

In the Cooler, the Liquor in temperate weather, stands four days. The second day the *Alum* begins to strike, gather and harden about the sides, and at the bottom of the Cooler.

If the Liquor should stand in the Cooler above four days, it would as they say turn to *Copperas*.

The use of Urine, is as well to cast off the Slam, as to keep the Kelp-Lees from hardning the *Alum* too much.

In hot weather, the Liquors will be one day longer in cooling, and the *Alum* in gathering, than when the weather is temperate. In frosty weather the cold strikes the *Alum* too soon, not giving time for the Nitre and Slam to sink to the bottom, whereby they are mingled with the *Alum*. This produceth double the quantity: But being foul, is consumed in the washing.

When the Liquor hath stood four days in the Cooler: Then that called Mothers is scooped into a Cistern, the *Alum* remaining on the sides and at the bottom; and from thence the Mothers are pumped back into the Boyler again. So that every five days, the Liquor is boyled again, untill it evaporate or turn into Alum or Slam.

The *Alum* taken from the sides and bottom of the Cooler, is put into a Cistern, and washed with Water that hath been used for the same purpose, being about twelve pound weight. After which it is Roached, as followeth.

Being washed, it is put into another Pan with a quantity of Water, where it melts and boils a little. Then is it scooped into a great Cask, where it commonly stands ten days, and is then fit to take down for the Market.

The Liquors are weighed by the Troy-weight. So that half a pint of Liquor must weigh more than so much Water, by so many penny weight.

*An Account of the way of making English Green-Copperas, Communicated by the same.*

**C**opperas-stones, which some call Gold-stones, are found on the Sea-shore in *Essex*, *Hampshire*, and so Westward. There are great quantities on the Cliffs; but not so good, as those on the Shore, where the Tides Ebb and Flow over them.

The



The best of them are of a bright shining Silver Colour: The next, such as are of a rusty deep yellow. The worst, such as have Gravel and Dirt in them, of a saddor Umber Colour.

In the midst of these Stones, are sometimes found the Shells of Cockles, and other small shell Fishes; small pieces of the Planks of Ships, and pieces of Seacoal.

The brightest of these Stones they use for Wheel-lock Pistols and Fusies.

In Order to the making of *Copperas*, they make Beds according as the Ground will permit. Those at *Debtford*, are about an hundred feet long, fifteen feet broad at the top, and twelve feet deep, shelving all the way to the bottom.

They ram the Bed very well, first with strong Clay, and then with the Rubbish of Chalk, whereby the Liquor, which drains out of the Dissolution of the Stones, is conveyed into a Wooden shallow Trough, laid in the middle of the Bed, and covered with a Board; being also boarded on all sides, and laid lower at one end than the other, whereby the Liquor is conveyed into a Cistern under the Boyling House.

When the Beds are indifferently well dried, they lay on the Stones about two feet thick.

These Stones will be five or six years, before they yield any considerable quantity of Liquor; and before that, the Liquor they yield is but weak.

They ripen by the Sun and Rain. Yet experience proves, that watering the Stones, although with Water prepared by lying in the Sun, and poured through very small holes of a Watering-pot, doth retard the work.

In time these Stones turn into a kind of Vitriolick Earth, which will swell and ferment like leavened Dough.

When the Bed is come to perfection, then once in four years, they refresh it, by laying new Stones on the top.

When they make a new Bed, they take a good quantity of the old fermented Earth, and mingle with new Stones, whereby the Work is hastned. Thus the old Earth never becomes useless.

The Cistern before mentioned is made of strong Oaken boards, well joyned and chalked. That at *Debtford* will contain seven hundred Tuns of Liquor. Great care is to be taken,



taken, that the Liquor doth not drain through the Beds, or out of the Cistern. The best way to prevent the same, is to divide the Cistern in the middle by Oaken boards, chalked as before; whereby one of them may be mended in case of a defect.

The more Rain falls, the more, but the weaker, will be the Liquor. The goodness whereof is tryed by weights prepared for that purpose. Fourteen penny weight, is Rich. Or an Egg being put into the Liquor, the higher it swims above the Liquor, the stronger it is. Sometimes the Egg will swim near half above the Liquor.

Within one minute after an Egg is put in, the ambient Liquor will boil and froth; and in three minutes the shell will be quite worne off.

A drop of this Liquor falling on the Manufactures of Hemp, Flax, or Cotten-Wooll, will presently burn a hole through it. As also in Woollen and Leather.

Out of the aforesaid Cistern, the Liquor is pumped into a Boyler of Lead, about eight feet square, containing about twelve Tuns, which is thus ordered. First they lay long pieces of Cast Iron, twelve inches square, as long as the breadth of the Boyler, about twelve inches one from another, and twenty four inches above the surface of the fire. Then crosswise they lay ordinary flat Iron Barrs, as close as they can lye, the sides being made up with Brick-work. In the middle of the bottom of this Boyler is laid a Trough of Lead, wherein they put at first a hundred pound weight of old Iron.

The fuel for boyling, is *New-Castle Coals*. By degrees, in the boyling, they put in more Iron, amounting in all to fifteen hundred pound weight in a boyling. As the Liquor wastes in boyling, they pump in fresh Liquor into the Boyler. Whereby, and by a defect in ordering the fire, they were wont to be above twenty days before it was enough. When that is, they try, by taking up a small quantity of Liquor, into a shallow Earthen Pan, and observing how soon it will gather and crust about the sides thereof.

But now of late by the ingenious contrivance of Sir *Nicolas Crisp*, the Work is much facilitated. For at his Work at *Debtford*, they boyl off three Boylers of ordinary Liquor in one Week. Which is done, first by ordering the Furnace so,



so, as that the heat is conveyed to all parts of the bottom and sides of the Furnace. Then whereas they were wont to pump cold Liquor into the Boyler to supply the waste in boyling, whereby the Boyler was checked some times ten hours: Sir *Nicolas* hath now a Vessel of Lead, which he calls a Heater, placed at the end of the Boyler, and a little higher, supported by Barrs of Iron as before, and fill'd with Liquor, which by a conveyance of heat from the Furnance, is kept near boyling hot: and so continually supplys the waste of the Boyler, without hindring the boyling. Thirdly, by putting in due proportions of Iron from time to time, into the Boyler. As soon as they perceive the Liquor to boyl slowly, they put in more Iron, which will soon quicken it.

Besides, if they do not continually supply the boyling Liquor with Iron, the *Copperas* will gather to the bottom of the Boyler and Melt. and so it will do, if the Liquor be not presently drawn off from the Boyler into a Cooler, so soon as it is enough.

The Cooler is oblong, twenty feet long, nine feet over at the top, five feet deep, taper'd towards the bottom, made of Tarras. Into this they let the Liquor run, so soon as it is boyled enough. The *Copperas* here will be gathering or shooting fourteen or fifteen days: and gathers much on the sides as in the bottom; *sc.* above five inches thick. Some put Bushes into the Cooler, about which the *Copperas* will gather. But *Deptford* they make not use of any.

That which sticks to the sides, and to the Bushes, is of a bright green, that in the bottom, of a foul and dirty colour.

In the end of fourteen days, they convey the Liquor into an other cooler, and reserve it to be boyl'd again with new Liquor.

The *Copperas* they shovel on a Floor adjoyning, so that the Liquor may drain from it into a Cooler.

The steam which comes from the boyling is of an acrimonious smell. *Copperas* may be boyled without Iron, but with difficulty. Without it, the Boyler will be in danger of melting.

Sometimes in stirring the Earth on the Beds, they find pieces of *Copperas* produced by lying in the Sun.

*An Account of the Salt Waters of Droytwich in Worcestershire; sent by Dr. William Cole from Dr. Tho. Rastell, who hath lived many years upon the place, and hath there several Phats of his own*

SIR,

HAVING heretofore seen in some of the Transactions of the Royal Society, Queries concerning the Salt-Springs in *Cheshire*, and not hearing of any account hath been given them of ours in *Worcestershire*, (which I hoped some more ingenuous Pen would have done before this time); to satisfy the desire of some friend, I have made as exact trialls of our Brine as I could, that I might be able in some measure to give an Answer to the *Cheshire* Queries, which if they are not answered