

Photographic Chemistry.

One of the leading exponents of photography said of it the other day that "as ordinarily practised it is an empirical art. Although it is founded upon, and intimately connected with, certain branches of chemistry and optics, very few photographers know anything of these sciences." We may go further and say that comparatively few of those who have such knowledge, and take up photography as a pastime, ever think of applying their science to the elucidation of the mysteries, or the improvement of the processes of photography. We think it appropriate, in publishing to day the report of our postcard photographic competition, to emphasise these statements, and to call the attention of pharmacists to the field of interesting chemical study which is open to them in photography, and the possibility there is of combining the pleasures of research with a profitable branch of business. Few chemists who take up the business in photographic materials do not at the same time dabble in the art themselves, and it is their experience in the dark room which should furnish them with much food for thought, problems for experiment, and special information for their customers. The dry plate is the first problem, and one worth a great deal of study. How few ever think what it is! Still fewer, if any, know what it is. The method of preparation is simple enough. A solution of gelatine and potassium bromide is made, and rendered faintly acid with hydrochloric acid, or this acidification may be omitted. Then a solution of silver nitrate, plain but sometimes ammoniacal, is added and followed in some cases by an alkaline iodide, and by more gelatine. The mixture, or emulsion, as it is called, is brought to a boil, and upon the length of boiling depends the sensitiveness of the dry plate prepared from the emulsion. After the boiling the mixture is allowed to set for twenty-four hours, more or less; it is then sifted, and the shreds are washed with water to free it from soluble salts. Obviously, in the double decomposition of silver nitrate and potassium bromide, soluble potassium nitrate is formed, and how it is possible to remove this by washing a refractory and amorphous substance like gelatine is beyond the pharmacist's ken or anybody else's. The dry plate, then, is composed of gelatine, silver bromide, and maybe silver chloride and iodide, *plus* an indefinite amount of other chemicals introduced in the course of manufacture and not removed by washing. Difficulties are continually cropping up in the path of the amateur photographer, such as spotting, fogging, staining, &c., of the plate, which no external agency can explain, and which may be traceable to interactions of the substances composing the sensitive film. We are apt to forget that substances which are extremely prone to change under the influence of light are equally changeable—frequently more changeable

—under chemical contact; in fact, there is nothing more uncertain than the chemical molecule, and it is to its uncertainty that AgBr owes its place in photography. Here, then, is the pharmaceutical chemist's first problem—how to introduce into the sensitive film silver bromide only, with gelatine and water as the mechanical agents for spreading the particles of the sensitive salt. It is a common notion that the sensitiveness of a plate depends upon the amount of silver in it—the more silver the more rapid the plate. On this point there has been quite a flutter in photographic circles lately, resulting from analyses of the more popular plates showing that the amounts of silver bromide present were variable and inconstant. The analytical data have been suppressed, and a flood of apologetic reasoning has been poured out in justification of the higher charges for the more rapid plates. It seems that we pay for the greater care required in the manufacture of the rapid brands. That is perfectly justifiable. But what are the chemical or physical conditions which determine greater rapidity? Mr. Chapman Jones says that, given certain physical conditions, "the plate with the smallest amount of silver would be the best," which view necessarily implies that the plate containing the smallest molecules of silver bromide is the best. How these may be produced is a problem which can best be solved by the study of such researches as those which Professor Ramsay communicated recently to the Chemical Society. It is remarkable that sensitiveness of the film is increased by boiling the emulsion, a circumstance which favors aggregation rather than disintegration; but does the presence of the gelatine alter the common rule? It is unnecessary to deal at any length with the change which occurs in the silver bromide on exposure to light further than to point out that the formation of a sub-bromide, Ag_2Br , is inconsistent with chemical theory, and that it is more probable that an oxysalt, Ag_2OBr , is formed. Here, again, there is room for research. Whatever the change may be, the action of the developing agent is to complete it as far as carrying reduction of the silver salt to the metallic stage. In this connection the matters of greatest practical importance to the photographic chemist are the preparation of stable developing solutions, and proper appreciation of the functions of the developer, the accelerator, the restrainer, and the solvent. These matters are fully treated in the popular books on photography, and a specially interesting article on the subject is contained in the "Dictionary of Applied Chemistry." We would call attention to the importance of the use of sulphites in developers, and point out that of the three, sulphite, bisulphite, and metaspulphite (or anhydrosulphite, erroneously called metabisulphite), the last is far and away the best for photographic purposes. The sulphite is commonly used, but it is extremely unstable, and is often nothing else than a

mixture of sulphate and sulphite. These sulphites are used for preserving pyrogallol and other solutions; they have also a wonderful influence in preventing staining, both of the gelatine and the fingers, but the action of metaspulphite, especially as a restrainer, does not appear to have had sufficient study, nor has its exact equivalent to good sulphite been experimentally worked out. Three grains are said to be equal to eight grains of sulphite (we refer now to the sodium salts, but this statement is based on chemical equivalence. It is unquestionable that the preservation of developing solutions in the uncolored state is of first importance for development, and even when the solution gets into the dish it is desirable that it should be rejected as soon as it becomes more than a pale brown color. So far we see that the study of the negative alone involves many interesting chemical problems, and when we begin to tone prints the variations of color and the empirical tricks used in producing them are even more fruitful for research. *Chemist and Druggist.*

Rise in Mustard.

The rise has not come yet, but it seems inevitable, says the *N. E. Grocer*. The great mustard seed growing section of this country is California. From that state comes our largest supply. Whatever it does not supply is largely supplied from Europe under ordinary conditions. The mustard seed sowing is done in February. This year there was no rain in California in that month. March passed, and now April is gone and still there has not been sufficient rain on the coast to give any encouragement that the mustard crop (which needs plenty of moisture) will be anywhere near its usual aggregate.

It is estimated that there are about 10,000 bags in California and about 3000 bags in eastern hands. In 1893 the European crop was a failure and the American crop was drawn on largely, and the demand from there still continues. If there should be a good crop there this year, in view of last year's shortage, it will go into home consumption. If the crop there should be a failure, the demand on the American crop would be even heavier than it was last year. With present prospects in California, the scarcity over the world will be very materially felt, and mustard seed will prove excellent property when the picking season opens up this summer and manufacturers find it necessary to cover their wants by heavy operations. *Exchange.*

DIPHTERICIDE is the name given to a form of chewing gum (gutta percha and damar) containing, in each tablet, $\frac{1}{3}$ grain thymol, $\frac{1}{3}$ grain sodium benzoate, and $\frac{1}{3}$ grain saccharin. Three or four tablets are to be chewed during the day in all catarrhal affections of the throat, especially as a prophylactic against diphtheria.