

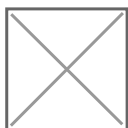
12 The Earliest Chemistry

Two papyri were discovered in Thebes, in Egypt from about 300 A.D. They were part of a trove of papyri, but two stood out: the Leyden Papyrus X ("ten"), and the Stockholm Papyrus, named for the museums housing them. Both are collections of chemical recipes.

These are written as clear, simple, and methodical. They say what the recipe will do. There are uncertainties, like measurement, and exactly what substance to use, and how long the steps are to take.

And there is clearly fraud being attempted here. Some appearances are intended to deceive by making base metals look like gold.

The Leyden Papyrus X has 111 recipes, and the Stockholm Papyrus has 154, are probably written by the same author and are in koine Greek.



See Earle Radcliffe Caley, "The Leyden Papyrus X: An English Translation with Brief Notes," *Journal of Chemical Education* 3,10 (Oct. **1926**): 1149–66, and "The Stockholm Papyrus: An English Translation with Brief Notes," *Journal of Chemical Education* 4,8 (Aug. **1927**): 979–1002. My notes are in [brackets.]

“ From Leyden Papyrus X

8. Manufacture of Asem.[alloy to imitate gold or silver]

Take soft tin in small pieces, purified four times; take 4 parts of it and 3 parts of pure white copper and 1 part of asem. Melt, and after the casting, clean several times and make with it whatever you wish to. It will be asem of the first quality, which will deceive even the artisans.

15. The coloration of Gold.

To color gold to render it fit for usage. Misy,[iron sulfate + copper sulfate] salt, and vinegar accruing from the purification of gold; mix it all and throw in the vessel (which contains it) the gold described in the preceding preparation; let it remain some time, (and then) having drawn (the gold) from the vessel, heat it upon the coals; then again throw it in the vessel which contains the above-mentioned preparation; do this several times until it becomes fit for use.

25. Gold Polish.

For treating gold, otherwise called, purifying gold and rendering it brilliant: Misy, 4 parts; alum, 4 parts; salt, 4 parts. Pulverize with water. And having coated the gold (with it), place it in an earthenware vessel deposited in a furnace and luted with clay, (and heat) until the above-named substances have become molten, then withdraw it and scour carefully.

34. A Procedure for Writing in Letters of Gold.

To write in letters of gold, take some mercury, pour it in a suitable vessel, and add to it some gold in leaves; when the gold appears dissolved in the mercury, agitate sharply; add a little gum, 1 grain for example, and, (after) letting stand, write in the letters of gold.

38. For Giving to Objects of Copper the Appearance of Gold. And neither touch nor rubbing against the touchstone[black silica stone which shows the color of gold or silver rubbed on it] will detect them, but they can serve especially for (the manufacture of) a ring of fine appearance. Here is the preparation for this. Gold and lead are ground to a fine powder like flour, 2 parts of lead for 1 of gold, then having mixed, they are incorporated with gum, and one coats the ring with this mixture; then it is heated. One repeats this several times until the object has taken the color. It is difficult to detect (the fraud), because rubbing gives the mark of a gold object, and the heat consumes the lead but not the gold.

43. Testing of Gold.

If you wish to test the purity of gold, remelt it and heat it: if it is pure it will keep its color after heating and remain like a piece of money. If it becomes white, it contains silver; if it becomes rougher and harder some copper and tin; if it blackens and softens, lead.

87. Doubling of Gold.

For augmenting the weight of gold. Melt (it) with a fourth part of cadmia, and it will become heavier and harder.

95. The Preparation of Purple [dye].

Break into small pieces stone of Phrygia; put it to boiling, and having immersed the wool, leave it until it cools. Then throwing in the vessel a mina[unit of weight in Greece and Egypt] of seaweed, put it to boiling and throw in it (again) a mina of seaweed. Let it boil and throw the wool into it, and letting cool, wash in sea water . . . [the stone of Phrygia is roasted before being broken] . . . until the purple coloration appears.

96. Dyeing with Purple (Two Methods).

Grind lime with water and let it stand over night. Having decanted, deposit the wool in the liquid for a day; take it out (and) dry it; having sprinkled the alkanet[red dye from the root of *Alkanna tinctoria*] with some vinegar, put it to

boiling and throw the wool in it and it will come out dyed in purple . . . alkanet boiled with water and natron produces the purple color. Then dry the wool, and dye it as follows: Boil the seaweed with water and when it has been exhausted, throw in the water an imperceptible quantity of copperas, in order to develop the purple, and then plunge the wool in it, and it will be dyed. If there is too much copperas, it becomes darker.

From the Stockholm Papyrus

1. Manufacture of Silver.

Plunge Cyprian copper, which is well worked and shingled[beaten with a hammer to expel impurities] for use, into dyer's vinegar and alum and let soak for three days. Then for every mina of copper mix in 6 drachmas each of earth of Chios, salt of Cappadocia and lamellose alum, and cast. Cast skillfully, however, and it will prove to be regular silver. Place in it not more than 20 drachmas of good, unfalsified, proof silver, which the whole mixture retains and (this) will make it imperishable.

18. Manufacture of a Pearl.

Take and grind an easily pulverized stone such as window mica. Take gum tragacanth and let it soften for ten days in cow's milk. When it has become soft, dissolve it until it becomes as thick as glue. Melt Tyrian wax; add to this, in addition, the white of egg. The mercury should amount to 2 parts and the stone 3 parts, but all remaining substances 1 part apiece. Mix (the ground mica and the molten wax) and knead the mixture with mercury. Soften the paste in the gum solution and the contents of the hen's egg. Mix all of the liquids in this way with the paste. Then make the pearl that you intend to, according to a pattern. The paste very shortly turns to stone. Make deep round impressions and bore through it while it is moist. Let the pearl thus solidify and polish it highly. If managed properly it will excel the natural.

101. Cold Dyeing of Purple Which is Done in the True Way.

Keep this as a secret matter because the purple has an extremely beautiful luster. Take scum of woad[blue dye from *Isatis tinctoria*] from the dyer, and a sufficient portion of foreign alkanet of about the same weight as the scum – the scum is very light – and triturate it in the mortar. Thus dissolve the alkanet by grinding in the scum and it will give off its essence. Then take the brilliant color prepared by the dyer – if from kermes[red dye from the small beetle *Kermes ilices*] it is better, or else from kirmnos – heat, and put this liquor into half of the scum in the mortar. Then put the wool in and color it unmordanted[without the agent to fix the color to the wool] and you will find it beyond all description.

The Alchemy Reader (pp. 46-49). Cambridge University Press. Kindle Edition.

