ART. XLII.—*On the Sensitiveness to Light of various Salts of Silver;* by M. CAREY LEA.

SALTS of silver may exhibit sensitiveness to light in three several ways. They may exhibit a visible darkening, or they may receive a latent image, and this latent image may have a capacity of being rendered visible either by receiving a deposit of metallic silver or by decomposition by alkalies in connection with reducing agents. These two last mentioned phenomena are very distinct in their character, for in the first of them the image is produced entirely by the addition of silver not previously present. In the second, no silver whatever is added, but that portion of substance which received the direct action of light, undergoes decomposition by subsequent treatment. In both cases the action of light sets up a molecular change. The portions acted upon by light become, in the one case, more apt to attract a precipitate in the act of formation (for example, silver precipitated by ferrous sulphate); in the other case they are more readily attacked by certain reducing agents.

The silver compounds which exhibit the greatest tendency to form latent images by the action of light are of course the iodide, bromide, and chloride. But the same tendency is shared to a less degree by other compounds, and the latent image formed upon them may belong to either of the above mentioned classes. The capacity of a certain number of silver salts to receive latent images, developable by a precipitate in the act of formation, was examined many years ago by Mr. Robert Hunt. Since then the matter has received but little attention, and if I am not mistaken, no investigations have at any time been made as to the capacity of silver salts other than iodide, bromide, and chloride to receive latent images of the second sort, viz: those susceptible of alkaline development, in the entire absence of silver nitrate. This subject I have recently examined with the following results:

Soluble salts of acids capable of forming insoluble or nearly insoluble salts with silver were selected and the surface of very pure paper was impregnated with them. After drying, the papers were floated on a solution of silver nitrate, containing about twenty grams to the ounce, acidulated with half a drop of nitric acid, sp. gr. 1·28 to the ounce of solution. The excess of silver nitrate was then washed out. One set of papers were then simply dried, another set were soaked for about a minute in a ten grain solution of gallo-tannic acid, and then again washed.

The salts thus formed on the surface of the paper were exposed to a strong diffuse light for, in some cases, twelve seconds, in others, seven. They were then submitted to the action of a very weak solution of pyrogallol, ammonium carbonate and potassium bromide, the latter used to check the rapidity of the action of the other agents.

Silver citrate and *tartrate* both gave rather weak images. The citrate showed a strong tendency to irregular reduction. Nothing of this appeared in the case of the tartrate.

Silver platinocyanide gave quite a strong image, stronger than any other substance tried, except of course the silver bromide used for comparison.

Silver mucate gave a very faint image with much irregular reduction.

Silver pyrophosphate behaved in the same way.

Silver arsenite gave a moderately strong image, coming next to the platinocyanide, and like it, clear and free from all irregular reduction.

Silver sulphocyanide, an extremely faint image with much irregular reduction.

Silver antimonio-tartrate, a weak image entirely free from irregular action.

Silver fulminurate, weaker than the last mentioned, but also clear.

Silver nitrite, similar to the last.

Silver hippurate, an excessively faint image with much irregular reduction.

The following substances showed (with the above mentioned exposures) no trace of a latent image:

Silver salicylate,
" *valerate*,
" *succinate*,
" *sulphite*,
" *resinate*,
" *phosphate*,
" *metaphosphate*,
Silver tungstate,
" *ferrocyanide*,
" *nitroprusside*,
" *chromate*,
" *carbonate*,
" *oxalate*.

As these experiments were strictly limited to the subject under investigation, viz: production of latent images capable of development by the action of pyrogallol and ammonia it must be understood that the insensitiveness spoken of is *insensitiveness to this particular action* with a rather brief exposure, and under the conditions mentioned. And this action is that to which the iodide, bromide, and chloride, exhibit their highest degree of sensitiveness, rendered evident by an exposure very much shorter than that given in these investigations.

As respects the action of tannin, which action was separately investigated with respect to every one of the above salts, it appeared that no substance, insensitive in the absence of tannin, acquired sensitiveness by its presence. It was also doubtful if in any case tannin increased the sensitiveness of any of these substances, a fact which, in view of the increased sensitiveness conferred by tannin on the silver haloids, is remarkable.

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