

## Isaac Newton. Laboratory Notebook from 1678 to 1696.

### Section 61-66: Of Formes & Transmutations wrought in them.

Quicksilver may bee turned to a red powder Vermilion being the fumes of ☿ & sulphur or a fusible & malleable body by the fumes of lead or a fugitive smoak & yet remaine recoverable Quicksilver pag 72 of Formes Mr. Boyle.

Camphire put into spirit of wine will dissolve in it without making it looke lesse cleare then faire water. But if you poure in a competent quantity of faire water the Camphire will emerge & become white as before. pag 73 of Formes

Leade kept long in a hot fire is turned into a glasse brittle reddish & a little Transparent pag 173 of formes.

A very sleight blending together of Nitre charcoale & Brimstone produce Gunpowder a body of more stupendious operations then ever Nature made & Glass is as usefull durable & close as any thing of Natures making.

Corrall that growing in the bottom of the sea is a succulent, soft & tender plant & propagats its species yet soe soone as it comes into the open aire it changes to a Lapideous forme & may bee corroded with good vinegar or by its Spirit like Lapis stellaris & many minerall stones. Soe in the Island Hainan (which belongs to China <)> There are Crabbs or Crawfishes which drawn out of the water in a moment loose both life & motion & become petrifyd without any apparent change of their shape. And in Sombrero not far from Sumatra in the East Indys there grow (neare the shore) twiggs which have a greate worme for their roote & the worme grows lesse as the tree grows greater untill the tree take roote in the ground when the worme is spent. If you pluck it upwards will shrink downwards & sinks into the earth unlesse you hold very hard but being plucked up by that time the leaves & Pill being being stripped of it turned to a stone much like white corral. Soe at Brasill there is an ordinary sorte of Animalls (like Grashoppers) transmuted into vegetables pag 245 246, 247, 248 of Formes.

Common Amber by Distillation (with much difficulty) yeilded neare 1/2 its weight in partly Oyle partly spirit & flegme & partly volatile salt, the remaining matter being a cole black cake more exquisitly polished above then any speculum. Which cake being broken & againe put to what was distilld from it & closely luted up & set in warme sand in a small time returned to a mass like Turpentine, when the Glasse broke. At another triall the masse was turned to a deepe blood Red when the Glass againe broke.

Allome in the same manner (but with more difficulty) beeing distilled & the Flegme & spirit which came over being powered back upon the Caput Mortuum generated more & more Christalline graines of Allome till the Glass was broke. Soe the flegme Spirits & Oyle distilld from Vitrioll being againe put to their caput Mortuum & set in the cold aire did by degrees generate new graines of Vitrioll which in time came to broade cakes, the chang in the substance (& colour too into a fine blew) still increasing till the glas broke. pag 261 of Formes etc. This had other Phaenomena.

Powdered Antimony with a greater weight of Oyle of Vitrioll by halfe being for divers weeks digested together & then distilld there came over (besides a little water) a greate quantity of Combustible Antimoniall, or Antimonio=Vitriolate Sulphur, & the remaining caput Mortuum (which was friable white at the top like wood ashes & the rest looked like a Cinder) being againe committed to the naked fire in a small glasse retort with a Receiver for many howers there came nothing over but a very little Sublimed Sulphur, & the Caput mortuum was found covered over with a thin cake of colourles glasse transparent as common white glasse, which being broken, that underneath was perfect black Antimony adorned with long Shining streakes like common Antimony. The purenesse of this redintegrated Antimony seemed to proceede from the recesses of so much Sulphur which is not at all necessary to the constitution of Antimony though perhaps too the vitrum a top might proceede from the avolation of two much Antimony from the superfiціальl parts. pag 265

But redintegration of Bodys succeded best in Turpentine for a very cleare liquor being distilld from it was againe put to the caput Mortuum (which was very dry brittle Transparent sleeke & red but purely yellow when powdered) it was immediatly dissolved part of it into a deepe red Balsome. And by further digestion in a large well stopt Glasse became perfect Turpentine againe as all men judgd by the smell & Taste. pag 268 of forms

Camphire dissolved in well deflegmed spirit of niter will make a colourlesse solution. But if it bee cast into good Oyle of Vitriol & shaken into it as it dissolves, the liquor will bee first yellow & then of a deepe reddish colour. & (if your materials bee good & their proportion right which is hard to be hit on) will not have the least scent of the Camphire but upon powring in a due quantity of water the Camphire will in a trice emerge into a white & strong scented froth or powder at the top as at the first. And note that the Camphire was detained from emerging in a liquor much heavier then it selfe (as dissolved Gold is kept from sinking in a liquor lighter then it selfe) & yet emerged when the liquor was made lighter by a mixture of water; That a Colourles liquor turnd its whitenesse to a deepe red & another colourlesse liquor redeemed its whitenesse againe; & that a liquor not odorous should deprive it of its scent (chaining its parts from being valatile) & another inodorus liquor should restore it. If into the said red mixture bee put spirit of wine the colour will bee a turbid red (though either of the ingredients severally mixed with spirit of wine make a cleare mixture) & if you then power water into it the mixture will bee white because of the parts of Camphire associated into little masses which by degres ascend into a white powder leaving the rest cleare If the Red mixture bee distilled, what comes over has a scent very divers both from Camphire & the mixture & the caput mortuum (which was the greatest part of the mixture) was black as jet, though neither distilld liquors by redistillation nor camphire in a retort (which notwithstanding the fire continues white) affords that colour. And though Oyle of Vitrioll bee a distilld liquor & Camphire very fugitive yet when mixt they endured a good fire before the caput Mortuum could bee reduced to the said pitchy substance & afterward it endured a greate heate in a crucible for 1/2 an hower without much diminution. pag 271 of the Origin of Formes.

Raine water whilst distilling appeares full of motes & (when all distild) it leaves the bottom all covered over with a pretty white sustance which is Earth in all proof more then twice heavier then water & almost as heavy as pure (wood ashes. (the weight of Glasse, wood ashes this powder & water being as  $2 \frac{1}{2}$ .  $2 \frac{1}{6} +$ .  $2 \frac{1}{6} - 1$ ) absolutly fixed & immutable in the greatest

fires. undissolvable in water of exceeding small granulae, (for fine sand mixed with it appeared like pebble stones in the finest flower with the best Microscopes) on which good oyle of Vitriol & also strong & well deflegmed spirit of Salt will work with bubbles & hissing (& that without the assistance of heat) as they will doe on

Lapis Stellaris Ossifragus & the earthy part of wood ashes & other soft stones washt in boyling water. insipid & a little gritty between the teeth, dry white & in the Microscope absolutely opaque. One by distillation of an ounce of well clarified raine water neare 200 times in cleane glasses got 3/4 of an ounce of this powder there remaining 1/8<sup>ounce</sup> of fluid water & this without any sensible injury to his glasse: Though it would seeme as strang that so insipid & mild a menstruum as raine water should with so gentle a heate dissolve the almost indestructible body of Glasse into it primitive sand & ashes (which Aqua fortis & Regis will not injure.). The latter operations afforded as much if not more powder then the first. A great parte of this earth remained undissolved in Oyle of Vitrioll though the oyle was not glutted as appeared by its working upon fresh powder thrown in. Runing mercury will by a circulatory distillation with a proportionable heat be transmuted to a powder more fixt then the running Mercury.

And Boyle knows two other liquors Oyle of Vitriol & Spirit of wine in the following experiment that digested together afford good store Substance insipid very fixd & indissoluble in water. And highly rectified Spirit of wine that will burne all away may without additaments. (& other ways too) bee turned a good part of it into flegme. If Helmont rightly affirm that water is the principle of all things becaus at last all things may (by successive operations) bee reduced to it ; wee may upon the same reason conclude earth the generall principle Stony particles lying in water ram themselves into the pores of bodys thrown in & make them appeare turned into stone. Boyle of Forms Experiment 9. pag 388

Put an equall weight of good Oyle of Vitrioll & Spirit of wine in a bolt head of glass egg with a long neck carfully stopt to digest in a Moderat heate for 3 or 2 weeks or lesse, & in a tall Glass cucurbit draw of the spirit with a graduall heate which will bee exceeding fragrant pleasant & subtile & differing in scent from all things else & may bee of excellent use in Physick for the vertues of Volatile Sulphur of Vitrioll are wonderfull. When the liquor which comes over begins to bee soure change the receiver & increase the fire & what coms over will stink like brimstone enough to take away ones breath. And besides there is in these operations produced a liquor very subtile pleasant & Aromaticall that will not mix with the said fragrant & faetid spirit & is also as differing from the spirit of wine & oyle of Vitrioll. Still urge the remaines with more heate (enough & no more then will make faetid liquor ascend (least the Caput Mortuum rise & run over) & there will at last remaine a Caput mortuum consistent like pitch (Or if you have urged it far enough brittle) black, not mingling with water, very fixed, incombustible & almost tastelesse; Though the ingredients bee cleare, will mix with water & are volatile (especially the spirit of wine) & The spirit most inflammable & the oyle most corrosive of any liquor. This will succede with oyle of Sulphur per Campanam & spirit of wine though not so well, & with Oyle of Vitrioll & Spanish wine.

Salts if they bee often dissolved in water & dried againe turne to a limus or calx & that the more by how much the better they are dried. The calx remaining like a sediment in the water wherin the salt is dissolved. And if salt of Tarter bee exposed to the sun on a plate of glasse for some time as 1/4<sup>ter</sup> of a year together it will turne to a pellucid stony substance indissoluble in water

Salts & Sulphurs are seminum tori, disguises in which the crasis of concretes are masked, which are successively transmutable into one another. So the juice of Grapes (if decocted) the aqueous parts exhaling the residue becomes a Rob [or thick extract] which is gummous & viscous; this by fermentation is made volatile & become a spiritual  $\Delta$  or burning spirit, which by the rectified Spirit of Urin is wholly turned into a volatile salt [viz: Offa alba.] Thus a terrestreity or gummous viscosity is turned into a volatil spirit wholly inflammable & this into a real pure salt not inflammable: & so on the contrary salt is turned into  $\Delta$  in the distillation of Tartar which being wholly saline & dissolvable in water, by bare distillation is turned the major part of it into an oyle impermiscible with water. G. Starkey's Pyrotechny asserted. pag. 116.

In Peru neare unto Guancavelica there is a water which they take & put into molds of what form & bignes they please & expose it to the Sun for a few days, whereby it is made perfect stone & they build their houses with it: all cattel that drink of it dy. In a mountain called Pacocava a league from the mines of Verenguela de Pajages, there are springs of this liquor (the colour wherof is whitish inclining to yellow) that as it runs along condenses into very hard & weighty stone of different shapes. Moreover any kind of porous substance that can suck this kind of liquor into it is apt to be turned into stone. Chap 12 of the Art of metals translated out of Spanish by the Earle of Sandwich.

Source: *The Chymistry of Isaac Newton*, <http://webapp1.dlib.indiana.edu/newton/>