

for the true artist recognizes deformity, even though covered by finery and leather.

Will not our mothers who have the care of children look into this subject, and if they have been in error before, a once apply the true remedy?

ADULTERATION OF PAINTS.

BY PROFESSOR HENRY E. COLTON.

It has been said that this is an age of adulteration. This may or may not be true. When prices are high those articles whose nature permits the frauds, will be adulterated, but there is a point in the decrease of prices where adulteration cannot be done with profit, taking into view, first, the cost of the article of adulteration; second, the deterioration in the article adulterated; third, the at least constructive damage to the adulterator if detected.

Almost the only adulteration of paints is sulphate of baryta, commonly called barytes. The oxide of zinc is frequently put into white lead, but it is questionable whether it is not an improvement rather than an injury. The commercial article, "barytes," is a sulphate of the alkali baryta, which has as a base the metal barium. It is insoluble in water and the weak acids, and but sparingly soluble in the most concentrated acids. Its specific gravity is about 4.84, being the heaviest known mineral, hence its common name among miners is heavy spar.

It is chiefly produced in the State that gave us the wooden nutmegs, and goes by the cant name of "Connecticut Lead." It is abundant in Virginia, North Carolina, Missouri, Georgia, and New Jersey. The best article now produced comes from Missouri. It usually accompanies lead ore; varies in color from a milky to a clear white, and can easily be told by its great weight and crystalline structure. Its value depends upon its freedom from specks of iron, copper, or leadore.

To prepare it for market the ore is cracked into pieces, about the size of buck shot. These are then agitated in dilute sulphuric acid to dissolve the copper and iron, then washed with water, again treated with acid, then washed repeatedly with water, dried, and ground perfectly fine. After which it passes through a number of bolting cloths, and is ready for market. Lead specks are more difficult of extraction. If not very numerous no effort is made to take them out, but if desirable to do so, the cracked ore is treated with strong hydrochloric acid, and sometimes with lime. Some manufacturers do what is called "floating," that is, after grinding the rock to flour dust it is run through a series of vats, water passing through them and constant agitation being carried on. The lighter impurities pass off, and nearly perfectly pure sulphate of baryta precipitates. The impurities of the ore other than above mentioned, are silica, carbonate of lime, and sometimes a little sulphate of strontia. The article differs very much in color and fineness as put on the market; that from St. Louis has, just now, the highest reputation, it is in fact less crystalline in structure than any other—partaking somewhat of the fibrous nature of strontia.

The present product is about 20,000 tons per annum, but it is estimated that in 1865-6 fully 40,000 tons were imported into and produced in the United States. At that time the price per ton ran as high as \$90, now it is \$35 and \$40. The imported article comes from Nova Scotia, Germany, and England. The profits of its production and manufacture have been very large; but it is doubtful if it can be produced with profit for much less than \$30 per ton.

We have been thus explicit with this article because of its whole product fully four-fifths enter into the adulteration of paints. Its other uses are for the adulteration of other articles, even medicines. We believe its only good use is as a substitute for white lead in enameling paper collars. As an adulteration of paints it adds to the weight and injures the quality. The paints containing it are better than whitewash just in the proportion that they have a larger percentage of lead or zinc in them. Some are the merest shams, others have 75 and 80 per cent of lead and zinc, and are proportionably valuable. Some of the latter have attained great reputation, especially when ground in a peculiarly refined oil, which contains some of the acids used in its refining. No person need be fooled by an adulterated paint. If he buys it, it is simply his own fault. If he desires cheapness more than durability and purity, he gets it. Every one knows when he buys a coat below the cost of the wool in it, and the labor on it, that he is getting shoddy. Metal lead, for instance, is 8 cents per pound (gold); white lead then would likely be about 12 cents per pound (currency) ground in oil. Hence, if a man buys a paint at 8 cents, he should have sense enough to know he does not get a pure white lead. It is further the custom of manufacturers never to put their names with the words "Warranted Pure," on adulterated brands. The latter or the former may be on, but never both together. Besides, no respectable firm ever sells a customer an adulterated paint if he asks for the pure and is willing to pay its price.

HOW CAN THE ADULTERATION BE DETECTED.

In a late statement of how to analyze white lead in oil, published in the SCIENTIFIC AMERICAN, it was recommended to dissolve out the oil with spirits of turpentine. This is next to an impossibility, as that article is not sufficiently volatile, has itself somewhat of an oily nature, and some of the particles of the pigment will remain coated with oil and not dissolve in the after process, hence creating an idea of impurity when the paint may be actually pure. Our experience has been large, and we prefer bisulphide of carbon to all other solvents of oil. It evaporates freely, takes less of it to do the work, and leaves the pigment cleaner; nearly as good is high gravity gasoline, say 80°. It is our custom to agitate the paint in the liquid, allow it to settle and draw off. Place the pigment on a funnel, filter, and triturate again and again

with the solvent. Then dry the pigment on a sand bath, wash with water and re-dry. Any one can easily tell from its looks and feel if he has extracted all the oil. Perfect dryness and perfect freedom from oil is absolutely necessary. Dissolve the dry pigment thus obtained in dilute nitric acid. Strong nitric acid will not dissolve white lead, it must be diluted with four or five times its volume in water, perhaps more. The operation is accompanied with the evolution of carbonic acid gas. If all is dissolved it is pure lead or zinc—either oxides or carbonates. If there is residuum after repeated trials, with more or less dilute acid, it shows presence of an adulteration—most likely barytes, perhaps sulphate of lead. Take this and boil in hydrochloric acid, if it dissolves it is not barytes. If dissolved, pour into the solution a little hydro-sulphuret of ammonium, a black precipitate shows that you have sulphate of lead. If there is no precipitate, put in a little dissolved oxalic acid; a white precipitate shows lime. The sulphate of lead is seldom or never used as an adulterant in this country, the sulphate of lime never in paint. For zinc, pour into the nitric acid solution sulphuric acid, the lead will precipitate as sulphate; then into the liquid pour a little hydro-sulphuret of ammonium, a white precipitate will show zinc. There is, however, in the market a pigment containing a sulphate of lead, not crystalline in structure, and perfectly soluble in dilute acids. It is made by sublimation.

Whiting and terra alba are seldom or never used as an adulterant for any white paint. They are two light and turn dark in oil. Some colors, however, have terra alba as a base. The process indicated, if conducted with care, will give a perfect result. The main point is to get the oil out entirely; and with all due respect we assure our friends of the SCIENTIFIC AMERICAN that it cannot be done with spirits of turpentine.

There is just now coming into practice another species of adulteration which for worthlessness bids fair to eclipse the baryta paints. This is the use of water instead of the full quantity of oil or spirits of turpentine. A paint is valuable and durable just as it has the proper quantity of pure oil in it. This new adulteration is thus accomplished: The soluble salts of the metals and alkalies dissolved in water and mixed with oil form a sort of soap, add to this a pigment and it will mix and be held in solution. Small quantities of spirits of turpentine or benzine are added. To such an extent can this be carried that in some of the paint sold "Mixed ready for use," fully one-half is water. Their worthlessness for work exposed to the weather is evident. There are paints thus sold, however, which are properly mixed.

[Notwithstanding our correspondent's criticism, we insist that very good results may be obtained by proceeding as we directed in the article to which he refers. He seems to have overlooked the subsequent washing with alcohol, after the spirits of turpentine have been used to remove the bulk of the oil. Alcohol dissolves both linseed oil and turpentine, and by its use the solid substances contained in the mixture may be rendered sufficiently clear for subsequent treatment, if the oil is pure linseed, as we can vouch from experience. If the linseed oil used is adulterated with fish oil, rape-seed or cotton-seed oil, other solvents must of course be used. In that case ether or the solvents he names are better. The bisulphide of carbon, or ether, is not, however, available to painters generally. Benzine and gasoline are, however, good solvents, and may be advantageously substituted for the turpentine. Turpentine and alcohol are, however, to be found in all painters' shops. If the alcohol be heated to boiling, it will be more effective than when used cold, and less will be required.]

SIRUPS FOR SODA WATER.

SIMPLE SIRUP.—Take of white sugar, 14 lbs. (com.); water, 1 gal. Dissolve with the aid of a gentle heat, strain, and when cold add the whites of two eggs, previously rubbed with a portion of the sirup, and mix thoroughly by agitation. (The egg albumen is added to produce froth).

LEMON SIRUP.—Take of oil of lemon, 25 drops; citric acid, 10 drachms; simple sirup, 1 gal. Rub the oil of lemon with the acid, add a small portion of sirup, and mix.

ORANGE SIRUP.—Take of oil of orange, 30 drops; tartaric acid, 4 drachms; simple sirup, 1 gal. Mix as above.

VANILLA SIRUP.—Take of fld. ext. vanilla, 1 ounce; citric acid $\frac{1}{2}$ ounce; simple sirup, 1 gal. Rub the acid with a portion of sirup, add ext. vanilla, and mix.

GINGER SIRUP.—Take of tinc. ginger, 4 ounces; white sugar, 7 pounds (com.); water, $\frac{1}{2}$ gal. Heat the sugar and water until the sugar is dissolved, raise to the boiling point, then gradually add the tinct. ginger, stirring briskly after each addition.

SIRUP SASSAPARILLA.—Take of simple sirup, 1 gal.; comp. syr. sarsap. ad lib.; powd. ext. licorice, 1 ounce; oil sassafras, oil wintergreen, aa, 15 drops; oil anise, 10 drops. Rub the oils with powdered licorice, add a portion of sirup, rub smoothly, and mix the whole together by agitation.

ORGEAT SIRUP.—Take of cream sirup, $\frac{1}{2}$ pint; vanilla sirup, 1 pint; simple sirup, $\frac{1}{2}$ pint; oil bitter almonds, 5 drops. Mix.

COFFEE SIRUP.—Take of ground, roasted coffee, 4 ounces; boiling water, 2 pints; sugar, 4 pounds (com.). Infuse the coffee in the water until cold, strain, add the sugar, and make a sirup.

STRAWBERRY SIRUP.—Take of fresh, ripe strawberries, 10 quarts; white sugar, 24 lbs.; water, $\frac{1}{2}$ gal. Spread a portion of the sugar over the fruit, in layers, let it stand four or five hours, express the juice, strain, washing out the marc with water; add remainder of sugar and water, raise to the boiling point, and strain.

SIRUP OF RASPBERRY.—Proceed as for strawberry sirup.

PINE-APPLE SIRUP.—Take of ripe pine-apples, No. 2 or 3; white sugar 16 lbs. water, q. s. Cut the fruit in thin slices,

spread sugar over them, let stand 12 hours. Pour off juice and sugar, and set aside. Express the fruit, adding a little water. Then take water, q. s., to make, with the above liquid (juice and sugar), 1 gal. Form a sirup with the sugar and water, and boil the pieces of the fruit already expressed. When the sirup is nearly completed add the fluid and boil a few minutes, to clarify. Remove scum, and strain. These three fruit sirups should be bottled when warm, corked tightly, and when wanted for use add equal parts of the fruit sirup and simple sirup. They will keep a year without change.

NECTAR SIRUP.—Take of vanilla sirup, 5 pints; pine-apple sirup, 1 pint; strawberry or raspberry, 2 pints. Mix.

CREAM SIRUP.—Take of fresh cream, $\frac{1}{2}$ pint; fresh milk, $\frac{1}{2}$ pint; powdered sugar, 1 lb. Mix by shaking. Keep in a cool place. The addition of one half drachm bicarb. soda to this sirup will prevent rapid change.

Editorial Summary.

MIGRATION OF FABLES.—Professor Max Müller, LL.D., recently lectured at the Royal Institution on "The Migration of Fables." He narrated how the proverb, "Do not count your chickens before they are hatched" is founded on a fable, and he traced this fable back through many of the literatures of Europe and Asia, and through some of the ancient books of Persia, to the "Panka Tantra," an ancient Sanscrit book, rich in fables. In the course of this lecture, he told how "St. John of Damascus" was in reality an individual who held high office at the court of the Khalif Almansur. He also told how Buddha in the course of time became transformed into St. Josephat, and under that name was made a saint in the Romish Church. This announcement was received with much laughter by the listeners, but Professor Müller added that, if Buddha actually lived the kind of life he is narrated to have done, no man ever better deserved to be made a saint by his fellow creatures.

ICICLES IN THE CELLS OF PLANTS.—At a meeting of the Academy of Sciences of Paris, on 21st February, M. Prillieux sent in an interesting paper on the congelation of plants. He has established the existence normally of large icicles in the interior of all frozen plants. These icicles form small columns, perpendicular to the surface, and often penetrating the epidermis. The ice is formed from liquids derived from the cells. The cells themselves remain intact, so that there is no destruction, but simply a separation of organs, and therefore what has been said concerning the death of plants by freezing goes for nothing.

So enormous are the losses of the Austrian Government from the frauds of the stamp washers, who collect old stamps and clean and sell them for new, that the Government finds it economy to furnish stamped envelopes free to the public except the usual postage duty.

In this country the envelope makers, who are anxious to raise the prices of envelopes, are whining for protection, and they want the Government to stop the sale of stamped envelopes. But if any change is to be made the people will prefer the Austrian plan.

A NEW PHOTOMETER.—A photometer, invented by M. Nagant, is based upon the formation of a column of liquid, partially opaque, which may be drawn out until the length is such that the light from an illuminating body ceases to be visible through the liquid. The length of the column, which completely obscures the light, starting from the point where the column is thinnest, gives a measure of the intensity of the light under examination.

The following results from an extended series of experiments by W. Casselman, in order to determine the effect of boiling saline and other solutions upon glass and porcelain vessels, may be found useful: Water and acids hardly, if at all, act upon good porcelain vessels; the fixed alkalies attack porcelain, but less than they do glass, which is far more readily acted upon by the substances alluded to as well as by saline solutions.

CHINA appears to be overcoming the peculiar superstition which for ages has prevented the development of her vast mineral wealth. Permission has been given to open up the coal mines at Nanking and Kinthaing where coal of a superior quality is obtainable. Good specimens of coal have also been found at San-ti, some two hundred miles above Hankow.

PERFUMED CARBOLIC ACID.—It is said an article of this kind has been recently introduced in England, used for the handkerchief and as a dentifrice, for which latter purpose it is said to be excellent, as it prevents decay from its antiseptic qualities. This is a hint from which American perfumers may perhaps profit.

GEORGIA STATE FAIR.—The premium list of the State Agricultural Society of Georgia has been sent us. The Society will hold its Fair at Atlanta, beginning on Wednesday, October 19th, and closing on the 26th. The Assistant Secretary is Mr. Thomas C. Howard, of Atlanta, who may be addressed by parties interested.

EXIT MACFIE.—The *Mechanics' Magazine* says that Mr. Macfie's book on the "Abolition of Patents" can be had at 1s. each, that gentleman having so many on hand he is desirous of disposing of them at a nominal price. They were originally published at 5s.

THE DARIEN EXPEDITION.—It is announced that the exploration of the routes for the proposed Darien Canal, known as the Caledonia and San Blas, have been found impracticable for such a work, and that the survey has been abandoned, at least for the present season.