an equal weight of water are, usually, sufficient to dissolve eight parts of lac dye; the mixture should be allowed to stand twenty-four hours. The correct mordant is made by dissolving one part of feathered tin in twenty parts of hydrochloric acid. Twelve fluid ounces of this suffice for each pound of the solution of lac dye. The solution and mordant should be mixed before using. Some dyers modify the tint by the use of cream of tartar and sumach, in the bath.

The colors produced by lac dye are various shades of red and pink. It is used on the score of economy, as a substitute for cochineal, and the colors developed are but slightly inferior, possessing moreover, a decided advantage in not being so liable to discoloration by perspiration. The dye is not adapted for use on cotton, and is therefore confined to silk and wool.

On the Use of Tinfoil for Preserving Substances Liable to Change on Exposure to Air.*

BY ERNEST BAUDRIMONT.

Tin reduced to thin sheets has for many years been employed for preserving a great number of substances from the action of air and moisture. The thin leaves (foil) of this metal are essentially repellant to moisture. When cemented to the surface of damp walls, they protect the paperhangings which may be afterwards applied, and they are in like manner used for lining the interior of boxes and drawers in which dried medicinal leaves and flowers are kept. It has long been the practice to enclose chocolate in tinfoil, to prevent the fatty matter contained in it from soiling the paper which forms the outside wrapper; in the same way butter of cacao itself is preserved, and some sorts of sweetmeats, sausages, and cheese are among the articles similarly protected. Tobacco-pouches are lined with tinfoil to preserve the flavor and humidity of the tobacco. Cakes of opium are kept in a moist and uniform state by wrapping them in this material, and bisulphate of soda is kept in the same way, for use in making artificial Seltzer water with Briet's apparatus. Lastly, on account of the opacity of tinfoil to the rays of light, bottles are coated with it for the purpose of excluding light from vegetable substances which would be injured by its action.

Notwithstanding the knowledge of all these facts, it might be said that the application of tinfoil for the preservation of substances liable to change is still rather limited and there seemed to be a prospect of its admitting of a more general use than has hitherto been made of it. At the same time there was an absence of any precise experiments for the purpose of determining in a scientific manner the degree of impenetrability of tinfoil. Having been engaged for some time in the investigation of this subject, I have obtained the following results:—

For many years past I have observed that cacao butter, which readily becomes rancid even when kept in bottles into which it has been introduced in the melted state, if the bottles be opened from time to time, does not undergo the same change when moulded in tablets and wrapped in tinfoil. This fact, which was confirmed by many observations, and could only be explained by assuming the impenetrability of tinfoil to atmospheric air, formed the starting-point for some experiments in the same direction, which proved satisfactory. Thus, a piece of well-burned quicklime, enclosed in a double wrapper of tinfoil, was exposed to the atmosphere of the laboratory by the side of another similar piece which was exposed without protection. While the latter became slacked, that which was protected by the tinfoil, and weighed 92·2 grams on the 1st of December, 1867, had only gained 3 decigrams in weight at the expiration of one month, and after being kept until the 25th of March, 1868, it had only increased 94 grams. It had thus gained only 1·8 grams in four months. On being then taken out of its metallic envelope much heat was developed from absorption of moisture, and it fell into powder.

Satisfied by this experiment of the efficacy of tinfoil for preserving bodies from the action of air and moisture, it seemed probable that substances the most susceptible of change might be kept in the same way. It was found that substances so deliquescent as chloride of calcium and liver of sulphur, and efflorescent salts such as carbonate and sulphate of soda, remained almost unchanged when wrapped in tinfoil, increasing or diminishing only to a few thousandths of their weight in several weeks.

Other experiments were made of a more precise character. It is well known that fresh lemon become rapidly dried and ultimately hard, when exposed to the air, and they also become perished and covered with mould. I had endeavoured to prevent this drying and moulding by placing the lemons in close vessels, in dry air, in sand, and also in bran, but none of these methods proved efficacious. Thus, for example, in twenty-one days the lemons lost on an average, 17·33 per cent. of their weight in sand, and 17·13 per cent in bran. Experiments were made for the purpose of ascertaining the effect of enveloping the fruit in tinfoil, and also of coating it with a film of collodion. Some of the fruit prepared in each way, and some unprepared, was weighed, exposed to the air, and again weighed at intervals of a month. This method was applied to lemons and oranges, and the following results were obtained:—

1. The unprepared fruit became rapidly dried. In two months the lemons had lost 42 per cent; of their weight, while oranges, in the same time, had lost 26 per cent.

2. Collodion, when applied to the fruit alone, exert but a feeble preservative influence in retarding spontaneous evaporation. In two months lemons coated with collodion had lost 29 per cent., and oranges 22·5 per cent.

3. Tinfoil almost entirely prevents the drying of the fruit. In two months lemons had only lost 1·58 per cent., and in three months 3·16 per cent. In one case the loss was only 0·92 per cent during the longer period. Oranges lost about 5 per cent. in two months. On the removal of the metallic envelope, the fruit was found to be as fresh and fragrant as when the experiments were commenced. These observations and experiments will tend to show the remarkable power of tinfoil in preserving substances enclosed in it from the influence of air and moisture derived from air, and may induce those who are interested in the subject to extend the application of this preservative means.

*From Jour. de Pharmacie et de Chemie.

The present Status of Potash Production.*

BY PROF. CHARLES P. WILLIAMS.

From being the most abundant and cheapest of the alkalies, potash has rapidly passed to the position of the dearest and most expensive, and one of the chief problems in technical chemistry is comprised in the efforts to lessen its consumption by the substitution of other bases, or to cheapen and increase its production by the utilization of the abundant raw materials offered by the mineral kingdom. The first step has in very many instances, been successfully accomplished by the employment of soda, ammonia or lime, as basic factors to accomplish a given result previously and almost exclusively brought about by potash. Thus, the pure potash alum has disappeared almost entirely from the markets, its place being assumed by a chemical equivalent in which at least one half of the original potash is replaced by ammonia—an ammonia potash alum. So also, the manufacture of the somewhat useful chlorate of potash was formerly effected by the passage of chlorine gas into potash solution—a process resulting in the production of five equivalents of the much less valuable and less useful chloride of potassium for each one equivalent of the desired salt. Now, a mixture of lime and potash is employed and chlorate of potash and chloride of calcium are produced. These two salts are much more readily separated by crystallization than were the two products of the old method, at the same time a great saving of potash is effected, forty-six parts of caustic alkali, producing nearly three hundred and twenty-three parts of chlorate, where formerly upwards of three hundred and thirty-six were required for the same operation.

In spite of these and similar substitutions, potash becomes scarcer and more expensive. We can not get rid of its use entirely. There are many important technical operations in which it is, as yet, a *sine qua non*, and some in which it must always remain such. In the production of a pure crystal glass, soda can not replace potash, since it imparts a greenish hue to the product. Nitrate of soda can not be substituted for saltpetre in the manufacture of gunpowder, though it has already taken off the burden from the nitrate of potash in very many of the operations of the manufacturing chemist. In the formation of the simple and compound cyanides potash will probably always be a requisite.

Hence, new sources of supply must be sought after and be made available. The slow process by which the vegetable kingdom extracts and assimilates the valuable potash from mineral matter must be replaced by the quicker changes of art operating on the same substances. The original forests of this country—one of the great centres from which potash has been sent into commerce—are so rapidly disappearing or finding such manifold uses and demands for their woods and

* From the Scientific American.