some cases arseniate of aluminum is used as a mordant. There are a number of well authenticated reports of poisoning from the use of arsenical aniline pigments in the manufacture of wall papers, and also of artificial flowers, and in one instance where an investigation of a fatal case of arsenical poisoning of a person employed in the manufacture of artificial flowers, it was found that out of six specimens of fuchsine, as sold in the shops, only one did not contain arsenic. Expensive and high-priced wall papers contain arsenic about as frequently as the cheaper ones, and this is true of the blue shade in expensive papers. Of two specimens of a beautiful red pigment, used in the manufacture of wall paper in Germany, when examined, it was found that one contained 1.96 per cent. of white arsenic and the other 2.49 per cent. Dark slate colors and drabs, colors which would seem to be the last to be suspected, are very liable to contain this poison, and, in fact, persons do not know, without having samples of the paper with which they wish to adorn their walls examined by a chemist, whether they are placing themselves in peril of sickness or death, or not. In rooms in which green papers containing arsenic are hung, a very simple experiment will detect presence of this poison. If a handkerchief is passed across the top of the door which has been left open for any length of time, there will be seen adhering to the handkerchief green patches, which have been rubbed or in some other manner displaced from the paper, and it will be readily seen how dangerous are these papers when these poisonous particles are floating about, and are breathed into the lungs or lodged in the pores of the skin. When paper containing arsenic is put on the walls of a room the plastering will absorb a certain amount of the poison, and although the paper may be removed the walls will still contain and give out poisonous properties. A case of this kind occurred but a short time ago. A lady having become distrustful as to the paper in one of her rooms sent a sample of it to a chemist for analysis. It was sent back with the statement that it contained no arsenic. Some two weeks later he received a communication from the lady that she, being entirely reassured by his assertions, reoccupied the room after an absence of over two months, but that the symptoms of arsenical poison immediately returned to her, although they had all disappeared while she had occupied another room. They increased markedly from day to day. The chemist could not account for these facts until it was learned that the paper formerly on the wall was a brilliant green and unquestionably arsenical. This paper was the first cause of a serious illness, whose symptoms indicated that it was caused by poison of some kind. The green paper was taken off, in doing which the paper was wet with water to facilitate the work, and streaks of green were thus left on the wall. When new paper was put on the wall, as stated, the paper was subjected to the chemist and found to contain no noxious properties, but the poison which had adhered to the wall was thrown out into the atmosphere of the chamber through the new paper and operated with serious results on the person occupying the room. The amount of arsenical pigment which adhered to the wall must have been quite small, but the case only goes to show that to preserve the health of persons who are very sensitive to poisons, especial care should be taken to see that the paper employed in decorating the walls of houses is perfectly free from this class of poisons.

Persons may be differently affected when subjected to the same amount of arsenical dust or vapor. Two persons may occupy the same room or sleep in the same bed, and while one may feel the effect of the poison very quickly the other may not be affected at all, or, at any rate, for a long time. A person may work in a factory or store where there are poisonous wall papers or artificial flowers prepared with arsenic and not feel any bad effects, while another person would find it impossible to live in the tainted atmosphere without being constantly subjected to sickness. Children are a great deal more susceptible to these influences than adults, and females are more susceptible than males. Undoubtedly, arsenical wall paper produces its effects upon persons occupying rooms whose walls are hung with such paper, chiefly by means of the minute particles of poisonous dust which are set free from the paper, and coming in contact with the mucous membranes inhaled into the lungs, cause disease. In some cases sitting in a room whose walls are hung with arsenical paper has been sufficient to produce marked symptoms, while in other cases months have elapsed before any decided effect on the health has been observed. The effects produced by arsenical compounds used in wall paper are twofold, local and general. The local action is an inflammation or irritation caused by the contact of the arsenical compound with the skin or mucous membrane; the general action is due to the effect of the arsenic upon the system after it has been absorbed into the blood. The inflammatory action is most noticeable in those parts with which the dust can most easily come in contact, such as the mucous membrane of the throat, nose, and eyes. Workmen engaged in the manufacture of wall paper may frequently be seen having an eruption of the skin of the hands and arms, which is caused by the poison being retained on the flesh and worked into the pores of the skin. The symptoms of the local action of arsenical poison are usually at first those of an ordinary cold, when the mucous membrane of the throat is affected, and sometimes without a cold. The mucous membrane of the throat, nose, and eyes being more easily affected by the poison, is usually irritated or inflamed to a certain extent. The inflammation is often the most marked symptom of chronic arsenical poisoning, and differs from the ordinary inflammation which is the result of exposure to the weather by its long duration and resistance to ordinary treatment. Sometimes, if the dust is inhaled into the throat or lungs, a bronchitis is produced, and shows itself by the usual cough and expectoration. After a period of these symptoms by a continued irritation of the stomach caused by the small particles of arsenical dust swallowed with the saliva, more or less indigestion is produced, and perhaps diarrhea, caused by its action on the intestines. Chronic inflammation of the stomach and intestines will sometimes ensue from this poison. The effect of the poison is shown later, chiefly by disturbances of the nervous system, which may vary in different cases, but most frequently, perhaps, take the form of neuralgia in different parts of the body. Severe headache, great debility, emaciation, cramps, convulsions, and even paralysis have been seen as symptoms of the severe or long continued action of the arsenical emanations from wall paper. Death may finally ensue either from some intercurrent disease, which the patient is unable to withstand on account of the low condition of his entire system. If while suffering from these symptoms of arsenical poison, a change of residence or of room is effected for a short period, a marked improvement in the condition of the person takes place, while previous to such removal or change different remedies and a variety of treatment may have been used without avail, but on the return of the person to the same

house or room he will immediately be attacked with his former symptoms.

The earlier and milder symptoms are so obscure and similar to those that may be due to other causes, that an accurate diagnosis is exceedingly difficult. The absence of any definite cause, such as exposure to the inclemency of the weather, or cold, etc., to account for the head and throat irritation, or symptoms in spite of treatment, the disappearance of the symptoms upon removal from a certain room, and return of the symptoms upon the return to the same room, are all important points to bear in mind in making a diagnosis. Finally, improvement and recovery after the removal of the arsenical paper from the walls of the room, will prove that the former symptoms were due to poisonous emanations from the papers. In conclusion, it would be well to say that no person can be too careful in seeing that no danger threatens himself or family by allowing them to be constantly exposed to sickness, and perhaps death, by allowing the walls of his room to be papered with this subtle and dangerous poison, and also that manufacturers should be very careful about allowing any of this poison to get into the papers which they manufacture, as it is sent out to deal disease and death among the populace at large.

[A fatal case of supposed arsenical poison occurred recently in Port Jervis, New York, the poison having been absorbed from a pair of stockings dyed brown and old gold.]

SEPARATION OF COBALT AND NICKEL.

By F. REICHEL.

THE circumstance that the detection of small quantities of cobalt in presence of nickel is tedious induced the author to utilize the solubility of the oxides of cobalt in concentrated potassa lye for this purpose.

If, in the course of analysis, a precipitate is obtained which may contain cobalt and nickel, it is not possible, if the nickel preponderates, to demonstrate the presence of cobalt by a simple blowpipe experiment. It is necessary to dissolve the precipitate, to add potassium nitrate, or to precipitate cobalt, if present, as hydroxide by means of a current of chlorine, and the subsequent addition of barium carbonate—an operation which requires several hours.

The author recommends to dissolve the precipitate, to throw down both metals with potassa lye, and place the precipitate on a filter. After the liquid is run off the precipitate, without washing, is introduced into a test tube; a fragment of caustic potassa and very little water are added, and the whole is brought to a boil. The more concentrated the potassa solution the easier is the separation. The cobalt dissolves with a blue color, and even very small quantities may thus be detected. The mixture is immediately filtered through a small asbestos filter, which should be in readiness, washing first with hot concentrated potassa lye and then with water. From the filtrate the cobalt may be precipitated as hydroxide by the addition of ether.—*Zeitschrift für Analyt. Chemie.*

SUNDRY NOTES.

The Use of Sirups in Brewing.—Brewers are now allowed to use sirups at rates of duty fairly proportional to the quantity of sugar they contain. By a recent general order, 34 lb. of cane sugar sirup not exceeding a density of 14 lb. per gallon, and 41 lb. of grape sugar sirup not exceeding 13½ lb. per gallon, are respectively deemed equivalent to 28 lb. of sugar, and pay duty accordingly. We do not object to these equivalents, and think they will be found to work fairly toward both brewers and the revenue, and we deem the concession so far a valuable one; but we consider the duty on sugars and sirups used in brewing might be assessed on a far more rational and scientific basis. There are no practical difficulties, but such as might be easily overcome, in the way of determining the exact percentage of dry sugar in each particular sample; the relation between sugar cane and grape sugar is a definite one, and the methods of determining the percentage of sugar are exact and easy of application. If the dealer in sugar were bound to declare the true percentage of sugar in every parcel he sold to the brewer, the duty could be assessed on this, and the excise could always have the right to check the correctness of the declaration. The determination of sugar by means of Fehling's solution is easy of application, and is a method which any brewer or exciseman could learn to perform with sufficient exactness by a little practice, and there would, of course, be the appeal in any case of dispute to the Somerset House chemist. Not only might the duty of sugar used in brewing be assessed on the exact amount of dry sugar contained in any particular sample or solution, but even the duty on malt and other grain might be assessed on their yield of sugar.

The Influence of Oxygen on Different Ferments.—Those who have had any experience in the microscopical examination of yeasts and beer deposits cannot but have observed the different effects produced by exposure to the aerating influence of the atmosphere. The yeast cells are certainly not injuriously affected by atmospheric oxygen, and some close observers have even asserted that under these conditions the cells become enlarged and offer other evidence of increased vitality. It is, on the other hand, clearly established that oxygen is inimical to the life of certain parasitic organisms accompanying yeast; the various forms of vibrios are especially susceptible to the influence of aeration, and the mere exposure of a drop of liquid containing these organisms on the glass slide, preparatory to microscopical examination, is sufficient to temporarily destroy their vitality. The experienced microscopist will, therefore, take precautions in these respects, in order that his observations may lead him to correct conclusions. The teachings of scientific men have now convinced most practical brewers that the influence of oxygen on a fermenting wort is favorable, and, as a result, we find many more mechanical arrangements for rousing and aerating the worts than were in vogue years ago. In the last generation brewers looked upon air as a poison to their wort and beers; now they know it is a necessity at certain stages of the process, and a most useful stimulant to the healthy growth of the yeast plant. Science, however, goes even further: she tells brewers that if they apply atmospheric air they must take one important precaution, and that is to insure its purity, so that no diseased germs are thus introduced.

Researches on an Acidifying Ferment.—In a recent communication to the Academy of Sciences at Paris, M. Boutroux has given some most interesting information concerning a peculiar ferment which generates acid in beer wort. He first isolated this ferment by placing a small quantity of the deposit from a bottle of beer in some malt extract, and by repeated cultivation the yeast cells and other organisms were eliminated, and the ferment was obtained in

a pure state. At first the ferment presented the appearance of oval or spherical cells, in some cases separate, in others grouped together in chaplets. These cells have nuclei at first, but as they develop the nuclei disappears, and the cells diminish in size. After several months the cells take the form of irregular and rather long filaments. These filaments, when sown in a suitable medium, produce a considerable quantity of acid. It was proved that these cells absorbed oxygen and evolved carbonic acid; and further, that they could not exist without oxygen, but the absence of this gas in some cases did not kill them immediately. Yeast water was found to be the most suitable cultivating medium. Cane sugar, invert sugar, and glucose are all acidified by this ferment, but the last named with the greatest facility. The temperatures most favorable to the development of this ferment are between 86° and 95° F.; above 99° F. the development takes place with difficulty, and ceases altogether at 104° F. A temperature of 131° is fatal to the old cells and 140° to the young ones. It was found that the cells would, while in an active state, retain their vitality for upwards of three years. This organism acts upon alcohol in the same manner as *Mycoderma aceti*—that is, by converting it into acetic acid, *vice versa*. M. Boutroux found that *Mycoderma aceti* converts glucose into acetic acid, but he does not consider the two organisms are identical, and he proposes to call the one, which is the subject of this note, *Micrococcus oblongus*. During the fermentation induced by it a little carbonic acid is formed, but no alcohol, no volatile acid, nor any other volatile substance; there is left a glucose which differs but slightly from ordinary fermentable glucose; the principal product is an acid, which, in fermentation made in the presence of carbonate of lime, yield crystals of the lime salt. M. Boutroux proposes to call the acid resulting from the fermentation of glucose by *Micrococcus oblongus*—zymogluconic acid, and the formation of one equivalent of this acid corresponds to the destruction of one equivalent of glucose and of two equivalents of oxygen. The fermentation induced by this ferment partakes more of the character of a combustion, and is analogous to the acetic fermentation of alcohol. This organism, instead of being anaerobic, as is the case of most ferments which give rise to the evolution of gases, is aerobic, or dependent upon a supply of air. The *Micrococcus oblongus* does not secrete any soluble ferment—it is a simple agent of oxidation capable of carrying free oxygen to glucose or alcohol, and thus bringing about a partial combustion of these bodies. These remarks of M. Boutroux are an interesting addition to our knowledge of the organisms which attack beer: Dangerous as this new organism may be, it has been pointed out that it is incapable of resisting a temperature of 140°, and it is for the practical brewer to avail himself of this knowledge if he wishes to destroy and counteract the evil effects of this ferment.

Beer in Frosty Weather.—The present inclement temperature is seriously affecting many stock beers. With the thermometer at about 15° below freezing point, the construction of ordinary beer cellars is not substantial enough to keep out the cold, and the beer becomes chilled; as most substances are less soluble at low temperatures than higher ones, and as this is especially the case with albuminous matters, we find that cold causes some of these to deposit, and the beer thus becomes very turbid. When once deposited they are dissolved again with great difficulty, and it sometimes takes several weeks of warmer weather to get the beer into condition again. Our English beers fermented at high temperatures are particularly susceptible to cold, and are quite different to the Bavarian and bottom fermentation beers, which withstand the influence of a low temperature without undergoing any appreciable change. One of the worst results of cold is to flatten the beer; in its normal state beer contains a number of ferments which gradually decompose the saccharine extract, giving rise to the evolution of carbonic acid; as soon as the beer becomes chilled these organisms either cease altogether, or, at all events, to a great extent, to perform their vital functions, and thus the generation of carbonic acid ceases. The change to a warmer temperature may restore the brilliancy of the beer, but it takes a long time for these organisms to recover their vitality, and thus a chilled beer remains flat for a long time after it has gained a normal temperature. It is, therefore, of the utmost importance to brewers to keep up the temperature of their store cellars; with this object all doorways, windows, and openings should be kept securely closed. It is seldom that we have such cold weather as we are experiencing at the present time, and our cellars are not constructed to withstand the attacks of cold; it therefore behooves our brewers to take extra precautions.—*Brewers' Guardian.*

PROGRESS IN CHEMISTRY.

A PROCESS for the manufacture of ammonia from the nitrogen of the air, invented by Messrs. Rickman and Thompson, encourages belief that this often attempted problem has at last approached a practical solution. The process is based upon the deoxidizing of air by coal dust in the presence of water vapor, at a full red heat, the water being simultaneously decomposed and yielding hydrogen, which combines in the proper proportion with the hydrogen thus set free. Common salt is introduced with the coal into the furnace wherein the reactions are effected, which, at the bright red heat maintained, is also decomposed. The free chlorine from the salt combines with the nascent ammonia, forming therewith ammonium chloride. The ammonia being thus combined, it does not decompose under the action of the heat, as would otherwise be the case. Should this process prove as practicable as has been anticipated, ammonium chloride will be furnished at a cheap rate and in large quantities, and will have great influence upon the future of artificial fertilizers.

The process invented by Mr. George Bower for coating iron with a preservative coating of magnetic oxide, appears to remove the difficulties attending the application of the method previously invented by Mr. Barff, who effected the same object by the use of super-heated steam, very difficult to manage, except in coating articles of moderate size. Mr. Bower effects the same object by burning carbonic oxide and air, in which the articles are placed.

The manufacture of paper from bagasse has attracted much attention and considerable experiment. A fiber sufficiently fine in texture to make excellent paper is obtainable from this refuse product, but it has not yet been successfully bleached. Doubtless this part of the manufacture, which does not appear to offer insurmountable difficulties, will, before long, be accomplished, and a valuable addition to paper-making materials will be supplied.

The manufacture of glucose has greatly increased during the year. As this substance has come to be largely used as an adulterant of sugar and confectionery, it is somewhat doubt-