wood, or on lead or zinc discs, fed with a mixture of Tripoli and water.

Many of the agates, beautiful as they are in nature, are artificially colored in the following manner: Having been well washed, they are placed in a sirup of honey and water, sometimes in olive oil; after this, they are exposed for some time to moderate heat in a vessel embedded in hot ashes, care being taken that the liquid does not boil. When removed, they are washed, placed in sulphuric acid, and exposed to gentle heat. After they have taken color they are again washed, and it is often the practice finally to lay them in a bath of oil, which improves the lustre. Some layers of agate are quite porous, while others are dense and well nigh impervious. When steeped in oil only the porous layers absorb the liquid, which, being deoxidized and blackened by the acid, makes the contrast between the layers more striking, thus enhancing greatly the beauty and value of the agate. Other colors are given agates by various processes; some, such as the reds, by simple exposure to heat; others by immersion in certain solutions; but these methods vary with the different lapidaries, and are more or less trade secrets.—H. L. Preston, *in Jewelers' Journal.*

GOLD.

Gold is the most malleable, ductile, and most brilliant of all the metallic substances; and, next to platina, the heaviest and most indestructible.

Gold is seldom found except in the metallic state. It has been obtained in every quarter, and almost every country of the globe; but North and South America supply a greater quantity than all the rest of the world.

Many laborious experiments have been repeatedly made by able chemists, who appear to have established the fact, that gold exists in vegetables.

A single grain of gold can be made to cover an area of more than 400 square inches; a wire of one-tenth of an inch in diameter will support a weight of 500 pounds; and Dr. Black has calculated that it would take fourteen millions of films of gold, such as cover some fine gilt wire, to make up the thickness of an inch, whereas the same number of leaves of common writing paper would make up nearly three quarters of a mile.

Though opacity is enumerated as one of the characters of the metals, yet gold, when the $\frac{1}{\text{xxxooo}}$th of an inch thick, which is about the thickness of ordinary gold leaf, transmits light of a lively bluish green color. Perhaps all the other metals, if they could be equally extended, would show some degree of transparency, but none of them can be made so thin.

The specific gravity of unhammered gold is 19.258, and is increased but little by hammering. Its hardness is 6. It melts at 32° of Wedgwood; and, if pure, its color when in fusion is not yellow, but a beautiful bluish green, like the light which it transmits.

Gold cannot be volatilized, except at an extreme heat. The utmost power of Parker's celebrated burning lens exerted upon it for some hours, did not cause it to lose any weight which could be discovered; but Lavoisier found that a piece of silver, held over gold melted by a fire maintained with oxygen gas, was sensibly gilt; and perhaps the same delicate test would have shown its volatility by the lens.

After fusion, gold will assume the crystalline form. Tillet and Mongez obtained it in short quadrangular pyramidal crystals.

Gold unites with most of the metals. Silver renders it pale; when the proportion of silver is about one-fifth part, the alloy has a greenish hue. Silver separates from gold as from platina, if the alloy be kept for some time in fusion.

Gold is strongly disposed to unite with mercury; this alloy forms an amalgam, the softness of which is in proportion to the quantity of mercury. It is by mercury, that in South America, gold is chiefly obtained from the earth with which it is mixed, and the gold is separated by distillation. This alloy readily crystallizes after fusion. It is applied by gilders to the surface of clean copper, and the mercury is driven off by heat.

Gold unites freely with tin and lead, but both these metals impair its ductility. Of lead, one quarter of a grain to the ounce renders the gold brittle; but tin has not so remarkable an effect.

Copper increases the fusibility of gold, as well as its hardness, and deepens its color. It forms the usual addition to gold for coin, plate, etc. The standard for gold in America, Great Britain and her Provinces is twenty-two parts pure gold and two parts copper; it is, therefore, called "gold of twenty-two carats fine."

Iron forms an alloy with gold, so hard as to be fit for edge tools. Its color is grey, and it obeys the magnet.

Arsenic, bismuth, nickel, manganese, zinc and antimony, render gold white and brittle. When the alloy is with zinc, in equal proportions, it has a fine grain, takes a high polish, and from these qualities, and its being not liable to tarnish, it forms a composition not unsuitable for the mirrors of telescopes.

For the purpose of coin, Hatchett considers an alloy consisting of equal parts of silver and copper as the best, and copper alone as preferable to silver. The same distinguished chemist gives the following order of different metals, arranged as they diminish the ductility of gold, viz., bismuth, lead, antimony, arsenic, zinc, cobalt, manganese, nickel, tin, iron, platina, copper, silver. The first three were nearly equal in effect, but the platina was not quite pure.

The nitric acid will take up a very minute quantity of gold, but the nitro-muriatic and oxy-muriatic acids are its only real solvents. The two latter acids are of a similar nature, and their effects on gold are increased by concentrating them, by enlarging the surface of the gold and by the application of heat. The solution is of a yellow color, caustic, and tinges the skin of a deep purple. By evaporation it affords yellow crystals, which take the form of truncated octahedrons. These crystals are a muriate of gold; they may be dissolved in water, and will stain the skin in the same manner as the acid.

Most metallic substances precipitate gold from its solution in the nitromuriatic acid; lead, iron and silver, precipitate it of a deep and dull purple color; copper and iron throw it down in its metallic state; bismuth, zinc, and mercury likewise precipitate it. When precipitated by tin, it forms the *purple precipitate of Cassius*, which is much used by enamellers and manufacturers of porcelain.

Ether, naphtha, and essential oils, take gold from its solvent, and from liquors which have been called potable gold, and are used in gilding. The gold obtained from these fluids by evaporation is extremely pure.

If diluted nitromuriatic solution of gold be used to write with upon any substance, and the letters while yet moist,