

## COOLEY'S CYCLOPÆDIA OF PRACTICAL RECEIPTS

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**INK.** Syn. *Atramentum*,—Lat. Coloured liquid employed for writing with a pen. Ink is made of various substances and colours; but in the present article we shall confine ourselves to a notice of the tanno-gallic compounds to which the term, when standing alone, is almost exclusively applied.

*Prep.* 1. *Aleppo galls* (well bruised), 4 oz.; clean *soft water*, 1 quart; macerate in a *clean* corked bottle for ten days or a fortnight, or even longer, with frequent agitation, then add of *gum arabic* (dissolved in a wine-glassful of water), 1¼ oz.; *lump sugar*, ½ oz.; mix well, and *afterwards* further add of *sulphate of iron* (green copperas, crushed small), 1½ oz.; agitate occasionally for 2 or 3 days, when the ink may be decanted for use, but is better if the whole is left to digest together for 2 or 3 weeks. When time is an object, the whole of the ingredients may be at once put into a bottle, and the latter agitated daily until the ink is made; and *boiling water* instead of *cold water* may be employed. *Product.* 1 quart of excellent ink, writing pale at first, but soon turning intensely black.

2. *Aleppo galls* (bruised), 12 lb.; *soft water*, 6 gall.; boil in a copper vessel for 1 hour, adding *more water* to make up for the portion lost by evaporation; strain, and again boil the galls with *water*, 4 gall., for ½ an hour; strain off the liquor, and boil a third time with *water*, 2½ gall., and strain; mix the several liquors, and while still hot, add of *green copperas* (coarsely powdered), 4½ lb.; *gum arabic* (bruised small), 4 lb.; agitate until dissolved, and after defecation strain through a hair sieve, and keep it in a bunged-up cask for use. *Prod.* 12 gall.; very fine and durable.

3. *Aleppo galls* (bruised), 14 lb.; *gum*, 5 lb.; put them into a small cask, and add of *boiling soft water*, 15 gall.; allow the whole to macerate, with frequent agitation, for a fortnight, then further add of *green copperas*, 5 lb.; (dissolved in) *water*, 7 pints; again mix well, and agitate the whole once daily for 2 or 3 weeks. *Prod.* Fully 15 gall. Resembles No. 1.

4. *Galls* (bruised), 9 lb.; *logwood chips* (best Campeachy), 3 lb.; boil as in No. 2; to the strained mixed liquors, add of *gum arabic* and *green copperas*, of each (bruised small), 4 lb.; simmer or digest until dissolved, and at once strain through a hair-sieve into the store-cask or jars. *Prod.* 16½ gall. Excellent, but inferior to the preceding.

5. *Galls* (bruised), 2 lb.; *logwood chips*, *green copperas*, and *gum*, of each, 1 lb.; *water*, 7 gall.; boil 2 hours, and strain. *Prod.* 5 gall. A superior ink for retail.

6. *Galls* (bruised), 1 lb.; *logwood*, 2 lb.; *gum* (common), 1 lb.; *green copperas*, ¾ lb.; *water*, 8 gall.; proceed as last. *Prod.* 6 gall. Common, but fit for all ordinary purposes.

The following formulæ are for some of the advertised inks, or are those recommended by the authorities, whose names are attached to them:—

7. (*Anti-corrosive.*) Same as “*Asiatic Ink.*”

8. (*Asiatic.*) *Galls*, 4 lb.; *logwood*, 2 lb.; *pomegranate peel*, 1 lb.; *soft water*, 5 gall.; boil as in No. 2, then add to the strained and decanted liquor, when cold, of *gum arabic*, 1 lb.; *lump sugar* or *sugar candy*, ¼ lb.; dissolved in *water*, 3 pints. *Prod.* 4½ gall. Writes pale, but flows well from the pen, and soon gets black.

9. (Brande.) *Galls*, 6 oz.; *green copperas* and *gum arabic*, of each, 4 oz.; *soft water*, 3 quarts; by decoction.
10. (Chaptal.) As No. 4 (nearly), adding *sulphate of copper*,  $\frac{1}{2}$  lb. Full coloured, but less durable and anti-corrosive than the preceding.
11. (M. Desormeaux, jun.) *Galls*, 1 lb.; *logwood chips*, 4 oz.; *water*, 6 quarts; boil 1 hour, strain 5 quarts, add of *sulphate of iron* (calcined to whiteness), 4 oz.; *brown sugar*, 3 oz.; *gum*, 6 oz.; *acetate of copper*,  $\frac{1}{4}$  oz.; agitate twice a day for a fortnight, then decant the clear, bottle, and cork up for use. Writes a full black. (See No. 10.)
12. (Exchequer.) *Galls* (bruised), 40 lb. (say 4 parts); *gum*, 10 lb. (say 1 part); *green sulphate of iron*, 9 lb. (say 1 part); *soft water*, 45 gall. (say 45 parts); macerate for 3 weeks, employing frequent agitation. "This ink will endure for centuries."
13. (Guibourt.) *Galls* (in powder), 50 parts; *hot water*, 800 parts; digest 24 hours, strain, and add of *green sulphate of iron* and *gum arabic*, of each, 25 parts; when dissolved, add the following solution, and mix well:—*Sal ammoniac*, 8 parts; *gum*, 2 parts; *oil of lavender*, 1 part; *boiling water*, 16 parts. Said to be indelible.
14. (Dr. Hare.) As No. 12 (nearly), but substituting "*finery cinder*" for the sulphate of iron. Recommended as anti-corrosive.
15. (Japan.) This is a black and glossy kind of ink, which may be prepared from either of the above receipts by calcining the copperas until white or yellow, or by sprinkling it (in powder) with a little nitric acid before adding it to the decoction (preferably the former), by which the ink is rendered of a full black as soon as made. The glossiness is given by using more *gum*. It flows less easily from the pen than other inks, and is less durable than ink that writes paler and afterwards turns black. It is unfitted for steel pens.
16. (Lewis.) *Bruised galls*, 3 lb.; *gum* and *sulphate of iron*, of each, 1 lb.; *vinegar*, 1 gall.; *water*, 9 quarts; macerate with frequent agitation for 14 days. To produce 3 galls. Fine quality, but apt to act on steel pens.
17. (Old "Patent.") As No. 8 (nearly).
18. (Prerogative Office.) *Galls*, 1 lb.; *gum arabic*, 6 oz.; *alum*, 2 oz.; *green vitriol*, 7 oz.; *kino*, 3 oz.; *logwood raspings*, 4 oz.; *soft water*, 1 gall.; macerate as last. Said to write well on parchment.
19. (M. Ribaucourt.) *Galls*, 1 lb.; *logwood chips* and *sulphate of iron*, of each,  $\frac{1}{2}$  lb.; *gum*, 6 oz.; *sulphate of copper* and *sugar candy*, of each, 1 oz.; boil the first two in *soft water*,  $2\frac{1}{2}$  gall., to one-half, then add the other ingredients. Full coloured. (See No. 10.)
20. (Dr. Ure.) *Galls*, 12 lb.; *green copperas* and *gum Senegal*, of each, 5 lb.; as No. 2 (nearly). To produce 12 gall.
21. (Dr. Wollaston.) *Galls*, 1 oz.; *sulphate of iron*, 3 dr.; *gum*,  $\frac{1}{4}$  oz.; *cold water*,  $\frac{1}{2}$  pint; put into a bottle and shaken together every day for a fortnight or longer.

*Obs.* According to the most accurate experiments on the preparation of black ink, it appears that the quantity of *sulphate of iron* should not exceed  $\frac{1}{3}$ rd part of that of the *galls*, by which an excess of astringent vegetable matter, which is necessary for the durability of the colour, is preserved in the liquid. *Gum*, by shielding the writing from the action of the air, tends to preserve the colour, but if much is employed, the ink flows languidly from *quill pens*, and scarcely at all from *steel pens*. The latter require a very limpid ink. The addition of *sugar* (especially of *moist sugar*) increases the flowing property of the liquid, but makes it dry more slowly, and frequently pass into an acetous state, in which condition it acts injuriously on the pen. *Vinegar* for a like reason is not calculated for the menstruum, as it rapidly softens quill or horn, and corrodes iron and steel.

The most permanent (tanno-gallate) inks, are those which contain the proper quantity of oxide of iron, at the *minimum* of oxidizement, in a state of solution or minute suspension, by which means, not only does a larger quantity of fluid flow from the pen on to a given space, but it also sinks into the substance of the paper, by which the stain is rendered more permanent, and less easily removed by attrition or accident. Such inks are uniformly *pale* until exposed to the air for some days, when they acquire their full colour. When the iron is at the *maximum* of oxidizement, as is the case when *calcined copperas* is employed, the ink writes of a *full black* at first; but from its colouring matter being merely a suspended precipitate, it rests upon the surface of the paper without sinking into it, and may consequently be more easily erased than the former. Its black colour is also more liable to fade by the action of light and atmospheric oxygen.

Another matter of importance connected with the *permanency* of the colour of the tanno-gallic inks, is the use of the *best* Aleppo, or blue nut-galls *only*. No second or inferior quality should be employed. A contrary practice, often adopted for the sake of economy, is nearly always followed by unpleasant results, and often by considerable loss.

The only improvement of importance which has been made in the manufacture of writing ink from the common materials, since the publication of our last edition, is the practice of first *roasting* the *gall-nuts*, which is now adopted by a few of the houses most celebrated for their *copying ink*. In this way, a portion of *pyrogallic acid* is formed, which is very soluble in water, and strikes an intense bluish-black colour with the protosulphate of green sulphate of iron. From galls so treated an ink may be made to write *at once black*, without the trouble and disadvantage of calcining or peroxidizing the copperas, as noticed above. Care must, however, be taken to avoid any loss of materials by volatilization; the process, therefore, requires the exercise of a little skill.

To prevent any tendency to *mouldiness* in ink, a few *bruised cloves*, or a *little oil of cloves*, or, still better, a few drops of *creasote*, may be added. The last two should be previously dissolved in a small quantity of *strong vinegar* or *rectified spirit*. With the same intention some of the large makers allow the ink to become covered with a skin of "mould" in the cask, to render it less liable to undergo the same change when subsequently bottled. Formerly, the practice was to add a little *spirit* for the same purpose.

*Sumach*, *logwood*, and *oak bark*, are frequently substituted for galls in the preparation of *common* ink. When such is the case, only about  $\frac{1}{6}$  th or  $\frac{1}{7}$  th of their weight of copperas should be employed. Inks so made possess little durability.

The very general use of steel pens of late years has caused a corresponding demand for "*easy-flowing inks*," many of which are now vended under the titles of "*writing fluids*," "*steel-pen ink*," "*anti-corrosive ink*." &c. The greater number of these are prepared from galls in the preceding manner; but a less quantity of gum is employed, and greater attention is paid than heretofore to

avoid every source of “*greasiness*,” among which *smoke* and *dirty utensils* are perhaps the principal. The *blue writing fluids* which either maintain their colour or turn black by exposure to the air, are in general prepared from *ferrocyanide of potassium*, or from *indigo*, and are fully noticed in another place. “*Copying ink*,” another variety of ink of recent introduction, is characterized by its suitability to metallic pens, and by furnishing a transcript by means of the *copying press* or *copying machine*.

The inks prepared by the *first four* of the above formulæ are very durable and limpid, and will bear dilution with nearly an equal bulk of *water*, and still be superior in quality to the ordinary inks of the shops. The journals of the editor's father, written with one of them in the Mediterranean, during the early part of the long war, though for some time exposed to the sea air, and now above 60 years old, are still as legible as if newly written. See *Copying Ink, Galls, Pyrogallic Acid, Stains, Writing Fluids, &c.*

**INK (Copying).** This is usually prepared by adding a little *sugar* or other *saccharine matter* to ordinary *black ink*, which for this purpose should be *very rich* in colour, and preferably made of galls prepared by heat, as noticed above. Writing executed with this ink may be copied within the space of 5 or 6 hours, by passing it through a *press* (*copying press*) in contact with *thin unsized paper* (“*bank post*”) slightly damped, enclosed between two sheets of thick *oiled* or *waxed paper*, when a reversed transcript will be obtained, which will read in proper order when the back of the copy is turned upwards. In the *absence* of a *press*, a copy may be taken, when the ink is good and the writing very recent, by rolling the sheets, duly arranged on a ruler, over the surface of a flat smooth table, employing as much force as possible, and avoiding any slipping or crumpling of the paper. Another method is to pass a warm flat-iron over the paper laid upon the writing. The following proportions are employed:—

1. *Sugar candy* or *lump sugar*, 1 oz.; or *treacle* or *moist sugar*, 1¼ oz.; *rich black ink*, 1½ pint; dissolve.
2. *Malt wort*, 1 pint; evaporate it to the consistence of a syrup, and then dissolve it in *good black ink*, 1¼ pint.
3. *Solazza juice*, 2 oz.; *mild ale*, ¼ pint; dissolve, strain, and triturate with *lamp black* (previously heated to dull redness in a covered vessel), ¼ oz.; when the mixture is complete, add of *strong black ink*, 1½ pint, mix well, and in 2 or 3 hours decant the clear.

*Obs.* After making the above mixtures, they must be tried with a common *steel pen*, and if they do not “*flow freely*” some more unprepared ink should be added until they are found to do so.

**INK (Indelible).**

*Prep.* 1. *Lamp black*, (previously heated to dull redness in a covered vessel), ¼ oz.; triturate with *good black ink* (gradually added), 1 pint. Resists chlorine, weak acids, and weak alkaline lyes, in the cold.

2. (M. Bezanger.) *Lamp black* ground in a *lye of caustic soda*, combined with a *mixture of gelatine* and *caustic soda*. Said to be indelible, and to resemble genuine China ink. (Moniteur Industriel.)

3. (M. Braconnot.) *Dantzic potash*, 4 parts; *tanned leather parings*, 2 parts; *sulphur*, 1 part; *water*, 20 parts; boil them in an iron vessel to dryness, then raise the heat (constantly stirring with an iron rod) until the whole forms a soft mass, observing that it does not ignite; next dissolve the mass in *water*, q. s., and filter the solution through a cloth. Flows freely from a pen, and resists the action of many chemical substances.

4. (*Carbon Ink*.) Genuine *Indian ink*, rubbed down with *good black ink*, until it will flow easily from a pen. Resists chlorine, oxalic acid, and ablution with a hair pencil or sponge.

5. (Coathupe.) *Borax*, 1 oz.; *shell-lac*, 2 oz.; *water*, 18 fl. oz.; boil in a covered vessel until dissolved, strain, add of *thick mucilage*, 1 oz.; and triturate it with *levigated indigo* and *lamp black*, of each, q. s. to give a good colour; after 2 hours' repose, decant it from the dregs, and bottle for use. Resists moisture, chlorine, and acids.

6. (*French*.)—*a*. From *Indian ink*, diffused through *water acidulated with hydrochloric acid*. For quills—*b*. From *Indian ink* diffused through *water slightly alkalized with liquor of potassa*. For metallic pens.

7. (Herberger.) *Wheat gluten* (free from starch), q. s., is dissolved in *weak acetic acid* or *good pure vinegar*, 4 fl. oz.; *lamp black* (best), 10 or 12 gr.; *indigo*, 2 or 3 gr.; and *oil of cloves*, 1 or 2 drops, are then added, and the whole is thoroughly incorporated together. The product is inexpensive, has a beautiful black colour, and resists the action of water, chlorine, and weak acids.

8. (Dr. Traill.) Resembles Herberger's (nearly).

9. (Dr. Ure.) Similar to No. 4.

*Obs.* The products of the above formulæ, though called "*indelible ink*" and "*indestructible ink*," are in reality only indelible as compared with common writing ink, as they may all be removed with more or less facility by chemical reagents, assisted by mechanical means. They are intended chiefly for paper, pasteboard, and parchment. No. 5 is also used for glass and metal. See *Marking Ink*.

#### **INK** (Horticultural).

*Prep.* 1. *Chloride of platinum*,  $\frac{1}{4}$  oz.; *soft water*, 1 pint; dissolve, and preserve it in glass. *Used* with a clean quill to write on *zinc labels*. It almost immediately turns black, and cannot be removed by washing. The addition of gum and lamp black, as recommended in certain books, is unnecessary, and even prejudicial to the quality of the ink.

2. *Verdigris* and *sal ammoniac*, of each,  $\frac{1}{2}$  oz.; *levigated lamp-black*,  $\frac{1}{4}$  oz.; *common vinegar*,  $\frac{1}{4}$  pint; mix thoroughly. *Used* as the last, for either *zinc*, *iron*, or *steel*.

3. *Blue vitriol*, 1 oz.; *sal ammoniac*,  $\frac{1}{2}$  oz.; (both in powder); *vinegar*,  $\frac{1}{4}$  pint; dissolve. A little lamp-black or vermilion[sic] may be added, but it is not necessary. As No. 1; for *iron*, *steel*, or *tin-plate*. Some of the preparations described under "*Incorrodible Ink*," are also used by gardeners and nurserymen.

**INK** (Incorrodible). This name has been given to several preparations of a resinous character capable of resisting the action of damp and acids.

*Prep.* 1. *Boiled linseed oil*, ground with *lamp-black* and *Prussian blue*, of each, q. s. to impart a deep black colour. It may be thinned with *oil of turpentine*.

2. Good *copal* or *amber varnish*, coloured with either *plumbago* or *vermillion*[sic].

3. *Trinidad asphaltum* (genuine), 1 part; *oil of turpentine*, 4 parts; *colour* (as last), q. s.

4. (Mr. Close.) *Cobalt* (in powder), 25 gr.; *oil of lavender*, 200 gr.; dissolve by a gentle heat, and add of *lampblack*, 3 gr.; *indigo*, 1 gr. (both in impalpable powder); or *vermilion*, q. s.

5. (Mr. Hausman.) As No. 3 (nearly). Resists the action of iodine, chlorine, alkalies and acids.

6. (Sheldrake.) *Asphaltum* dissolved in *amber varnish* and *oil of turpentine*, and coloured with *lampblack*.

*Obs.* The above are also frequently called “*indelible*” or “*indestructible inks*.” They are employed for writing labels on bottles containing strong acids and alkaline solutions. The last four are very permanent, and are capable of resisting the action of iodine, chlorine, alkaline lyes, and acids, together with all the operations of dyeing and bleaching, and at once offer a cheap and an excellent material for marking linen, &c., as they cannot be dissolved off by any menstrua that will not destroy the fabric. They must be employed with *stamps*, *types*, or *stencil plates*, by which greater neatness will be secured than can be obtained with either brush or pen. See *Horticultural Ink*, *Indelible Ink*, &c.

**INK** (Indian). Syn. *China Ink*; *Atramentum Indicum*,—Lat.

*Prep.* 1. *Lamp black* (finest) is ground to a paste with very weak *liquor of potassa*, and this paste is then diffused through *water slightly alkalinized* with potassa, after which it is collected, washed with clean water, and dried; the dry powder is next levigated to a smooth, stiff paste, with a *strong filtered decoction of carrageen* or *Irish moss*, or of *quince seed*, a few drops of *essence of musk* and about half as much *essence of ambergris* being added, by way of perfume, towards the end of the process; the mass is, lastly, moulded into cakes, which are ornamented with Chinese characters and devices, as soon as they are dry and hard.

2. A *weak solution of fine gelatine* is boiled at a high temperature in a Papin’s digester for two hours, and then in an *open vessel* for 1 hour more; the liquid is next filtered and evaporated to a proper consistence, either in a steam or salt water bath; it is, lastly, made into a paste, as before, with *pure lampblack* which has been previously heated to dull redness in a well-closed crucible. Neither of the above gelatinize in cold weather, like the ordinary imitations.

3. (Gray.) *Pure lampblack* made up with *asses’-skin glue*, and scented with musk.

4. (M. Merimée.) Dissolve *superfine glue* in *water*, add a *strong solution of nut-galls*, and wash the precipitate in *hot water*; then dissolve it in a *fresh solution of glue*, filter, evaporate to a proper thickness, and form it into a paste as before, with *purified lampblack*.

5. (Proust.) As No. 1 (nearly).

6. *Seed lac*, ½ oz.; *borax*, 1½ dr.; *water*, ½ pint; boil to 8 oz., filter, and make a paste with *pure lampblack*, as before. When dry it resists the action of water.

*Obs.* The Chinese do not use glue in the preparation of their ink, but an infusion or decoction of certain seeds abounding in a glutinous transparent mucilage, which at once imparts brilliancy and durability to the colour. Starch converted into gum by means of sulphuric acid, or British gum, has been recommended as a substitute. (M. Merimée.) *Indian ink* is chiefly *employed* by artists, but it has been occasionally given as a medicine, dissolved in water or wine, in hæmorrhages and stomach complaints. *Dose.* 1 to 2 dr.

**INK** (Lithographic).

*Prep.* 1. *Mastic* (in tears), 8 oz.; *shell lac*, 12 oz.; *Venice turpentine*, 1 oz.; melt together, add of *wax*, 1 lb., *tallow*, 6 oz.; when dissolved, further add of *hard tallow soap* (in shavings), 6 oz.; and when the whole is perfectly combined, add of *lampblack*, 4 oz.; lastly, mix well, cool a little, and then pour it into moulds, or upon a slab, and when cold cut it into square pieces.

2. (M. Lasteyrie.) *Dry tallow soap*, *mastic* (in tears), and *common soda* (in fine powder), of each, 30 parts; *shell lac*, 150 parts; *lampblack*, 12 parts; mix as last. Both the above are used for writing on lithographic stones.

3. (*Autographic.*)—*a.* Take of *white wax*, 8 oz.; and *white soap*, 2 to 3 oz.; melt, and when well combined, add of *lampblack*, 1 oz.; mix well, heat it strongly, and then add of *shell lac*, 2 oz.; again heat it strongly, stir well together, cool a little, and pour it out as before. With this ink lines may be drawn of the finest to the fullest class, without danger of its spreading, and the copy may be kept for years before being transferred.

*b.* From *white soap* and *white wax*, of each, 10 oz.; *mutton suet*, 3 oz.; *shell lac* and *mastic*, of each, 5 oz.; *lampblack*, 3½ oz.; mix as above. Both the above are used for writing on lithographic paper. When the last one is employed, the transfer must be made within a week.

*Obs.* The above inks are rubbed down with a little water in a small cup or saucer for use, in the same way as common water-colour cakes, or Indian ink. In winter, the operation should be performed near the fire, or the saucer should be placed over a basin containing a little *tepid* water. Either a steel pen or a camel's hair pencil may be employed with the ink. See *Lithography*.

**INK** (Marking). Syn. *Indelible Ink*, *Permanent do.* Of this there are several varieties, of which the following are the most valuable and commonly used:—

1. *Nitrate of silver*, ¼ oz.; *hot distilled water*, 7 fl. dr.; dissolve, add of *mucilage*, ¼ oz., previously rubbed with *sap green* or *syrup of buckthorn*, q. s. to colour. The linen must be first moistened with "*liquid pounce*," or "*the preparation*," as it is commonly called, and when it has again become dry, written on with a *clean* quill pen. This ink will bear dilution if the writing is not required very black.

The "*Pounce*" or "*Preparation*." A solution of *carbonate of soda*, 1½ oz., in *water*, 1 pint, *slightly* coloured with a little *sap green* or *syrup of buckthorn*, to enable the spots wetted with it to be afterwards known.

2. (*Without preparation.*) Take of *nitrate of silver*, ¼ oz.; *water*, ¾ oz.; dissolve, add as much of the *strongest liquor of ammonia* as will dissolve the precipitate formed on its first addition, then further add of *mucilage*, 1½ dr.; and a little *sap green*, *syrup of buckthorn*, or *finely powdered*

*indigo*, to colour. Writing executed with this ink turns black on being passed over a hot Italian iron, or held near the fire.

3. *Terchloride of gold*, 1½ dr.; *water*, 7 fl. dr.; *mucilage*, 2 dr.; *sap green*, q. s. to colour. To be written with on a ground prepared with a *weak solution of protochloride of tin*, and dried. Dark purple.

4. (Rev. J. B. Reade.) *Nitrate of silver*, 1 oz.; *tartaric acid* (pure), 3 dr.; are triturated together in a mortar, in the dry state; a *little water* is then added, by which crystals of *tartrate of silver* are formed, and the *nitric acid* set free; the latter is then saturated with *liquor of ammonia*, sufficient being added to dissolve all the newly formed tartrate of silver, avoiding unnecessary excess; lastly, a *little gum and colouring matter* is added.

5. (Rev. J. B. Reade.) To the last is added an *ammoniacal solution* of a *salt of gold*. Mr. Reade has used for this *purpose* the *purple of Cassius*, the *hyposulphate*, the *ammonio-iodide*, the *ammonio-periodide of gold*, but any other compound of gold which is soluble in ammonia will do as well. The last two substances are new compounds, for which the chemical world is indebted to this gentleman. This ink is unacted on by nearly all those reagents which remove writing executed with solutions of the salts of silver alone; as cyanide of potassium, the chlorides of lime and soda, &c.

6. (Redwood.) *Nitrate of silver* and *pure bitartrate of potassa*, of each, 1 oz. (or, 4 parts), are rubbed together in a glass or Wedgewood-ware mortar, and after a short time, *liquor of ammonia*, 4 oz. (16 parts, or q. s.), is added; when the solution is complete, *archil*, 4 dr. (or, 2 parts); *white sugar*, 6 dr. (or, 3 parts); and *powdered gum*, 10 dr. (or, 5 parts), are dissolved in the liquor, after which *sufficient water* is added to make the whole measure exactly 6 fl oz., when it is ready to be bottled for use. The last three are used in the same manner as No. 2.

7. (Dr. Smellie.) From *sulphate of iron*, 1 dr.; *vermilion*, 4 dr.; *boiled linseed oil*, 1 oz.; triturated together until perfectly smooth. Used with type.

8. (Soubeiran.) *Nitrate of copper*, 3 parts; *carbonate of soda*, 4 parts; *nitrate of silver*, 8 parts; mix, and dissolve in *liquor of ammonia*, 100 parts. Used like No. 2.

9. (Ure.) A *strong solution* of *chloride of platinum*, with a *little potassa*, and *sugar and gum*, to thicken.

10. The *fluid* contained between the *kernel* and *shell* of the *cashew nut*. On linen and cotton it turns gradually black, and is very durable. This has been called "*anacardium*" or "*cashew-nut ink*."

11. *Sulphate of manganese*, 2 parts; *lamp black*, 1 part; *sugar*, 4 parts; all in fine powder, and triturated to a *paste* with a *little water*. Used with types or stencil-plates; the part when dry being well rinsed in water. Brown.

12. *Black oxide of manganese* and *hydrate of potassa*, are mixed, heated to redness in a crucible, and then triturated with an equal weight of *pure white clay*, and *water*, q. s. to give it due consistence. Used like the last. Brown.

*Obs.* The products of the first two of the above formulæ constitute the *marking ink of the shops*. They have, however, no claim to the title of "*Indelible ink*," "*which no art can extract without injuring the fabric*"—as is generally represented. On the contrary, they may be discharged with

almost as much facility as common iron-moulds. This may be easily and cheaply effected by means of ammonia, cyanide of potassium, the chlorides of lime and soda, and some of the hyposulphites, without in the least injuring the texture of the fabric to which they may be applied. The only precaution required, is that of rinsing the part in clean water immediately after the operation. The "*marking ink without preparation*" is more easily extracted than that "*with preparation.*" The former has also the disadvantage of not keeping so well as the latter, and of depositing a portion of fulminating silver, under some circumstances, which renders its use dangerous. The thinner inks, when intended to be used with type or plates, are thickened by adding *a little more gum*, or some sugar.

**INK** (Marking). Syn. *Packer's Ink*. Ink bottoms. *Used* by packers for marking bales, boxes, &c.

**INK** (Perpetual).

*Prep.* 1. *Pitch*, 3 lb.; melt over the fire, and add of *lampblack*,  $\frac{3}{4}$  lb.; mix well.

2. *Trinidad asphaltum* and *oil of turpentine*, equal parts. *Used* in melted state to fill in the letters on tombstones, marbles, &c. Without actual violence it will endure as long as the stone itself.

**INK** (Printer's). See *Printing Ink*.

**INK** (Sepia). See *Sepia*.

**INK** (Sympathetic). Syn. *Diplomatic Ink*, *Invisible do*. Fluids which, when used for writing, remain invisible until the paper is heated, or acted on by some other chemical agent. Sympathetic inks have been frequently employed as the instruments of secret correspondence, and have often escaped detection; but by heating the paper before the fire until it begins to grow discoloured by the heat, the whole of them may be rendered visible.

The following are the most common and amusing sympathetic inks:—

1. *Sulphate of copper* and *sal ammoniac*, equal parts, dissolved in *water*; writes colourless, but turns YELLOW when heated.—

2. *Onion juice*; like the last.—

3. A *weak infusion of galls*; turns BLACK when moistened with *weak copperas water*.—

4. A *weak solution of sulphate of iron*; turns BLUE when moistened with a *weak solution of prussiate of potassa*, and BLACK when moistened with *infusion of galls*.—

5. The *diluted solutions of nitrate of silver* and of *terchloride of gold*; become respectively DARK BROWN and PURPLE when exposed to the sunlight.—

6. *Aqua fortis*, *spirits of salts*, *oil of vitriol*, *common salt*, or *saltpetre*, dissolved in a *large quantity of water*; turns YELLOW or BROWN when heated.—

7. *Solution of chloride or nitromuriate of cobalt*; turns GREEN when heated, and disappears again on cooling. If the salt is pure, the marks turn BLUE.—

8. *Solution of acetate of cobalt*, to which a *little nitre* has been added; becomes ROSE COLOURED when heated, and disappears on cooling.—

9. A *weak solution* of the *mixed chlorides of cobalt and nickel*; turns GREEN. The last three are about the best of our sympathetic inks.—

10. *Solution of acetate of lead*; turns BROWNISH-BLACK when exposed to the *fumes of sulphuretted hydrogen*.—

11. A *weak solution of nitrate of mercury*; turned BLACK by heat and sulphuretted fumes.—

12. *Rice water* or *decoction of starch*; turned BLUE by a solution of iodine in *weak spirit*, and by the *fumes of iodine*, if the paper is first slightly moistened by exposure to steam or damp air.

**INKS** (Coloured). Inks of various colours may be made from a strong decoction of the *ingredients used in dyeing*, mixed with a little *alum* or *other substance* used as a *mordant*, and *gum arabic*. Any of the ordinary *water-colour cakes* employed in drawing, diffused through water, may also be used as coloured ink.

*Blue Ink.* See *Ink* and *Writing Fluids*.

*Brown Ink.*

1. A strong *decoction of catechu*; the shade may be varied by the cautious addition of a little *weak solution of bichromate of potash*.

2. A strong *decoction of logwood* with a *very little bichromate of potash*.

*Gold Ink.* From *gold* in the state of an *impalpable powder*, ground up with a little *gum water*. The brilliancy of the writing performed with this ink is considerable, and may be increased by burnishing. (See *page 539*.) [Reproduced below.]

*Green Ink.*

1. From *sap green* dissolved in very weak *alum water*.

2. A strong solution of *binacetate of copper* in *water*, or of *verdigris* in *vinegar*.

3. (Klaproth.) *Verdigris*, 2 oz.; *cream of tartar*, 1 oz.; *water*,  $\frac{1}{2}$  a pint; boil to one-half, and filter.

4. (Winckler.) *Bichromate of potassa*, 3 parts; *hot water*, 8 parts; dissolve, add of *rectified spirit*, 4 parts, mix, and further add of *sulphuric acid*, q. s. to liberate the *chromic acid*, avoiding excess; next evaporate to one-half, dilute with *water*, filter, and add to the filtrate, *rectified spirit*, 4 parts, together with 3 or 4 drops of *sulphuric acid* (if required) to precipitate any remaining potash-salt; lastly, decant and preserve the liquid until it assumes a rich green colour.

5. A solution of *recently precipitated hydrated oxide of chromium* in *liquor of ammonia*, diluted with *distilled water*, q. s. A magnificent dark green liquid, perfectly anti-corrosive.

*Purple Ink.* A strong *decoction of logwood*, to which a little *alum* or *chloride of tin* has been added.

*Red Ink.*

1. *Brazil wood* (ground), 4 oz.; *white-wine vinegar* (hot), 1¼ pint; digest in glass or a well-tinned copper or enamel saucepan, until the next day, then gently simmer for half an hour, adding towards the end, *gum arabic* and *alum*, of each, ½ oz.
2. *Ground Brazil wood*, 10 oz.; *white vinegar*, 10 pints; macerate for 4 or 5 days; then boil as before to one-half, and add of *roach alum*, 4½ oz.; *gum*, 5 oz.; and when dissolved, bottle for use.
3. As the last, but using *water* or *beer* instead of vinegar.
4. *Cochineal* (in powder), 1 oz.; *hot water*, ½ pint; digest, and when *quite cold*, add of *spirit of hartshorn*, ¼ pint (or *liquor of ammonia*, 1 oz., diluted with 3 or 4 oz. of *water*;) macerate for a few days longer, and then decant the clear. Very fine.
5. (Buchner.) *Pure carmine*, 20 gr.; *liquor of ammonia*, 3 fl. oz.; dissolve, then add of *powdered gum*, 18 gr. Half a drachm of powdered *drop lake* may be substituted for the carmine where expense is an object. Colour superb.
6. (Henzeler.) *Brazil wood*, 2 oz.; *alum* and *cream of tartar*, of each ½ oz.; *rain water*, 16 fl. oz.; boil to one-half, strain, add of *gum* (dissolved), ½ oz.; and when cold, further add a *tincture* made by digesting *powdered cochineal*, 1½ dr., in *rectified spirit*, 1½ fl. oz.
7. (Redwood.) *Guarancine* and *liquor of ammonia*, of each, 1 oz.; *distilled water* (cold), 1 pint; triturate together in a mortar, filter, and dissolve in the solution, *gum arabic*, ½ oz.

*Silver Ink.* From *silver leaf* or *powdered silver*, as *Gold Ink*.

*Violet Ink.* The same as *purple ink*, but weaker.

*Yellow Ink.* 1. From *gamboge* (in course powder), 1 oz.; *hot water*, 5 oz.; dissolve, and when cold, add of *spirit*, ¾ oz.

2. Boil *French berries*, ½ lb., and *alum* 1 oz., in *rain water*, 1 quart, for half-an-hour, or longer, then strain and dissolve in the hot liquor, *gum arabic*, 1 oz.

**INK POWDERS.**

*Prep.* 1. *Aleppo galls*, 4 oz.; *sulphate of iron*, 1½ oz.; *gum arabic*, 1 oz.; *lump sugar*, ¾ oz.; (all quite dry and in powder); mix, and divide into 3 packets. A pint of *boiling water* poured over one of them produces, in a few hours, a pint of excellent ink.

2. *Aleppo galls*, 3 lb.; *copperas*, 1 lb.; *gum arabic*, ½ lb.; *white sugar*, ¼ lb.; all in powder; mix, and divide into two-ounce packets, to be used as the last. *Ink powders* are very useful in travelling.

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**COOLEY'S CYCLOPÆDIA OF PRACTICAL RECEIPTS**

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**GOLD** (Powdered). Syn. *Divided Gold, Gilding Powder, Gold Bronze, Gold Colour; Auri Pulvis, Aurum Pulveratum, A. Divisum*,—Lat.

*Prep.* 1. *Gold*, 1 part; *mercury*, 7 parts; form an amalgam, and expose it to heat until *all* the mercury is volatilized; or, the mercury may be dissolved out with hot *nitric acid*. In either case, the residuum is to be powdered, washed, and dried. If the quantity operated on is considerable, the process should be so conducted as to save the mercury.

2. (P. Cod.) *Gold leaf* is triturated with 10 or 12 times its weight of *sulphate of potassa* (in crystals) until shining laminæ are no longer visible; the mixture is then passed through a fine sieve, and the sulphate of potassa washed out with *boiling water*.

3. From *gold leaf* and *honey* ground together, as the last, by means of a stone and muller. This is the plan commonly adopted in the *small way* by artists.

4. From a *solution of gold* in *aqua regia*, precipitated by *protosulphate of iron*, the resulting powder being washed, dried, and gently heated. This gives pure gold.

*Uses, &c.* Powdered gold is employed in gilding by japanners and by artists. It is either sold in powder (*gold in powder*), or made up into shells (*gold shells*.) Its use in *medicine*, has been already noticed.

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**GOLD SHELLS.** *Gold leaf* or *powdered gold* ground up with *gum-water*, and spread upon the insides of shells. *Used* by artists.

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