of 10% linalol and 90% phenyl-glyco-methylene-acetal makes an admirable artificial product, as these two chemical compounds are the chief constituents of the natural oil. Other authorities, Hesse and Mueler, deny the existence of phenyl-glyco-methylene-acetal in jasmine oil, or that they even give a jasmine odor. Their conclusion lead us to infer that a fine artificial product results, from a mixture of benzyl acetate, 65%; linalyl acetate 7 to 10%; benzyl alcohol, 6%; linalol 16%. We infer from Parry's experiments that secondary styrolyl acetate—C_6H_5. $CH(O.COCH_3)$ CH_3—is in itself a good product. Artificial jasmine oil is made on the basis of these researches, although probably small quantities of some bodies not generally known are added by the manufacturers.

ARTIFICIAL COGNAC OIL.—Cognac oil, which is not an essential oil in the fullest sense, is prepared by distilling wine lees with seven or eight times its weight of water. Commercial "oenanthic ether" serves its purpose fully and is a product of more reliable quality than the genuine oil. It is not used so much in the manufacture of artificial perfumes as in the manufacture of brandies, chiefly for flavoring poor qualities of brandies made from corn.

Any intelligent perfumer can produce most all of the natural perfumes from the synthetic bodies of which we have spoken briefly or otherwise. Very finished products can be perfected by the proper and cautious use of the more common aromatic alcohols and esters for correctives, intensifiers and fixatives.

DETERIORATION OF GALENICALS.

E. KIMMICH, PH. G.

Many of the U. S. P. and N. F. galenical preparations deteriorate after storage for periods varying from a few weeks to several years, and this change in constitution is due to the action of light, changes in temperature, oxygen of the air, the action of living organisms, and the spontaneous breakdown which must take place sooner or later. These changes sometimes alter the physical properties of a preparation to such an extent that it seems like a different product.

Every pharmacist has had his troubles with liquid preparations containing Iron Phosphate and Pyrophosphate; he knows that when such products, (mainly elixirs) are freshly made they are usually of a light amber or pale greenish color; but on aging some turn to a darker green or brown, depending on the solvents or adjuvants used, such as the alkaline citrates, ammonium chloride or acetate, and sodium chloride.

When exposed to light for a much longer period, decomposition and precipitation takes place. While these changes are largely brought about by the action of light and temperature, the solvents and menstrua used have a great deal to do with hastening the process.

Some years ago I made several series of experiments in an effort to determine the principal cause of such changes. These experiments, consisted mostly of the group containing Iron Phosphate Sol., Iron Pyrophosphate Sol., and Tincture

Citrochloride of Iron in combination with Quinine salts, and in menstrua containing varying percentages of alcohol, glycerin, sugar and water, also with added solvents, to aid in the solution of the iron and quinine salts, such as Sodium Citrate, Potassium Citrate, Ammonium Acetate, Ammonium Chloride, and Sodium Chloride.

On exposure to diffused light for several months, and direct sunlight later, I was also able to make the following general deductions:—

(1) Citro-chloride of Iron withstood the effects of light better than the Phosphate and Pyrophosphate of Iron.

(2) The less sugar the product contained the slower the darkening in color.

(3) The varying percentages of alcohol did not seem to have much influence in the matter of discoloration.

(4) Those having Ammonium Chloride or Ammonium Acetate present darkened more quickly than those containing Potassium and Sodium Citrates and Chlorides.

(5) The presence of glycerin retards discoloration and decomposition.

(6) Prolonged exposure to direct sunlight decomposes the mixtures, probably with the formation of insoluble Ferrous Phosphate and Quinine Citrate, which is only slightly soluble.

(7) Storage in amber bottles is almost a necessity, as the changes take place very slowly if light is excluded.

When the light has decomposed the mixtures, in corked bottles, pressure is developed, due to the formation of CO_2.

Samples tested at the time for fermentation showed the liquids to be sterile, indicating that bacteria played no part in producing the changes.

In conclusion I would state that elixirs, in which a soluble green iron compound is wanted, will keep better if made with citrochloride of iron, particularly if part of the sugar is replaced with glycerin and the liquid is stored in amber bottles.

Beef, Iron and Wine, N. F. is another product that will sometimes give trouble, especially if put up in flint bottles and exposed to direct sunlight in a display window. The action of the light causes decomposition, forms a gas and possibly blows the cork. As this product contains ingredients that are liable to ferment, one naturally supposes that the product has spoiled from this cause; the real cause, however, is the action of actinic sun rays on the citrochloride of iron present. Ferric Salts in the presence of citric acid are reduced by action of sunlight, and the citric acid is decomposed, liberating CO_2.

In making this statement I do not mean to say that Beef, Iron and Wine does not ferment under certain conditions, but that we have the same factor present to cause decomposition that we have in the iron elixirs.

Most pharmacists have observed the darkening in color and change in taste of syrups containing chemicals held in solution by the aid of acids, also syrups containing acids only. In such compounds we can always look for those changes, and the more acid present the more pronounced the color and the more rapidly will the changes take place.

Syrup Hydriodic Acid is a fair illustration. The present U. S. P. syrup contains less sugar than the 1890 formula, and consequently is more stable. Samples that had stood for over ten years, made with varying amounts of sugar, glycerin and water showed the discoloration to be in direct proportion to the amount of

sugar present. One sample made with 60% glycerin and no sugar remained practically unchanged. In none of the samples was the darkening due to free iodine.

Syrup of Iron Iodide is another product requiring the greatest care in manufacturing to prevent darkening at the beginning. If the operator is fortunate enough to make the syrup without its being tinted through exposure or contamination in the process of manufacture, he will find that the syrup soon begins to discolor on aging, even if kept in flint bottles and in the light.

There is enough Hypophosphorous Acid added for the purpose of preventing discoloring to act on the sugar present and develop colored decomposition products.

Liberation of Iodine causes the least of the discoloration in Syrup Iron Iodide. It is oxidation of the Ferrous into Ferric Iron, and the formation of invert sugar and caramel from the action of the acid on the sugar.

Syrups containing Hypophosphites are another class that darken, and the trouble can usually be traced to the mineral acids present. It is a well known fact that the Hypophosphite Syrups form an excellent medium for the growth of fungus. They should be sterilized where practicable. This will retard the development of fungus growth for a long time, especially if the containers are unopened.

Cod Liver Oil Emulsions darken quite rapidly, unless properly handled. Cod Liver Oil is one of the most easily decomposed fats we have, and exposure to air for even a short time darkens the product and makes a decided change in the odor. All Cod Liver Oil Emulsions act practically the same in these respects, regardless of the emulsifying agents used. The only practical way to prevent or retard discoloration is to bottle the emulsions as soon as made in pint bottles or less so that it will be consumed by the patient before it has time to change in color, odor and taste.

Medicated Bougies and Suppositories with a gelatin base undergo changes which result in hardening of the mass and decrease in solubility. The best and most practicable method is to encase them in proper shaped metal collapsible tubes. In this way the mass is protected and remains soluble indefinitely.

DISCUSSION.

CHAIRMAN NITARDY:—I think this paper a very valuable one. It treats of a question that has not received sufficient attention among druggists.

MR. RAUBENHEIMER:—I think the subject of this paper one most interesting to every pharmacist. Preparations containing ferric salts should not be exposed to light. They should be kept in amber-colored bottles. The Formulary is very specific about that. On the other hand, ferrous salts ought to be exposed to light. Bear that distinction well in mind. The less sugar there is in these ferric preparations the longer they will keep. They should not contain any sugar. The next official formula for Elixir of Iron, Quinine and Strychnin will not contain any sugar. It will contain glycerin and mostly water. The same applies to syrup hydriodic acid. The more glycerin this preparation contains the longer it will keep. I have some in my store that I made about twenty-seven years ago and it is still white. I think it a fallacy to add hypophosphorus acid to syrup of ferrous iodid. All that is necessary with that,—and I believe that is the old German method,—is to put the syrup in a flint-glass bottle, a pint, quart or gallon bottle, and if you have much use for it put it into a five-gallon demijohn and keep it exposed to light. Drop into it an ordinary iron nail. This will much assist in its preservation.