

sets about 3 A. M.

Neptune.

Neptune rises at 8h. 26m. A. M. on the 1st, and sets at 9h. 23m. P. M. On the 31st it rises at 6h. 30m. A. M., and sets at 7h. 30m. P. M.

Sun Spots.

About February 18, a long chain-like group of spots could be seen on the sun. Although some of them have already passed the center of the disk, the last of the group may be seen for some days.

SCIENTIFIC AND PRACTICAL INFORMATION.

IRON YELLOW AND IRON GREEN PIGMENTS.

It is desirable to have yellow and green pigments free from lead and arsenic, as both of these metals are the occasion of much mischief. An iron yellow, called *siderin yellow*, has been introduced to the trade: it is prepared by adding a saturated solution of bichromate of potash to neutral chloride of iron. A bright yellow precipitate forms, which, after thorough washing, proves to be a basic chromate of iron of a fixed chemical composition. This pigment, known as *siderin yellow*, can be used as a water color, also with drying oil, and, when combined with soluble glass, makes a fine yellow cement that sets rapidly and is insoluble in water.

If *siderin yellow* be mixed with ultramarine blue, fine green results, which can be also mixed with soluble glass, and could be substituted for the dangerous arsenic green in many arts. In the preparation of iron yellow, the following are the proportions to be taken: 433 parts of weight of crystallized chloride of iron, in which there are 325 parts anhydrous chloride, require for complete decomposition 1,473 parts bichromate of potash. After mixing and boiling the aqueous solutions of the above salts, 378 parts by weight of basic chromate of iron, *siderin yellow*, is precipitated. There remain in solution 1,049 parts chloro-chromate of potash and 389 parts yellow chromate of potash.

PROTECTING PETROLEUM FROM FIRE.

Charles A. Jordery of Paris has discovered that a small quantity of soap wort (*saponaria officinalis*) powder produces in combination with petroleum an emulsion of the consistency of lard or, rather, thick glue. This mixture flows with difficulty, and does not infiltrate into the fissures of leaky vessels. When ignited, it burns with a weak flame, easily extinguished and having no resemblance to the fierce deflagration of the light oils in their ordinary state. A small quantity of an aqueous extract of the powder is necessary, to which about thirty times its volume of petroleum is added little by little, and continually stirred. The result is very much the same as mixing salad dressing, the oil gradually thickening until a pasty mass is obtained. In this condition it is suggested that petroleum may be stored for any length of time or transported long distances with little danger from fire.

To regain the oil in its limpid condition it is only necessary to add a few drops of carbolic acid, or a somewhat larger quantity of crystallized acetic acid. The reaction takes place instantly, and in a very short time the petroleum appears pure and clear with all its properties intact floating above the soap wort extract. It is stated that the augmentation of the price of the oil through the use of this process would not exceed one quarter of a cent per quart.

This saponine process for giving to petroleum the consistency of thick gum was patented in the United States May 7, 1872, No. 126,552. The specimen we have seen resembles closely the paste employed by bill posters, and could be transported in ordinary wooden tubs, and would not be likely to take fire unless exposed to great heat; but the cost of treating petroleum on a large scale in this way would put the article on a par with sperm oil or paraffin. In fact, we should think that paraffin candles would be more economical than the patent oil. The whole thing is too much like combining butter with lime, to be subsequently set afloat by sulphuric acid after it reaches the city. Neither process is feasible on a large scale.

USES OF BISULPHIDE OF CARBON.

From a new work of Dr Rudolph Wagner, "*Die Chemische Fabrik-Industrie*," we extract the following: Until 1850, the only technical application of bisulphide of carbon consisted in vulcanizing and dissolving caoutchouc. Since that time, however, this substance has been applied to a good many purposes. 1. For the complete extraction of fat from bones for the preparation of bone black. Ten or twelve per cent of fat can be obtained. 2. For the extraction of oil from seeds and olives; large quantities of olive oil, rape oil, linseed oil, hempseed oil, palm oil, and cotton seed oil are obtained in this manner. 3. For the extraction of sulphur from sulphurous earth (according to Moussu) and of bitumen from bituminous rocks. 4. For separating fat from wool, woolen tissues, and rags from machine shops, by Seyferth's patent. 5. For the extraction of the soluble principles of spices, according to the process of Bonière of Rouen, France. 6. For the manufacture of yellow prussiate of potash according to Gélis, and of sulphocyanide of ammonium for the fabrication of the toys called Pharoah's serpents. 7. For the preparation of the Fenian or liquid fire, a solution of phosphorus in bisulphide of carbon, with which projectiles for rifled guns are filled. 8. In silver plating a small quantity of bisulphide of carbon is added to the silver bath, so that a brilliant deposit may at once be effected. 9. For killing rats, mice, moths, ground worms, and other vermin. 10. As a motor for steam engines; all systems of steam engines, with or without expansion, can be run with bisulphide of carbon, which, as well known, boils at 115° Fah.

The construction requires no essential alteration, but, since bisulphide of carbon dissolves fat and oil with ease, water must be used for lubricating.

ENAMELING PUMP CYLINDERS.

Cast iron cylinders can be enameled in the following manner, according to Amtmann: To separate the graphite, they are laid for two or three hours in an acid bath, and then well washed off with water and brushes. A mass, consisting of 84 parts quartz, 15 parts borax, and 2 parts carbonate of soda is then uniformly spread on; the pipes are then heated for ten minutes in a muffle of a semicircular cross section of the width of 36 inches, and 9 feet in length. They are then withdrawn, cooled, and coated uniformly with a glazing composition consisting of 84 parts felspar, 19 parts quartz, 24 parts borax, 16 parts oxide of tin, 4 parts fluor spar, 9 parts carbonate of soda, and 3 parts niter. The mass is prepared by melting the materials together in a crucible and then grinding them in a mill, with the addition of water. After the cylinders have been covered with the glazing, they are heated in a muffle to a white heat for twenty minutes, whereupon they are withdrawn and coated with coal tar before they are quite cold. In practice, they have been subjected to a pressure, and showed no cracks, proving that the combination of the materials was thorough and complete. Attempts to glaze lead pipes have hitherto been unsuccessful.

CAUSTIC SODA.

An important improvement has been effected in the manufacture of caustic soda by the introduction of a blast of air through the melted mass. The caustic soda, as prepared from soda ash by means of lime, is contaminated with carbonate of soda, cyanides, and sulphur compounds; the latter are particularly deleterious in numerous operations, and much attention has been bestowed upon getting rid of them. Formerly some saltpeter was added to the lye and the sulphide of sodium was oxidized to Glauber salts, which was less objectionable, but the process is expensive and the result not satisfactory. W. Hebig, of Gera, Germany, has modified the operation by blowing air through the fused soda, by which the sulphides are oxidized and the cyanides decomposed. The operation is conducted as follows: The soda lye is evaporated in iron kettles, and a point is reached at which the cyanogen and ammonia compounds are decomposed and graphite swims on the top. Finally the contents of the kettle are heated to redness and melted to a thin liquid; while in this condition, a current of air is passed through. Graphite floats on the top which is sometimes saved but, owing to its crystalline texture, is not adapted to paint or pencils and is often burned up as useless. The air blast is made so strong as to keep the mass in agitation, and is continued until all of the sulphur is oxidized. The operation is then suspended, the air tube is removed, and the soda poured off the sediment and allowed to solidify. A good product is secured in this way more cheaply than by the saltpeter process. The graphite obtained as an incidental product is quite large in some establishments, and is made up into refractory crucibles.

A GOOD OIL TEST.

Inquiries have been made for a good oil test, and all sorts of nostrums of the "magic," "lightning," and other brands are to be found in the market. It is not easy to find a simple test that will prove decisive on all occasions, but an approximation can easily be made. A convenient test to those about a factory or workshop is the nitrate of mercury. To prepare this reagent, dissolve metallic mercury in an excess of nitric acid; after all the mercury is dissolved, evaporate the liquid over a water bath to sirupy consistence and add a little nitric acid, and store in a glass stoppered bottle. The nitrate of mercury must not be permitted to come in contact with the skin or clothes, as it will stain and destroy both. Pure standard samples of oil should be kept on hand for making comparative tests. Take one part of the nitrate of mercury and three parts of oil and pour them into a test tube; protect the thumb with a piece of india rubber, and shake well and notice the appearance of a specimen of pure oil as compared with a sample suspected to contain impurities. We can in this way soon learn by experience how to detect a poor article. After making the observation with the nitrate of mercury alone, add a few drops of oil of vitriol and note the changes. Some persons use watch glasses, into which they put 10 or 15 drops of oil, and test with bisulphide of carbon, oil of vitriol, chloride of zinc, and chloride of tin. The oil test usually sold under a variety of names is the nitrate of mercury prepared as above.

POISONING OF A HORSE BY THE PAINT ON A CRIB.

According to a communication of Professor Bollinger, of Zurich, Switzerland, a hitherto healthy Wallachian horse, of five years age, was subjected to veterinary treatment on account of a slight nasal catarrh. To effect a cure he was fed with boiled barley, which was given him in a painted cast-iron crib. Soon, however, he lost his appetite, became very feverish, and got a violent diarrhoea, which, in spite of all the medicines administered, could not be alleviated; and he died nine days after the feeding in said crib. A post mortem examination showed small discharges of blood into the lungs, a considerable swelling and fatty degeneration of the liver, and catarrhal inflammation of the intestines. No abscesses, however, were found in the latter. In general, the dissection gave the impression that the animal had died from either phosphorus, arsenic or lead. Accordingly a chemical examination of the milk, the liver, and of the contents of stomach and bowels was undertaken, in all of which small quantities of lead were discovered. The oil paint, moreover, yielded sulphate of lead and chromate of lead in abundance. It was

of a blackish green color, and adhered to the iron in a loose, lamellar condition. There was no sure indication of arsenic, antimony, zinc or barytes. From the results of the examination, there is no doubt that the animal, being fed with the boiled barley, had taken large quantities of the lead in the oil paint of the crib.

REGENERATION OF BONE BLACK OF SUGAR REFINERIES.

Eisfeldt and Thumb have introduced for this purpose exhaustion with ammonia, in place of the heating process hitherto employed. The animal carbon or bone black is first subjected to fermentation or boiling with soda; and, after being washed, it is placed in an iron cylinder with a perforated bottom, and boiled therein, with ammonia of two per cent, by the introduction of steam. This operation is repeated thrice, each time for an hour, until a sample of the lye, on being evaporated and heated with soda lye, yields no color. The ammoniacal vapors are condensed in the cooling worms and re-conveyed into the treating cylinder. This process is said to cost one third less than the ordinary one. The ammonia dissolves not only the organic substances, but also the gypsum and caustic lime, so that there will be much less muriatic acid required to keep the amount of lime constant. The waste of the carbon is greatly decreased, and much which otherwise would be consumed by combustion is saved.

The Resources of Richmond, Va.

A correspondent, A. S., says that Richmond, whose name, but a few years since, was on every tongue, being made famous by the active part she took in the late bloody struggle, is now an example worthy to be followed by any sister city, and more especially by those who stood by her in days of yore. Here swords have been turned into plowshares, and scarcely had the cannon ceased its deadly firing when the hammer and anvil struck their sweeter notes, and have made Richmond what she is, and have placed her where she is, with but few visible traces of the war.

This grand old city, capital of the State which has produced intellect, unsurpassed in the world, to represent her in Congress and elsewhere, when brains, honesty and virtue were the noblest traits of man, stands, as Rome does, on seven hills; but unlike Rome's ragged crags, her hills are beautiful terraced waves whose slopes are just adequate to afford the most perfect drainage, as the least fall of water cleanses her streets as a swept floor. Her climate is always comparatively mild, and she is noted for her salubrious situation, and many spend much time here seeking the greatest earthly boon, health.

The picturesque river James, whose current rushes madly over the rapids above, along half the length of Richmond, here settles into deep water, affording unlimited and unequalled water power, with a clear course to the sea for the largest vessels. Indeed, Nature seems to have spent some time in nestling here all the requisites for a manufacturing and shipping town, and to-day Richmond presents to the capitalist and mechanic inducements scarcely to be found elsewhere. Already have her manufacturers won for themselves high praise as to the quality and quantity of their wares. And while much capability lies dormant, the day is not far distant when she will laugh at the rivalry of her sister cities. The blaze of the furnace and the clash of the miner's pick are now seen and heard in her great storehouse, the valley of Virginia, where lie inexhaustible supplies of economic minerals: that is to say, of minerals in common use in the mechanic arts. And on January 30, 1873, the Chesapeake and Ohio railroad trains made the first through passage to the Ohio, and will in future transport to Richmond the heretofore untouched supplies of gold from the belt of Louisa, the roofing slates of Albemarle, the kaolin of Augusta, hydraulic cement and marble from Rockbridge, besides iron, limestone, coal of all kinds, granite, marl, copper, fire clay, salt and products of the soil lying along three hundred miles of this road.

Indeed, a new era has just opened upon Richmond. Labor is cheap and plentiful, but capital she much needs, as her merchants, reduced by the war, cannot enter much into the new undertakings which should and will soon adorn her. But let capitalists consider her offers and invest here, where eventually the continent will look for many of its supplies.

Philadelphia Academy of Natural Sciences.

The Academy now possesses more than 6,000 minerals, 700 rocks, 65,000 fossils, 70,000 species of plants, 1,000 species of zoophytes, 2,000 species of crustaceans, 500 species of myriapods and arachnids, 25,000 species of insects, 20,000 species of shell-bearing molluscs, 2,000 species of fishes, 800 species of reptiles, 21,000 birds, with the nests of 200 and the eggs of 1,500 species, 1,000 mammals, and nearly 900 skeletons and pieces of osteology. Most of the species are presented by four or five specimens, so that, including the archaeological and ethnological cabinets, space is required now for the arrangement of not less than 400,000 objects, as well as for the accommodation of a library of more than 22,500 volumes. A new building to cost half a million is now in process of erection.

ASSAYING LEAD ORES.—Previous to reducing the galena or other lead ore to the metallic state, A. Mascazzini converts the lead present in the ore into sulphate, by igniting it in a porcelain crucible with sulphate of ammonia, after which the ore is treated in the usual manner. The flux preferred by the author is that recommended by Plattner, consisting of 13 parts of carbonate of potash; 10 of dry carbonate of soda; 5 of previously fused borax; and five of well dried starch.