	5%.

Experimentation is the key to your success.

The equipment you use for your general sand casting will be OK.
You will need another drying & burn out oven, you may need to practice melting your metal, and burning out your wax mould. The two operations are intertwined during the final phase of casting.

Note that the **mould needs to be hot when you pour**, selecting the correct time for this will be arrived at with much experimenting.

If you pour too hot, the metal will boil in the mould and most likely destroy all the good work you have done.

Making and preparing moulds may take you days… perhaps weeks to get to the point where you are ready to pour…investment casting is very time consuming.

On the other hand, using the green sand casting method, it is possible to ram up a mould, melt your metal and pour, all within the hour if everything is going your way. Not so with investment casting.

The BIG advantage with investment casting is the incredibly intricate shapes that can be cast. No other form of casting can replicate like lost wax or investment casting. Except perhaps that of shell, or ceramic casting, providing you have the skills and know-how to manage the craft.

Note:
There are many good books around, dealing in great depth with lost wax casting, search for these and read them, and practice until you feel you know enough to succeed with whatever project you have in mind.

Now, for some modern technology.

Build you own thermocouple pyrometer.

A thermocouple pyrometer is ideal for measuring high temperatures as found in the hobby casting foundry, this instrument will enable very accurate readings to be taken of your melt to determine the correct temperature at which you should pour.

The thermocouple operates on the principle of two dissimilar metals which when heated gives off an electric current, which you can measure with a cheap multimeter as used in the electrical industry.
The current generated is quite small but is measurable with this simple equipment.

By connecting the thermocouple (alumel) which are two pieces of dissimilar metal connected by wires about 24" in length, the wires need to be fed through ceramic insulators to protect the wires from the molten metal when taking a reading.

The meter reading of the metal temperature depends not only on the how much heat are at the junction of the alumel metal sensors but also on the resistance of the metal and the wires.

The instrument in use does not really measure temperature as such; the calibration is done by comparing the reading at KNOWN temperatures of the various metals at the molten stage.

How to make your thermocouple meter.

Visit your local electronics store and purchase a o –50 milliamp direct current meter, the dial, or needle should have a swing or movement of at least tow inches, it should read at the very minium 1 milliamp or better.

You may have to search at furnace or foundry suppliers, to procure your chromel - alumel thermocouple, which is normally 8 to 14, gauge wire.

The length of the wires and probe should be at least 24” in length; a series of ceramic insulators will have to be placed over the whole length as protection against the hot molten metal.

The alumel couples should be joined to heavy copper or brass wires, these wires travel through the insulators as described above.

The two heavy wires are then joined (soldered) to the wires, which attachés to the meter do not twist the wires to connect, if the joints are not secure you will get an inaccurate reading.

To calibrate your instrument.

Watch carefully again until the metal is melted fully again, if the metal is clean and bright and very fluid, take another reading with your meter, make a not of where the needle comes to rest on the dial, this will be your maximum heating point and thaw lower point is when solidification starts to take place.
First check to see that the wires are connected with correct polarity, gently heat the end of the probe to determine which way the needle is going to swing, if it swings down scale, you will have to reverse the connection.
(switch leads over)

A reading of zero should be noted when the meter is at room temperature, if it is not, use the adjustment screw or knob on the instrument to readjust to zero.

Try to obtain a small amount of pure aluminium, melt this is your crucible furnace, when it is fully melted remove the crucible form the furnace and let it sit on a fire brick and watch as it cools, as soon as you see a slight solidification around the wall of the crucible, dip your alumel metal tip into the melt and take a reading with your meter. Make a note of the reading, **plot it on a graph**

Place the crucible back into the furnace; continue to reheat the metal in the crucible. By experimenting with different temperature (scale) readings, you will arrive at a setting or dial reading, which will be the optimum heating you will need for your foundry work.

This instrument does not actually measure temperature as such, you ascertain from the scale reading, through trial and error what the correct temperature is for pouring.

You may have to repeat these tests with other metals you intend to melt, e.g. bronze, copper etc.

If you wish to use a more accurate instrument you will need to purchase a commercial pyrometer made specially made for the purpose of reading the temperature of molten metals.

These instruments are available from foundry suppliers, or specialised supply houses that cater for the furnace & heating industry.

Hardening & tempering steel.

The water annealing process.

If you're short of time and want to anneal a piece of hard tool steel which requires machining urgently, the following method will prove to be very efficient. One of the methods is to heat the steel to a dull cherry red, then remove it from the fire, and with a soft piece of wood, try the heat, as the heat decreases, touch the steel with the end of the piece of wood.
When the steel has cooled to the point where it no longer chars the wood, plunge the steel into a bath consisting of oil & water, this will make the steel soft and suitable for machining.
Another very effective method is to heat the steel slowly to a red heat, then place it in the ashes of the forge fire for a few minutes until it is almost black, then drop it into a container of soapsuds and allow it to cool.

Making a charcoal annealing box for small parts.

A scrap piece of 3" Dia steel pipe X 11" long will make an ideal annealing box, weld a plug on one end (a round steel plate), and machine a thread and make a screw on cap for the other end. Make sure the charcoal is evenly spread between the items and the walls

Using crushed charcoal, pack the small parts and the charcoal neatly in the pipe, carefully fill the entire container with charcoal and then close the end with the screw on cap.
The box should be kept at a red heat for at least an hour, and then left in the fire ashes over night to cool, the steel will be ready for machining next morning.

Tempering steel parts in a silicate sand bath.

A small quantity of parts of the same size can be readily tempered in the sand bath. After the hardening process has been carried out and it is desired to "draw" the temper; follow this method. Fill an iron box with clean dry silica sand, place the box full of sand in the fire and heat to a red heat, remove the box from the fire and take the small parts to be tempered, and lower them into the sand, take particular note of the change in the colour of the metal, when the correct colour has formed on the metal which denotes the correct temper, withdraw the part and let cool.

Tempering in an oil bath.
Fill a large steel container with engine oil, even used engine oil will work well for this method.
Suspend a thermometer in the oil bath and heat it until between 380 to 400 Deg F, throw the parts to be tempered into the oil, leave until drawn, the parts will not be drawn any more than the temperature of the oil.
It may be an advantage to tie the pieces to a length of thin wire to retrieve and check them from time to time.

Tempering solutions.

- Water X 3 gallons; salt X 2 quarts; sal – ammoniac and saltpetre X 2 Oz of each. And 1 X shovel full of the ashes from white ash bark.
- Salt X 4 Oz; saltpetre X ½ Oz; pulverized alum X 1 OZ to one gallon of water. Heat the articles to a cherry red and quench, but refrain from drawing the temper.

Like any thing learned in life, you can be given the tools, but you must learn how to use them. Likewise with “old time hints” some experimentation will be required.

An effective method for bluing small steel parts.

Take a cast iron or steel box, and fill it with clean dry silica sand and heat it to red-hot. Put the article which has been highly polished into the sand, when the right colour appears remove it and quench in oil.
It is possible to impart a nice blue on small machine parts such as sewing machines, gun parts, workshop tools, eg chisels, punches etc.

These same parts can be blued by placing in a solution of 10 parts saltpetre and black oxide of manganese, to gage the correct temperature of the pot, saw dust will flash when thrown against it or on the lid.

String small parts on wires and dip in the solution for about two minutes, but the time may depend on the actual thickness of the parts to be blued.

Melting cast iron in a crucible.
Many hobby casters don’t realize they can melt small quantities of cast iron in a crucible using a gas-fired furnace. (See 3-volume metal casting made easy ebooks at the myhomefoundry.com web site)

The best type of cast iron to use is that gained from scrap water heaters or any thin walled cast iron item. The cast iron must be broken up into small pieces, the smaller the better. The other ingredient you require is charcoal, which we explained how to make at the front of the book.

Crush the charcoal into a size equal to say an almond nut. Now what you do is to take your crucible, place some small pieces of cast iron in the bottom, then a thin layer of crushed charcoal, then another layer of cast iron pieces, keep repeating this process until the crucible is full.
The alternate layers of charcoal and cast iron pieces are just like the method used when charging a cupola furnace.
It is time to fire up the gas-fired furnace, get it reasonably hot and stabilise the flame for maximum heat, you will need much more blast than that required for aluminium or bronze.

Grab the crucible with your crucible tongs (you can make your own, full instructions in our **FREE ebook (How to Build Crucible Lifting Tongs)** and lower it into the furnace chamber, slide the furnace lid over to close and let the crucible heat up.

As the heat in the furnace rises, the crucible walls heat up and the cast iron and charcoal also start to get super heated, the charcoal helps to raise the internal heat of the crucible even higher than the furnace, if you could take a look between the layers of metal and charcoal you would see just how hot everything becomes after about 50 minutes of heating.

After about the hour mark (melting time will depend on how efficient your furnace is) the cast iron should be starting to melt, when the melt has progressed more, you will notice the layers of charcoal reducing and it will start to float on top of the molten iron.

When the iron is totally fluid, it is ready to pour, remember this will be only a small pour, perhaps 3 or 4 lbs, and most likely only suitable for small ornaments etc.
There are things you can do to improve the quality of the iron, but for this small melt it is probably not worthwhile. Some experimentation may be required for best results.

Bright dips & pickles.
Aluminium castings.

First dip the castings into a caustic solution, don't leave it to long, as the caustic will start to eat the metal. Rinse in clean cold water then dip into a solution of 50% nitric acid & 50% water. Watch the cleaning action carefully; you may have to pass the castings between the acid dip and the clean water until the desired effect is found.
Wash the castings in clean water; dry sawdust is a great drying material after this treatment.

Pickles for brass.

Recipe 01.

Nitric Acid.	1-½ parts.
Sulphuric acid.	2 parts.
Sodium Chloride.	2oz for each of 4 gal.

Recipe 02.

Sulphuric acid	5 parts.
Saltpetre	1part.
Water	3parts.

Method: Dip parts to be pickled in acid bath and rinse in clean water, rotate between baths to get required result.

Please wear protective clothing and eye protection goggles, you dealing with harmful acids, ADD ACIDS TO WATER, **NOT WATER TO ACID.**

Bright dip for copper casting.

10 gal water.
1 gal sulphuric acid.
10Lbs potassium dichromate.

After dipping and achieving desired result wash in clean water and neutralize acid by dipping in a solution of 1% sodium carbonate (bi-carb soda) solution. Rinse in clean water afterwards, air dry or let dry in hardwood sawdust.

Old time foundry flux for copper.

Mix equal parts of ground charcoal and zinc with enough molasses water to form into a stiff paste. Roll into small balls of about an inch perhaps larger, depending on the melt size, let them dry. When the copper starts to melt drop in just enough balls to create a good cover of the molten metal.

We trust that you'll find the old time hints & formulae to be of use.

Many of the recipes & hints have been lifted from many old out of print late 1800s and early 1900s text books, no guarantee of any kind is given as to the accuracy or otherwise of these recipes.

Please be aware that chemicals used in some old time recipes may be quite harmful if used incorrectly.

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