

schel, were selected; one was exposed quite dry, another moistened with distilled water, and the third with a solution of nitrate of silver. The action was most rapid on that wetted with the nitrated solution, the next in order was the moist one. In an hour they were however darkened to as nearly as possible the same shade of color.

25. The glass plate over which the wash of nitrate of silver had been applied, was soaked in distilled water to remove any of that salt that might remain undecomposed. The three pieces of glass with their darkened films, were then boiled separately in nitric acid diluted with double its quantity of water. The colors of the plates were but very slightly changed. The liquids were then examined for silver, and in that alone in which the plate on which the nitrate had been spread was any detected. It was evident that the nitric acid had either dissolved off oxide of silver or oxidized metallic silver and then dissolved it. The films on the other plates were not changed in color by the application of either ammonia or hyposulphite of soda.

26. Three similar plates of glass covered with films of chloride of silver were placed in jars of pure hydrogen and nitrogen gases and in atmospheric air, and then exposed to bright diffused daylight. The object of this was to ascertain if the nitrogen of the acid, or the hydrogen of the water, were likely to assist the change in any way. The chloride in the nitrogen and the atmospheric air darkened equally in equal times. The first action of the hydrogen on the chloride of silver was to reduce it to the state of metal over the surface. But as soon as the chloride began to darken, this bright metallic film was removed and the whole darkened equally, but to a deeper tint than either of the others. These plates, as in the former case, were boiled in diluted acid, from which experiment I ascertained that the hydrogen plate alone gave any evi-

dence of the presence of oxide of silver or revived metal.

27. It may appear that this metal was produced by the hydrogen independent of the actinic power, but I find when chloride of silver is plunged into hydrogen gas in bright sunshine, that no reduction of the chloride due directly to the hydrogen takes place, yet most distinct evidence of the presence of metallic silver after darkening has been obtained. We thus learn that the advantage of the nitrate of silver over the chloride is, that it is more readily reduced to the metallic state (17) than the chloride and that the well-known accelerating power of moisture is due to the decomposition of water, and the influence of the nascent hydrogen, in reducing the argentine salt.

28. The principal point was now to ascertain the condition of the chloride of silver after it had been thoroughly darkened by exposure. Many experiments were tried, in various ways, which need not now be detailed, as they were in varying degrees successful; to one alone, which gave very satisfactory results, I shall at present confine myself. Pure chloride of silver was prepared with great care, as before stated (21), well washed with boiling distilled water, until neither nitrate of silver nor muriatic acid produced any precipitate, and then dried. Five grains of the salt were put into a long test tube full of distilled water, and placed in the sunshine to darken, the powder being frequently moved that every part might be acted upon by the sun's rays. It was found, even after an exposure of a few minutes, that the water contained chlorine; it became opaque on the addition of nitrate of silver, and this very gradually increased as the chloride darkened. The darkening was continued for several hours, after which the solution was filtered to free it from chloride of silver and nitrate of silver added to the filtered fluid; chloride of silver was precipitated, which, when collected and dis-